A Decade of Change in the Goroka Valley, New Guinea: Land Use and Development in the 1950s

Diana R. Howlett

A DECADE OF CHANGE IN THE GOROKA VALLEY, NEW GUINEA: LAND USE AND DEVELOPMENT IN THE 1950s

Diana R. Howlett

Thesis Submitted for the Degree of
Doctor of Philosophy

in the

Australian National University
1962

Statement of Originality

This thesis is based on original field work by the author, supplemented by a study of relevant literature and manuscripts, and by interviews with a number of persons with experience pertinent to the investigation. Chapters I to III and part of Chapter IV depend more strongly on secondary sources; the remainder of the thesis is basically the product of field research.

(Signed) Diana R. Howlett

Note on plates and maps: quality of the images varies. Not all plates and maps were present in the paper copy from which this scanned version was prepared. Some of the missing plates and maps were scanned from a microfilm copy of the dissertation; these illustrations are the best quality which could be obtained from the microfilm.

TABLE OF CONTENTS

List of Maps

Maps contained in back folder:

Land Use, Fondiwe'i, 1960
Land Use, Nupasafa, 1960
Land Use, Nupasafa, 1961
Land Use, Makiroka, 1959
Land Use, Makiroka, 1960

List of Plates

Short Title

List of Tables

List of Figures

PREFACE

The aim of this research has been to make a study of the social geography of the Goroka Valley, with particular reference to the developments of the period 1950-60. During this period, with the opening of the Valley to European settlement, many profound changes have taken place in the Valley. The traditional pattern of native life has been broadened - many clans now operate on a semi-commercial basis, and with the establishment of schools and local government councils social and political changes are contributing to the emergence of a new order. The European community has steadily increased in size, and has been responsible for the development of coffee plantations, the growth of a township with a population of almost 500, the construction of roads and airfields, the establishment of light industries, and the extension of social services. The intention here has been to produce a regional study of the Goroka Valley - to this end the physical environment and 'historical' background are described by way of introduction to an examination of the geographically significant events of the 1950s.

Two periods were spent in the field, between June and November 1959, and April 1960 to January 1961, amounting to a total of fifteen months. The main part of this time was spent in villages - three native communities were studied in detail - and from these field bases surveys of the European plantations and Goroka township were also conducted. The survey methods

are described in Chapter V. Maps and photographs illustrating various aspects of the study are contained in the relevant places in the text; in addition five large-scale land use maps are inserted in a separate folder inside the back cover: it is intended that these be consulted in conjunction with the chapters on village communities.

Text references have been made brief, and contain only the author's name, the year of the publication, and the page number or numbers (e.g., Read 1955, 251). If more than one work by a particular author was published in any year, then the publications are indicated chronologically thus: Read 1952a, Read 1952b, etc. Full references to the works cited in the text are contained in the bibliography at the end of the thesis.

The following abbreviations appear in the text:

TPNG for Territory of Papua and New Guinea

Territory for Territory of Papua and New Guinea

DASF for Department of Agriculture, Stocks and Fisheries

CSIRO for Commonwealth Scientific and Industrial Research Organisation

UNESCO for United Nations Educational, Scientific and Cultural Organisation.

ACKNOWLEDGMENTS

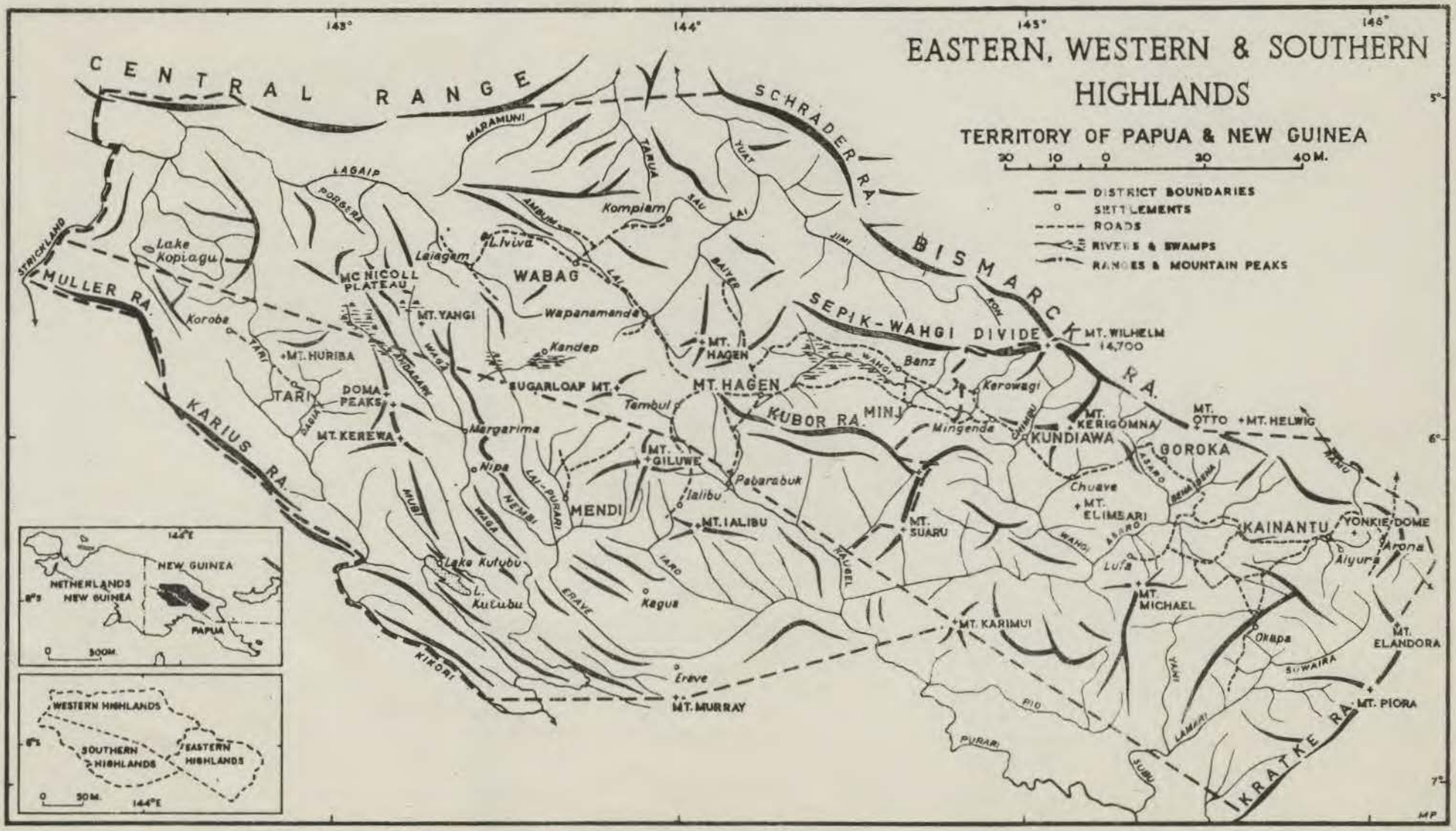
This study was made possible by a Research Scholarship from the Australian National University. Acknowledgment is gratefully made to Dr H.C. Brookfield and Professor O.H.K. Spate of the Department of Geography in the University, under whose supervision the thesis was written: to both I express my appreciation for their helpful advice and sound criticism.

I am indebted to many people in the Goroka Valley for their co-operation and assistance during the course of field work, and for the many kindnesses they showed me. In particular I am indebted to the staffs of the District Office and the Department of Agriculture at Goroka, but I should like to mention with thanks the help and hospitality of all Administration personnel with whom I had contact, and also that of the planters and townspeople. This work could not have been written without the co-operation of the people in whose villages I lived and in whose daily life I participated: special thanks are due to Gahuno of Makiroka, Samara of Nupasafa, and Arum of Korfena, who assumed in their respective clans the responsibility for my well-being.

I extend my appreciation to those members of the Land Research Unit (CSIRO), the Department of Territories, and the Bureaux of Mineral Resources and Agricultural Economics in Canberra whom I consulted many times and who gave information so readily.

I am grateful to Professor K. Read of the University of Washington, Seattle, to the National Library, Canberra, and the Department of Territories for permission to quote from unpublished material.

The maps were drawn by H. Gunther, J. Heyward and L. Pancino of the cartographic laboratory of the University, and the thesis was typed by Mrs A. Geunot - to these my thanks are due for their expert and uncomplaining fulfilment of these tasks.


EASTERN, WESTERN & SOUTHERN HIGHLANDS
TERRITORY OF PAPUA & NEW GUINEA
30 10 0 30 40 M.
DISTRICT BOUNDARIES
SETTLEMENTS
ROADS
RIVERS & SWAMPS
RANGES & MOUNTAIN PEAKS
143°
144°
145°
146°
5°
6°
7°
CENTRAL RANGE
SCHRADER RA.
BISMARCK RA.
MULLER RA.
KARIUS RA.
IKRATKE RA.
SEPIK-WAHGI DIVIDE
KUBOR RA.
MARAMUNI
TARUA
YUAT
LAGAIP
PORGERA
AMBUM
Kompiam
SAU
LAI
JIMI
STRICKLAND
Lake Kopiagu
Laiagam
Liviva
WABAG
BAIYER
MC NICOLL PLATEAU
Wapanamande
Koroba
TARI
MT. YANGI
MT. HURIBA
Kandep
SUGARLOAF MT.
DOMA PEAKS
MT. KEREWA
Margarima
Nipa
MT. HAGEN
MT. WILHELM 14,700
Banz
Kerowagi
Tambul
MINJ
Mingenda
KUNDIAWA
MT. KERIGOMNA
MT. OTTO
MT. HELWIG
GOROKA
Chuave
MT. ELIMBARI
MT. GILUWE
Pabarabuk
Ialibu
MENDI
MT. IALIBU
MT. SUARU
KAINANTU
YONKIE DOME
Aiyura
Arona
Lake Kutubu
L. Kutubu
Kegua
Lufa
MT. MICHAEL
MT. KARIMUI
Okapa
MT. ELANDORA
Erave
MT. MURRAY
MT. PIORA
NEW GUINEA
NETHERLANDS NEW GUINEA
PAPUA
WESTERN HIGHLANDS
SOUTHERN HIGHLANDS
EASTERN HIGHLANDS

Chapter I

THE PHYSICAL LANDSCAPE

The Goroka Valley is one of a series of inter-montane valleys which occur at altitudes between 4,000 and 6,000 feet throughout the length of the central cordillera of New Guinea, from the Wissel Lakes area in the Netherlands territory to the Kainantu-Arona basin in Australian New Guinea. There is a broad similarity of physical characteristics between these valleys, but individually they exhibit considerable variation in climate, topography and soils.

The Goroka Valley lies within longitudes 145'10"E. and 145'40"E. and latitudes 5'50"S. and 6'15"S. The tract of country forming the subject of this study is approximately 450 square miles in area, and is encompassed almost entirely by mountain ranges. To the north and northeast the Valley is bounded by a section of the Bismarck Mountains, and spurs of the Bismarcks extend southeast-ward to form a lower divide which dwindles further south to the low Kami Hills; these form the eastern boundary of the Valley. The Asaro Range defines the western boundary.

Two main rivers, the Asaro and its tributary the Bena Bena, which form part of the Purari headwaters, rise in the Bismarcks, the Asaro in the northwest and the Bena Bena in the northeast,

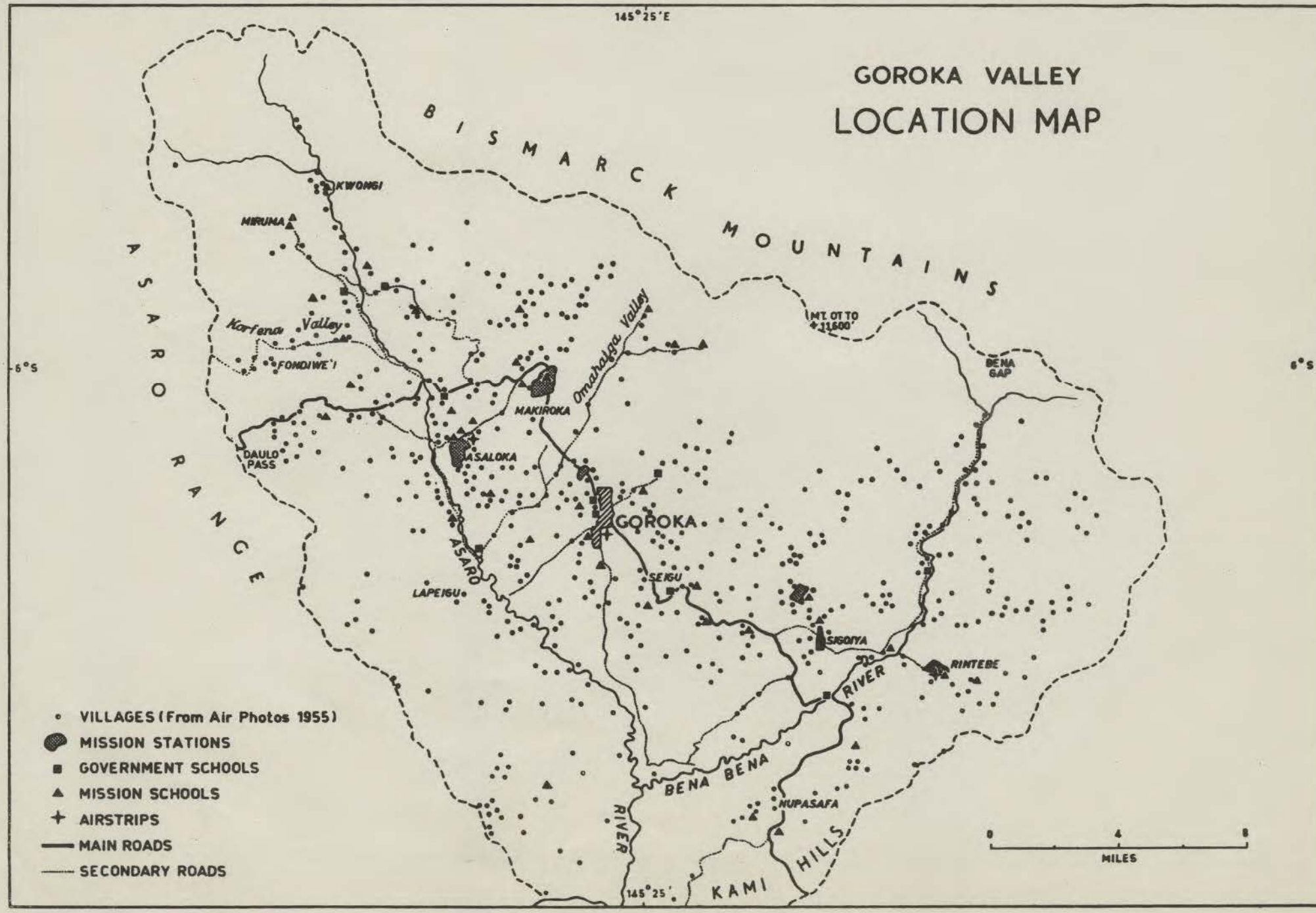
and drain the Valley to the south. A few miles below their junction, the Asaro flows through a narrow gorge, between the Asaro Range and the Kami Hills; this gorge section is taken as the southern limit of the Valley.

Geology

The geology of the Goroka Valley and adjacent areas has been most recently and most intensively studied by N.J. McMillan and E.J. Malone, of the Bureau of Mineral Resources, Canberra. Previous geological investigations in the Highlands of Australian New Guinea have been conducted by N.H. Fisher (1937), K. Washington Gray (1939), L.C. Noakes (1939), G.A.V. Stanley and K. Llewellyn (1949), and F.K. Rickwood studied the geology of the western Highlands in some detail between 1950 and 1953.

The main structural features of the central cordillera, the arrangement of the mountain chains and basins, are believed to have existed in the early Tertiary, when all but the highest ranges were below sea level. (CSIRO Report 58/1 (1958), 5.) The Highland valleys were formed during a period of tectonic activity which probably began in the late Mesozoic and continued through the Tertiary, with the most intense orogeny in the Pliocene and early Pleistocene. The greatest degree of recent tectonic and volcanic activity occurred west of the Goroka area, the eastern Highlands being of lower and more uniform relief.

Structurally, the northwest-southeast trend of the relief and drainage is the dominant feature of the western part of the Goroka Valley. Further east, the arrangement of the ranges and


GOROKA VALLEY
LOCATION MAP
145°25'E
6°S
BISMARCK MOUNTAINS
ASARO RANGE
KWONGI
MIRUNA
Karfena Valley
FONDIWE'I
DAULO PASS
MAKIROKA
Omahaga Valley
ASALOKA
GOROKA
ASARO
LAPEISU
SEISU
MT. OTTO +11600'
BENA GAP
SIGOIYA
RINTEBE
RIVER
BENA BENA
NUPASAFA
HILLS
KAMI
RIVER
145°25'
0 4 8
MILES
VILLAGES (From Air Photos 1955)
MISSION STATIONS
GOVERNMENT SCHOOLS
MISSION SCHOOLS
AIRSTRIPS
MAIN ROADS
SECONDARY ROADS

rivers has been determined by faults striking northeast. In the report of their survey of the geology of the eastern Highlands McMillan and Malone (1960) state that a basement of Palaeozoic rocks was overlain by sediments in the late Mesozoic and early Tertiary, and subsequent Pliocene orogeny resulted in the uplift and folding of these sediments, accompanied by faulting and volcanic activity.

> The oldest rocks in the areas consist of a metamorphic complex in which two formations, the Goroka and Bena Bena Formations, are recognised. They are intruded by a vast differentiated or composite intrusive mass, the Bismarck Granodiorite.... The metamorphic complex and the Bismarck Granodiorite constitute a basement of probably pre-Permian age, which is unconformably overlain by an incomplete and discontinuous marine succession. This succession contains sediments of Upper Cretaceous, Eocene and Oligocene age and a much greater thickness of lower and middle Miocene sediments and volcanics.
>
> Both the basement and the younger sedimentary succession were involved in the orogeny which took place during the Pliocene. The basement was folded into a number of vast geanticlinal arches, the crests of which have since been stripped of their sedimentary mantle.
> .....
>
> The Pliocene orogeny was accompanied by intrusive and extrusive activity. The vulcanism continued into the Quaternary, resulting in outpourings on a grand scale in adjacent areas. Faulting, initiated during the orogeny, is still taking place, and is responsible for part of the uplift of the Bismarck Range. (Ibid., 12-13.)

The metamorphic formations and the Bismarck Granodiorite now determine the physical character of most of the Goroka Valley; only in the south of the Valley does the nature of the landscape differ significantly with respect to terrain and soils. The evolution of the landscape, and the present morphology, date from the Quaternary. The alluvial deposits of the Valley Floor are thus of Recent origin, and their subsequent displacement and dissection indicate that the area is still one of instability.

The Physiographic Units

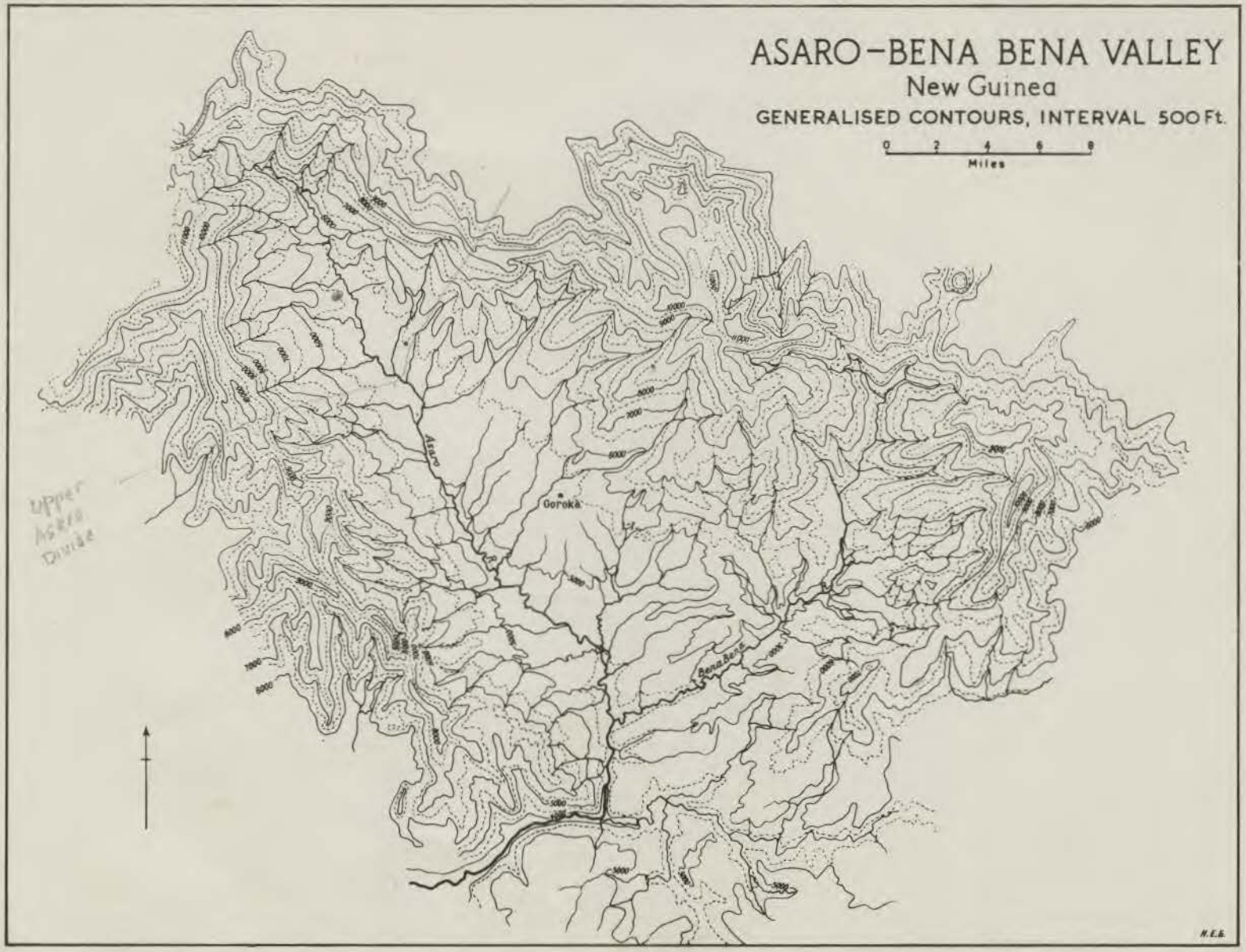
Four major physiographic units are here distinguished in the Goroka Valley. These are the Bismarck Mountains, the Asaro Range, the Kami Hills, and the Valley Floor. The area as a whole is characterised by a youthful topography under active stream erosion, though some characteristics of maturity occur on the crests of the Bismarck Mountains above 10,000 feet, and in the central part of the Valley Floor.

The Bismarck Mountains

These mountains are formed largely of the metamorphic complex described by McMillan and Malone as the Goroka Formation. However, this complex is intruded at the head of the Asaro by the Bismarck Granodiorite, and in the upper Bena Bena Valley a western outlier of the main mass of the metamorphic Bena Bena Formation lies adjacent to the Goroka Formation. This latter consists mainly of schists and schistose siltstone, while the Bena Bena Formation contains a greater variety of metamorphosed sediments, including gneisses and quartzite as well as schists. (Ibid., 16-18.)

The range attains its highest elevation in Mt Otto (11,600 feet) in the section of the Bismarcks bordering the Goroka Valley. Here, the general altitude is between 9,000 and 10,000 feet, although several un-named peaks exceed 10,000 feet. The lowest divide in the entire Bismarcks, the Bena Gap, near the headwaters of the Bena Bena River, is only 7,000 feet above sea level.

The northern wall of the Bismarcks, the Ramu Fall, is extremely abrupt, but the southwest side which confronts the Goroka


ASARO–BENA BENA VALLEY
New Guinea
GENERALISED CONTOURS, INTERVAL 500 Ft.
0 2 4 6 8
Miles
Asaro
Goroka
Bena Bena
Upper Asaro Divide
N.E.L.

Valley is less so, and only the upper slopes near the divide are steep and rugged. The lower slopes are less steep, the spurs fingering out to the southwest in gentler gradients, interspersed by late youthful and mature valleys.

The Asaro Range

The Asaro Range constitutes a fault block, dominated by the Asaro Fault, which trends north-northwest. The range is generally about 8,000 feet above sea level, but is somewhat higher in the north and decreases in altitude to the south. The ranges are formed predominantly of Miocene sediments, mainly conglomerates, shales and greywacke, overlain in the Daulo vicinity by Miocene volcanic extrusives, mainly hornblende-feldspar porphyries. (Ibid., 34.)

The topography of the Asaro Range is youthful: dissection of the steep slopes into narrow V-shaped valleys is taking place by active streams, tributaries of the Asaro River. The slopes are scarred by numerous recent landslides; there is some development of piedmont fans.

The Kami Hills

In the southeastern extremity of the Valley, gentler hills and ridges intervene between the valleys of the Bena Bena and Dunantina Rivers, forming a low divide. They are composed of volcanic extrusives and a variety of sediments, largely Miocene siltstones and shales. (Ibid., 30-31.)

A feature of these hills is their curious hummocky appearance. McMillan and Malone do not explain 'this unusual and

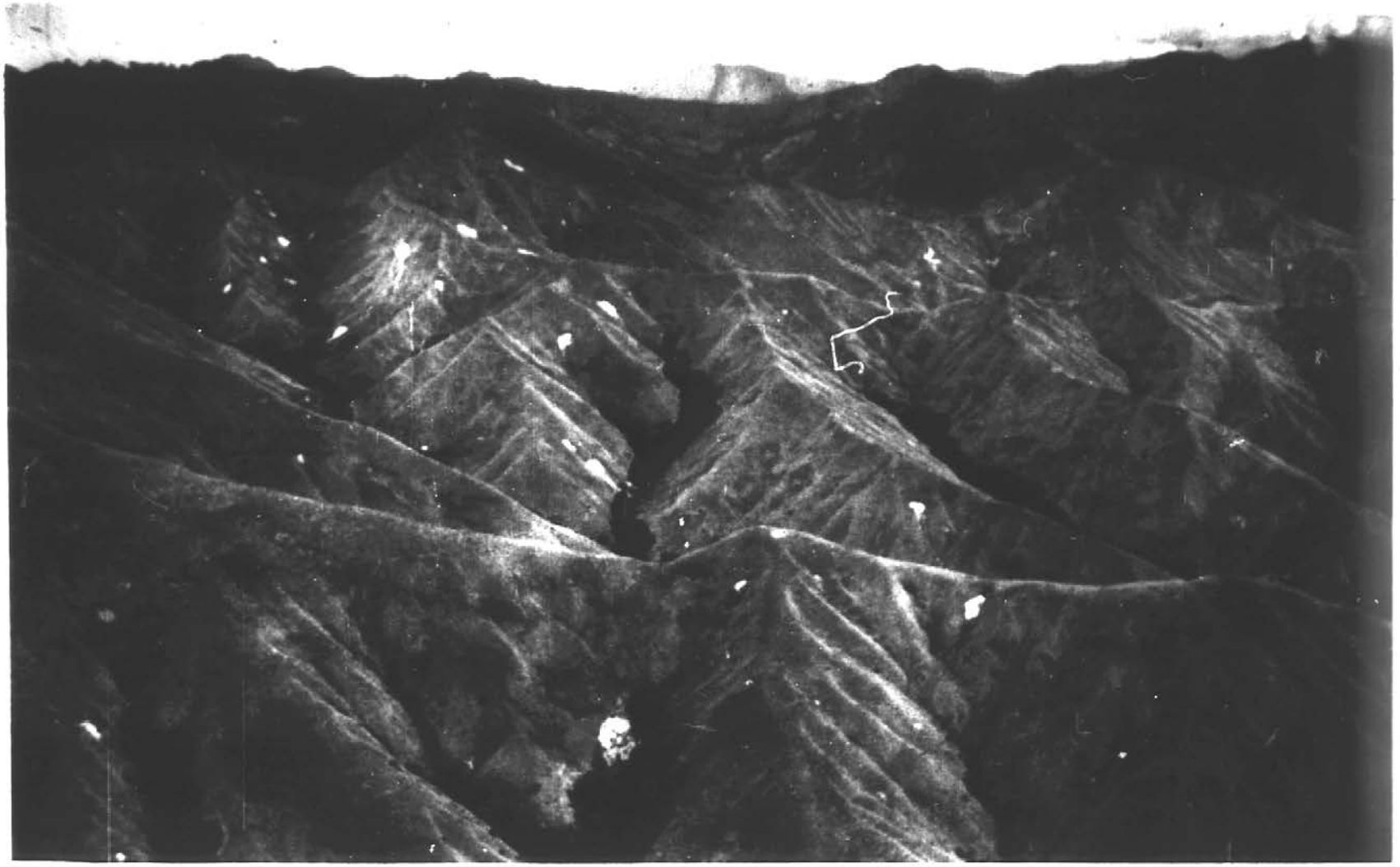


Plate 1. View near the crest of the Asaro Range. Note the forest remnants only in valleys: the ranges are grass-covered almost to the crest. White patches are scars from landslides.

distinctive morphology', but Reiner suggests that it is due to 'weathering and dissection of the lavas along original lines of weakness and voids in the flows'. (CSIRO Report 58/1, L.S.14.)

The low ridges of the Kami Hills are separated by wide shallow valleys and undulating, open basins, which are drained by intermittent creeks. The drainage is northwest and west, to the Bena Bena River.

The Valley Floor

The Valley Floor is virtually contained within the two major faults, the Asaro and Helwig Faults, which suggests that it may be a down-faulted block. (McMillan and Malone 1960, 53.) The Valley Floor is a roughly triangular plain, at a general level of 5,000 feet, with its apex to the northwest, from which it slopes away in a gentle gradient to the southeast. The alluvial and lacustrine products of Quaternary erosion were derived from the piedmont fans of the Bismarcks and Asaro Ranges, and have been deposited in the Valley Floor in thicknesses of up to 200 feet in places. (Ibid., 36.) These deposits consist of gravels, clays, sand and boulder beds.

The two main rivers vary in width and depth along their courses, which are determined in the upper reaches by outcrops of more resistant rock; in the lower reaches they meander widely in the easily-eroded sediments of the Valley Floor. During the dry season the rivers and streams are clear and shallow, but after rains and during the wet season flash floods transform them to vigorous torrents of muddy water.

Several distinct terrain types are recognisable below the 5,500 foot contour, which may be taken as the definitive boundary of the Valley Floor against the surrounding uplands. Initially agents of deposition, the rejuvenated Asaro River and its tributaries are now incising and degrading the alluvial accumulations. The main terrain types are (a) the dissected landslip slopes and piedmonts in the foothills and tributary valleys; (b) the sharply dissected fans of the middle Valley; (c) the low ridge-and-valley terrain in an area surrounding the confluence of the Asaro and Bena Bena Rivers; and (d) a narrow belt of flood plains and river terraces directly along the courses of these two rivers. These closely correspond with the Land Systems described in the CSIRO Report 58/1, which are respectively (a) Omahaiga Land System, Units 1, 2 and 3; (b) Goroka Land System, Units 1, 2 and 3; (c) Limisate Land System, Units 1 and 2; Abiera Land System, Units 3 and 4; (d) Goroka Land System, Unit 4. Each of these terrain types is characterised by a distinctive soil and vegetation pattern: these are discussed later.

Climate

The nature of the atmospheric circulation in the Tropical Pacific area, both at the surface and in upper levels, has been the subject of much controversy. Watts (1955), an adherent of the air-mass theory, locates the origin of southeast Asian air masses in the western Pacific and Indian Ocean, with the continent of Australia and northeast Asia also contributing. Although New Guinea is actually an outlier in respect of southeast Asia, and

Plate 2. Section of the upper Omahaiga Valley, part of the Bismarck piedmont. (Courtesy CSIRO.)

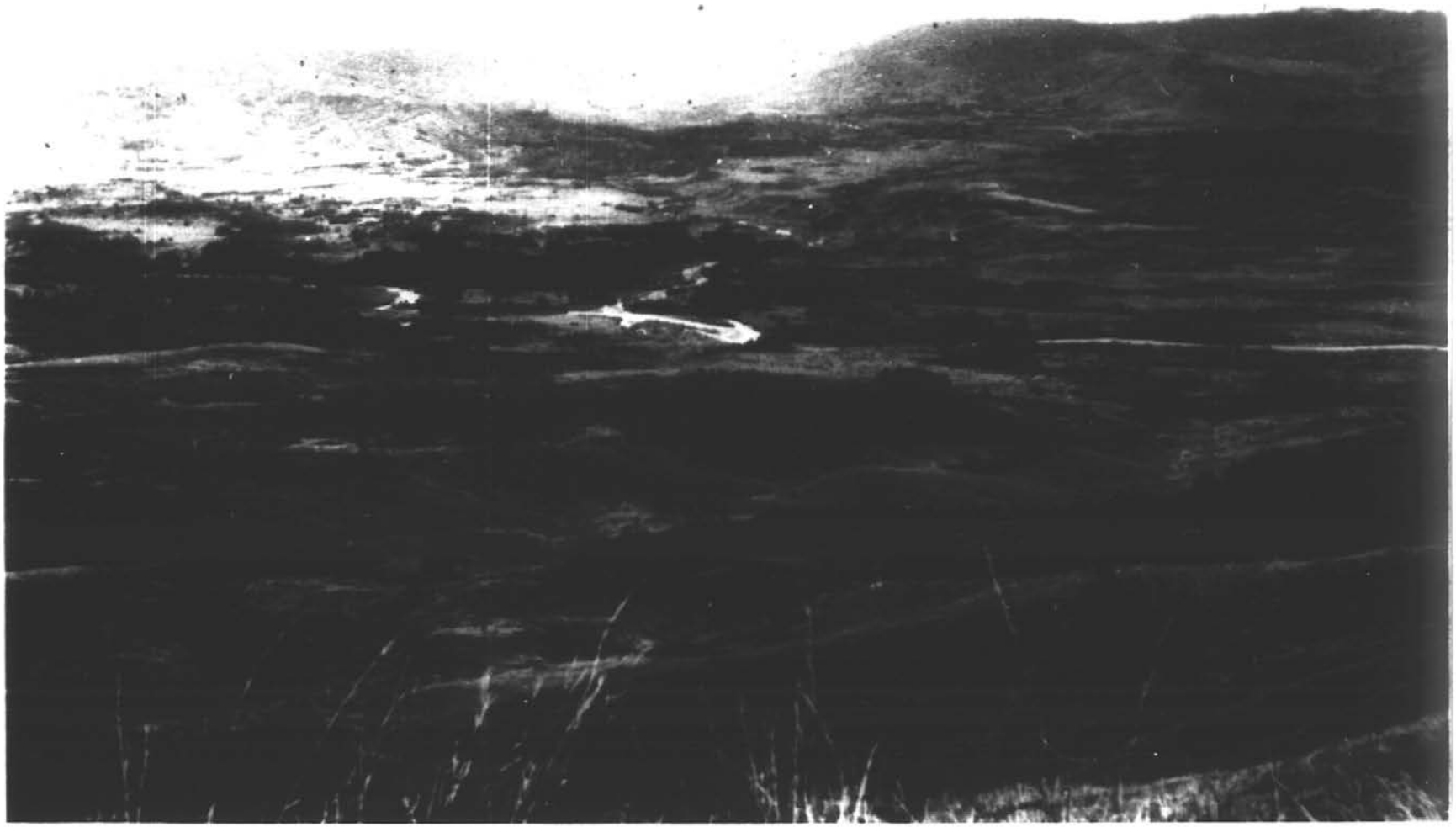


Plate 3. Alluvial fans of the middle Goroka Valley, now sharply dissected by tributaries of the Asaro River.

is thus not so much influenced by the maritime air mass of the Indian Ocean, it comes under the influence of maritime streams from the northwest Pacific and the China Sea to a greater degree than southeast Asian countries. Also by virtue of its position, air masses developing over the continent of Australia do not influence New Guinea, so that the nature of the air masses over New Guinea is more distinctly maritime than those over most of southeast Asia. The progression of the air-mass system in relation to the position of the Equatorial Air-Stream Boundary gives this area its two-season regime. As Curry and Armstrong (1959, 253) point out, this two-season climatic system over New Guinea is generally described in terms of the northwest monsoon (the wet season) in summer and the southeast monsoon (the dry season) in winter. They continue: 'It would be more correct to speak of surface southerlies and easterlies in July and variable winds in January with a marked westerly component in the south and a northerly component in the north.'

The climatic pattern of the intermontane basins is a product of three basic factors: latitudinal position, altitude, and relief. These factors give the Highland valleys a climate typified by high rainfall with marked seasonal variation, and seasonally-uniform temperatures with a moderate diurnal range.[1] However, distinct local climates occur, not only from one valley to another, but also within the confines of each of the valleys,

---

[1] Maximum temperatures in the Highlands are 10-20 degrees lower than in the lowland areas, and the discrepancy in minimum temperatures is greater.

resulting from wide differences in the amount, seasonality and variability of precipitation in conjunction with local differences in altitude and terrain.

In general, the eastern Highlands are drier than either the western or southern Highlands areas, and the dry seasons in the eastern basins are more sharply defined. It is not easy to see why this should be so: locally wetter and drier areas can be explained in terms of topography, but over the central cordillera as a whole the variations in altitude, and the position of the main and secondary chains of mountains are not sufficient in themselves to fully account for the important differences in the rainfall regime between those areas east and west of the Asaro. In part this regional difference can be explained by the trend of the east coast of the Gulf of Papua, which deflects the southeast trades to the west of the Goroka-Kainantu area; similarly there is a rain-shadow effect created by the position of the Bismarcks and the Ramu-Markham Valley in relation to the wet season air masses.

Meteorological statistics for the Goroka Valley are few and irregular. The only official recording station in the Valley is at the Goroka air-strip, for which statistics of rainfall, temperature, pressure, humidity, and cloud cover are available. Continuous records date only from 1952, however, although there are some rainfall statistics dating from 1946. A number of sporadic rainfall figures are available from plantations and mission stations, but no plantations were able to provide temperature records. Temperature records were kept for short

periods during the course of field work in different locations in the Valley, but these are of obviously limited value. The following account of weather and climate in the Goroka Valley is therefore necessarily based in large measure on personal observation and extrapolation of the records for Goroka itself.

Rainfall

The wet season corresponds with the summer months of the southern hemisphere, usually beginning during November, with December-March the wettest period. On the basis of the rainfall records available for Goroka an average of 55 per cent of the total annual rainfall falls during these months, and 74.8 per cent of the total annual rainfall during the six-month period November-April.

There is a marked rainfall gradient across the Valley from northwest to southeast, i.e., from the head of the Asaro Valley to the lower Bena Bena Valley. Plantation records for the former area indicate a rainfall in the vicinity of 100 inches annually, whereas the lower Bena Bena and the district southeast of it averages 50-60 inches annually. Goroka, which is roughly midway between these two localities, has an annual rainfall of about 76 inches. This variation of up to 40 inches between the two extremes occurs over a direct distance of some 25 miles. The greatest concentration of precipitation is effected over a limited area at the head of the Asaro, where greater altitude and the narrowness of the Valley cause more convection-initiated rainfall than in the southeast with its topography of lower, more open plains. Furthermore, the upper Asaro is more directly in

the path of the prevailing northwesterly currents of the wet season, and the rainshadow factors described above, combined with the local rainshadow conditions, all contribute to the relatively lower rainfall in the lower Bena Bena Valley.

Not only is rainfall less in the lower Bena Bena than elsewhere in the Goroka Valley, but it is also more distinctly seasonal in nature. Isopleths of 'seasonality', based on the Schmidt and Ferguson (1951) classification of rainfall types for Indonesia indicate three different seasonal regimes for the Goroka Valley alone. This has an important bearing on native agriculture, which is traditionally based on short-term crops. A marked dry season can so reduce the length of the growing period that famines may be experienced, although usually only for short periods.

Apart from this general pattern of rainfall distribution, rainfall variability is high. Very local variation occurs between places only a mile or two apart, but apart from this, the total annual rainfall for single stations varies considerably from year to year. For Goroka, the extremes of the total annual rainfall since 1948 have been 61.9 inches and 94.6 inches. Over a period of five years, a mission station in the middle Bena Bena Valley has recorded annual totals varying from 54 to 83 inches; a plantation in the lower Bena Bena has received from 46 inches to 81 inches over a three-year period; and over a five-year period in the upper Asaro Valley, the annual totals from a plantation have varied from 79 inches to 113 inches.[2] On the basis of the available figures, the rainfall variability for Goroka is 8 per cent.

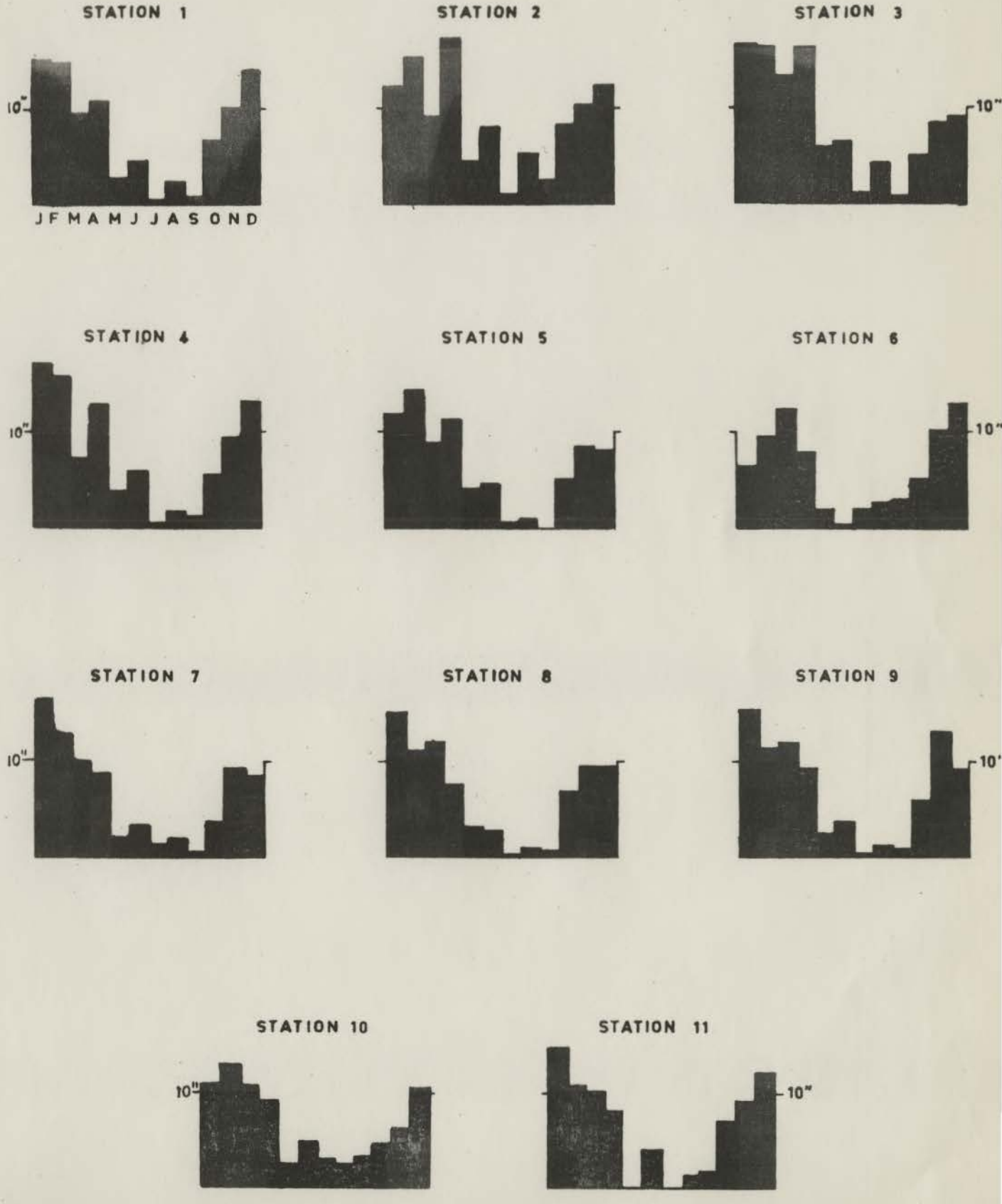
---

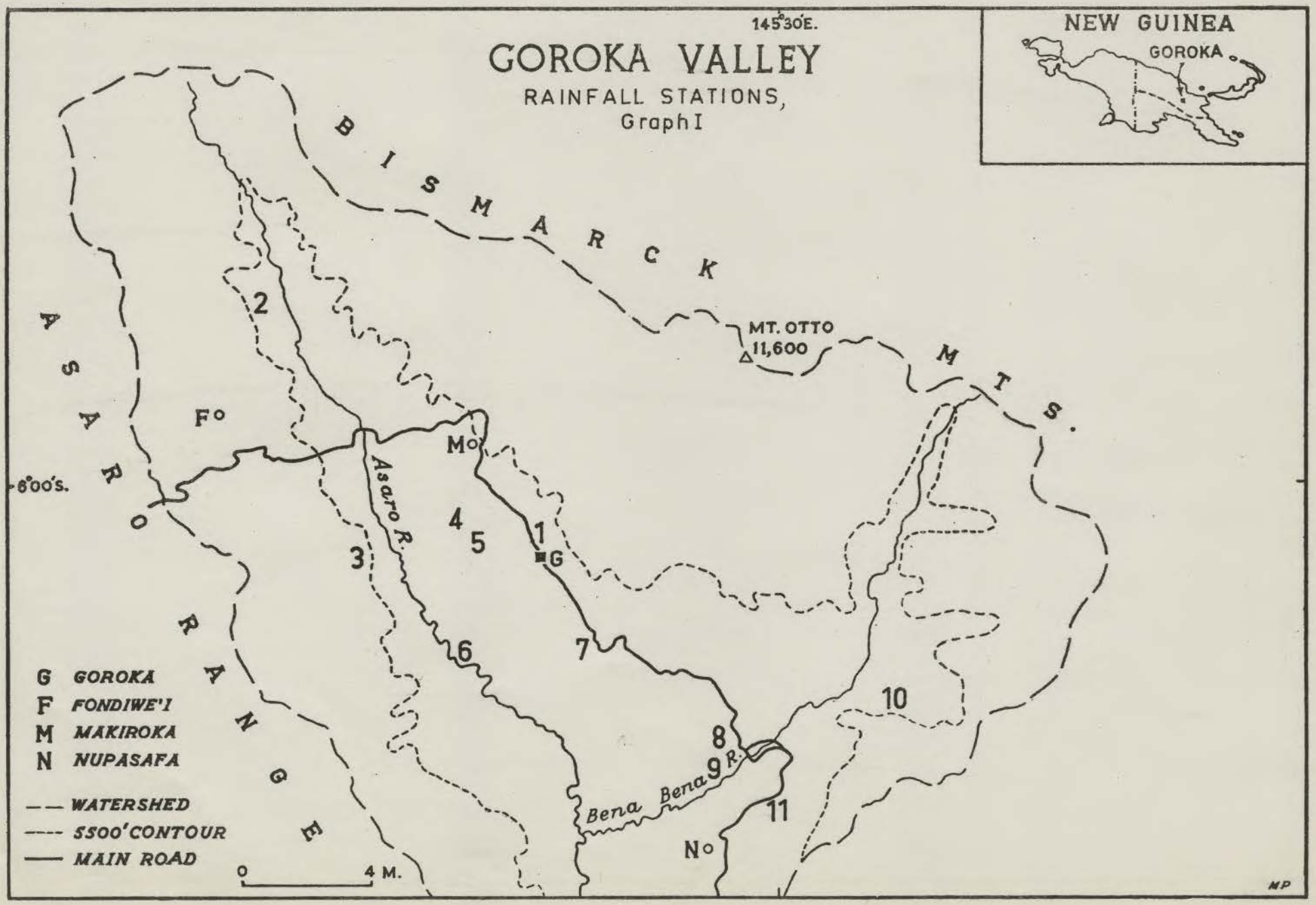
[2] While it must be pointed out that figures from plantations etc. are likely to be somewhat unreliable, nevertheless the range from year to year is considerable - in the vicinity of 30 inches in each case.

GRAPH I

GOROKA VALLEY

RAINFALL, 1960




145°30'E.
GOROKA VALLEY
RAINFALL STATIONS,
Graph I
NEW GUINEA
GOROKA
BISMARCK MTS.
MT. OTTO
11,600
ASARO RANGE
6°00'S.
Asaro R.
Bena Bena R.
F°
M°
N°
G GOROKA
F FONDIWE'I
M MAKIROKA
N NUPASAFA
WATERSHED
5500' CONTOUR
MAIN ROAD
0
4 M.
MP

The number of rain days per month averages at 24 for the wettest months, December-March, and at 13 during the dry-season months, June-September.[3] For the year as a whole the average number of rain days per month is 18, based on statistics for Goroka, 1952-60.

In an area of rugged terrain, the intensity of the rainfall might be expected to play an important part, especially in soil erosion on steep slopes. A crude index of rainfall intensity may be obtained by dividing the total rainfall in each year by the number of rain days for that year, and then obtaining a mean based on the number of years for which records are available. On this basis, a mean rainfall of 0.36 inches per rain day is indicated for Goroka, a figure of low to moderate intensity only. The highest daily fall on record for Goroka is 3.05 inches, which does not compare with extreme falls registered in coastal locations of Papua-New Guinea, or in parts of Australia.

Temperature

As mentioned already, there is little seasonal variation in temperatures; monthly mean maximum temperatures vary from about 79 degrees in the wet (summer) season to 76 degrees in the dry (winter) season.[4] Monthly mean minimum temperatures exhibit a range of about five degrees, from 59-60 degrees in the wet season to 55 degrees in the drier months. The mean annual range of temperature therefore remains constant at about 20 degrees.

---

[3] A rain day is defined as a day on which a minimum of 0.01 inches of rain falls.

[4] All temperatures are given in degrees Fahrenheit.

Graph II illustrates the diurnal range of temperature recorded at Goroka in January and July 1959, and shows rather more variation than the mean monthly figures indicate. The highest maximum ever recorded at Goroka was 92 degrees (December 1953) and the lowest minimum 38 degrees (July 1954).

The Valley Floor, between 5,000 and 5,500 feet above sea level, is completely frost-free, and frosts do not appear to have occurred within the confines of the Valley, at any rate within the cultivated limits, which extend to almost 8,000 feet.

The greater cloud cover during the wet season probably reduces to a slight extent the maximum temperatures, while the greater insolation received during the finer weather of the dry season probably increases somewhat the maximum temperatures in these months.

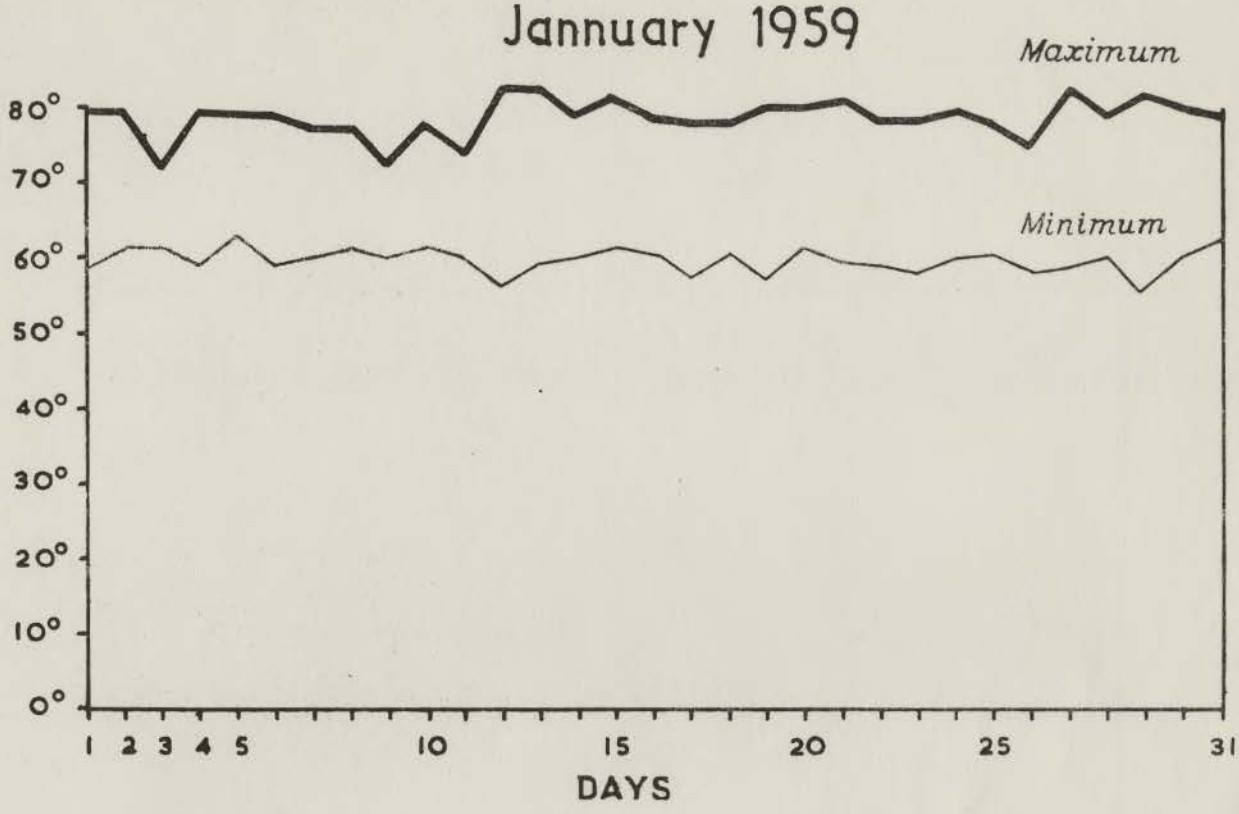
Humidity

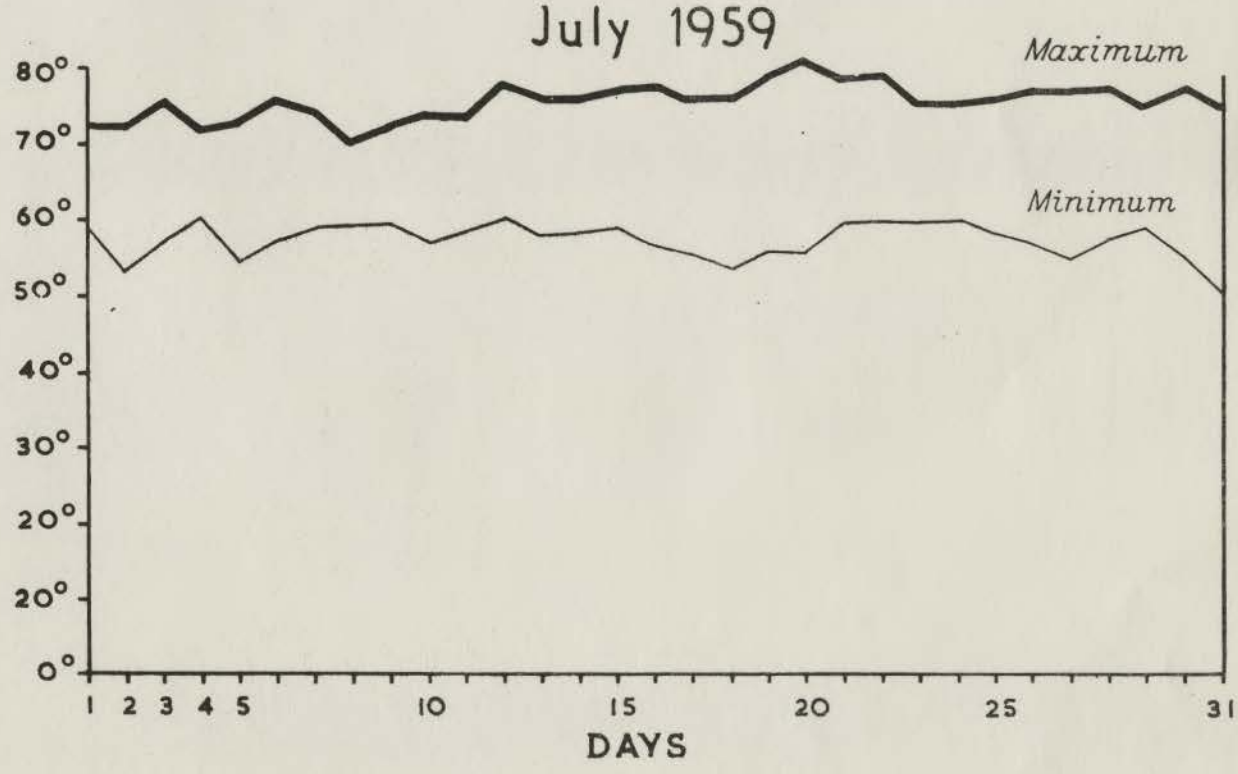
The unpleasant combination of high temperature and high humidity which characterises the lowland climate is not experienced in the Highlands. Although relative humidity is high, the lower temperatures make for a climate which, in terms of human comfort, is most refreshing, and in which physical exertion is not uncomfortable. The available statistics for Goroka indicate that the mean 8 a.m. relative humidity varies from about 76 per cent in the late dry season to 86 per cent or slightly higher towards the end of the wet season. Mean relative humidity at 3 p.m. varies more widely, and is between 40-50 per cent in the dry season, and between 60-80 per cent in the wet season.

GOROKA

GRAPH II

DIURNAL RANGE TEMPERATURES





Pressure and Winds

Pressure is markedly constant: mean annual pressure for Goroka at 9 a.m. and 3 p.m. is respectively 841 mb. and 836 mb., with virtually no variation in the mean monthly figures.[5] A concomitant of the stability of the pressure regime is the absence of strong or constant winds. High winds are uncommon at these latitudes, and the mountain walls shelter the inter-montane valleys from the main force of the trade winds.

The only area in which winds are a significant feature of the climate is the lower Bena Bena plains, where cool dry easterly winds are experienced during the afternoons in the dry season. These winds attain a velocity of perhaps 15-20 miles per hour, and are obviously associated with the southeast trade regime, but their effect is of local significance only - elsewhere it is dissipated by the less open nature of the terrain. At other times winds are associated only with heavy convectional storms, which are often preceded by gusts strong enough to break branches from trees. During one such storm in 1948 considerable damage was done to the temporary buildings which then constituted the hospital and government station at Goroka. Most coffee planters claim that wind-breaks are unnecessary. Along the slopes of the Asaro Range local gully winds occur during the dry season in particular.

Mists

Morning mists are a common phenomenon over the Valley Floor, and to an altitude of 6,000 feet, throughout the year. They are

---

5 Goroka's elevation is 5,100 feet; these pressures have not been converted to sea level.

due to radiation at night, which produces temperature inversion, combined with high humidity levels. Dew point at 9 a.m. varies only from about 57 to 61 degrees, and it is about this time that the mists are densest. The mists usually disperse by 10 a.m. after which the remainder of the morning is fine and clear.

Cloud

A heavy cover of cumulus is virtually a constant feature over the ranges in the afternoons. This cumulus development is based on the convective movement of the air, which reaches its climax in mid-afternoon. The condensation occurs first at altitudes of about 8,000 feet, but the cloud often descends, especially during the wet season, spilling down from the crests of the ranges and extending through the valleys. Cumulo-numbus formations develop during the wet season, with the usual accompaniments of sudden thunderstorms, lightning, heavy rains and occasionally hail.

Mean cloud cover at Goroka at 3 p.m. is 70 per cent during the months December-March, and 60 per cent over the period June-September. Figures for 9 a.m. are only slightly less than these, but are probably influenced by the morning mists.

In an area which is so heavily dependent on air transport as the New Guinea Highlands, the combination of morning mists and afternoon cloud cover, which greatly reduces flying time, becomes an important and sometimes a critical consideration. In effect, the length of the working day for most people engaged in out-of-doors occupations is influenced by this aspect of the climatic regime; the occasional exception is the subsistence cultivator.

Daily Weather

(a) Dry Season

Typical dry season weather begins fine and clear at daybreak (about 6 a.m.) with the temperature usually between 50-55 degrees, but mists often fill the Valley Floor an hour later, to be dispersed again by 9.30 or 10 a.m. Temperatures rise in the clear morning hours and continue to do so until about 2 p.m. when the maximum of 75-80 degrees is reached. After this, either light breezes or cloud cover reduces them somewhat. Light rain may fall in the late afternoons every two to three days. Widespread haze often develops in the afternoons, and in the Bena Bena this is intensified by smoke haze which drifts in over the low Bena Gap from the huge grass fires in the Ramu-Markham Valley.[6] There is virtually no twilight - the sun sets soon after 6 p.m. and darkness falls rapidly. Nights are usually fine and cloudless, and heavy dew is not uncommon.

(b) Wet Season

The most noticeable differences between the two seasons are the greater cloud cover (skies may be overcast all day, and at night), the greater frequency of mists, and the much greater rainfall. Rain falls on an average of two days out of three, and thunder and lightning activity is greater. There is also rain more often during the night in the wet season, but it is rare for showers to continue throughout the day. It is quite

---

6 Widespread burning is practised by natives in the Ramu-Markham in the dry season for hunting small animals, as well as for clearing.

common, however, for only the hours between 9 a.m. and 2 p.m. to be free of rain. The cloud level is lower, and it is not unusual for areas above 6,500 feet to be under cloud cover all day during periods in the wet season.

Soils

The only information which is available for the soils of the Highlands is that from a reconnaisance survey conducted by the CSIRO in 1957-8 in the Goroka-Mt Hagen area, and much detailed investigation remains to be carried out. The report of the CSIRO is, however, a most valuable guide.

Haantjens, the pedologist of the survey team, says of the soils of this area 'The Goroka-Mt Hagen Area is an outstanding example of a region in which nearly all types of soil are part of one large soil continuum without any sharp breaks in properties between the various taxonomic units'. (CSIRO Report 58/1, 23.) Within this continuum, however, there exists a great variety of soil characteristics.

Soil development in the Goroka Valley has been influenced primarily by the recent date of the landscape evolution, and on steep slopes by the rapid mantle-movement. Thus there are many areas in which soil development is either not very advanced, or in which the soil pattern is very confused or so haphazard as to make the term 'pattern' meaningless. Over large areas, soils are azonal in character. To an important extent, the large differences in the nature of the parent material over short distances, combined with the instability of slopes, has contributed to '...abrupt differences in profile characteristics...almost

from yard to yard in all hilly residual and dissected alluvial areas between 5,000 and 7,000 ft altitude'. (Ibid., 24.) Climatic factors, while assisting the overall decomposition from rocks to soils, play little part in soil variations on a zonal basis, with the exception that the acidity is less pronounced in drier areas, being high in areas west of the Asaro Range, while soils in the Bena Bena are virtually neutral. (Ibid., 26.)

Haantjens points out that an increase in altitude and wetness (either from higher rainfall or poor drainage) increases the organic content of the soil, whereas it is lowered by the practice of burning in the grasslands, and is also low on unstable land surfaces. He adds that grass fires have not appreciably reduced the organic matter content of the wetter Waghi Valley, whereas in the drier eastern Highlands the amount of organic matter is considerably less. (Ibid., 27-8.) On the whole, no soils are actually deficient in organic matter or in nitrogen (although soils in the Goroka Valley respond to nitrogen fertilisation), but all are phosphate deficient to some extent. (Ibid.)

The following brief description of soil types occurring in the Goroka Valley is adapted from the CSIRO Report 58/1. A more detailed description of the soil series is contained in Appendix A.

Bismarck Mountains

The upper slopes are predominantly covered by undifferentiated brown clays which attain a depth of three to four feet. The topsoil is moderately rich in organic matter, as these soils

occur under forest cover. Weathered rock fragments frequently occur in lower horizons. Deep, dark brown clay loams, rich in organic matter, also occur throughout this unit.

Soils on the lower slopes have developed on old landslide slopes, and development has been irregular due to the instability of the slopes. The soils are mainly dark brown very friable clay loams to heavy clay soils, attaining a depth of over four feet, with an organically-rich topsoil varying in depth between eight to twenty inches.

Asaro Range

Soil development is not very advanced, owing to the steepness of the upper slopes. The soil pattern is extremely complex, including brown and mottled clays, mudstone clays and concretionary soils. Rock fragments occur frequently in the upper horizons. The depth of soil is between three and four feet, with a topsoil of up to twelve inches in depth. There is some variation from north to south in the Asaro Range soils, introduced by climatic factors in part, and partly also by different parent material in each section. These soils would contain low levels of organic matter, as the forest cover has been removed to a large extent.

Kami Hills

The low ridges are mainly covered by skeletal soils, poor in organic matter, overlying partially-weathered parent rock. The actual depth of soil is frequently less than twelve inches. The soils of the shallow, poorly-drained valleys in this unit consist mainly of thick black clays, clay loams and peaty formations, the latter developing under swamps on heavy clay subsoils.

Valley Floor

Four broad categories are distinguished over the Valley Floor - the dissected high alluvial fans of the upper Valley; the low, undulating ridges of the lower Valley; the terraces bordering the Asaro River and less conspicuously the Bena Bena River; and the flood plains which occur along the courses of the two main rivers.[7]

Soils on the dissected alluvial fans have developed under relatively stable conditions, and are mainly deep, dark, friable clay topsoils, rich in organic matter, underlain by red to brown clays, usually with a layer of iron concretions near the surface.

In the broad area of low undulating ridges in the lower, southern half of the Valley, deep brown and mottled clays and heavy clays predominate. They are concretionary, fairly deep, with black and dark-grey topsoils of a friable nature, moderately rich in organic matter.

The river terraces are characterised by heavy clay soils, which vary from light grey to brown in the subsoil zones, with deep friable topsoils of dark clays. The topsoils are very rich in organic matter. Iron concretions occur frequently. Drainage is often poor.

In the discontinuous pockets of flood plains a complex pattern of fine- to medium-textured young alluvial soils occurs, with occasional peat soils, and on low level terraces heavy grey clays predominate. The soils are immature, and subject to flooding at the lower levels.

---

7 See pp.6-7.

To sum up then, the soils of the Goroka Valley are in the main clays, with friable topsoils containing a moderate to high level of organic matter. The clays vary widely in colour, texture, structure, depth and profile, but it may be stated that in general they are of moderate fertility, with some areas of quite high fertility. Badly-eroded and leached soils are rare, usually occurring only on very steep slopes, and not as a result of man's interference.

In Table 1 the physiographic units described here are listed with the corresponding Land Systems and Soil Series of the CSIRO Report.

Vegetation

The Goroka Valley is very largely grass-covered, and only on the higher ranges for the most part above 7,500 feet is it continuously forested. At first considered to be a natural grassland climax, the mid-altitude grasslands of the Highland valleys have now been shown by Robbins (1958, 1960, unpublished) to be of anthropogenic origin.

Primary Vegetation

The climate of the Goroka Valley and of all the Highland valleys is potentially a forest climate. The amount and seasonal distribution of the rainfall, and the temperature regime, provide a habitat in which forest would be the natural climax. Robbins classified the natural vegetation of the Goroka-Mt Hagen area into the following main categories: swamp and floodplain vegetation; montane forests; and alpine vegetation. (CSIRO Report 58/1, 79.) All other types of vegetation he considers are induced

Table 1

Physiographic Unit	CSIRO Land System	CSIRO Soil Series
Bismarck Mountains		
a) Upper Slopes & Ridges	4	Ogelbeng Ombun Pompameiri Slope Soils Brown
b) Lower Slopes and Spurs	18	Bidnimin Daulo Kerebiji Singa
Asaro Ranges	10	Bidnimin Lithosols Ogelbeng Ombun Slope Soils Brown Slope Soils Mottled
Kami Hills	14, 30	Banz Lithosols Kuli Mombol Omahaiga Slope Soils Mottled Slope Soils Sandy
Valley Floor		
a) Dissected Alluvial Fans	22	Kerowil Minj Ogelbeng Omahaiga Singa
b) Low Undulating Ridges	20	Banz Gitunu Kerowil Minj Mombol Omahaiga
c) River Terraces	27	Banz Mombol Omahaiga
d) Flood Plains	31	Recent Alluvial Soils Banz Kerebiji Kuli Mombol Ogelbeng

communities. Of these natural communities, the most important in the Goroka Valley is the lower montane rain forest, the other communities occurring infrequently over small or scattered areas only in this area.

(a) Lower Montane Rain Forest

The present distribution of this formation is in an altitudinal belt between 7,000 and 9,000 feet, although in many places 8,000 feet would be a more accurate lower limit, as it has been pushed back by the extension of native gardens. The forest is evergreen, composed of a variety of broadleaf trees and gymnosperms, many of which are commercially useful and are being logged. Dominant are species of beech (Nothofagus), oak (Castanopsis and Quercus), Cunoniaceae and Elaeocarpaceae, and among the gymnosperms species of Podocarpus predominates. (Ibid., 82-4.) These trees are dominant both numerically and in size, attaining heights up to 100 feet. A second canopy level at 30-50 feet is formed by a number of varieties, among which species of Ficus, Myrtaceae and Pandanus commonly occur. (Ibid., 83-5.) Robbins notes that 'Although the forest has basically two tree layers, a dense shrubby layer often attains sufficient height to constitute a third woody understory'. (Ibid., 85.) In addition to a variety of shrubs, this layer is supplemented by pandanus, tree ferns and bamboo. Finally, sedges, herbs, mosses, ferns and small creepers combine to form a 'rich ground flora'.

(b) Montane Cloud Forest

This formation occurs above the lower montane rain forest, and is characterised by the dense cover of mosses and lichens

Plate 4. Lower montane rain forest vegetation - here illustrated are Nothofagus, Pandanus and climbing bamboo. (Courtesy CSIRO.)

which enshrouds the entire forest, forming over the entire tree, trailing from the foliage, and growing in a spongy layer over the branches and trunk. The forest at this level (usually above 9,000 feet) is almost continuously enveloped in cloud, and moisture drips continually from the vegetation. The montane cloud forest is composed of a single tree layer reaching a height of 34-40 feet, in which species of Myrtaceae and Podocarpaceae are dominant. (Ibid., 87.)

(c) Alpine Vegetation

The two formations, Alpine Shrub and Alpine Grassland, described by Robbins, occur in the Goroka Valley only on the slopes of Mt Otto, above 10,500 feet. In the alpine shrub zone, tree ferns and rhododendrons are common in an association comprising also a number of other shrubs, herbs and grasses, and mosses. The alpine grassland is tussocky, with Danthonia predominating. (Ibid., 89.) Smaller grasses, herbs and ferns occur. Robbins asserts that 'Alpine grassland is basically a climatic complex...there is no doubt that alpine grassland in the Goroka-Mt Hagen area constitutes a natural and original formation with its own specific and floristic identity'. (Ibid.)

(d) Herbaceous Swamp Vegetation

In the Goroka Valley this formation is represented in poorly-drained depressions, seepage hollows and along intermittent stream beds as a Phragmites karka association. Its occurrence is local, but pure stands of Phragmites occur in the locations mentioned in dense thickets over ten feet high. These areas form valuable garden sites when drained.

Induced Communities

In support of his thesis that the grasslands of the Highland valleys are anthropogenic in origin, Robbins has argued that climatic factors are not responsible for the origin of these areas, and in addition the zones of forest and grassland show no correspondence with either soils or topography. (1960, 17.) This view was supported by botanists and other scientists attending a UNESCO Symposium on The Influence of Man on the Vegetation of the Humid Tropics (held in Goroka, September 1960). Robbins further suggests that '...different grassland communities can be correlated with the time and direction of man's migration into the Highland valleys, and his progressive removal of the forests'. (Ibid., 18.) Thus Robbins postulates that the Highland peoples entered the intermontane valleys from the east and migrated progressively westward. He finds evidence for this in the present vegetation pattern: forest was cleared by burning and ring-barking to prepare land for agriculture of a type which is based on a very thorough removal of the former vegetative cover; intensive horticulture following on this thorough clearing would soon suppress forest re-establishment, and encourage the development of grassland communities; as grassland becomes established over increasingly wider areas these areas become further and further removed from forest-regenerating seed-sources; thus the grasses become more definitely entrenched; such entrenched grasslands are found in the eastern Highlands, and are only immaturely developed, if at all, west of the Waghi Valley.

Robbins has classified the induced communities into three categories: short grassland, domestic, and successional communities.

Only the short grasslands and successional communities have relevance here.

(a) Short Grasslands

Virtually the whole of the Valley Floor is under a cover of short grasslands. These are considered to form 'a stabilised disclimax vegetation' (CSIRO Report 58/1, 80) for the reasons already mentioned. A wide variety of grasses occurs throughout the Valley, but Robbins has recognised one sub-alliance and two associations, which bear in their distribution some relation to the environmental factors of soils, climate, and drainage. The Arundinellum-Capillipedium sub-alliance covers wide areas, especially in the southern and southeastern sections of the Valley, in the drier, undulating ridge and valley region previously described. This is described as 'an extremely mixed community' in which the two grasses named predominate. An association of Themeda australis and Arundinella occurs on dry or shallow soils in the Kami Hills and along ridge tops. There are fewer species in this association, although secondary grasses of the Arundinella-Capillipedium association also occur. (Ibid., 95.) A third community, the Themeda intermedia-Imperata cylindrica association, occurs on the level terrace and fan remnants along the Asaro and Bena Bena Rivers. This community usually indicates more fertile land, as the giant kangaroo grass favours moist sites.

(b) Successional Vegetation

A tall cane-grass, Miscanthus floridulus, whether occurring in dense stands or in scattered clumps, forms the dominant tall grassland. In the Goroka Valley it is found most frequently and

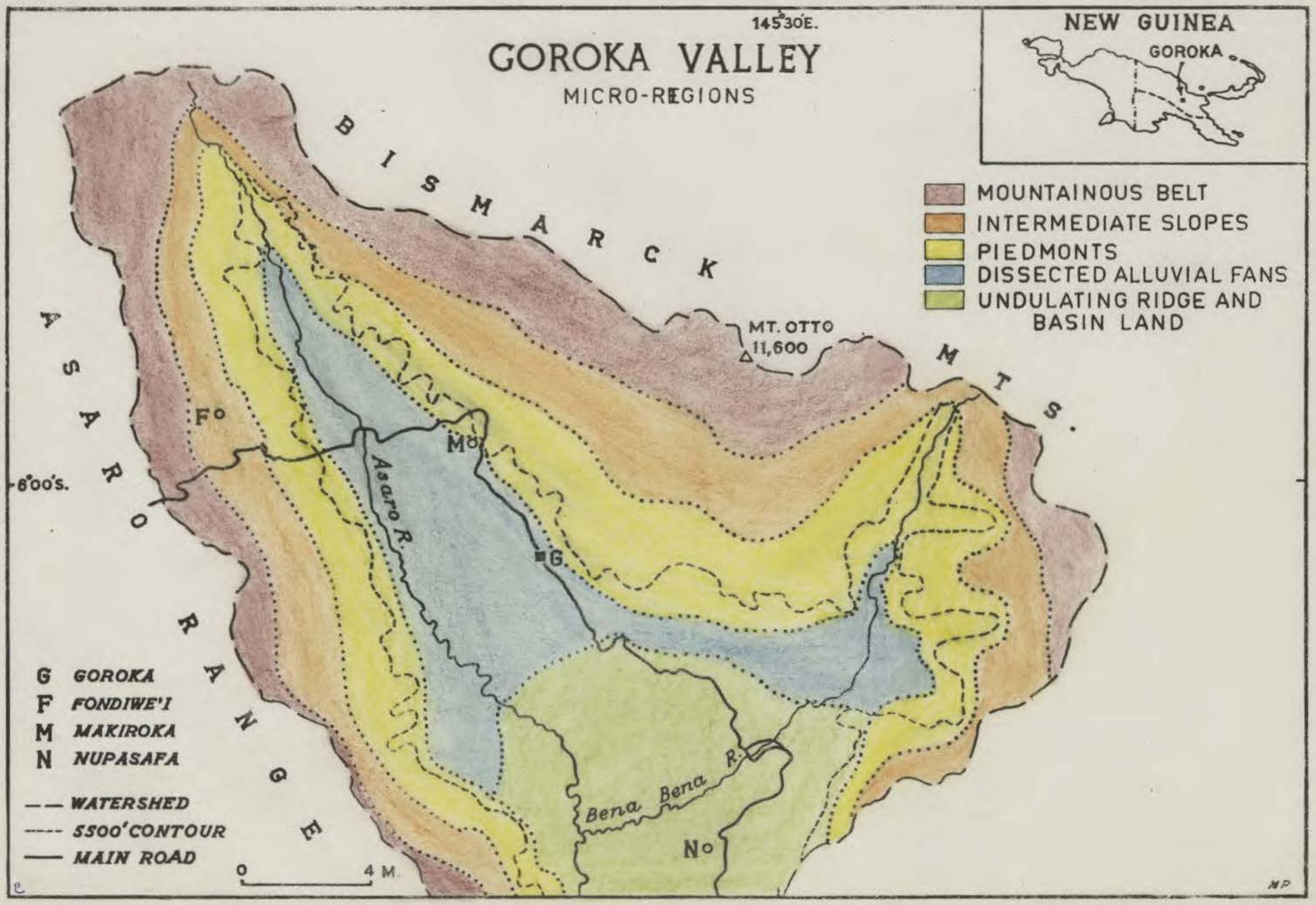
Plate 5. Short grasslands in the middle Asaro Valley, Mainly Imperata and cane grasses. The trees are mainly planted Casuarinas.

most densely in the tributary valleys of the Asaro and Bismarck Ranges, but it occurs in the driest and in the most densely-occupied areas as well. Robbins asserts that Miscanthus is 'typical of all unused land' and also that 'it may be found as an undergrowth of tall secondary forest or co-dominant with re-growth shrubs and trees'. (Ibid., 97.) Thus Miscanthus communities are postulated as representing a dynamic status, being intermediate between the stage of natural forest and the stage of a stabilised disclimax, represented by the short grasslands. (Robbins 1960, 8.)

Summary

Although only brief references have been made here to the other Highland valleys, they suggest that considerable diversity exists within a broad framework of uniformity for the inter-montane valley system. The diversity of the physical environment has been demonstrated more fully within the Goroka Valley, and on the basis of geological origins, terrain, climate, soils and vegetation, distinct areas may be delineated within which there is a high degree of environmental uniformity. An analysis of these physical characteristics suggests that five 'micro-regions' may be recognised in the Goroka Valley. These regions are briefly described here, and shown on the accompanying sketch map.

The Mountainous Belt includes all areas above 8,000 feet altitude, and forms a rim around the northern half of the Asaro Range continuing along the Bismarcks as far east as the Bena Gap. The rock formations are metamorphic, the topography youthful, steep and rugged. Rainfall is heavy, temperatures never high,


145°30E.
GOROKA VALLEY
MICRO-REGIONS
NEW GUINEA
GOROKA
MOUNTAINOUS BELT
INTERMEDIATE SLOPES
PIEDMONTS
DISSECTED ALLUVIAL FANS
UNDULATING RIDGE AND BASIN LAND
BISMARCK MTS.
ASARO RANGE
MT. OTTO
△11,600
6°00's.
F°
M°
G
Asaro R.
Bena Bena R.
N°
G GOROKA
F FONDIWE'I
M MAKIROKA
N NUPASAFA
WATERSHED
5500' CONTOUR
MAIN ROAD
0
4 M.

and cloud cover is a more or less constant feature. These mountains are forested almost entirely up to the tree line (about 10,500 feet), above which alpine shrubs and grasses replace the forest. Land use potential is virtually nil: there is no cultivation except for isolated small pockets at the lower level. The only potential resource is the forest cover, which has commercially-useful timbers, but attention must be paid to reforestation and erosion control.

The Intermediate Slopes region is a belt of sharply-dissected hill-and-valley terrain between 6,000 and 8,000 feet above sea level, on the eastern slopes of the Asaro Range and the southern slopes of the Bismarck Mountains. The topography is youthful, most slopes unstable, and stream erosion active. Rainfall is between 80-100 inches annually and there is no pronounced dry season; mists are very common. Although remnants of the lower montane rain forest are found on uncultivable slopes, most of the vegetation is secondary, with Miscanthus, pandanus, and tree ferns occurring commonly. This land is cultivable but is of low to moderate fertility only: at present the land use is subsistence agriculture, as this region lies above the altitudinal limit for the cash crops at present cultivated.

The Piedmonts virtually encircle the Valley except for a section in the southeast. They occur at a general altitude of 5,500-6,000 feet, and here the greater stability of slopes gives rise to a more mature topography and soil development. Rainfall is 80-90 inches annually and temperatures a few degrees higher than on the intermediate slopes of the ranges.
The vegetation is secondary, predominated by a mixture of tall

and short grasses, mainly Miscanthus, Saccharum species and Imperata. The present land use is mixed subsistence-commercial cropping; although the piedmonts are of moderate fertility, other factors of a non-environmental nature ensure that subsistence agriculture predominates.

The Dissected Alluvial Fans occur in two separate units, one surrounding the middle reaches of the Asaro River, the other in the middle Bena Bena Valley. The fans are at an altitude of 5,000-5,500 feet, and the combination of fairly level surfaces, fertile soils, adequate rainfall, and moderate temperatures results in a zone of relatively high agricultural potential. The vegetation is a mixture of induced grasses, with Imperata dominant. The present land use includes the cultivation of both subsistence and commercial crops; the latter grow well, and while this region already supports the greatest concentration of commercial cropping, there is scope for even more intensive cultivation of such crops on the old alluvial fans.

A belt of Undulating Basin terrain, characterised by low ridges and broad shallow valleys, extends across the lower Valley in the south and southeast. Relief is low and the topography rounded, with the exception of occasional deep gullies. The soils here have developed on alluvial and lacustrine deposits, but the additional factors of low rainfall and a vegetation cover of short grasses result in an area of only low to moderate potential. Over most of this region rainfall is relatively low, below 70 inches annually. While both cash and subsistence crops are grown throughout, they are likely to suffer occasionally from the exigencies of the climate. This area is less densely

populated than the rest of the Goroka Valley, and scope exists for the extension of livestock industries rather than agricultural pursuits.

The recognition of these regions is of some relevance in an evaluation of their contemporary occupance, and of their potential for development by a society whose subsistence-orientated economy is fairly rapidly being converted to broader bases. A full discussion of the native economy in the Goroka Valley is made in Chapter IV.

Chapter II

THE PRE-CONTACT SOCIETY

Origins

Little is known of the origins of the Highland people, a group numbering over 600,000 in the Australian territory and some 300,000 in the Netherlands territory.

Physically, a typical Highlander is of medium stature, brown-skinned, lean and muscular, with crinkly negroid hair and rather heavy features. Wide variations from this 'norm' are likely to occur in stature, facial features, and skin colour, some being so light that they are called 'red-skins' by their own people, and their hair is correspondingly reddish or even blonde.

Average height of the Goroka natives was found by Kariks et al. (1960, 231) to be 60.75 inches for males, 57.36 inches for females. Mean weights were 120.6 pounds and 105.5 pounds for males and females respectively.

However, although considerable differences now exist in social organisation, customs and ritual, and dress, as well as physically, it does appear likely that the eastern Highlanders at least (from the Kainantu plateau to the Goroka Valley) came from a common stock.

Attempts have been made by research workers in the fields of linguistics (Wurm 1957, 1959, 1960, 1961), archaeology (Bulmer 1960), botany (Robbins 1960, 1961), and blood grouping (Mackintosh et al. 1958; Kariks et al. 1960) to shed light on

the past history of these people, but little has thus far emerged except that they have been in the Highlands for a very long time.

Using glotto-chronological datings, Wurm (1961, 22-3) estimates that a period of perhaps 5,000 years has been involved in the separation of the most distantly-related of the Highlands languages. He has shown that forty-seven of the sixty Highlands languages derive from a single Language Stock, consisting of four Families which are 'fairly closely related'. (Ibid., 16). Wurm points out that the linguistic situation in the Highlands is markedly different from that of most other parts of Papua-New Guinea, in that each Highland language is used by a much larger number of speakers, and that the East New Guinea Highlands Stock embraces some 731,000 speakers, which is between one-third and one-half of the total population of the Territory. (Ibid., 14.) Furthermore, he has noted that there is a distant relationship between this Highlands Stock and the languages of the Huon Peninsula, Binandere Group (along most of the coast and hinterland of the Northern District), and a group in the Baliem Valley in Netherlands New Guinea. (Ibid., 23.) However, no connection has yet been established with any language outside New Guinea.

There is widespread evidence to suggest that a group of people whose culture was markedly different from that of the contemporary Highlanders once occupied these valleys. This evidence is in the form of artifacts such as stone mortars and pestles, club heads, human figures and heads, bird figures, and axe-adze heads. These are no longer made or used (except sometimes ceremonially), and suggest that the present Highlanders are a later migration. There are no legends of the people

associated with these earlier artifacts. Preliminary work by Bulmer has been unable as yet to offer any conclusions for these artifacts, although she finds that more recent tools 'appear to be virtually identical with many pieces recently illustrated from Southeast Asia' and that 'there is surprisingly little parallel material in the Australian record'. (1960, 15-16.)

Blood group surveys have been undertaken in the western Highlands in 1955-7 (Mackintosh, Walsh and Kooptzoff 1958), and in the Goroka Sub-District a survey of some physical characteristics of the natives has been carried out (Kariks, Kooptzoff et al. 1960). The results of these surveys are tentative only, and the most significant statements are summarised here:

> In view of the volume of the blood group data of these highland people, it is disappointing that their origin and their relation to other New Guinea peoples remains inconclusive.
> .....
> One of the authors (N.W.G.M.) suggests that...all the highlanders are the product of hybridisation between an earlier stratum which occupied the entire island from coast to coast, and a later immigrant wave. Mixture of the later arrived people with the earlier inhabitants obviously has not occurred uniformly in all parts of the occupied territory, and in general, the coastal belts show preponderance of the later immigrants, compared with the highlands. (Macintosh et al. 1958, 193.)

It is further suggested that, on the basis of the 'S gene' frequencies, which are high in the western Highlands and drop sharply at the Goroka Valley, possibly each of these groups migrated into the Highlands via different routes. (Ibid., 191.)

> In general the blood group pattern in the Western Highlands is similar to that in other parts of the island of New Guinea, but the blood group gene frequencies differ regional populations outside New Guinea where ethnic links might be sought. In fact, the overall New Guinea pattern differs markedly from those found

> in other Oceanic populations and in the Asian populations so far tested and it does not appear possible to designate any combination of existing ethnic groups which, on hybridisation, would have produced a similar pattern. (Ibid., 196.)

According to Robbins, a much shorter period of time than Wurm's 5,000 years would satisfy the botanical evidence. Basing his thesis on the rate of change from forest to established grassland by human agency, and on the evidence of plant migration, he suggests that the Highlanders entered from the east, via the Ramu-Markham, and moved progressively westward, and that the stabilised short grasslands of the eastern Highlands may suggest a history of settlement of more than 1,000 years. (Robbins 1961). Robbins' thesis is supported to a certain extent by the legends of some of the native peoples. Such information as can be gained from the natives is, however, confused: they have no means of recording events, and remembered events extend backward in time over a few generations only; furthermore, it is easy to recognise a distortion of the legends of their own history with the inclusion recently of imperfectly-understood Christian mission teachings. This is clearly illustrated by the following version of the 'origin myth' of the Kanusa tribe, which is presented as an example.

> The Kanusa, a group of people living in the upper Asaro Valley, claim that their ancestors a long time ago lived on the coast, at a place called Bambi. [It is not clear whether this was on the coast of Papua or New Guinea.] At that time, their skins were white, but they had no facial features, merely a hole on the top of the head which was apparently a mouth.
>
> A woman one day destroyed a sacred tree, and as a consequence, 'God' changed their skins to black, gave them many new languages so that they could not understand each other, and told them that they could no longer live in their old homes. He put the knowledge into their heads

> that there were empty places in the mountains to which they could go, but told them that they must take their food with them, as they would find none in their place of banishment. So they brought sweet potato, bananas, sugar cane and the edible pitpit [a native vegetable] with them. When they came to the mountains all was forested, and they had to make clearings in the forest to plant their food. [I was unable to establish the route alleged to have been taken by the ancestors, except that they came across the Kainantu plateau and followed the Dunantina River.] Some groups took up land immediately, and others wandered further west or were forced to move on by hostile groups.
>
> The story then continues into remembered events, describing the changing fortunes of the Kanusa in battle, through which they finally settled in their present location. It is also claimed that the ancestors had books and pencils, but lost them on their journey into the Highlands!

However, the botanical evidence is also inconclusive: the Highlanders cultivate in grassland areas extensively today and may have been doing so for a very long time. Perhaps Robbins' 1,000 years and Wurm's 5,000 years may be taken as limits of a possible range.

The People

It is still comparatively easy to establish the nature of the society which must have existed for centuries in the Goroka Valley. First contact with Europeans occurred only a generation ago, when the Leahy brothers and other prospectors penetrated the central mountains, and since this time the traditions have not been greatly modified. The elder men of the tribes have strong memories of the pre-contact era, and in addition the basic features of traditional society have been recorded by Europeans. Documentation is found in M. Leahy's diaries; in the reports of the initial and early administrative patrols; in the preliminary work of the then Government Anthropologist, E.W.P. Chinnery; and

in the intensive studies undertaken by K.E. Read, the anthropologist who worked in the early 1950s with the Gahuku-Gama of the Asaro Valley. I have also had personal communication with J.L. Taylor, leader of the first administrative patrol through the Highlands and a former District Commissioner at Goroka, and with members of the Leahy family who have now settled in the Highlands.

Living in the Goroka Valley a generation ago was a population of perhaps 35,000 natives at a Neolithic level of culture, their lives dominated by warfare and agriculture. In common with people in many parts of New Guinea, these people were politically fragmented, being grouped into some thirty-five or forty tribes, each numbering approximately 1,000 members. They had no sense of unity, or of distinction as 'valley' people from the occupants of the nearby uplands.

There is some variation of cultural mores throughout the Valley, and on this basis three broad groups are recognised. No names are available for these groups, as from the native's point of view any classification of groups extending beyond the tribal level would be quite artificial. The three groups are here called the Upper Asaro, Central Valley, and Bena Bena groups. (The Central Valley group corresponds with Read's Gahuku-Gama.) The differences which distinguish the groups are found in dialects, ritual, economic practice, dress, and personal adornment. However, it is important to emphasise that these criteria cannot be readily used to demarcate boundaries between the groups as there is diffusion along the borders: for example, while each group speaks a different language, the fringe tribes at least are

bi-lingual. Furthermore, there is a basic identity common to all the Goroka Valley people which distinguishes them from the Kainantu to the east and the Chimbu to the west. In actual fact, the differences which set each group apart from its neighbours may be described rather as variations on a theme, and it may be pointed out that something of a cultural continuum exists throughout the Highlands, rather than a series of discrete cultures.

The tribes of the Goroka Valley had developed no class system, and no hereditary system of leadership. Leaders were recognised but leadership in each generation was usually achieved through a combination of fighting prowess, outstanding personality, and wealth. Within each major group there were a number of tribes, which were in turn organisations of clans and sub-clans.

The following extract from the report of the first patrol through this area, conducted by Taylor in 1933, is one of the earliest accounts of the eastern Highlanders:

> The people living between Bena Bena and Mt Hagen appeared to be of two, or perhaps three, great tribes. The first extended from the Kratke Mountains, 40 miles to the Garfuku Valley. [Now the Asaro Valley. DRH.] They were a very numerous people and lived in villages of from twenty to one hundred small circular houses. They were a handsome race, clean-shaven generally, well built, and of medium height with a highly developed sense of decoration, and they delighted in ornamenting themselves with leaves and flowers. Their excellent sweet potato gardens were set out in patch-work quilt patterns, exact in design and cleanly furrowed and tilled. They grew corn, sugar and cucumbers. They displayed eagerness to get seeds of any kind. The bow and arrow was their principal weapon, and inter-tribal affrays appeared to be more or less continuous, though more general in the dry than the wet season. (N.G. Annual Report 1934-5, 116.)

The society was, and is, patrilineally organised: descent, inheritance and succession being through the males. (Read 1954a, 11.) Men occupied the dominant position in society, and maintained

superiority over the women in every sphere of activity. 'Initiating and controlling all the more important group activities, they are the guardians of custom and the repositories of knowledge.' (Read 1954b, 866.) They were characteristically volatile and aggressive. The warlike nature of the Highlanders before pacification is by now well-known: males began their formal training as warriors from adolescence, courage and endurance of pain were exemplified, and cannibalism (selective) and physical torture were customary. Women had no social or political status: their role was basically one of submission, their duties entirely domestic. The nature of this sex dichotomy, and the resultant 'group personality', are fully described by Read (1953, 1954a).

In describing the tradition of inter-tribal aggression, Read writes:

> Fighting occurred quite frequently within the tribe, but it was always concluded amicably, and is thus to be distinguished from warfare proper, which was conceived of as something which went on indefinitely, and was never 'lost'. (1952, 442.)

Alliances existed between traditionally friendly tribes, which joined in battle against traditionally enemy tribes. These attacks were carried out fairly regularly each dry season, so that year after year there were changes in the fortunes of each tribe: its members might be forced to flee and to ally themselves with a stronger group, leaving behind ruined villages and gardens and some dead; alternatively, through conquest a tribe might establish claims over new territory, although it must be emphasised that the claims could only be maintained by force of arms. Read points out that

> Each group in the course of the past three generations has suffered an amazing number of vicissitudes, compelled at times to seek refuge in widely scattered

> areas all over the valley until eventually its members were sufficiently strong to reverse their defeats. (Ibid.)

The scale of these battles is not certain. It is unlikely that all the adult men engaged in every battle, or that each act of aggression was in the nature of a full-scale formal war; rather it appears that small-scale skirmishes and sorties were more common, and that feuds rather than battles were the case. However, the early explorers have recorded being met in many areas by large numbers of armed men, usually strung out on a single front. This suggests that the men were constantly on the alert, and always ready to meet an emergency. The women were always accompanied to and protected in the gardens, the cultivation of which fell mainly to them, by a group of armed men, and villages were posted with sentries at night.

> The people live in villages which were in most cases surrounded by a barricade of split slabs up to 12 feet high if timber were available; and in the country away from the timber-clad ranges, wild cane stalks woven together formed a very effective wall; at intervals along the barricades the wall extended outwards to allow the besieged villages to protect the barricades against invaders. Getting in close to it and protected by their wooden shields the invaders would cut the vine binding it together and let in their comrades to burn the rounded grass-thatched houses and kill all to whom they could get near enough. (Leahy 1936, 230.)

As far as this tradition of warfare allowed, the population lived in settled communities. Throughout the Valley the native people lived in villages occupying permanent sites, and were subsistence agriculturalists, cultivating a defined tract of land. Within this area, food crops were rotated according to a cycle which varied in relation to the terrain, climate, and density of population of the locality.

Population Distribution and Settlement

The present distribution of population in the Valley is somewhat different from that of thirty years ago, when the overall distribution was largely determined by the contingencies of warfare. Before pacification was achieved, greater concentrations of people lived in the protection of the mountains than is now the case, a fact confirmed by the extensive deforestation of the higher hill-slopes, and by the observation that many of these areas are no longer occupied and cultivated, but are reverting to secondary growth. This is further supported by the location of villages as shown on Military Survey maps (1943-4), at which time there were still many more settlements in higher areas than there are now; and by the observations of early settlers. It was feared that the introduction of steel axes would lead to increased deforestation on the hill-slopes, but this does not seem to have taken place to any marked degree. One of the major uses of timber was for the stockades surrounding villages, and this need no longer exists. But more important, the native people are notably 'tree-conscious': forest areas are jealously preserved, and in the grassland areas trees are planted not only for utility, in providing material for the construction of houses and fences and for fuel, but also for ornamental purposes.

A considerable area surrounding the lower reaches of the Asaro and Bena Bena Rivers is even now sparsely populated, but the reasons for this are not necessarily of political origin. The area may have been game mikasi (no-man's-land) between the Bena Bena and Central Valley groups, but an ecological explanation

is more likely. Robbins states that the natural vegetation over the whole of the Valley was forest, and the Kanusa say that when their ancestors came the whole upper Valley at least was covered with forest, through which paths had to be cut and in which the garden clearings were made. This suggests that the Valley Floor, now almost completely under stabilised short grassland, has been the stage of continuous human activity for some time. If, as is claimed, the first migrations into the Valley were via the Dunantina Valley, the first areas to have been cultivated are likely to have been those which are now most sparsely populated, around the confluence of the Asaro and Bena Bena Rivers, and the avoidance of this area now is most likely due to the inherently poorer physical environment in this drier area combined with the induced decline in fertility consequent upon the establishment of short grasses.

The subjugation of the forest and the establishment and extension of the grasslands were undoubtedly achieved by burning, which was not only employed to clear ground but also for hunting small animals and, more importantly, as part of the programme of destroying all improvements on enemy territory.[1]

As has been shown, the Valley Floor is by no means an open, level plain, and certain areas of it could provide as much protection and were as defensible as the mountain valleys and ridges,

---

1 At the UNESCO Symposium on 'The Impact of Man on the Vegetation of the Humid Tropics', held in Goroka, September 1960, the phrase 'peripatetic pyromaniac' was coined to indicate that fires were also often started deliberately, for fun.

so that there have always been a number of people in more or less permanent occupation in the lower-lying areas. However, there has been over the past two decades a definite trend toward closer settlement in the Valley Floor, a trend which has by no means lessened the disputes over land ownership. Traditional enmities have not necessarily been forgotten, and conflicting claims to the ownership of the basin land, now that its defence is no longer a consideration, provide the Native Lands Commissioner, now permanently appointed to Goroka, with virtually insoluble problems, considering the uncertain tenure on which many of these claims are based.

Apart from the movements of segments of the population incurred during warfare, which were confined within the Valley itself for the main part, and apart from the necessity for some trading with other areas (mainly north over the Bismarcks to Bundi via the upper Asaro Valley, and to the Markham via the Bena Gap), the population was fairly static. There seems to have been no recent migration by Goroka Valley people beyond the Valley, although small numbers of Chimbu are now migrating into the Valley at the upper Asaro; there was, however, extensive internal migration within the Valley. As well as the actual physical danger from enemies, superstition and the fear of sorcery deterred people from travelling far, and language barriers were a further hindrance.

Since the second world war, and especially since 1950, this has no longer been the case. Large numbers of adult males from all controlled parts of the Highlands have lived and worked on the Papuan and New Guinea coasts and in the islands, under the

auspices of the Highland Labour Scheme,[2] and of their own initiative have visited other parts of the Highlands. The extension of Pidgin as a lingua franca has made communication between formerly mutually unintelligible groups possible. Of the former deterrents to free movement, only the fear of sorcery still operates in a limited form.

The villages were situated with reference to two desiderata in particular: defence and water. Formerly, defence was probably the more important consideration, and the most common village sites were ridges and spurs. Chinnery reports that villages in the Valley Floor were 'frequently built on the edge of cane swamps, which are difficult to penetrate and afford a natural protection to the inhabitants, enabling them to escape by tracks not known to their enemies'. (1934, 117.) Leahy has described the approach to one of the Asaro villages:

> For the first 500 feet we had to pass through the village's first line of defence, a deep-cut track and high cane grass growing thickly over this. At intervals we came on the village sentries posted in a cleared space on the side of the mountain commanding a magnificent view of the top portions of the Garfuku Valley. (Diary, 2 March 1934.)

Traditionally, villages were single lines of low, round, thatch-roofed houses, the walls constructed either of vertically set planks or of cane and bamboo: the women and children, and frequently the pigs, lived in these. Men and adolescent boys lived in separate men's houses, of similar design, somewhat apart from the women's houses. The villages sometimes also had an

---

2 See Chapter XII.

initiation house for the young boys and small huts for menstruating women. It is likely that village sites were abandoned more frequently in pre-contact times than they are now that fighting has ceased, but in any case a village is basically a permanent unit, and the villages which were abandoned during fighting were eventually returned to, and rebuilt if necessary. Today too, houses are rebuilt over the same sites as they decay, and the tall trees which surround many villages attest to the length of time that the sites have been occupied, as the trees have invariably been planted.

The size of the villages varies, but they may contain from under fifty to over two hundred people. In many areas, small hamlets comprising only a few houses are found, where gardens are being worked at some distance from the main village. Similarly, scattered huts for sheltering pigs are to be found throughout the fallow and grazing land.

The houses were of simple design: the floors were earth, and people usually slept on mats made from cane grass or pandanus leaf, on the ground or sometimes on low bamboo platforms. A fire was usually kept burning in the houses during the night for warmth. Cooking was done in stone-and-earth ovens, in hollowed logs filled with heated stones, or over fires in the cleared area in front of the houses, several families sharing the facilities. Traditionally the only utensils were made from bamboo or sometimes wood (which was often a trade item); in spite of the abundance of clays the making of pottery utensils was not known. Food was cooked in sections of bamboo or wrapped in leaves or roasted. Long lengths of bamboo were used for carrying

water. Personal possessions were carried in mesh bags, woven by the women from fibres. Such clothing as was worn was also made from woven fibre or from bark cloth.

Present-day villages are apt to be somewhat different from the traditional pattern. In the first place, the protective stockade has gone, and has been replaced in most villages by a low fence to keep pigs from straying into the adjacent gardens. Elementary ideas of sanitation have been introduced, and the mud and filth which characterised the villages seen by the first Europeans in this area are no longer so evident. Architecturally there are changes, and while the traditional round house still predominates, many are now built on the rectangular 'modern' style, often raised on stilts and with shutters. These latter features are an unnecessary innovation in a reasonably cool climate and in an area where the houses are seldom used in the daytime in any case. Such changes may take place rapidly: between 1957 and 1959, for example, the whole village of Lapeigu, near the Asaro River, was rebuilt in 'modern' style. The new styles are most often observed in 'mission villages' (a post-war development) which have been built by the converts to a particular faith, perhaps to demonstrate in some tangible form that they have given up all aspects of their former way of life. It is also likely that men who have worked on the coasts have introduced new styles in architecture: a characteristic of the present generation of Highlanders is their capacity and indeed their eagerness to adopt new ideas and new ways, often without selectivity, but on the whole with favourable results. The institution of the men's house has disappeared almost completely among some groups, under the influence of the Christian missions.

Plates 7 & 8. Lapeigu Village in 1957 (top) and 1959 (bottom) after the houses had been rebuilt on 'modern' design. (Plate 7 courtesy H.C. Brookfield.)

Plate 9. A house of 'modern' style, designed by the owner, and built of traditional housing materials - woven cane grass walls and thatched roof of Imperata.

Social Organisation

Although three 'culture groups' have been tentatively suggested, present knowledge of these cultures is not detailed enough to state definitely that such a separation of the Valley peoples is valid. Read has published on the Gahuku-Gama, representative of the Central Valley cluster of tribes, and research is currently being undertaken in each of the other two groups, by P. Newman in the upper Asaro and L. Langness in the Bena Bena. Until the results of the latter two investigations are available so that comparisons are possible, the suggestion that these three groups have distinct cultures cannot be confirmed. The following account of social organisation is based on Read, together with personal communications from Newman and Langness, and personal observation in the course of field work within each of the three areas.

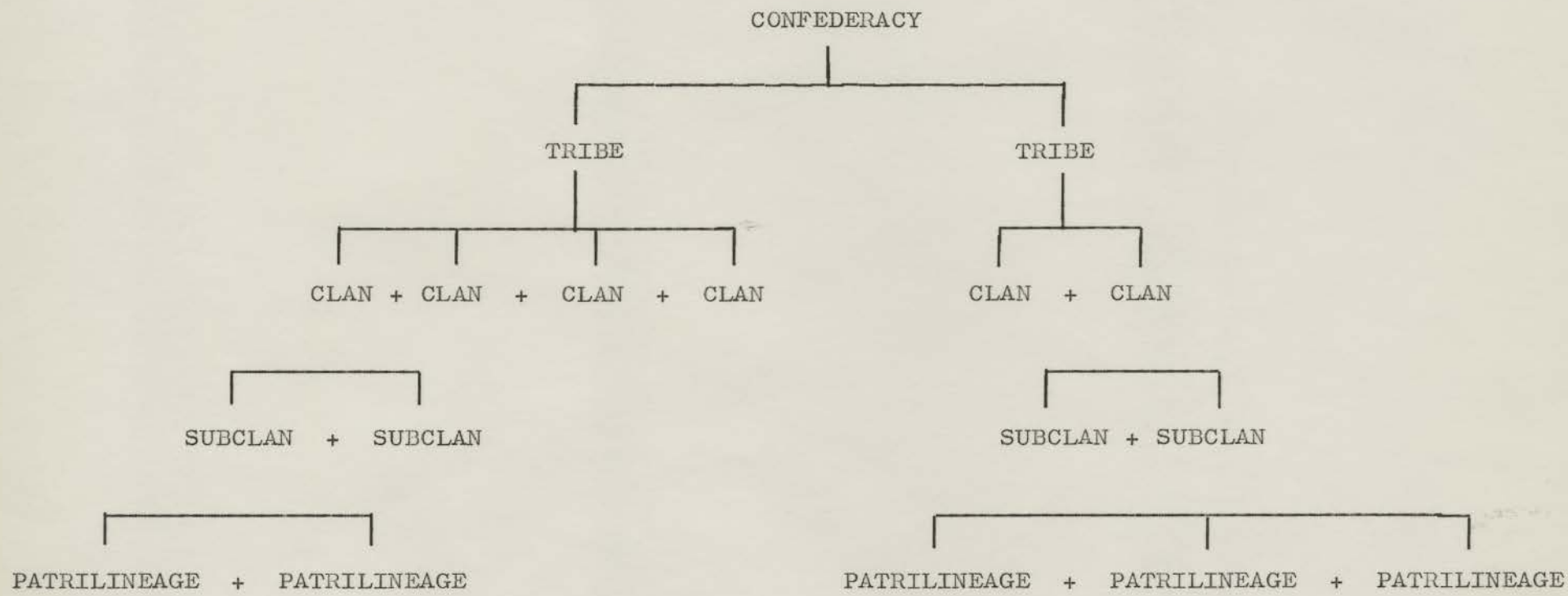
Read defines the social structure of the Gahuku-Gama thus:

> The social structure follows a segmentary pattern and is based on principles of kinship and on a balanced opposition between solitary local groups which effectively controls the use of force and takes the place of centralised political machinery. (1955, 251.)

Structurally, the social groups form a hierarchy which may be represented diagramatically. Read's terminology for the Gahuku-Gama is not fully applicable throughout the Valley: the confederacies are not always found, nor do they seem to have been permanent: the partners in a confederacy were wont to change according to the exigencies of the situation at any time. Similarly, in the Bena Bena and among the upper Asaro, there were often no groups which could be recognised as sub-clans, or such groups were functionally unimportant. The unions at the highest

SOCIAL ORGANISATION, GOROKA VALLEY

Schematic Representation



level of the hierarchy, the confederacies, seem to have existed primarily for purposes of warfare, and any festivals which were held by such large groups were usually in recognition of assistance from and debts to allies.

A group united consistently by similar loyalties was seldom much larger than 1,000 people, and frequently only half this size. These groups are here termed tribes, although in Read's terminology some of the smaller groups, numbering perhaps 500 to 600, would be termed sub-tribes. According to Read's definition of the tribes and sub-tribes their functions are identical: they each acknowledge a common name, and members have a tradition or vaguely defined belief in a common origin, speaking of themselves as 'one people'; the group did not fight internally and it occupied a continuous unit of territory; pig festivals were regarded as a corporate activity. Any alliance of sub-tribes (alliances which Read in places refers to as tribes) here becomes an alliance of tribes, or a confederacy, following Pospicil's terminology (1958). Such confederacies used a common name compounded of the names of their two major segments (the confederacies never seem to have comprised more than two tribes), although in the Bena Bena one finds some confederacies identified by a name completely unrelated to the names of either member. The confederacies generally occupied adjacent territories, but a political alliance between two tribes did not confer inclusive territorial rights to the members; under the terms of the alliance the tribes of a confederacy did not engage in formal battle against each other, although this convention seems to have lapsed if the alliance was broken.

While the confederacy was therefore primarily a political unit, the tribe was a more distinctly social unit. In its role as a fighting unit, the tribe made and endeavoured to maintain territorial claims, although it must be noted that apart from the right to graze pigs throughout the tribal land, there were no common territorial rights to tribal land by its members, these being vested in smaller units of the tribe, namely the clans and sub-clans. For ceremonial purposes the whole tribe generally functioned as a unit. The tribe was by no means a static unit in terms of size and power. Two distinct processes seem to have operated in respect of size as a result of warfare. In the first place, groups which had been decimated in battle tended to ally themselves with larger and more powerful tribes, and sometimes to become absorbed by them, but eventually a re-formation of such a group occurred, re-establishing the status quo. Read says

> I consider it can be established beyond doubt that there is a correlation between the numerical size of groups and the number of segments, i.e., as a group becomes larger numerically it tends to split into smaller segments of the same order. (Unpublished notes, 1951-2.)

No large political unions, therefore, were ever achieved. At the time of European contact, the political instability of generations still prevailed, making it now virtually impossible to delineate tribal territories, the boundaries of which were in a constant state of flux. The first conscious attempt to stabilise tribal boundaries in the Goroka Valley was undertaken in the early 1950s by District Commissioner I. Downs. Downs' policy was to accept the status quo of 1933, when the first administrative patrol post was established in the Valley by

Taylor. However, tribal fighting did not cease at this date, and it is suggested that a more valid date would have been the late 1930s or 1940, by which time control was effective, although tribal rivalries had by no means been eliminated. In any attempt to separate tribal territory, each tribe's land must be distinguished from that of its neighbours by a frontier zone of game mikasi, the ownership of which was never permanently resolved.

It may perhaps be inferred that the constant inter-tribal fighting was primarily initiated by actual land shortage, but it is suggested that population pressures in the Goroka Valley have never - at least in recent generations - been so intense that conquests for land were vital for survival. Rather it is likely that minor disputes over pigs and women (which today still form the majority of cases brought before the native courts) were perpetuated in the vendetta fighting, and that the acquisition or destruction of enemy territory was a secondary consequence, and more a matter of prestige.

The continuance of disputes over land during the 1950s was in places intensified by the acquisition of land by Europeans. Land alienated to Europeans lies largely in the Valley Floor, and a desire to share in the proceeds from the sale of this land, or to use the European as a scapegoat to settle scores against rivals, has perpetuated the conflicting claims of ownership between those groups once occupying the land and those who held it at various times after conquest. It was for this reason that Downs undertook to define tribal territories. A case history of a land dispute involving Europeans is given at the end of the thesis in Appendix B.

The clan is the most important of the levels of segmentation, and its members demonstrate a cohesion not acknowledged in larger groupings. Each tribe consists of two or more named, linked, clans, the linking tie being that of distant kinship. The members of a clan find its raison d'être in their descent from a common, but unremembered, ancestor, whose brother or brothers were ancestors of the other clans comprising the tribe. It is not possible to trace these progenitors genealogically, as native memory does not extend back beyond three or four generations in most cases. Clans are normally exogamous, especially in the case where only two clans comprise a tribe, and patri-virilocal, but exceptions can be found to both these rules today. The size of the clans varies, but they are usually not much less than one hundred and not much greater than three hundred people. Clan members occupy a core of land within the tribe's territory, the sum of the clan lands being that of the tribe's land. As a rule, clan members reside together in one village, although in larger clans there is usually one large village and one or two smaller ones. Pig festivals and initiation ceremonies were corporate activities for the clan's members. Fighting never occurred among the clan members. The land-holding rights of clans are discussed in more detail in Chapter IV.

Each clan usually consists of two or more un-named sub-clans, whose members consider themselves blood relatives, and who live together in corporate groups. In the case of a large clan, separate sub-clans may reside in a separate hamlet; frequently the houses in the villages are arranged in sub-clan groups, the members occupying perhaps six or eight adjacent houses, and

sharing cooking fires and ovens. Clan land is often sub-divided into sub-clan parcels, and sub-clan members act together in mutual assistance for the making of gardens, contributing to marriage payments, and so on.

Read describes a final sub-group, the patrilineage, but it is generally a very small group and thus seldom acts as an independent unit. My experience is that patrilineages, and even on occasion sub-clans, cannot be readily established as functioning units, from observation of group activity and co-operation, and only extensive genealogical investigation will in fact reveal who are the members of these small kinship units.

In the present day, the most important criterion for distinguishing the relevance of the component segments of the society is their respective rights to land, which are discussed in Chapter IV; formerly, however, the unity and separateness of each segment, and its bonds both vertically and laterally with the other orders of the hierarchy, were also expressed through ritual practice.

Such then was the nature of the traditional society in the Goroka Valley. While some of the changes which have taken place in the native society as a result of European penetration, administration and settlement have been briefly mentioned, much of the former pattern still prevails. We must now turn to the discovery of the Highland valleys and their peoples by the European pioneers.

Chapter III

PIONEERS, PROSPECTORS AND PATROLS

Exploration Before 1930

In a way both the first and second world wars influenced the discovery, and later the development, of the Highland valleys. The Highlands in Australian New Guinea, excluding the Southern Highlands, all lie within what was formerly the German colony of New Guinea. During the German occupation, a period lasting from 1884 to 1914, the extension of administrative control and commercial development had not been taken very far beyond the coastal strip and those inland areas which were accessible by navigable rivers. Much of the interior was known, however, to such people as labour recruiters; expeditions had been undertaken in the Sepik and Markham Valleys, and just prior to the first world war, boundary survey expeditions were being undertaken in conjunction with the Australians and Dutch. In 1914, the Germans commenced the survey of the boundary with Papua, and had the war not intervened, the Highland valleys would certainly have been discovered in the course of this work.

The Highland valleys were possibly seen for the first time during the 1914-18 war by the German boundary surveyor, Detzner, who was traversing the Papuan boundary from the Waria northwestward. When Detzner learned of the outbreak of war, he decided not to surrender but to try to evade the Australians and reach

the Dutch territory. In his attempt to do this, he apparently traversed much of the central mountain zone, and a record of his travels is contained in 'Vier Jahre Unter Kannibalen', published in Berlin in 1921. It is, however, impossible to establish his precise routes from the text, as Detzner's notebooks had been destroyed. It is known, however, that in 1914 he was in Kuku-kuku country, and in 1916-17 he travelled from the Finisterres through the Ramu, and claims he came over the Bismarcks. Had he done so, he must have seen the valleys of the eastern Highlands. However, this claim is not supported by an accompanying map, which in no way suggests that there are large valleys in the central mountains: the whole area is shaded as a mountainous tract. Furthermore, neither Mt Wilhelm nor Mt Otto are shown, and both these peaks were known well before Detzner's journeys, as they had been sighted and named from the coast. Current opinion is that if Detzner proceeded from the Ramu west through the Bismarcks in 1916, he must have at least seen the Highland valleys, and his account does describe grasslands south of the range, but his documentation of the journey is so poor and haphazard as to make his account of very limited value.

Prospectors

The next major landmark in the exploration of the interior in this part of New Guinea was the discovery of gold at Edie Creek in 1926. The subsequent search for new goldfields led prospectors from the upper Markham tributaries into the Ramu, and thence to the Highlands, in an effort to trace the source of gold-bearing streams.

The first expedition organised for this purpose was undertaken by M.J. Leahy and M.I. Dwyer, between April and September 1930. The route of this journey took the two prospectors to the eastern fringe only of the Goroka Valley: they crossed the Bismarcks from the Ramu and came to the headwaters of the Dunantina River, which they followed to its junction with the Asaro-Purari system, south of the Goroka Valley. A hazardous journey down the Purari brought them some months later to the Papuan coast. An entry in Leahy's diary for 4 June 1930, when they were in the Dunantina Valley, reads:

> Climbed up to the top of the highest kunai ridge and could see a very big and apparently level valley west from where we were so are making over to it.... The main stream [the Dunantina. DRH] is now definitely swinging east and when joined by the new branch will probably descend to the Markham Valley in a series of waterfalls.

The big valley referred to was undoubtedly the Goroka Valley, but the party did not penetrate it on this journey; the misconception about the direction of the rivers was not finally cleared up until 1933.

In October 1930, a month after their return to their base at Salamaua, Leahy and Dwyer set out again, following their original route into the Highlands via the Dunantina. Two accounts of the journeys have been recorded by Leahy, the first contained in his diaries, the second in a paper to the Royal Geographical Society (1936). The second record contains a fuller account of the country and native people, but dates do not always correspond with those in the diaries. In the following outline, reference is made to both records; names used today are inserted in brackets.

On 3 November 1930 Leahy records:

> Camped on the Dunantina near Gavitula where we camped on our first trip a few months ago. Followed a north-westerly direction over grass ranges and small valleys not very thickly populated [Kami Hills]. Arrived at a large stream called the Bina Bina about 1 p.m. and camped in a village on the banks called Korafagu [Korofeigu]. Very big population here, and as we afterwards learned, cannibals. A big valley running away to the north-west of us, principally flat terraces of alluvial cut through by streams coming in from the ranges on either side and populated by many thousands of people, all armed with bows and arrows. No steel of any description here, all using stone axes. (1936, 238-9.)

Dwyer was ill with fever and the party camped at Korofeigu for several days. In his personal diary Leahy records:

> November 3 Went on top of a low ridge close to [Korofeigu] and am sure this stream [Bena Bena R.] does not run into the Purari but flows about NW and will run into the Ramu or Sepik, probably the Ramu.
>
> November 6 Got away from Orafaygu [sic] about 6 a.m. with a few carriers and advisers. Country is broken by deep gullies showing wash in the beds but no gold. Passed through and were welcomed and escorted away from three fair sized villages and after getting on to a fairly level tract of country and travelling across it for about two hours reached a pretty big stream coming in from the NORTH side of the valley [possibly the Omahaiga] and camped at 12 noon near the village of Asarme which is a big place containing a few hundred natives. They were frightened for a start but got friendly after a bit.... Looks as if this valley does drain back to the Purari but have not got to the main stream to make sure yet. (Diary, 1930.)
>
> November 7 Got away from AS-ARM-E [sic] 5,300 feet above sea level, about 8 a.m. Up and down over the gullies worn by streams cutting through the alluvial beds. Met hundreds of natives. Camped near the Gafuku. [Asaro R.] ...The Gafuku is a bigger stream than the Bina Bina which it joins farther to the east and both together run into the Purari. (1936, 239.)

Having established that both the Bena Bena and Asaro Rivers flowed south, in which case there were few prospects of finding gold in them, Leahy and Dwyer decided to return to the Ramu.

> November 8 Will try and break through to the Ramu. Some trade is coming in from the north so will see if there is a track out that way. Ranges are pretty high but if there are natives about it will be o.k. (Diary, 1930.)
> Travelled north-west up the valley and camping again near the main stream. (1936, 239.)
>
> November 9 Got away 6 a.m. across the valley toward the Bismarck Range through very thickly populated areas. Crossed the Bismarck Range 7,000 feet. [Probably the Bena Gap] and camped on the Ramu Fall. (Ibid.)

The party descended the Bismarcks into the Ramu Valley, following it across to the Markham and thence to Salamaua, arriving at the end of November.

This then was the first actual contact the natives of the Goroka Valley had with Europeans. The two men were invariably greeted with initial amazement and fear, which was soon followed by curiosity and friendliness. No further exploration was made through this area for two years.

In October 1932, plans were made to establish an airstrip in the Goroka Valley to serve as a base for reconnaissance of the area west of the Asaro. Mick Leahy and his brother Dan selected a suitable site on a terrace west of the Bena Bena River, and a week's preparation by a hundred natives saw it ready to receive aircraft, the first of which landed on Christmas Day, 1932, with Assistant District Officer Taylor from the Ramu patrol post. Taylor was shortly after to establish the first administrative post for the Valley at this location. In Leahy's words, 'Our communication with civilisation was opened up and the first base camp established for expeditions into the country to the west and out to the Sepik River, a project always in the back of our minds'. (Ibid., 245.)

Prospecting in the Bena Bena was carried on for several months at the end of 1932 and early 1933. Although it was not regarded as a field of great promise, the high prices gold was commanding as a result of the depression seemed to make it worthwhile to fully investigate the possibilities of the area. It was hoped to find sufficient gold to justify the installation of dredges such as were then being flown into the Bulolo Valley. Leahy hoped to receive £5,000 for each dredge put into operation.

On 11 February 1933 the Leahy brothers and Marshall (of New Guinea Goldfields Ltd) set out from the Bena Bena base to investigate the area to the south and southwest, prospecting for gold as they went. Leahy reports on the 19th: 'Good colours found but not sufficient for dredging'.

> February 21 At the junction of the Bena Bena and Garfuku rivers. Some excitement here from natives who were seeing white men for the first time. Saw gorge through which the drainage from the western tributaries of the Purari enters the main stream, which puzzled us before on our last trip. (Diary, 1933.) [This reference must be to the Asaro gorge.]

During February 1933, the party crossed over the Asaro Range through the territory of the Yabiyufa tribe, proceeded west to Mt Elimbari and the Marifutiga River, sighting the vast Waghi Valley for the first time. They then returned to the Bena Bena base, following the Marifutiga upstream and re-crossing the Asaro Range in the north, probably in the vicinity of Korfena or Miruma. Leahy mentions 'steeple-chasing over thickly populated cultivated ranges' and 'dropping down to the Gafuku river, passing through hundreds of people'. (1936, 246.)

During March reconnaissance flights were made over the Waghi as a preliminary to exploration by a ground party, and at the end

of the month Dan and Mick Leahy accompanied Taylor and the surveyor K. Spinks in a joint patrol to the western Highlands. This was the first administrative patrol conducted in the Highlands, and reporting on the patrol at its conclusion, Taylor wrote:

> Many thousands of natives whose existence was previously unknown, had been visited. A new mountain range and several valleys had been discovered; and it is now reasonably certain that all the rivers running south from the Bismarcks eventually join the Purari, the great Papuan river which enters the sea in the Gulf of Papua; also it is definitely established that the main range, which was hitherto believed to be a backbone of high, forest-clad uninhabited mountains, is in these parts at any rate a cartographic myth, and in its place we have a fine grass upland region, which may prove to be the best and most important part of New Guinea of the future. (N.G. Annual Report, 1933-4.)

During 1934 the Leahy brothers made four more exploratory journeys in the western Highlands, operating from a base and airstrip established at Mt Hagen. On one of these they were again accompanied by Taylor.

The Establishment of Administrative Control

For the Goroka Valley the stage of initial discovery and contact was over. During the expeditions of late 1930 and early 1933, much of the Goroka Valley was traversed and many of its people contacted. It now remained, in Taylor's concluding words, 'to bring to the inhabitants the pax Britannica'.

But to establish the pax Britannica among many thousands of primitive and warlike people was not a simple matter. The Leahys reported that during early 1933, when they were based near the Bena Bena airfield, they were constantly being prevailed upon to assist tribal groups in their battles with enemy tribes. Their departure in February was delayed until a 'plane brought rifles

and ammunition for the protection of the members of the party left at the Bena Bena base'. A year later, Mick Leahy's diary has the following entry:

> 22 February A rather strange thing has happened at Mahometofi. One man has died a natural death and they can't quite understand it, death by arrow being the usual way. The death rate in this area alone from fighting is appalling, and every day we are getting particulars of more deaths of people we knew when we were here before. (Diary, 1934.)

It is perhaps an exaggeration to say that death from natural causes was so rare, but tribal fighting was by no means halted by the temporary presence of a few Europeans. The resumption of fighting among the tribes near the airfield was partly due to the fact that late in 1933 New Guinea Goldfields decided against continuing mining operations in the area. The dredging equipment that had been flown in at the end of 1932 was moved out in October 1933, and in Leahy's words:

> 21 October So ends the chance of Bena Bena ever seeing a dredge ploughing up the gravel. However it has done a lot towards bringing the locals to see that the white man does not get hostile just to show his superiority over their weapons. (Ibid., 1933.)

But not all prospectors were as humane as the Leahys and their parties. Much ill-feeling had been caused by the maltreatment of natives in this area by Schmidt, a prospector who was later hanged at Rabaul for his offences against natives. A series of murders of Europeans throughout the Highlands occurred in the early 1930s. McGrath, a prospector, was killed at his camp at Finintegu in late 1933; a year later two Catholic missionaries, Father Morschauser and Brother Eugene, were killed in the Chimbu; three prospectors, Baum, Karius and Naylor were killed by the Kukukukus and a patrol investigating the murder of the two

latter men was ambushed. It became apparent that the time was not yet safe to permit free movement of Europeans throughout the area. These events 'led to the establishment of regulations virtually closing the uncontrolled interior regions to further prospecting'. (Leahy 1937, 287.)

The Highlands remained classified as uncontrolled territory until after the war. However, during this period a certain amount of contact between natives and Europeans was maintained. Patrols during the early 1930s were conducted from the Ramu Police Post (now the Sub-District headquarters at Kainantu); a permanent station in the Goroka Valley was not set up for some time. The original post at Bena Bena was not maintained, although the reason for this is not certain. Either it lapsed when New Guinea Goldfields Ltd decided not to continue prospecting there, or it was shifted to Finintegu after McGrath's murder. Patrol Officer Black, conducting a patrol from the Finintegu Base Camp in the latter months of 1934, commented on the Bena Bena Post:

> It was a great pity this post was abandoned. No good can result from entering an area and leaving it before consolidating our influence there, and when done, the work of recovery is usually more difficult than the initial penetration. Now that the Finintegu area is sufficiently advanced, the intention is to reopen the Bena Bena post.... Since the evacuation of the Bena Bena area by European miners and their parties, tribal fighting has once more broken out, and further patrols will have to be made in the area to prevent the trouble spreading. As long as one European was in the area no serious inter-village hostilities occurred. The evacuation of the area is to be regretted, as these natives had made considerable progress whilst the station was in the area. (Patrol Report B16/34-35, 9.)

On the value of the patrol posts, Black says:

> A patrol officer's influence is, necessarily, by its very nature transient. An established base camp is a tangible reminder of the Administration's influence,

> and as such would act as a deterrent when hostilities and wrong-doing were contemplated.... If a base camp had been established at Bena Bena at the time of his [E.M. Peacock, a miner] departure, it can confidently be asserted that the outbreak of hostilities would not have occurred, even if such a base camp had only been visited once a fortnight or at even longer intervals. (Ibid., 10.)

Documentation of the events between 1935 and 1945 is difficult. The area came under the administrative direction of the District of Morobe, the headquarters of which were originally at Salamaua, later at Lae. Official records of the pre-war period were destroyed during the war, and all that survives are a few patrol reports. No reports of patrols conducted after 1935 are available for the Goroka Valley, nor are there records of the establishment of the Government Station at the present site of Goroka, or of the development which took place subsequent to this. The information for the decade 1935-45 was largely obtained from personal communication with Europeans who were in the Valley either as administrative officers, missionaries or prospectors, and is unavoidably sketchy. It has also been possible to reconstruct something of the achievements of this period from the military maps made for the area, surveyed in 1943 and compiled in mid-1944, although maps for the whole Valley are not available.

After the Morschauser-Eugene murders a post was established in Chimbu, and for some years this was the principal administration post in the Highlands. The earlier contacted areas further east were in some measure neglected. By mid-1939 the present site of Goroka had become the Government Station, but the name Goroka (or Garoka, as it was initially) does not seem to have been applied until during the war years; in 1939 it was still referred to as

the Bena Bena Station. The original post at Sigoiya near the Bena Bena River was not maintained, and it is not certain that it was ever re-established, as Black had recommended. The military maps show that a native hospital had been established at Seigu, a few miles east of Goroka, by 1944, and that a number of Government Rest Houses had been constructed between Goroka and Kainantu. A jeep road had been constructed between Goroka and Kainantu by 1944, and there were a number of airfields in existence at that date. In the Goroka Valley the original Bena Bena airstrip constructed by the Leahys had been converted by American forces to accommodate DC3 aircraft. Three airfields are shown on the military map at the site of Goroka: the original one in what is now North Goroka was for light aircraft only; another main strip, which is still the airfield today, was built by native labour under the auspices of the RAAF at the end of 1943. The road, rest houses and station buildings, as well as the airfields, would all have been constructed by native labour, largely local.

Christian Missions

The first mission to be established in the Goroka Valley was the Lutheran mission at Asaloka in 1935, under Pastor Helwig. He remained until about 1942 and was succeeded by Pastor Goldhart, who is still with the mission. The military maps show that a mission had been established also at Sigoiya, near the original Patrol Post. This was the Seventh Day Adventist mission, which is in this area at present. In general terms, the eastern valleys of Kainantu and Goroka were penetrated pre-war largely by Lutherans, and Chimbu and the Waghi Valley in the west by Catholics.

In his patrol report of 1934, Black comments on the missions operating between Kainanatu and Mt Hagen:

> While no doubt they will aid materially in its pacification, they are, at the moment, the only ambassadors of the new era. There is keen rivalry between the Catholics and the Lutherans, as well as between the German and American branches of the latter, and if inference may be drawn from the number of applications for land, there are indications of a race for religious control of the new people. I am not at all sure that this state of affairs is in the best interests of all concerned, and I suggest that the development calls for better administration control by the establishment of government posts. (Ibid., 1.)

The 'race for religious control' was not as marked in the Goroka Valley as it was further west; although the area was closed, entry to the Highlands, especially from Madang, could not be controlled, and a number of missions were in fact established in advance of administration posts. Once in an area, little could be done to prevent a mission from remaining. For the Goroka Valley, the establishment of missions has not had any major disruptive effects, and the benefit applied not only to the natives, but also assisted an under-staffed administration in the establishment of control. Both the Seventh Day Adventists and the Lutherans established second missions in the Valley, so that each mission now has an Asaro and a Bena Bena station. The Catholic mission operates mainly in the upper Asaro, although it has schools at various locations throughout the Valley. These latter missions were all set up after the war.

Later History

During the war, New Guinea was administered by ANGAU,[1] which imposed military rule over the island, but was also responsible

---

[1] Australian and New Guinea Administrative Unit.

for the maintenance of law and order and for the promotion of native welfare as far as this was possible during the emergency. The Highlands, however, were never a theatre in the New Guinea fighting, and contributed in a very small and indirect way only to the war effort. Vegetable 'farms' were established at several centres, including Goroka, to supply food to troops on the coast, but these were never a large enterprise. (Bowman 1946, 437-40.) A Rest Centre for the recuperation of troops was established in Goroka for a short period in 1945. There was a fairly heavy demand for native services as carriers and as labourers for the roads and airfields. However, the fact of the war was widely realised among the Highlanders, and today men still talk of the war as the 'time no good' or the 'time belong fight': it is interesting to speculate about their reactions to the war in the light of the pacification policy being enforced by their peers!

Civil administration was restored throughout New Guinea by 1946. By the end of the war, the natives of the Goroka Valley had become accustomed to the movement of aircraft and troops. The core of a communications system had been established. Patrolling had brought about the cessation of tribal fighting. The Highlands remained an uncontrolled area for several more years, however, but by the end of the 1940s a new era was dawning. In the first place, under the heavy demand for labour to rehabilitate and develop the coastal areas, there were in effect mass movements of Highlanders to the lowlands. Secondly, a new group of Europeans came to the Highlands, to settle and engage in various forms of private enterprise: coffee planting, trading, and service industries.

Finally, the Administration was at last able to undertake a programme for the improvement of native welfare, which included the introduction of a new economy. These developments have brought about still greater changes in the native way of life than did those of the first two decades of contact with Europeans. But before these changes are examined, it is necessary to discuss the traditional economy of the native society, which was rooted in the land.

Chapter IV

NATIVE AGRICULTURE: TRADITION AND INNOVATION

General

The economy of the Highland societies is based traditionally on subsistence agriculture. Land is a Highlander's most valued possession, indeed his only permanent one, and until very recently his whole existence was spent within the frame of reference provided by the land he owned or to which he had access. Every man owned land which he inherited patrilineally and which was divided among his sons on his death: there was no such thing as a landless group. Within the limitations of his cultural and physical environment the Highland native uses his land with a degree of skill which is not surpassed or equalled in New Guinea.

In the Goroka Valley as in other parts of the Highlands the natives possess an understanding of their environment. In addition to naming major physical features such as mountains, ranges and rivers, they recognise and name different soil and rock types; many species of vegetation are named and their value, real or attributed, is widely known; animals, birds and insects are named; the varying agricultural potential of different classes of land is realised and cultivation cycles adjusted accordingly; some attempt is made at soil conservation practices. Seasons and winds are not named, but with the exception of a swathe of country in the south of the Goroka Valley, occupied roughly by the Yabiyufa,

Plate 10. Aerial view of a clan's lands, showing the nucleus of houses in the village, a small hamlet, and fenced gardens and adjacent fallow areas. Note the location of the village on the crest of the ridge.

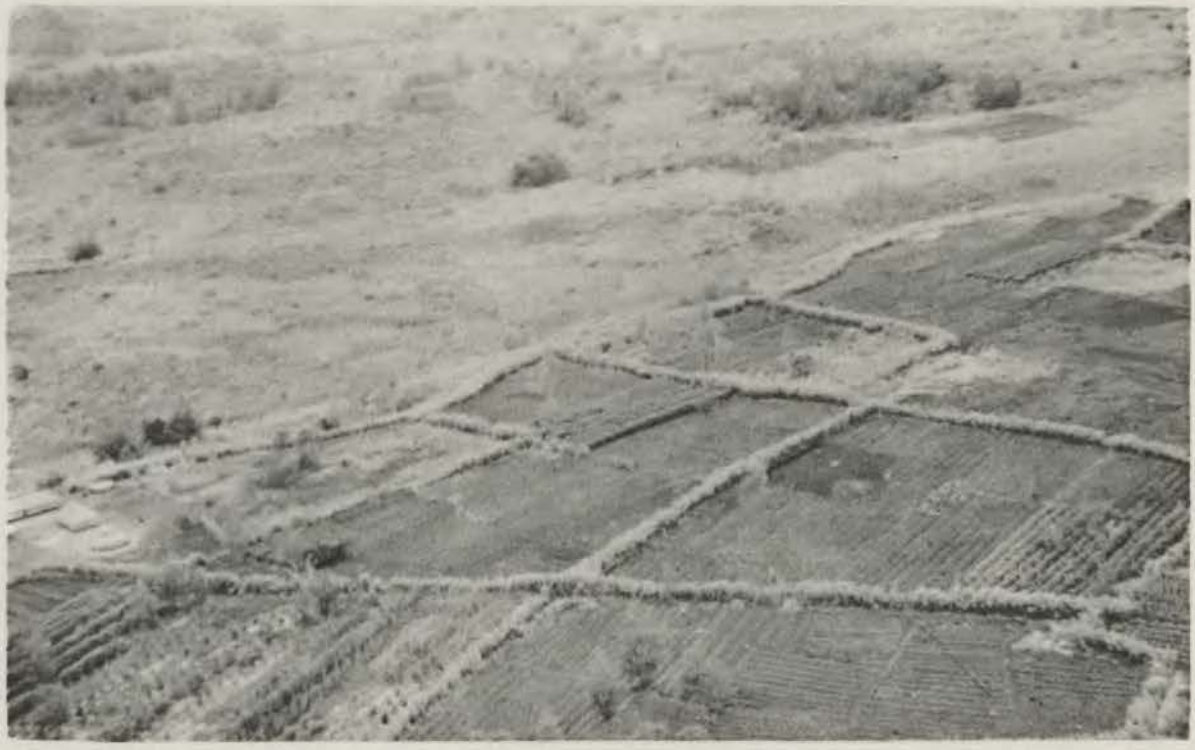


Plate 11. Native gardens, containing sweet potato and coffee (in left foreground). The fences are now hedges of cane grass, indicating that this land has been cultivated continuously for some time. Individual plots can be distinguished by the direction of the rows in the gardens and by gutters.

Kami and Korofeigu tribes, a twelve-month growing season seems to exist virtually throughout and seasonal change is not a critical factor in terms of its effect on productivity.

Highlanders do not practise migratory agriculture: each man cultivates land within the territory of his clan of residence, the cultivable land being cropped and fallowed on a rotation system, a variable depending on the terrain, climate, and density of population within the locality.

Throughout the Valley, sweet potato (Ipomoea batatas) forms the staple crop, and pigs the main source of wealth. A considerable range of secondary crops is grown, some for food, and others for fibres, dyes, building materials, decoration, and for their reputed medicinal and magical qualities. In addition cash crops are now widely grown - an innovation of the 1950s - and some of these have been added to the diet.

Each clan of people lives in villages more or less centrally located in the land owned by that clan. Few clan territories are so large that they cannot be traversed from end to end in an hour's walk, but even so it is rare to find a clan territory which does not contain dispersed hamlets and single houses in the garden land, where a man or his wife and pigs will lodge temporarily. The overall impression gained from this landscape is of patches of land intensively cultivated, with fenced gardens interspersed with casuarinas surrounding the village or villages; adjacent stretches of land under a predominantly grass and shrub cover containing evidence of former cultivation in the occasional trees, remnant banana groves, clumps of bamboo and cane-grass hedges - these fallowed areas are the grazing ground for pigs;

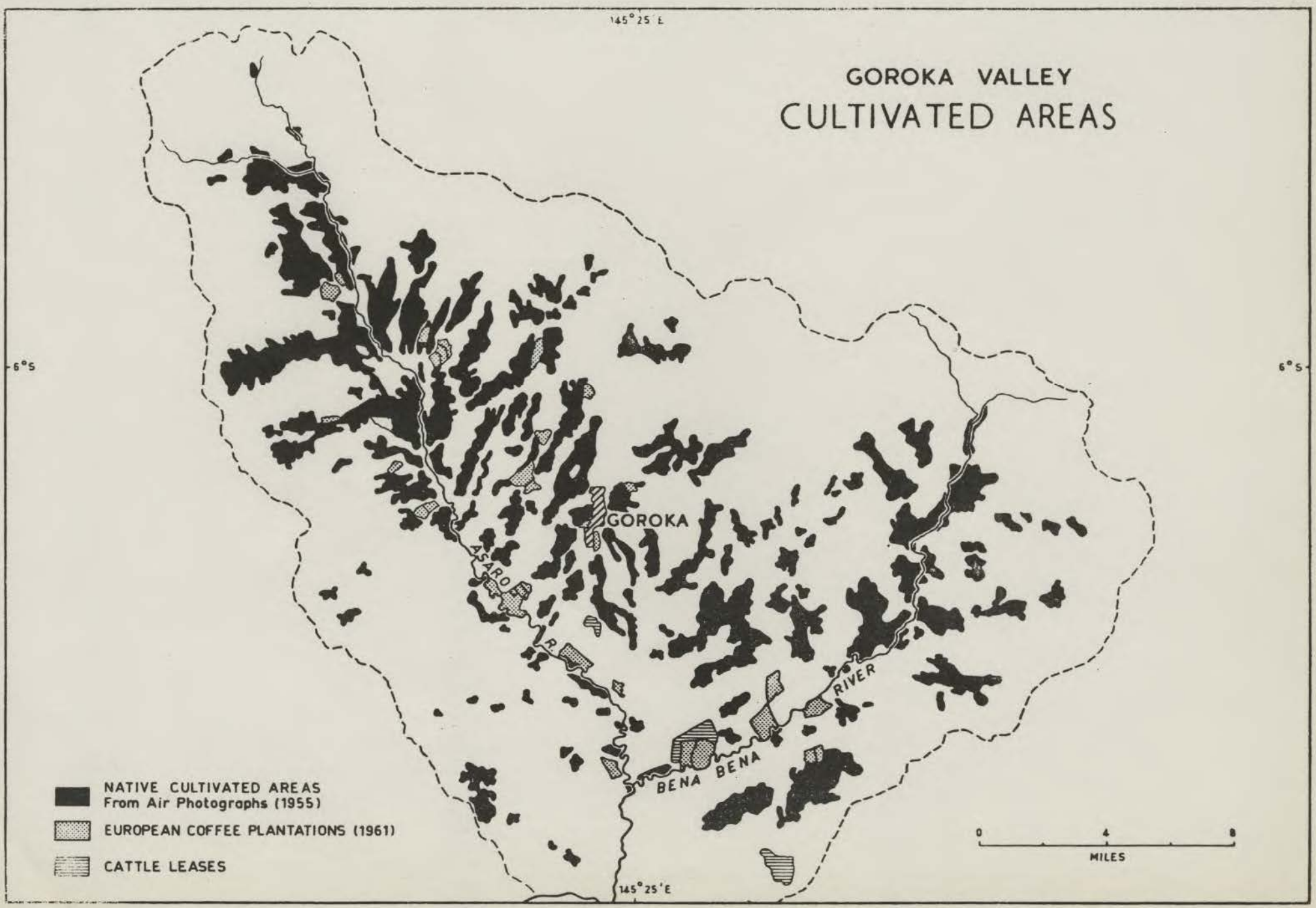
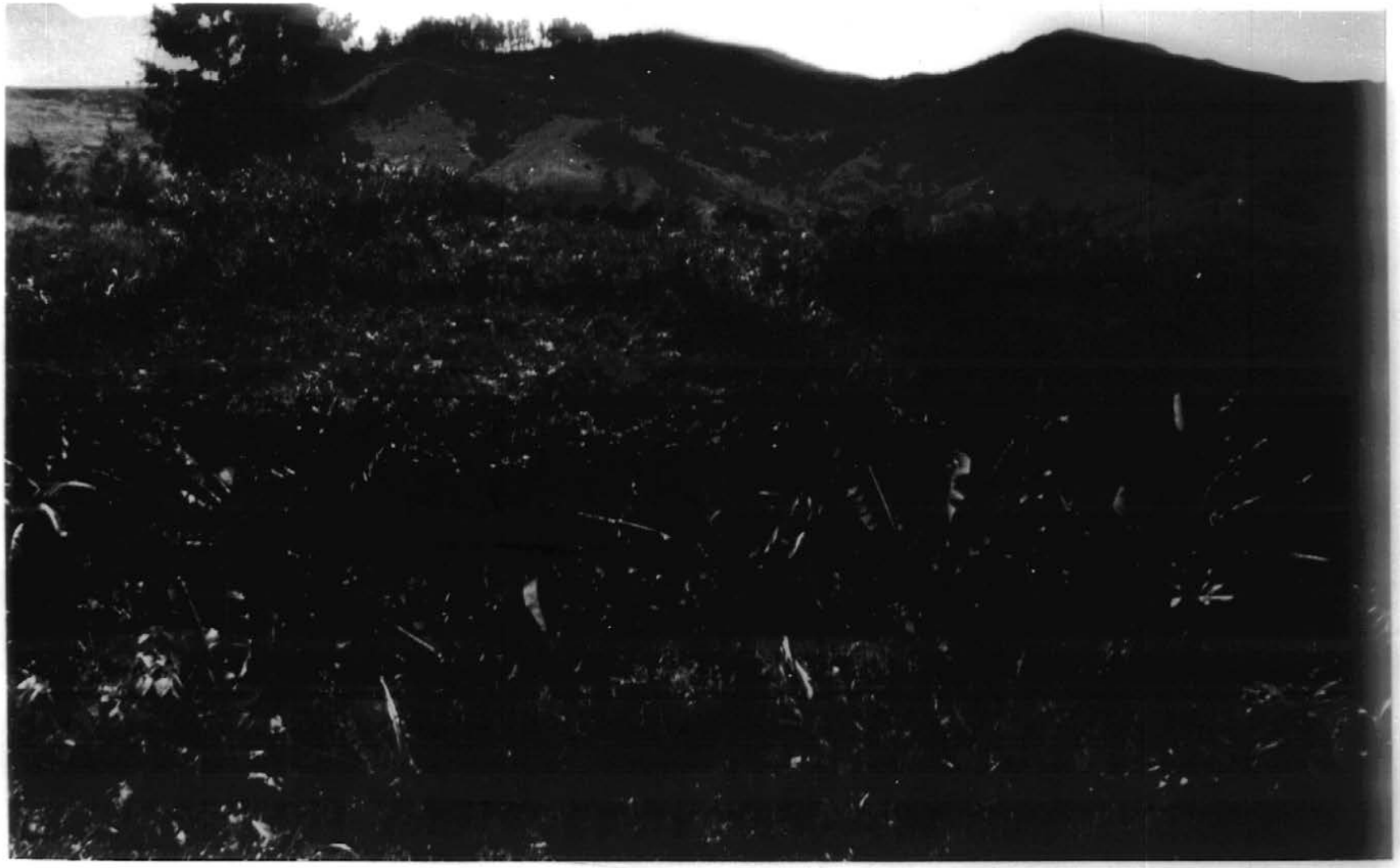

GOROKA VALLEY
CULTIVATED AREAS
145° 25' E
6° S
GOROKA
ASARO R.
BENA BENA
RIVER
NATIVE CULTIVATED AREAS
From Air Photographs (1955)
EUROPEAN COFFEE PLANTATIONS (1961)
CATTLE LEASES
0
4
8
MILES
145° 25' E

Plate 12. Fallow garden land. Note the remnant banana grove, the boundaries indicated by cane grass hedges (formerly fences) and the cover of short grasses.



and dense stands of trees only where land is uncultivated or uncultivable, in gullies or near the larger streams and high in the mountains.

Land Tenure

The pattern of land-holding and rights to land is best seen against the background of social organisation. For the members of a confederacy there were no territorial rights, as a confederacy was a more or less temporary alliance for political purposes. The only territorial right common to members of a tribe was the right to graze pigs anywhere within their tribe's land which was uncultivated. Each tribe's land was divided into units owned by the member clans, and only at this level are cultivation rights exercised.

The lands of the component clans of each tribe are clearly defined, often by creeks, gullies or crests of ridges, and sometimes also by fences, hedges, or a row of plants such as the cordyline. At the clan level, all members have access to the grazing areas within the clan territory, and the right to cultivate unclaimed sections of the game mikasi lying within the clan's 'sphere of influence'. (Read, unpublished notes.) If clan land is sold (to Europeans), clan members share in the proceeds.

Clan lands are usually divided into sub-clan parcels. Members of one sub-clan desiring to cultivate land held by another sub-clan must consult that sub-clan's influential men and obtain permission to do so. Similarly, a man from one clan may not cultivate land in another clan's territory unless he has been granted permission to do so by one of the latter clan's members.

Within the sub-clan a member may cultivate any land on which the claim has lapsed, but he will usually consult with other members of the sub-clan before doing so. In some areas forest is owned in sub-clan sections, in which case an individual may use freely the products it contains.

All land under current cultivation or recent fallow is under individual claim. Individual claims in land which has not been cultivated for a long time may lapse and the land reverts, in effect, to a sub-clan pool; or they may lapse if a man's sons choose to reside elsewhere (e.g., with another clan, at a mission, at a distant place of employment). Individual claims are of two classes: they include claims to land inherited from the father or taken into cultivation with the permission of other members of the sub-clan; and secondly they embrace the 'improvements' a man may make, and thus include crops, casuarinas and other trees, bamboo and cordylines. These two categories of possession must be distinguished in cases where an individual has been granted usufruct of land in another sub-clan, clan, or even tribe. He may claim any products of that land which he has planted, although the land itself is owned by another. 'Property improvements' such as these may be transmitted to heirs in the same way as plots of land.

Rules of inheritance do not favour the eldest or any particular son. When a man is about to be married his father (if alive) will consider the son's needs and allot sections of his property to him. The young man may also receive land from his uncles or elder brothers, and will have already inherited land if his father is dead. If he visits another territory for a period of some

months he will be given usufructuary rights to land adequate for his needs, and in return he will be expected to do likewise for relatives or friends who visit him in his own clan. The rule is that women do not inherit land, although this is not an unvarying rule. (M. Orken, Lands Commissioner, Goroka, personal communication.) A man may reside matrilocally, rather than in the clan of his father, and get land through his mother, but such cases are rare.

Land was never sold among the natives. I am aware of only two ways in which natives lose land: firstly, through voluntary sale to Europeans, and secondly, through arbitration by an administration officer over disputed land. However, parcels of land are given as outright gifts from one individual to another (who is not an hereditary member of the clan) in cases where the latter has chosen to live permanently outside his clan. This occurs occasionally: a man may decide to live in his wife's clan, or he may have been adopted by his mother's brothers if his father died when he was young, or he may have been banished from his own clan after some quarrel, although this is rare.

Certain sections of the clan land are communally owned. These are the village sites and cemeteries, and forest areas may also be owned in clan units rather than in individual lots.

In summary, although confederacies are contiguous, and tribes are continuous units of clan territory, neither of these larger orders of social organisation has important inclusive territorial rights for its members. The most significant rights to land belong primarily to individuals, and after that to sub-clans.

Land Use

Clearing

The Highlanders are skilled and painstaking cultivators. The preparation of a new garden from land which has been under fallow is an exacting and lengthy operation in terms of the tools which were traditionally available. Land which has been fallowed will usually remain unused for at least five or six years, but it may not be recultivated for upwards of fifteen years. After a short period of fallow a cover of short and tall grasses (Imperata, Themeda and Miscanthus) springs up and planted casuarinas become established; over a long fallow period other trees, shrubs, and at higher altitudes, tree ferns, may also contribute to the vegetative cover.

The first step in making a garden is to roughly mark out the proposed boundaries, after which the fallow vegetation must be removed. In those drier parts of the Valley where short grasses are dominant, the selected land is fired as a first step, but elsewhere trees are cut down and cane-grass slashed before burning. Formerly stone axes were the main cutting instruments, making the task of clearing a laborious one, but now steel axes and machetes are widely used. Smaller branches of the trees are lopped and saved for firewood and the trunks are either split into stakes for fencing or building material, or split into logs for sale. Stumps of trees and the root clumps of cane-grass and the giant kangaroo grass (Themeda intermedia) are burnt out individually. Uncontrolled use of fire has been prohibited since the second world war and this regulation is usually carefully

Plate 13. Firing fallow grassland in the Bena Bena preparatory to making a new garden.

Plate 14. Vegetational regeneration after some 15 years of prohibition on burning. This locality is some distance from forest seed sources, but small shrubs and bushes are becoming established.

observed, but even so scores of acres may be burnt out each year by escaping fires. Most clearing is initiated by the onset of the dry season, and smoke from innumerable small fires is a feature of the landscape throughout the dry months.

After the initial clearing the trash is commonly left where it has been cut, to dry. Where only burning is necessary as a first step, women as well as men undertake the job, but men carry out the cutting of trees and slashing of cane-grass.

Fencing

The construction of fences is the next operation: the materials used vary with the resources of the locality, and a number of fence types is to be observed in the Valley. In the dry areas, cane fences are invariably made because virtually the only timber available is a limited amount of casuarina, which is reserved for housing and for fuel. The cane is usually cut from former gardens or gully slopes and beds; this is a man's task, the women being employed in carrying the huge bundles of cane from the source to the garden site. A cane fence under construction is illustrated: it is an intricate piece of work and when completed adequately serves its main purpose of keeping pigs out of the garden. Vertical lengths of cane about four feet long are thrust close together into the ground, interwoven with horizontal lengths, and lashed together with vine. The cane eventually takes root so that after the fence is decayed, usually within three years, the resultant hedges remain and serve the useful function of preserving boundary marks of former gardens (useful not only to the owner and his heirs, but also to the field-worker!). In areas where there is

Plate 15. Fencing. Several stages are illustrated: the 'planting' of vertical lengths of cane, the completed fence, and in the background a decayed fence. The ground is in an intermediate stage of preparation as the trash has not yet been removed.

no land pressure, the life of a fence often determines the length of time for which a garden is cultivated.

In the mountain villages timber is used for fence construction, being both more plentiful and more durable, and involving less time and effort in the making. Flat slabs, six or nine inches wide, are sharpened at each end and thrust into the ground, lashed together with vine. Sharpening each end serves a useful purpose: by doing this it is not usually necessary to dig holes to 'plant' the stakes, and furthermore, when the end in the ground has rotted the stake can be reversed; sharpening the tops also makes it less easy to climb over the fences and thus weaken them. Entry to fenced gardens is usually by means of a rough stile. Where tree ferns occur, usually above 7,000 feet, the trunks are also used occasionally for fencing, being lain horizontally to a height of several feet and contained within spaced vertical stakes. Such fences often border gardens extending to the banks of a creek or to the edge of a gully - they are then angled outward and buttressed on the under side, and act in some measure as a soil retention barrier. Cordylines are often planted at intervals along stake fences, or may be used alone in the making of a fence, by being planted closely and lashed together to form a narrow hedge. The purpose is to indicate boundaries, as in themselves they do not make a strong fencing material.

Cultivation

When the trash has dried, and while the fences are being erected, the soil is dug for the first time. Before beds are prepared and planted the soil is usually cultivated at least

Plate 16. Men, women and children preparing land for a new garden. The soil is being turned over for the first time with spades, and broken into large clods. Observe the pile of sticks and trash in the foreground.

twice, and the garden may be burnt over a second time, although it is more usual to turn the dried trash into the soil. Both men and women dig the garden, penetrating the surface to a depth of six to nine inches and breaking it first into large clods, eventually into loose soil. When digging sticks were the only implement available for this operation, cultivation must also have been a lengthy task in an area whose soils are predominantly clays. Metal spades now enable this process to be carried out much more rapidly. In the drier districts the soil is dug deeper than elsewhere and later tilled frequently to inhibit the growth of weeds and grass and to prevent a hard crust forming, as conservation of soil moisture is essential. In effect, this is a 'dry-farming' technique.

Planting

Several months may elapse from the time of first clearing to the time of planting. Sweet potato is the first crop to be planted, although other crops may be planted simultaneously or subsequently; inter-cropping is a frequent practice except at high altitudes. The design of the sweet potato garden in the Goroka Valley differs from that farther west in Chimbu and in the Waghi Valley. Long straight beds, several yards wide and extending the full length of the garden, are prepared. They are separated by shallow, narrow gutters, which in most parts of the Valley are described as having the function of paths rather than drains, although they undoubtedly act in the latter capacity also, especially on land with any slope. The gutters in steep gardens run downhill and not along the contour, thus allowing excess surface water to drain

Plate 17. A woman weeding and cultivating a sweet potato garden with a digging stick.

off rapidly and preventing the formation of a greasy subsurface which could result in mass soil slipping.

The soil on the beds is heaped into mounds about two feet in diameter and a foot high, so that each bed is about three mounds wide. Men prepared the beds and trenches, lining out straight edges with vine or fibre. Women plant the sweet potato, thrusting several cuttings into the top of each mound. All subsequent work in the gardens such as tilling (with the digging stick), weeding and harvesting, falls to the women.

In the preparation of a new garden a man will usually be assisted in all the major tasks by his brothers and other members of his sub-clan, and by his and their wives. If he has more than one wife (which is not uncommon) he prepares separate gardens for each of them. When other members of his patrilineage or sub-clan are similarly engaged he will be expected to assist them in return. The decision to prepare new gardens is often taken jointly by several men who can then economise both on labour and fence materials, as they will enclose the entire area within one fence. Individual plots within it are marked by transverse trenches, special plants (e.g., cordylines, crotons, ornamentals), or lines of small stones which have been cleared out of the soil. Casuarinas, bamboo and certain other trees are also employed as boundary markers.

The following is one of the first observations by a European of the gardens in this area:

> The gardens of the people inhabiting the headwaters and numerous tributaries of the Purari are probably the most scientifically worked out of any native cultivations in New Guinea. The ground is first turned over by means of pointed sticks, then allowed to fallow for some time,

Plate 18. A newly-planted sweet potato garden, showing the long, narrow beds separated by gutters, and the low mounds in which the sweet potato is planted.

Plate 19. A mature sweet potato garden.

> then it is dug up again with pointed sticks, every weed or grass root being taken out and the soil rubbed into a fine mulch between the hands. It is then arranged in long, straight rows, a shallow drainage channel cut between the beds and their sweet potatoes, yams, beans etc., planted. Looked at from a distance the general lay-out is symmetrically perfect. (Leahy 1936, 230.)

Soil Conservation

Several soil conservation techniques are employed in various parts of the Valley. The most obvious, that of allowing the land to revert to fallow at the point of diminishing returns, has been mentioned. The planting of casuarinas, although practised mainly to create a timber supply where no other exists, also assists in soil regeneration by virtue of its nitrogen-fixing root nodules, but it is doubtful if the natives recognise this property. Leahy made this observation on the practice:

> In all the headwaters of the Purari river the natives who, owing to tribal wars dare not go to the timber-covered ranges in the vicinity to get timber for building purposes, firewood, etc., plant casuarina trees, a quick-growing, easily-split hardwood, and in the Bina Bina, Gafuku and Waghi river valleys which are much wider and almost all grass country, are to be found thousands of these artificially planted trees, and when the owners are unfortunate enough to be driven out of their villages, the invaders do not consider that they have destroyed the village properly until they have ring-barked every tree and so destroyed it. They would cut them down but for the fact that it would be too long and hard a job with their stone axes. (Ibid., 242-3.)

Bates, who was among the first administrative officers to patrol the Goroka Valley, noted that '...there is no doubt that the natives realise the value of reafforestation'. (Patrol Report 25, 1932/33, 9.)

Ditching for drainage purposes has been mentioned. Where possible, the natives cultivate level and gently sloping land for preference, and as such sites often have well-drained alluvial

soils, run-off of excess water is not a problem. But steep slopes were used of necessity in the past and are still cultivated. Bates observed that:

> If the site for the garden is to be on the steep slopes of some hill, three drains are used, viz: one top horizontal drain joined by two vertical drains. If the ground to be cultivated is on the flats and of a swampy nature, many drains are made between each row whereon the crops are planted. For the purpose of making the drains straight and uniform a long plaited cord of fibre is used by the males. (Ibid., 10.)

The remaining method of conserving soil, which is found only in gardens on steep slopes, but not consistently even here, is the use of small retention barriers. These may consist of single saplings laid end to end horizontally across the garden at intervals down the slope, or small lengths of cane and sticks stuck upright into the ground to form a barrier nine to twelve inches high. Stones are sometimes used in the same way; they are not specially collected for the purpose: if they are used it is because they were in situ - limestone fragments and water-eroded pebbles - and to use them so is just as simple as to carry them away. Although these various methods of soil retention are known, the practice is not, however, so highly developed in the Goroka Valley as it is in Chimbu to the west.

Crops

In the planting of crops, as in the preparation of land for gardens, strict conventions apply to the roles of each sex. The planting of certain crops can only be done by the men: these include bananas, sugar, taro, tapioca, bamboo, cordylines, casuarinas, and cash crops such as coffee and peanuts. Women only plant sweet potato, maize, edible pitpit, wing bean and leafy vegetables. A

woman will only plant 'men's' crops if her husband is absent from the village or if she is a widow, and she may not do so even then if her husband's brothers are able to do it for her. In the Bena Bena, only men plant yam and tobacco but in the upper Asaro women also may plant these crops. Both plant pandanus.

Over twenty varieties of sweet potato were recognised in the Goroka Valley, and all of them were named by the natives; most were further classified by them either as having belonged to the ancestors or as being of recent origin, although it was not possible to obtain more specific information about the introduction and dispersal of the different varieties. In spite of the large number of varieties, little attempt seems to be made to plant selectively for the environment, and most gardens contain at least five different types and often more depending on the size of the plot. It is to be expected that in an area with cultivation extending over an altitudinal range of over 3,000 feet (from under 5,000 feet to over 8,000 feet), and with a variation in annual rainfall of 40-50 inches between the wettest and driest parts, some sweet potato varieties would be recognised by the natives as being better adapted to tolerate the varying environmental conditions than others. However, I am aware of only one variety (known as konivena'i in the Bena Bena; gonime in the Asaro) which is widely favoured in the Goroka Valley for its yield, size, and flesh, and even this is not found in all gardens; it apparently withstands dry spells well, but was not always found in those Bena Bena gardens which were seen being planted during the dry season. Undoubtedly experimental trials would reveal important distinctions in the suitability of the varieties for different localities,

but I do not know of any trials having been conducted for the Goroka Valley.

The length of time which sweet potato takes to mature varies widely in the Highlands according to soil type and altitude. In the Goroka Valley, climatic factors are not often critical: frosts do not occur, but rainfall in all parts of the Valley is unreliable and a prolonged dry period will result in a sweet potato famine, as irrigation is nowhere practised. Under the best soil conditions at altitudes between 5,000 and 5,500 feet, the crop takes about four months to mature; on poor soils at altitudes above 7,000 feet the period may be from 12-18 months. The bearing life varies similarly, being perhaps nine or ten months in favourable areas, and only half this in the higher zones.

Over most of the Valley one may observe gardens being planted at all times of the year, but in general the practice is to prepare land during the dry season and plant it during the wet. This planting regime is of necessity most carefully observed in the southern sections of the Valley. Gardens usually yield three to four successive crops of sweet potato before it is necessary to allow the land to revert to fallow. Yields vary widely, and all the following factors may influence the yield:

differences from year to year in a long cropping period,
variable annual rainfall,
variable soil types within even small areas,
different varieties (20-30 types),
time of planting,
altitude,
slope plus aspect,
the stage of the harvest, i.e., whether just beginning or nearing completion.

These are self-explanatory and are not further discussed at this stage.

Sweet potato cannot be stored for long intervals and is usually harvested as required. As a rule the tubers only are consumed, the leaves and shoots rarely, although they are sometimes used decoratively. The tubers vary in size and in the colour of the flesh according to variety: konivena'i has a fine reddish-purple skin and white flesh, but others are yellow or pink fleshed, and have pale to dark brown skin.

The vegetable is cooked in a variety of ways. For the morning meal and if eaten during the day it is baked in the ashes, and cold baked potatoes are usually taken for sustenance if a short journey is involved; in the evenings the women may also prepare a kind of soup, with or without other vegetables. On ceremonial occasions it is cleaned, wrapped in bundles of perhaps a dozen in leaves, and steamed in earth ovens.

The following extract on the nutritional status of the sweet potato is quoted from 'Food Plants of the South Sea Islands':

> The composition of the tubers varies greatly with the variety, at least as far as certain nutrients is concerned; and, even within the same variety, according to methods of cultivation, the time of harvesting, and the duration and conditions of storing. However, the following average values per 100 grammes (approximately 3½ ozs) of raw, edible material may be considered reliable in practice:

Water	70.8 g.	Ash	1.0 g.
Calories	100	Calcium	35.0 mg
Proteins	1.7 "	Phosphorous	50.0 mg
Fat	0.3 "	Vitamin A	2,500 I.U.
Starch	25.0 "	Thiamin	0.10 mg
Reducing sugars	3.5 "	Riboflavin	0.05 mg
Cellulose	0.8 "	Niacin	0.7 mg
Pectic substances	2.5 "	Ascorbic acid	25.0 mg
Iron	0.8 "		

(Massal and Barrau 1956, 25.)

Although a 'valuable energy food containing sufficient quantities of minerals and vitamins for general health' (ibid.) the sweet potato is protein deficient, and as possibly 90 per cent of the

Highlander's diet is provided by this vegetable, this may account for his generally shorter stature compared with coastal groups who are able to supplement their diet with fish and other sources of animal protein.

Other food crops are eaten for variety but in lesser quantities. Two of the most important are bananas and sugar cane, which are interplanted with sweet potato. Neither crop is grown in stands or 'plantation' form, but is planted in clumps through the gardens. The slips of sugar cane are usually planted in groups of three, and later lashed to a sapling to prevent their snapping. Bananas are either cooked or eaten raw, depending on the variety, and sugar chewed as a snack, for refreshment, or during the evenings spent talking around the fires. It is often offered to visitors to the villages. Pineapples and pawpaw have been introduced since the advent of Europeans - the latter grows well and is widely grown, but pineapples do not attain the size they reach at lower altitudes and are less commonly grown.

Native informants claim that maize was in the Highlands before the area was entered by Europeans, and Taylor's observation confirms this. (N.G. Annual Report 1933-4, 116.) However, it seems to have been of poor quality; in places it was cultivated merely as a decorative plant, and in others it was believed to cause sickness. Now, on the other hand, it is widely grown and may be virtually classed as a second crop in the lower Bena Bena. It is inter-planted with sweet potato, but a bed may be devoted entirely to maize. The usual method of cooking is to bake the cob, surrounded by its leaves, in the ashes.

Another of the important subsistence food crops is wing bean (Psophocarpus tetragonolobus). At different times of the year this is cultivated for its tubers (rather like a white radish) or for its pods. The leaves and flowers are also eaten. If grown for pods and leaves, the plant is trained onto crossed sticks of cane two to three feet high, but this is not done if it is raised for the tubers. Very few beans are grown at altitudes above 6,000 feet, so possibly an altitudinal limit exists for this crop. Unlike sweet potato, it is usually harvested at one time, and a special feast is held on the occasion.

Yam (Dioscorea spp.) and taro are grown in very small quantities only in the Goroka Valley. A taro-like plant, Alocasia or Xanthosoma, is usually planted in small fenced plots only a few square yards in area adjoining the village houses or in damp patches of soil. Yam plots, most often found in a corner of a sweet potato garden, are similarly small, often too minute to be mapped at a scale of 1 inch to 100 yards. Not every man cultivates yam and taro: they do not have the significance in the diet that they occupy in some coastal areas of New Guinea, and their consumption is reserved for ceremonial feasts. Several varieties of yam were noticed but are not identified.

Frequently in the Bena Bena gardens, and occasionally through the central Valley, tapioca (Manihot esculenta) is planted along the borders of the sweet potato beds. It is usually planted with the first crop of sweet potato in a new garden and harvested from nine to twelve months later. It is either baked or sliced and boiled.

Plates 20 & 21

Wing bean (*Psophocarpus tetragonolobus*) planted as a root crop (top) and an 'aerial' crop (bottom).

Two other foods are widely grown but in small plots only. One is edible pitpit (Saccharum edule), the young inflorescence of the cane being consumed. It is eaten mainly at pig feasts, and cooked by steaming or boiling. The vegetable is very similar in taste and appearance to asparagus, though not so tender. The second is a small herb with blue flowers (Acanthaceae Rungia), usually planted along the borders of sweet potato beds, as it is decorative as well as a nutritious vegetable. Several other leafy green vegetables are grown but were not identified. One very much resembles spinach. These are known in Pidgin by the collective name kumu.

This exhausts the most important food crops cultivated traditionally. A number of other plants and trees are also cultivated and of these, two varieties of pandanus are important. The oil pandanus (P. conoideus), marita in Pidgin, produces a long red fruit which is cooked in earth ovens, yielding an oily reddish pulp. As well as a food, this oil is used in some parts of the Highlands as a dye, and is also rubbed into the skin, but whether for warmth, decoration, or a charm I am uncertain. The oil pandanus is usually found below 6,000 feet, planted singly or in small groves. The nut pandanus (P. jiulianettii and P. brosimos), which is similarly planted, grows at higher altitudes, predominantly above 7,000 feet. The nuts are harvested annually about June, and smoked and dried. Where they occur, they are often distributed ceremonially to former allies, but nowadays they are also sold in the native vegetable market in Goroka.

Tobacco was grown before European contact, but since then new varieties have been introduced and are more widely grown,

Plate 22. A yam plot. The original ground crop of sweet potato has been harvested.

having much larger leaves. Tobacco plants are commonly to be found growing against the houses or in adjoining taro plots. Each man usually has a few plants, the leaves of which he dries himself, inside his house, to prepare them for smoking.

Other 'subsistence' crops which must be briefly mentioned include that group of tree and bush crops planted for building materials and formerly for tools and weapons. They include casuarinas, bamboo, cordyline,[1] and the 'sandpaper fig' (Dammaropsis kingiana), the rough leaves of which were, and still are, used to polish and smooth wood for arrows.

The sandpaper fig may be added to another group also: a variety of trees planted for their edible leaves, young shoots, fruits, or dye-yielding berries. Some of these belong to the Ficus family but few were identified. The tree tomato (Cyphomandra betacea) is included in this group. There is a small range of cultivated medicinal plants - these include the ginger plant (Zingiber officinale), a number of ferns including a lemon-scented grass, a shrub with aromatic leaves (used as an inhalant) - these are mainly used for the relief of cold; and a large-leafed nettle (unidentified) used to stroke the skin as a counter-irritant.

Plants and shrubs used in the making of the traditional costume constitute another group. An Urtycaceous shrub, yielding a bark from the woody stems which is beaten and rolled into string or narrow strips to make the women's clothing, and the fleshy inner leaves of a type of cactus (unidentified) which the men

---

[1] The tuber of the cordyline is eaten in parts of the Pacific, but in the Goroka Valley the plant is used almost entirely for marking boundaries; the leaves are still used as a posterior covering by the less sophisticated men and boys.

Plate 23. Tobacco growing in a common location - against the owner's house.

use for making tapa, are the most important; the bark of the tree known to the Gahuku as ovisopa is shredded to make string for carrying nets, and the seeds of a tree known to the Gahuku as wu'hi are crushed to yield a red dye for colouring clothing and nets.

Hunting and Gathering

Very little food is gathered, and in any case this is only possible to those groups living near the forest. Apart from the edible leaves and fruits of some trees, the only other vegetable food sources in the forests are ferns, some herbs, fungi and mushrooms, of which several varieties are eaten, some raw and some cooked in bamboo containers with other vegetables.

Hunting was not a widespread activity and is even less engaged in nowadays, except in the dry southern plains. There are very few animals in New Guinea as a whole. In the Goroka Valley the high forested mountains in the Bismarcks contain scattered 'hunting lodges' where men camp when hunting singly or in small groups for tree kangaroos, opposum, and similar small marsupials. These animals are sought for their fur as much as for food. Birds are also hunted in the mountains for their plumes, but are comparatively scarce in this region; the prized bird-of-paradise is especially so, as it favours the mossy cloud forest, and for its plumes men from the Goroka Valley will travel long distances and pay high prices. In the Valley Floor, rats and quail are occasionally caught and eaten, but this is a children's activity rather than a serious adult occupation. Now that widespread fires are prohibited, the birds and animals are hunted with bow-and-arrow; no traps or snares were observed in use.

Animal Husbandry

The Highlanders have almost no knowledge of organised animal husbandry. Every man owns pigs, and women and sometimes even children have their own pigs. The pigs, which represent a source of wealth and prestige, are valued as much for their quantity as for their quality and on the whole are rather mean and sorry-looking animals. All pigs in the Goroka Valley are domesticated, notwithstanding the feral aspect of many, but wild pigs are to be found in parts of the Highlands.

Pigs are given a certain amount of attention, being occasionally suckled by the women and hand-fed on sweet potato, and sheltered in village or garden houses at night, but more often they are allowed free range in the fallow land and old sweet potato gardens. They are the subject of never-ceasing disputes over destroyed fences and gardens, and play a major part in ceremonial feasts and bride payments.

With the exception of some upper Asaro tribes which have been influenced by migrant Chimbus, the Goroka Valley tribes do not hold large pig-festivals as do the people of the western Highlands. Pigs are killed on a number of occasions, the importance of the event determining the number of pigs consumed. Probably the largest ceremonies held are those between formerly allied tribes to commemorate victories and obligations of assistance. These may be held every year or two and up to forty or fifty pigs will be exchanged, slaughtered and eaten. Other occasions for eating pig occur when marriages are arranged and consummated, when someone is born, when a boy or girl reaches puberty,

when someone dies, and when a new garden has been completed. Pigs are sometimes (but rarely) killed and eaten without a special reason. A man may also kill and roast a pig, and cut it into small portions for sale to the members of his village. On such occasions it is virtually obligatory to buy some of the pork, as the man will not usually do this unless he needs money for some reason, and the prices charged are quite high.

The number of pigs owned by an individual varies greatly, depending on his inherited wealth and his personal influence, and on the extent of his debts and obligations to others. A man may only have one or two pigs, or he may own more than twenty, but this is fairly rare. Most individuals own three to five pigs, including piglets. Pigs are nowadays bought for cash, and a good pig or a sow may command up to £15 but the average price is about £5. The Department of Agriculture, Stock and Fisheries (DASF) has a piggery in the Valley and its livestock officer is engaged in the improvement of breeding and the control of disease among pigs, but neither of these can be effected in the short term.

Apart from pigs, there is virtually no other native-owned livestock in the Valley. According to O.H.K. Spate (personal communication), sheep were introduced to Goroka during the latter stages of the war and were successfully tended by the natives of the adjoining village of Asariufa; however, I know of no other instances of sheep being kept in the villages, either in the past or at present. One of the missions has introduced a few goats through the Bena Bena which seem to do well, and there is possibly more scope for goats than for sheep in this area, as they appear

to require less attention and are less susceptible to disease. Most villages have a small number of poultry, largely European varieties, but they are rarely penned and are rather muscular birds - neither the poultry nor the eggs are often eaten; they may sometimes be sold to Europeans. During 1960 two Bena Bena tribes purchased, with DASF assistance, a 'pilot herd' of cattle, but the success of this venture remains to be seen, and in any case not all tribes have sufficient suitable land for large numbers of cattle. This experiment with cattle is discussed further in Chapter VII.

Commercial Agriculture

General

The introduction and production of commercial crops in the native economy has been due to two main influences. In the first place, it is an important part of Administration policy to foster the production of cash crops by the natives, and this policy has in the Goroka Valley as elsewhere been actively promoted by the Agricultural Extension Service. In the second place this new development has been reinforced by the advent of European settlers, whose example in growing coffee, in particular, has been followed in most areas where they have taken up land.

Commercial agriculture by both natives and Europeans is very recent in the Goroka Valley. Up to 1950, there were virtually no Europeans in the Valley who were not connected with the Administration, apart from missionaries. Even now the number of European-owned plantations is just over thirty, but at the moment this represents a greater concentration of private enterprise than

will be found elsewhere in the Highlands. In addition, processing plants for coffee, passionfruit and peanuts have been established by private enterprise in Goroka.

The establishment of almost all native cash crops in the Valley dates from 1954, with the exception of a few acres of coffee, and in most cases the acreage devoted to cash crops and the total income derived from them, has steadily increased since then.

Cash crops produced by the natives fall into two categories: food crops such as peanuts, passionfruit and vegetables; and coffee, a tree crop. Money is also earned from the sale of timber, but as this usually draws on existing surpluses of timber rather than on timber which has been planted for commercial purposes, it will not be dealt with at length here. The production of food crops is not unfamiliar to the native, even though the crops themselves be ones that he has not formerly cultivated, but the production of a permanent tree crop involves completely unfamiliar techniques. Coffee is the most important of the commercial crops, and its cultivation methods are the most divergent from the traditional system because, with the exception of the nut pandanus, permanent tree crops were never part of the former agricultural regime.

Coffee

At an agricultural conference held in Goroka in 1956 a senior agricultural officer outlined some of the problems incurred in the introduction of perennial crops to native agriculture. (Carne 1956, unpublished.) These problems are briefly discussed here.

In the first instance, a long wait is necessary for the harvest and first financial return. Although considerable forethought is involved even in the planting of sweet potato from the time a plot is selected, cleared and planted to when it is eventually harvested, the delay between first preparation and first harvest may be ten times as long with coffee. One season is devoted to the preparation of the ground and the establishment of a nursery. In the following wet season the seedlings are planted out. After this it will be about three years before any return is likely and during this period the coffee groves require considerable attention to weeding, mulching, pruning, and the establishment and care of shade trees. Many groves give strong evidence that their owners have not maintained sufficient interest during this long wait, and when the first crop is borne, it will undoubtedly be a poor one in such cases, and the owner will undoubtedly be disillusioned.

The second problem has been suggested already: the constant attention which perennial crops demand.

Thirdly, for efficiency in all stages of production during the bearing life of the grove, certain aspects of management must be observed. Correct spacing and lining of the trees is essential; the establishment and regulation of shade trees to protect the coffee is a new concept; pruning must be carried out regularly, and it is easy to understand that a man would be unwilling to cut off branches which are carrying money-yielding berries simply because he has been told that at some future time the final yield will be greater.

Harvesting consistently and thoroughly is also a somewhat unnatural practice to the native who is used to harvesting according to his need, or to taking the most he can get off any one plant before it dies, with no particular concern for the plant itself. Irregular harvesting of coffee can mean loss of produce, lowered quality, and perhaps the spread of pests and diseases from neglected trees.

Processing of coffee is not difficult. It has to be pulped to remove the red outer skin from the berry and washed to remove the mucilage from the bean, and before further treatment can be carried out, the beans have to be dried to a moisture content of 12 per cent. At this stage the beans are sold and out of the native grower's hands. Many villages have bought manual coffee pulpers, which cost about £40, and share their use as the coffee ripens. Pulping can also be done by hand, and the berries are often chewed to separate bean and skin. Natives are sometimes able to take their 'cherry coffee' to a nearby plantation for pulping. Washing is a simple matter also, and the beans are then simply spread out in the sun to dry for several days on a bamboo platform or a sheet of galvanised iron. The test of adequate dryness is the simple one of biting the bean: if hard enough to resist denting, it has reached approximately the desired moisture content of 12 per cent. Most coffee (at this stage known as 'parchment') is then sold to the factory in North Goroka, which completes the drying process if it has not been carried out thoroughly by the grower, but in such a case he will receive a lower price for his coffee, so it is to his advantage to give attention to this aspect. The price he receives will also depend

Plate 24. 'Pulping' cherry coffee by chewing off the skin.

Plate 25. A bag of parchment coffee ready for sale on a 'drying rack'. And a nice contrast between the old and the new, with the traditional house and the owner in traditional costume.

on the quality of the beans, e.g., as to size and uniformity of size, and high quality coffee will only result from careful attention to the factors previously mentioned.

A final aspect of the problem of introducing a commercial economy into a subsistence economy is the question of land tenure. The general pattern of land tenure in this area has been outlined. It will be realised that it is a system which does not fix the ownership and occupance of an area of land by any individual for more than a few years at a time. The bearing life of a coffee tree is between 25 and 30 years, in other words about a generation, which means considerable adaptation of the traditional land tenure system. The fragmentation of holdings presents another difficulty, as an intending grower may not have enough land in one parcel to plant an adequate area to coffee. (A minimum area of half an acre for individual groves has been recommended by the DASF, which has tried to discourage communal coffee groves.) As we have seen on ownership, the land and the cultivated crops on it may belong to two different people. This introduces a further problem: the custom of giving usufructuary rights to land for short-term crops has been extended to include coffee, which may work well in the case of the first negotiators, but not necessarily so when the land and the coffee it supports are passed on to heirs. In some Bena Bena communities, areas of formerly unused land (e.g., poorly drained pockets near rivers) were prepared for coffee groves, and most of the coffee owned by a clan was planted in such a location, each individual having a certain number of trees. These are not the same as communal blocks, but the problem remains that as each man's trees will be divided among his sons on his death, the

number of trees per man will become uneconomically small. It is possible to envisage that this may be overcome by more enterprising individuals who will buy small lots of trees and merge them into larger holdings, but so far there has been no indication of such a process in operation.

With these problems in mind, the promotion of coffee was undertaken by the DASF in a carefully planned programme. Native assistants were selected, sometimes locally, sometimes not, and were given an elementary training, including some literacy in Pidgin to enable them to keep rough field notes. They were given practical training at the Goroka Experimental Station, and at the end of their training accompanied field staff officers or undertook patrols of their own in the initial work of coffee planting and in making progress reports on native coffee groves.

Field days were held at various centres for explanation and demonstration of the economic, social and cultural aspects of growing coffee. The larger field days were attended by the District Commissioner and personnel from the Department of Native Affairs (DNA) and the DASF. This was followed by the planting of nurseries for coffee seedlings, the selection of a site and the preparation, shading, planting and maintenance of the nurseries being undertaken by an agricultural patrol officer and his native trainees. A central nursery was established at North Goroka and others at village Rest House sites along the main road. The preparation of the groves in which to plant these seedlings was begun as soon as the nurseries were established. Villages were visited, land selected, and interested growers interviewed. When the plots were ready seedlings were distributed according to the number

of holes each intending grower was listed for, and the villages were visited to demonstrate and supervise planting.

As far as possible, field staff tried to anticipate land tenure problems before the coffee areas were planted, and to restrict ownership to the individual or at most to the family unit. In the initial stages it was possible to exercise some control over this aspect, but after the first planting programme many natives planted coffee groves of their own initiative, and the supervision of land tenure questions by the DASF was lost.

Following the initial intensive work of 1954-5, the Department's policy was consolidation of existing blocks rather than the encouragement of numerous small new plantings. Growers were encouraged to bring their blocks to half an acre in size, containing about 300 trees; however, many small groves were planted by natives without DASF supervision, and many were content to leave their groves at their original size. It is doubtful if many individuals even now actually do have 250-300 trees in single groves. One of the main drawbacks to the control of the coffee programme was, and is, the lack of staff available from the DASF.

By 1957-8 the demand for assistance in planting coffee had greatly increased, as by this time the initial groves had yielded their first harvest and the tangible evidence of financial return was seen. Initially, the marketing of coffee posed no problems for the native grower. Up to mid-1955, while coffee was being bought in small, uneven lots, there was no organised buying and marketing. The coffee was bought by the DASF as a temporary expedient and disposed of locally, either as hulled coffee or roast coffee to European buyers. Private individuals and missions also

bought native coffee during 1956. After 1956, crops offered for sale by the natives were purchased by Europeans at specified buying centres along the main roads at prices approved by the DASF. On the whole, this proved a satisfactory system. The native grower receives an immediate cash payment and he does not have any major transport problems as he merely has to get his produce to the nearest main road or buying centre. Periodical checks were made to ensure that the approved purchasing prices were being respected, and also that the native producers themselves did not demand excessive prices. This system embraced those producers who did not live within easy walking distance of the town, as many native growers also take their coffee direct to the factory for sale. Some road buying still operates for coffee, but has ceased in respect of passionfruit and peanuts, for reasons which are discussed later.

By 1958-9 the marketing of New Guinea coffee in Australia had become somewhat difficult and subsequently this situation has worsened rather than eased. As a consequence the DASF ceased the promotion of further 'mass plantings', but the natives have no awareness of the wider economic aspects of the industry, and the demand for coffee seedlings, the increase in coffee groves not sponsored by the DASF, and the natives' faith in the returns likely from coffee did not diminish. In the face of the existing crisis in the coffee industry, however, it appears that the rate of planting has at least diminished.

The standard of native-grown coffee is not high. Conditions in the New Guinea Highlands are not exacly paralleled in other coffee-producing countries, and the European plantations were

established and are still operating on a more or less experimental basis. The wide variation of environmental factors in the Valley has been discussed and no definite pattern of management can yet be stated. Yields from European plantations average about half a ton per acre, and higher yields are not consistently sustained, although occasional yields of over a ton per acre are achieved. It was anticipated by the DASF that native coffee groves would return about a quarter of a ton per acre on the average, but in 1958-9 the overall yield was only 0.16 tons per acre. Low yields are to be expected in the initial stages with a crop whose methods of production and disposal are quite different from any others in the natives' experience, and latterly the incentive to produce good quality coffee has been weakened by lowered prices and even the inability to sell the harvest.

The marketing of the crop is for the industry as a whole in Papua-New Guinea its most serious problem. It is estimated that by 1965 native-produced coffee in the Territory will exceed the production from European plantations. (BAE Report 1961, 53.) In the light of these two facts the quality of native-grown coffee is of the most vital importance for the future of the industry. Very few natives in the Highlands can be aware of these implications: in general the native is still largely subsistence-orientated and so does not have to depend on the production of cash crops for his livelihood. He grows coffee to acquire prestige and to acquire cash for a limited range of low-cost items available from local trade stores, items which in terms of his own value-system are luxuries rather than necessities. Thus poor yields and low-quality produce are not disastrous to the native

grower as they are to the European planter. If a cash economy is eventually to supplant the subsistence economy, education of an awareness of problems such as these must be given as soon as possible. Efforts by the Department of Territories and the Papua-New Guinea Department of Agriculture to secure market and tariff agreements in Australia will not succeed with a product which does not meet the consumer's standards.

Passionfruit

Passionfruit (Passiflora edulis Sims) is a vine, the fruit of which yields a juice which is used mainly for cordials. It was introduced to the Highlands during the 1930s by Europeans, and was soon being widely cultivated by natives in their gardens. Observation of the heavy crops of excellent fruit, virtually disease-free, by an agricultural officer led to the establishment of a factory in Goroka by an Australian company in 1953 to extract juice and pulp. The Administration and the company actively encouraged the planting of passionfruit once an outlet for the crop was assured: nurseries were established and seedlings distributed free, and native assistants were trained to give advice on the growing techniques involved.

The cultivation of passionfruit is ideally suited to the Highlands and to the native system of agriculture. Passionfruit vines are grown either as a trellised crop over the garden fences or in casuarina groves, and the fruit harvested as it falls. Casuarinas are valuable as an erosion control, as a soil regenerator, and as coffee shade, so that this latter form of cultivation combines a cash incentive with land-improvement procedure.

Most of the passionfruit cultivated in the Highlands comes from the Goroka Valley, with additional supplies from Chimbu and Mt Hagen. Although the fruit can be produced very cheaply, the freight and refrigeration costs incurred in exporting it to Australia bring the total production costs more or less in line with those of Australian growers. Almost all the Highlands' passionfruit is exported to Australia, a small amount being sold within the Territory. On the whole, production of the crop within Australia has been irregular, and it is regarded as a 'stand-by' rather than a specialist crop. In New South Wales the crop is subject to disease infestation which is not present in New Guinea. In spite of the seeming opportunity for marketing New Guinea passionfruit in Australia, there have been with this crop, as with coffee, difficulties beyond the native growers' control which have disrupted production considerably. The price paid initially was 1d per lb., but in 1957-8 it rose to 3d per lb., producing a matching enthusiasm among native growers to cultivate the fruit. Early in 1959 production of passionfruit in Papua-New Guinea had exceeded the demand and the Australian company had more than a 12-month supply in stock. To avoid a complete break-down, the price was cut to 2d per lb., and the former purchasing arrangements were curtailed. The road-buying system operated by private Europeans was stopped, the company buying only the fruit brought to the Goroka factory by native growers. This limited the quantity of fruit being offered for sale. The imbalance between supply and demand led Australian growers, although growing only a fractional part of what is required for Australian needs, to demand tariff protection against importation of New Guinea fruit, and as

a result the tariff was substantially increased.[2] Representations by the Department of Territories on behalf of native growers were made to the Tariff Board in 1960, as a result of which the quantity to be admitted duty-free was increased from 25,000 gallons to 45,000 gallons for three years, with duties on imports in excess of this unchanged. The Goroka factory has not changed its purchasing policy or the price set early in 1959, and as a result much fruit representing potential income still wastes in those villages beyond reasonable walking distance of the town.

Peanuts

Peanuts were introduced as a cash crop in the Goroka Valley in the early 1950s. The advantage of this crop is that it can be grown in areas which are less fertile and have a lower rainfall than is necessary for coffee. Furthermore, it is an annual crop and so a quicker financial return is possible. Being leguminous it is a useful rotation crop and its high protein content makes it a valuable addition to the native diet. It is estimated by the DASF in Goroka that only one-third of the annual peanut crop is offered for sale, the rest being consumed.

Marketing difficulties with this crop, the result of protests from Australian growers, led to efforts to improve the quality: these efforts began in 1957 with the distribution of better seed by the DASF and planters, but were intensified in 1960 with an

---

2 Before 1959, 25,000 gallons of juice (= about 400 tons fruit) could be imported tariff-free under a permit which had to be renewed annually. A rate of 1/1½ per gallon was charged on imports in excess of this. In 1959, the rate was increased to 8/3 per gallon on all juice in excess of the initial 25,000 gallons.

attempt to eliminate all but one variety, Virginia Bunch, which has a large nut and is in greater demand than the smaller Red Spanish variety. This programme is controlled by the DASF which, when it began the scheme, insisted on the eradication of all existing peanuts in the village gardens before distributing new seed, and did not issue new seed until the beginning of the wet season, thus ensuring a uniform harvest. The DASF also undertook to purchase the crop, but prior to 1960 the usual road-marketing system operated and meant that practically all the nuts offered for sale were bought by private and not Administration transaction. Some peanuts are processed in Goroka, but although there is ready demand locally for them, the entire crop cannot be disposed of and a surplus remains for export. This surplus has to be sold in Australia in the face of competition from an established Australian industry. The Australian crop is true to type and properly graded - so far the New Guinea crop has been neither and has only been accepted in Australian in times of scarcity due to adverse seasonal conditions.

During 1960 the DASF hoped to arrange a forward contract for the sale of the Virginia Bunch harvest which it had guaranteed to buy from the natives. However, the crop was purchased from the natives (at a higher price than has hitherto been paid for peanuts in the Valley) without any such contract having been negotiated, and scores of bags of nuts had to be stored in Goroka with the likelihood of rotting after hundreds of pounds had been paid over to native growers. Such an arrangement, however well-intentioned, cannot persist.

Vegetables

There is a local market for vegetables, especially sweet potato, which is in demand to supply native employees on plantations, in the town, and at the headquarters of the Highland Labour Scheme in North Goroka. For the latter establishment, the Administration advertises tenders to Europeans to supply quantities of sweet potato, and most of these are filled by the successful applicant purchasing surpluses of sweet potato from the villages. Some planters find it more economical to purchase sweet potato for their labour lines from nearby villages than to hire the labour to plant and tend gardens on the plantation. In 1959-60 sweet potato was the largest money-earning crop in the Valley for natives, although this situation will change as more coffee groves come into production.

In 1957 a native fruit-and-vegetable market was organised in Goroka. The market is held weekly and is supplied from most parts of the Valley. Native-grown vegetables are of good quality but scarcity of seed often means lack of variety. The demand for seed is great and there is no lack of interest in trying out new crops, but fresh supplies of seed are not always obtainable; seeds are distributed free from the DASF when available.

For a while transport was available on market days and was well patronised by natives living at some distance from the town wanting to take produce to the market, but unfortunately it ceased operating in 1960. It is impossible to estimate the turnover at the market, but its value is unquestionable: the social aspect of the market is probably as important as its economic aspect, as the market represents the only informal meeting place for natives

from all parts of the Valley; the fact that many natives regularly and faithfully walk long distances heavily-laden, and often have to return to their villages without selling more than a fraction of their produce, suggests that they may well make the journey for reasons other than financial gain.

The supply is again greater than the demand, as there are only some 450 Europeans in the town, but it is difficult to find another outlet for the produce. There is some scope for marketing fresh vegetables at coastal towns, especially Port Moresby, but the natives are not well enough organised to carry out the arrangements themselves, and most attempts by Europeans have been short-lived, frustrated either by irregular supply (if they rely on village purchases), bad seasons, the vagaries of the transport system, or competition with other Territory centres whose freight rates are lower.

There is a small local market for maize, which is used to supplement native rations and also as a stock and poultry food. European potatoes are widely grown, but the bulk of the potatoes grown in the Highlands comes from the Kainantu district, which is freer from disease than the Goroka Valley.

Other

The most recent cash crop in the Valley is tobacco. It was not grown commercially by natives in the Highlands until 1960, when seed was distributed to Bena Bena natives after trials during 1959 by a Bena Bena planter. Tobacco is another crop which involves no new techniques for the natives, and a crop for which there is a limited but assured internal market. By controlling the distribution of seed to ensure that strains are not crossed

Plate 26. Carrying produce to the Goroka market.

Plate 27. Fruit and vegetables set out for sale at the Goroka market.

Table 2

NATIVE-GROWN CASH CROPS: PRODUCTION AND INCOME*

Crop	Pre-1954	July 54-June 55	1955-56	1956-57	1957-58	1958-59
COFFEE						
Acreage planted		100	92	70	220	530
Total acreage	20	120	212	240	460	990
Prodn. in tons		1+	n.r.	n.r.	19	100
Price per lb.		n.r.	n.r.	n.r.	n.r.	n.r.
Income (£)		180			5,200	20,360
PEANUTS						
Prodn. in tons	None sold	65.5	75	90	69	75
Price per lb.		4d shell 6d kernels	4d shell 6d kernels	4d shell 6d kernels	4d shell 6d kernels	4d shell 6d kernels
Income (£)		2,887	3,000 (est.)	3,600 (est.)	2,576	3,000 (est.)
SWEET POTATOES						
Prodn. in tons	n.r.	n.r.	n.r.	1,800 (est.)	1,420 (est.)	1,700
Price per lb.	n.r.	n.r.	n.r.	½d	½d-2d	2d
Income (£)	n.r.	n.r.	n.r.	8,400 (est.)	13,250	30,000
VEGETABLES, POTATOES (European)						
Prodn. in tons	n.r.	n.r.	70 P.	110 P. 60 V.	71 P. ? V.	35 P.
Price per lb.	n.r.	n.r.	1d-2d	1d-2d 2d	1d-3d 1d-4d	1d
Income (£)	n.r.	n.r.	1,000 (est.)	1,540 1,120	1,000 1,400	325
	1954	1955	1956	1957	1958	1959
PASSIONFRUIT						
Prodn. in tons	45	209	252	179	525	449
Price per lb.	1d	1d	1d	1d	3d	2d
Income (£)	2,054	3,557	3,586	3,308	15,398	11,816

*Statistics for Passionfruit from Cottees Ltd; others from Annual Reports, DASF, Goroka.

and that the demand is not over-supplied, a valuable source of income is possible to those Bena Bena groups having suitable soils. Several crops per year are possible on fertile river flat soils, and this could represent about £400 per acre per year.[3] The tobacco is processed into native twist on the plantation.

A final source of income is from the sale of timber. Timber is not grown commercially by natives in the Goroka Valley, so the sales are of timber surplus to native needs. Casuarina is widely sold for firewood, and those groups who own forest occasionally sell logs for bridge construction. However, two European-operated timber leases are being worked in the Valley and fill the demand for most timbers apart from casuarina. Natives offer timber for sale by splitting the casuarina into sections and piling the logs at a convenient point on the road to await a buyer.

Of the major cash crops discussed none are grown successfully above about 6,000 feet. The altitudinal limit for Arabica coffee is uncertain, but no European coffee in the Goroka Valley is grown above 5,800 feet, and very little native-owned coffee is found above 6,000 feet. The altitudinal limit for passionfruit is somewhat higher than 6,000 feet, and vegetables grow well above this altitude, but the factor of distance from markets mitigates against the production of these crops for sale in any

---

[3] Tobacco matures in four months after 2-3 month old seedlings are transplanted. It is estimated that good soils will yield at least half a ton of dried leaf per acre per crop, and at the planter's guaranteed price of 2/- to 2/6 per lb. for dried leaf each crop could bring over £100. This compares favourably with the return from coffee, estimated at £62 per acre per year after five years (estimating returns at 2/- per tree per year, 620 trees/acre).

quantity. The general distribution of the cash crops therefore lies in the land below 6,000 feet, with the added qualification of distance from either Goroka or a road where transport might be available; this further restricts the cash crop region to those areas of the Valley Floor within about five miles of the town or a road, but in effect the road network in the Goroka Valley is now extensive enough to bring practically all the people of the Valley Floor within reach of transportation to the market.

In this chapter the traditional agricultural system in the Goroka Valley has been described, followed by a discussion of the most significant of the recent changes in that system. This account forms a background to Chapters V-IX, in which the results of studies in three native communities are presented.

Chapter V

THREE NATIVE COMMUNITIES: INTRODUCTORY

The Selection of a Survey Method

A main aim of this study was to investigate native land use in the Goroka Valley. For this Valley, with an area of some 450 square miles and a population of 35,000 recently discovered and pacified people, a number of problems were involved in selecting a survey method which would adequately illustrate the nature of the present native economy.

At the time when the survey was begun very little material was available in the form of maps and records which could be used for the basis of such a study. There were available rough sketch maps of the Census Divisions drawn with varying degrees of accuracy and detail by patrol officers; a series of maps of the area between Kainantu and Mt Hagen compiled from air photographs, showing river systems, most roads, airfields, government stations, some walking tracks and a number of un-named villages; and the incomplete series of maps produced during the war, which apart from being out of date contain many inaccuracies. The air photographs themselves, apart from also being out of date for my purposes (1955) are high-altitude photographs (25,000 feet) so that their scale, 1:33,665, renders them useless as a base for detailed work in intensively used parts of the Valley. A good topographical map is still not available.

The only place where detailed 'documentary' records are likely to be found for the individual native communities is in the Village Registers, which ideally contain a record of census information for each clan: its population recorded at roughly annual intervals, plus a record of all births, marriages, divorces and deaths in the clan, a record of absentees working in other localities, and of the labour potential of the group; they should also contain records of any disputes over which court cases have been held, and the reports of any administrative officer who has visited the clan, whether for the annual census, for agricultural extension services or for medical services. However, these registers were begun in most cases only about 1948 so the records are for a short term only. Furthermore, the information they contain is frequently inaccurate and inadequate, so that they are of limited value only to the fieldworker, although they could be a most fruitful source of information. They are given to the charge of the luluai[1] or Council representative of each clan, and may have been lost in fires or damaged in other ways.

For these reasons, a general survey of the area was out of the question even if it had been desirable: for an understanding of the nature of the land use here, detailed information on the relationship of individuals and small groups to land is necessary, and a general survey would not be likely to provide this.

Three possible methods of approach were considered: (1) to visit every village in the Valley and collect data on the basis of a 'spot questionnaire' coupled with rapid observation of each

---

1 A luluai is a government-appointed official at the clan level.

village's lands; (2) to take a sample of the villages and apply the same techniques; or (3) to select several sites and examine them in detail. The wide variation of physical, cultural and economic factors in this Valley have been discussed: the method applied would therefore have to incorporate a cross-section or range of communities between subsistence-based groups and those groups regarded as 'advanced' (whose members have widely adopted cash cropping and who have been under Local Government Council administration since its inception in this area); also a range between groups living in high and wet mountainous territories, and groups in lower and drier open environments.

In view of the general illiteracy of the population, coupled with problems of language, communication, and logistics, and the fact that no maps show the location and names of the villages, the first two of the possible lines of approach were considered unsuitable - both would have to depend on the collection of fairly superficial data and neither method would provide satisfactory insight or the necessary depth. Under the necessity of collecting all the information sought by myself the third alternative, that of limiting the areas to a small number for intensive study, was adopted.

The Communities Selected

After a preliminary reconnaissance of the Valley by jeep, three communities were selected for the purpose of investigating land use, land-holding, land-population relationships, and the transition from a subsistence economy to a semi-commercial economy under the combined influence of European administration and European settlement. These three were the Fondiwe'i clan of the

Kanusa tribe; the Nupasafa clan in the Korofeigu tribe, and the village of Makiroka in the Notofona tribe.[2]

The Fondiwe'i land lies in the northern section of the Asaro Range, some twenty miles by road northwest of Goroka. The clan's land lies in the headwaters of the Korfena River, a tributary of the Asaro River, occupying the south side of the upper valley. Fondiwe'i clan was chosen on the 'environment' criterion to represent mountainous groups, as its cultivated land extends from 6,000 to 8,000 feet, the terrain is rugged and broken, rainfall is high, soils generally poor, and cultivation extends to the forest line. On the 'economic' criterion Fondiwe'i represents the subsistence groups remaining in the Valley. Subsistence groups now are only found in areas environmentally unsuited to the production of such cash crops as have been introduced to date, which means that they are mainly to be found in the upper slopes of the Bismarcks and the Asaro Range. The final choice of Fondiwe'i as against other such groups rested with its altitude and the fact that it has so recently been made accessible: two districts were considered, the Korfena valley and Kotuni in the upper Omahaiga valley. Both are accessible by jeep as a timber lease has been worked in each place. However, the cultivation in the Korfena valley extends up a thousand feet higher than at Kotuni, and the road into the former was only opened in 1960 so that contact with Europeans has been less than at Kotuni.

Makiroka is situated five miles northwest of Goroka, and is physically typical of the groups of the central Valley occupying

---

[2] The reason why a village, and not a clan community, was studied in Notofona is explained in Chapter VIII.

the level, fertile remnants of the dissected alluvial fans. The altitude at Makorika is just over 5,000 feet, the rainfall of 70-80 inches imposes no problems of either shortage or excess of water, and virtually all vegetation is either planted or regrowth. On the 'environmental' criterion it occupies an intermediate position, but by virtue of its nearness to Goroka and to plantations, mission stations and the main road, it is taken to represent the commercial extreme on the economic criterion.

Nupasafa, about twenty miles by road southeast of Goroka, lies at an altitude ranging from 4,700 to 5,100 feet, in the driest part of the Goroka Valley. It is an area of low, undulating relief, the landscape in non-cultivated areas being bare and grass-covered, devoid of trees. Physically it lies at the opposite end of the continuum from Fondiwe'i, but economically it is intermediate between Fondiwe'i and Makiroka: cash crops grow well enough if the ground is carefully selected and sufficient attention is given, but the distance from the township and therefore from the initial market has placed some limitation on the development of cash cropping. As with Fondiwe'i, the final selection of these other two localities lay with the question of accessibility by road. Makiroka lies just off the main road and as this location was used as a base during surveys of the plantations and the township, a site near the main road was valuable. Similarly a site near a main road was useful at Nupasafa: because of its distance from the town passing vehicles could be utilised to bring supplies and obviate the long journey.

Apart from the physical and economic variations between the three groups there are also culture differences. Each speaks a

different language, there is variation of dress and ceremonial custom across the three, and the local government in each area is at a different level of development. On the other hand, there are features in common such as methods of cultivation, the types of crops produced traditionally, and settlement patterns and housing. These uniform features provide some measure of control and a basis for comparison of the variations resulting from the environmental conditions and from the stage of economic development reached at each place.

At each of the locations a permanent base was established in or near the main village of the clan. At Makiroka I lived in a Government Rest House adjacent to the village, at Nupasafa a house was built on a Government Rest House site bordering the clan's land, and at Fondiwe'i a plot of land was rented from the owner for the duration of the stay, and a house erected on it. The houses were constructed from native materials, the latter two bases being established in about two weeks with the assistance of members of the tribe. Each base was situated near a jeep road, and at Makiroka and Fondiwe'i it was necessary to undertake road repairs also, and to rebuild a bridge at Makiroka.

The period spent at each location varied somewhat. Makiroka was the first base, and about five months were spent here during the latter half of 1959, with an additional two months from December 1960 to January 1961. Part of each period at Makiroka was spent in conducting surveys of the European plantations and the township. The period May-July 1960 was spent at Nupasafa, and it was revisited briefly during December 1960. Only one term was possible at Fondiwe'i, from August-November 1960. Hence some

comparison was able to be made at Makiroka, after a twelve-month lapse, and similarly at Nupasafa after a six-month lapse. Additional material for Nupasafa was collected by Langness in July 1961, twelve months after the initial survey, using my map as a base for a re-survey of land use. It was not possible to make a second visit to Fondiwe'i so no observations based on a time lapse can be submitted for that area. Altogether, with the periods spent in the villages and in the township, a total of fifteen months was spent in the field.

Problems of Fieldwork

The fieldworker in a primitive community is confronted with many problems which cannot always be fully anticipated or adequately resolved. Apart from the difficulty of establishing adequate survey techniques, the major problems proved to be the question of communication with the native people, the unreliability of any investigation involving a time factor, and the unreliability of informants. Other problems were posed by the nature of the terrain and seasonal conditions.

Each of the communities selected speaks a different language and the available time did not permit the learning of more than a smattering of these languages. Communication with the villagers was made therefore through the medium of the lingua franca of Australian New Guinea, Pidgin. This is an imprecise language, limited in vocabulary and its range of concepts, capable of a high degree of misinterpretation, and furthermore a language with which not all members of the community are conversant. A high proportion of the male children and men under 40 speak Pidgin, but it was

rare in the Goroka Valley to find either old people or women of any age speaking it, and consequently one could only communicate with these groups through a Pidgin interpreter, thus doubling the likelihood of misinterpretation. The few natives who do speak English will not in any case be found in the villages as they are able to find employment readily as teachers, clerks, etc. Before going to the field I took a course in Pidgin and was able to understand conversations on arrival; with this background it was possible to speak Pidgin fluently within a short time. A small vocabulary of indigenous terms applying to land, vegetation and environmental features was also learned, so that some conversations in the native languages could be followed.

A further aspect of this 'communication barrier' is that, having left the field, one cannot correspond with informants and rely on them to report changes and developments significant to the initial study. Any information required must be collected by the fieldworker in the field and follow-up work can only be undertaken in additional visits; hence an adequate study along the lines adopted for this research should ideally involve a number of periods in the field at selected intervals.

The Goroka Valley natives have evolved no calendrical system and no means of recording events, so that any enquiry depending on a time factor cannot rely on native informants except in a very limited sense. As personal observation of the region concerned over a number of years is seldom possible, one can only attempt to establish some very relative means of dating. Any event which occurred before about 40 years ago must therefore be classed as legend; a rough chronology can be established for events within

this time span by relating them to the time when certain administrative personnel were in office, or to the estimated age of individuals, or to events such as the second world war, early patrols and so on. For this reason the attempts made in the following chapters to establish the cultivation cycles on different classes of land, or bearing and yield factors of any crop under different environmental conditions, or the 'history' of tribal groups, become estimates only in most cases.

One side of the problem of unreliable informants has been discussed: that of communicating in Pidgin. Also, informants tend to give the acceptable answer or to over-simplify. For example, it was discovered that one informant was in the habit of giving the name of the major owner of a cultivated plot, without bothering to indicate either lesser owners or people cultivating sections of the garden under usufruct.[3]

The difficulty of travelling from one place to another, especially during the wet season, imposed some problems. It was hoped to map the tribal territories, and also the location of all villages. Many parts of the Goroka Valley are now accessible by jeep roads, except border tribes living in the headwaters of the Asaro and Bena Bena rivers and in the upper sections of the

---

[3] An illustration of this concerns a plot of land which the informant, A, claimed was his. It was subsequently discovered that an old man, B, owned one section of the plot. Although A is not related to B, he has been looking after him and for this reason expects to inherit B's land on his death. Another section of the same plot belongs to A's sister's husband, C, who has been living in the clan for some twenty years. It is likely that A may inherit C's section although this is by no means certain as it depends whether C's sons return to their father's clan or choose to remain in their mother's. But to A's way of thinking the whole plot is his. (Langness, personal communication.)

Bismarcks and Asaro Range. The road network is gradually being improved, but conditions during the wet season, when bridges may be washed away and sections of road become impassable, make the links tenuous. There are innumerable walking tracks linking the areas away from the main roads, but to visit these areas involves hiring carriers and spending considerable time simply in making contact. Some tribal territories were mapped, and village locations were finally mapped from the air photographs.

The climate is comfortable, except at high altitudes. During the wet season, however, the morning mists, heavy cloud cover and heavy rains often reduced the actual working day for surveying to a few hours.

On the whole there were few problems of acceptance in each of the three communities in which I lived. Native experience of other Europeans in the Valley has been fairly favourable so that the natives were surprised and flattered rather than suspicious or hostile when a request was made to live in their villages, and when the nature of my work was explained. Some problems were anticipated in view of the fact that in native society women have inferior status, but the natives had observed European ways sufficiently to realise the somewhat different status of European women.

Methods

The method adopted for the study of each clan involved two main lines of investigation. As there were no existing maps it was necessary to survey the land owned by each clan to obtain precise information on land availability and patterns of tenure

and so on. The maps were constructed from interlocking closed compass traverses. Distances were measured by pacing at Makiroka and Nupasafa, and by tape at Fondiwe'i, where the dissected terrain made pacing impractical. The nature of the terrain, the difficulty of finding assistants who could count and read measurements, and the intricate patterns of land-holding rendered the use of more accurate survey techniques impossible. The boundaries of the plots are irregular and in any case are often masked by tall cane-grass hedges and casuarinas so each plot had to be traversed around its perimeter; in addition the complications of tenure and inter-cropping meant that each garden had to be surveyed 'internally' as well. One or two informants accompanied me on all surveying to point out boundaries and supply information regarding tenure and crops. Surveying on mountainous terrain at altitudes ranging from 5,000 to 8,000 feet is strenuous; furthermore, it was usually found necessary to take one or two additional men each day simply to assist in clearing vegetation for the purpose of taking bearings and making traverses.

The main objects of the mapping were therefore to record details of land use, land ownership, tenure and settlement, and the relation of the social groups to land, and at the same time to study the terrain. It was not found possible, or practical, to map the total territory of each clan, as each territory includes large cultivated areas which are either grassland or forest. The extent of each clan's territory was established from the air photographs after clansmen had shown me the boundaries. In reality, the maps constructed, therefore, show the areas of each clan effectively occupied in 1959-61. The length of time spent in

Fondiwe'i and Nupasafa was determined by the time it took to construct the map of each area, but a longer time was spent at Makiroka as it served as a base for work with the European community.

The degree of accuracy of the maps is considered to be relatively high, but the statistics derived from them may be less accurate owing to the unreliability of the data from informants. However, the per capita figures quoted in the following three chapters relating to land and various crops compare reasonably well with those derived by others in the Highlands and by the DASF.

In addition to the survey of clan lands, I interviewed the villagers informally and discussed with them further aspects of their land and social organisation and customs. The residents of each clan were recorded in a census, a pig census was taken, an attempt was made to reconstruct the remembered history of each group, and neighbouring clans were visited briefly for comparison and confirmation of the information acquired. Planters in the vicinity of each group and members of the Administration were also consulted in respect of matters relating to the group concerned.

There are two main disadvantages involved in the method of study adopted. The first, which would have applied to each of the survey techniques considered, has been mentioned: the difficulty of observing variations in, and the nature of, the agricultural system over a sufficient period of time to state definite conclusions on land potential, economic development, population trends, and cultivation cycles. The cycle is, however, very long in some parts of the Valley, so that full coverage would take

perhaps fifteen years or more. This disadvantage is therefore insuperable. The second is the limited scope of the survey: although other tribes in each region were visited few comparisons in depth were possible, and the certainty that the three clans studied are in fact representative cannot be absolutely stated. Ideally at least two locations in each environment (physical or economic) should have been investigated for an internal comparison, but this would have required twice the length of field work, and even the present field work occupied nearly half the total length of my course of study. Some compensation for this has been provided by taking a random sample of individuals within each clan, and comparing the sample with the whole, but the possible distorting effects of local conditions are still not effectively eliminated in this way.

The justification for the method adopted lies in the fact that in view of the difficulties stated, long residence at each location made it possible to glean much information which would not have emerged from a general survey. The results presented here could not have been obtained otherwise by a single fieldworker.

A Note on the Land-Use Maps

The accompanying land-use maps show the settlement pattern, types of crops grown, relationship of cultivated to fallow land, and the drainage system, in each of the communities studied. An inset indicates the total area claimed by each community, as only the occupied and cultivated areas are shown at the larger scale

of one inch to one hundred yards. Two maps are presented for Nupasafa and Makiroka, and one for Fondiwe'i.

The unbroken lines on the Nupasafa and Fondiwe'i maps indicate the boundaries of individual plots, whether cultivated or under fallow. On the Makiroka maps, only the fallow areas are indicated in this way and in the cultivated areas the unbroken lines separate crops and not individual plots.

To represent inter-planted gardens, the plots concerned are shaded purple (for sweet potato) and cross-shaded variously depending on the types of crops contained additionally in each. The cross-shading bears no relation to the area under each of the additional crops, as this was very difficult to establish: crops such as bananas and sugar cane are usually planted at random in a sweet potato garden, tapioca and maize are usually planted along the borders of the sweet potato beds, but maize and also wing bean may be planted in narrow strips as well.

Colours rather than symbols or shading in black and white were used to represent the land-use pattern in each area because it was felt that the complexity of the different areas could be better illustrated thus.

Plate 28. Air Photograph, Kanusa.

Chapter VI

FONDIWE'I

The territory of the Kanusa tribe, of which Fondiwe'i clan is a member, surrounds the headwaters of the Korfena River, a western tributary of the upper Asaro River. Fondiwe'i clan occupies the southern side of the upper Korfena valley, holding a roughly-triangular sector which widens fan-like from a narrow wedge of land bordering the Korfena in its middle reaches to embrace a broad extent of country up to the forested crest of the surrounding ranges.

The Physical Landscape

Geology

Distinct geological formations occur on either side of the Korfena valley. The northern wall and the valley bottom consist essentially of the Palaeozoic metamorphics of the Goroka Formation, intruded in places by outliers of the Bismarck Granodiorite. Gneisses and schists predominate in the rocks of the Goroka Formation, and quartz diorite forms the main element of the Bismarck Granodiorite in this region.

A sequence of folded Miocene 'e' stage sediments, mainly calcareous shales, mudstones and conglomerates, overlies the rocks of the Goroka Formation along the foot of the southern wall of the valley. (McMillan and Malone 1960, 29.) The most striking feature of the Miocene sequence here is the outcrop of two

limestone masses - striking because limestone outcrops, so common in the Highlands to the west and south, are rare in the Goroka Valley. The larger outcrop forms the main part of the sharp, steeply-sloping southern ridge of the valley; the other abuts bluff-like against the end of the north ridge at the entrance to the valley. The limestone is hard, dense and finely crystalline, grey in colour, and contains no diagnostic fossils. (Ibid.) In the lower eastern half of the valley the rocks of the Goroka Formation are overlain by thin Quaternary deposits.

Terrain

The valley runs east-west, enclosed on the north and south by sharply defined spurs of the Asaro Range, and on the west by a saddle of the Range rising to 8,600 feet. It is a bottle-shaped valley, reaching a maximum width of three to four miles near its headwaters and narrowing at the entrance to perhaps a mile in width between the two limestone outcrops. From the entrance to the crest of the ranges the altitude increases by 3,000 feet over the distance of six miles; the gradient is not uniform over the valley profile, however, being gentle in the lower section and much steeper in the upper half.

The drainage is to the east, to the Asaro River. The headwaters flow from all sides of the amphitheatre of the upper valley to the Korfena River.[1] The streams, narrow, steep-sided and

---

1 It should be pointed out that the names applied to the rivers throughout the Goroka Valley are a convention: each river and stream is known to the local natives by a number of names along its course, taken from the name of the ground in each section; only one of these has been used here.

Plate 29. The Korfena Valley, looking east toward the Asaro River and Bismarck Mountains. Fondiwe'i land is in the foreground, and the limestone ridge to the right of the Photograph.

Plate 30. Closer view of the foreground in Plate 29, with Kawonda village encircled. Nosabe territory on the north (left) side of the valley.

swiftly-flowing, their beds littered with large boulders, have sharply dissected the terrain. Small waterfalls and rapids characterise the larger streams. Gullying is widespread and landslide scars are common in the upper valley and on the north wall as a whole, where the deep clays from the weathered metamorphic rocks tend to slip easily. Soil slips are also noticeable on newly cleared or planted steep slopes, and slips and washaways occur along road cuttings with every heavy fall of rain.

The land of the Fondiwe'i clan has on the whole a youthful topography characterised by steep-sided ridges closely dissected by small but swift streams in narrow gullies; only in the belt of land at the eastern extremity of Fondiwe'i is the topography of a more mature aspect: here alluvial fans have a gentle to moderate slope before breaking away sharply to the narrow watercourse of the middle Korfena River, which has incised the colluvial deposits to depths of up to 100 feet.

Soils

The soil pattern in Fondiwe'i is characteristically complex, resulting from the variety of bedrock, the broken terrain, and active erosion. Soils on the steep upper slopes tend to be unstable and are not well-developed, but more mature soils are developed on the few areas of gentler gradient. Many of the slope soils are interspersed with rock fragments which may be up to nine inches across: these are not always derived from weathered parent material - the rounded surface of many seems to indicate that they are older alluvial gravels being re-dissected.

In the forest areas, largely above 7,500 feet, the general soil type consists of a very dark grey-brown topsoil, usually about

twelve inches in depth, underlain by a varying depth of dark clay loam, and lower horizons of variously grey, yellow and red-brown heavy clays of undetermined depth. Soils at this altitude under forest are invariably very moist in the upper horizons.

Slope soils above 6,500 feet under cultivation or regrowth are generally shallow, the topsoil (varying in colour from light brown to dark grey-brown) underlain most commonly by red and red-mottled clays, with the rock fragments and pebbles already mentioned. Limestone boulders up to several feet across, as well as smaller fragments, are often found embedded in the deeper and very dark friable soils on the lower slopes; these limestone fragments are derived from the south ridge. Some poorly drained pockets give rise to swampy soils but these are of insignificant extent.

In Fondiwe'i, the greatest extent of more mature soils occurs between 6,000 and 6,500 feet on the terraces of the Korfena River and in similar locations bordering its larger tributaries. The topsoil, black and dark grey friable clays and clay loams, may extend to a depth of two feet, and is generally rich in organic matter. The lower levels of the A-horizon are frequently concretionary. Heavy red and brown clays are predominant in lower horizons. These are the most fertile soils in Fondiwe'i, together with those forming from limestone parent material; slope soils are generally of low to moderate fertility, depending on the degree of slope and on the altitude.

Soil types recognised and named in Fondiwe'i are:

gwonombu misumba:	black soils with limestone fragments
mumusopa misumba:	brown and grey-brown clay loams
getulu misumba:	red concretionary clays
gamboso misumba:	swampy or poorly-drained soils
fumi:	red clays.

Climate

The upper Korfena valley is both wetter and colder than is typical for the Goroka Valley. There are no rainfall records for any station in the Valley of comparable altitude, but observations were made from August to November 1960, over part of the dry season and the beginning of the wet season in Fondiwe'i. These suggest that the dry season is much less pronounced here than in the east at Bena Bena, and the rainfall intensity appears greater. Heavy falls were frequent during August and September, which are generally dry months. The rainfall is estimated at about 90 inches per year for the lower Korfena valley, and over 100 inches in upper Fondiwe'i.

Temperatures recorded at an altitude of 6,500 feet over several months were roughly ten degrees lower than those at Nupasafa (altitude 5,000 feet) in the Bena Bena, the maximum being about 65 degrees, the minimum approximately 50 degrees. The highest maximum recorded over this period was 70 degrees, the lowest minimum 48 degrees. The Marafunga sawmill, just beyond the crest of the Range at 8,400 feet, recorded a maximum of only 60 degrees between November 1959 and November 1960.

Morning mist is common, but often it does not shroud Fondiwe'i until mid-morning when it rises from the lower valley. In the wet season the mists may rise slightly and then re-settle as heavy cloud forms and descend early in the afternoon. In such cases it becomes necessary to light lamps between 3 p.m. and 4 p.m. Hours of sunshine are therefore few in the wet season. Strong winds are rare.

Vegetation

Forest apparently primary remains around the crests of the ridges and the upper rim of the valley. The forest line cannot be stated as an altitude, as its position depends on the extent to which the forest has been cleared for cultivation. Although cultivation extends in places up to 8,000 feet, the areas above about 7,500 feet are generally forested. The forest is lower montane rain forest, with species of Nothofagus and Podocarpus predominating in a mixed broad-leaf alliance. Scattered pandanus (P. jiulianettii and P. brosimos), climbing bamboo, and tree ferns (Cyathea spp.) occur throughout the formation, while low shrubs form a dense undergrowth which inhibits movement through the forest. The higher areas of forest, above 8,500 feet, begin to exhibit a transition to montane cloud forest and trees are festooned with mosses; scattered tall trees below this altitude may also be moss-covered. Forest remnants are found in small pockets below the general forest line in locations such as steep-sided valleys which are uncultivable.

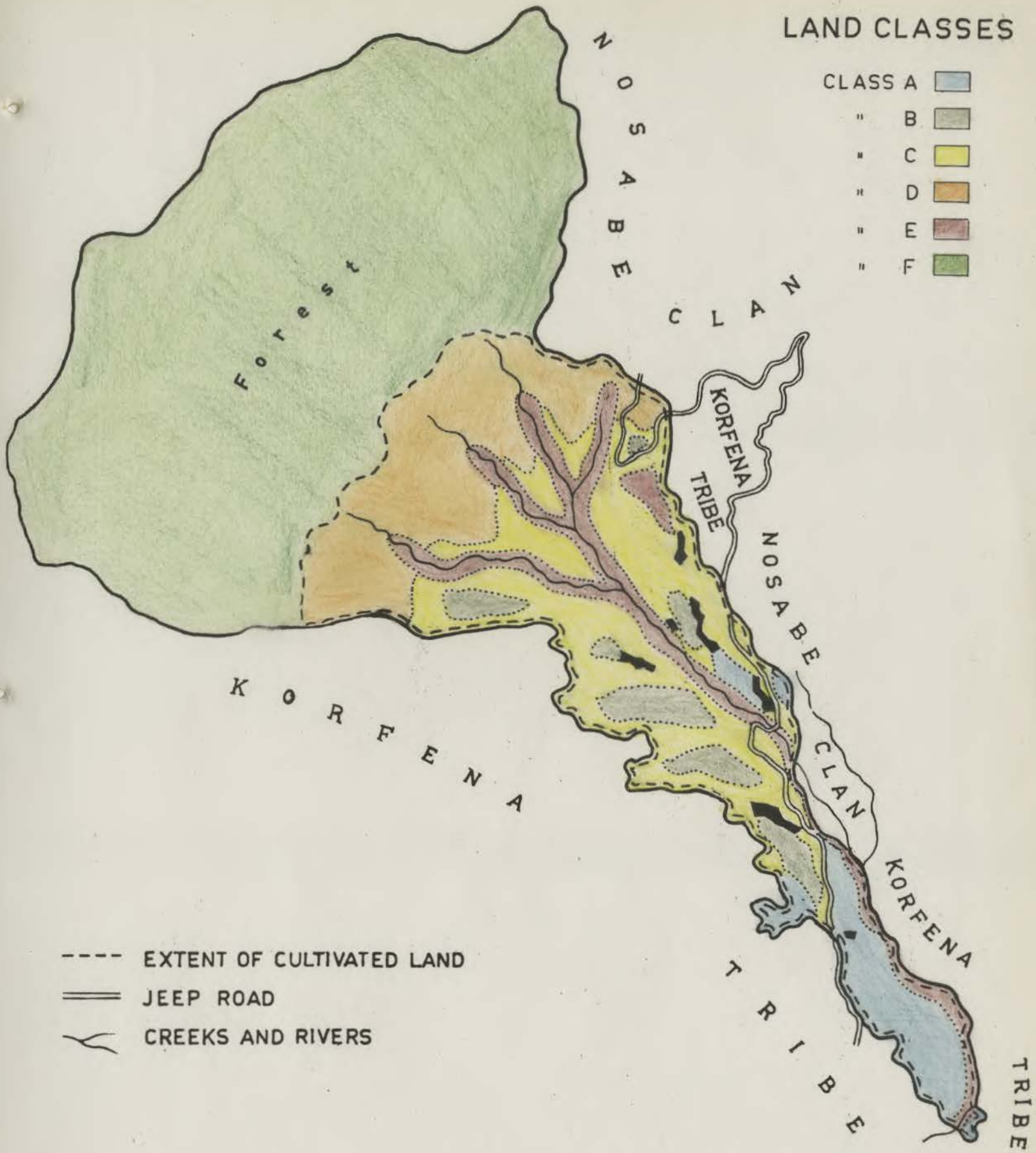
The main forest resources for the Fondiwe'i people are pandanus, which is planted as seedlings in the gardened areas; various hardwoods, particularly beech, used for house and fence construction and for cooking pots; and rattans, also used in fencing and houses. In Fondiwe'i the forest is owned by individuals, who plant cordylines to indicate the boundaries of their lots. The size of these forest parcels was not investigated, as it would have been necessary to cut swatches to survey them, a difficult operation and one which the natives would view with disfavour.

In the long-term fallow land below and bordering the forest, a secondary succession develops in which Miscanthus predominates in dense stands, in association with shrubs and small trees. Tree ferns occur here, but it is uncertain whether they are a successional growth or whether they have been left standing from the original forest clearings: on the whole they are of uniform and mature height, which suggests that the latter may be the case. Many of these long-fallowed areas contain clumps of pandanus which have been planted but have not passed their bearing life. Grass of Miscanthus species predominates in fallow land throughout Fondiwe'i, but tree ferns and shrubs are not found in abundance below about 6,800 feet, and short grasses (in particular Imperata) and bracken ferns (Pteridium esculentum var. aquilinum) are more common associates. Imperata appears in the initial regrowth vegetation but is later choked out by Miscanthus. Planted casuarinas are found widely in the land below the forest, and achieve rapid growth in this high-rainfall area.

Land Classes

On the criterion of agricultural potential, six classes of land may be recognised in Fondiwe'i territory. These are based on a combination of the predominant terrain type, climatic and soil conditions, and altitude.

Class A land occurs between 6,000 and 6,700 feet on river terrace strips along the Korfena River and in small pockets of level or gently sloping land near the major tributaries where alluvial deposits have accumulated. The soils are reasonably deep and fertile. The rainfall is about 90 inches annually but erosion



TOTAL TERRITORY—FONDIWE'I

One half Mile

Aug.-Nov. 1960

problems are negligible and soil preservation techniques unnecessary. Sweet potato matures on this land in about six months and yields are greater than on other land classes. Due to its fertility the cultivation cycle on Class A land is more clearly defined than on other classes, and the ratio between cultivated and fallow land here is roughly equal. Continuous cultivation is possible for four or possibly five years, and about four years fallowing is necessary before recultivating, although the fallow period may only be three years in cases. The productivity is classed as moderate to high.

Class B land occurs on slopes of less than 15 degrees at altitudes between 6,000 and 6,700 feet, on slopes of less than 10 degrees between 6,700 and 7,500 feet, and on fairly level ridge tops between altitudes of 6,000 and 6,700 feet. The amount of land in the two latter situations is limited, however. Soils may be up to 15 or 20 inches deep, the A-horizon brown and grey-brown friable clay, underlain by mainly red clays. No erosion control measures are taken on these slopes. Sweet potato matures in roughly the same time as it does on Class A land, but yields are lower. The cultivation cycle is estimated at three years in both altitudinal zones, with about five years fallowing in the lower zone and six or seven years fallowing in the higher zone. Productivity is classed as low to moderate.

Class C land includes those areas in the 6,000-6,700 feet altitudinal range with slopes of between 15 and 40 degrees, and land between 6,700 and 7,500 feet with slopes between 10 and 40 degrees. Soils tend to be shallow and are frequently rubbly. Soil retention measures are desirable on the steeper slopes of

Class C land, although they are not always practised. In the upper zone, sweet potato may take twelve months to mature and yields on this land are everywhere fairly low. The length of bearing time is several months less than on Class A land. It is usually necessary to fallow this land after two crops of sweet potato have been harvested, and the fallow period is estimated at generally seven or more years. In any case, as Class C land is not used intensively, the fallow period is usually a long one. Productivity is low.

Class D is classified as all unforested land above 7,500 feet. On the whole, this is steep land in Fondiwe'i, and the combination of slope and altitude makes for very low productivity, although soils are not significantly different from other land classes in type or fertility. Methods of soil retention become necessary. Sweet potato may take up to 18 months to mature and may yield for only four or five months. The size of the tubers is small. It is thought that the land should be fallowed after two crops of sweet potato, but the length of the fallow period has not been estimated. Much of this zone is today used as grazing for pigs: Fondiwe'i men say that the pigs root for a variety of grubs found near the forest fringe.

Class E land is uncultivable. It includes very steeply-sloping land, gullies, landslide zones and the few swampy pockets. There is no one belt of Class E land: it occurs throughout Fondiwe'i in scattered patches.

Class F land includes the forest land. This is generally above 8,000 feet, and, while uncultivable by virtue of its altitude, is not unproductive, as the forest represents a usable resource.

A comparison of the land-use and land-class maps for Fondiwe'i indicates that the intensity of occupance agrees closely with the land classification. This is developed more fully in the section under land tenure.

History

According to the old men, the initial settlement of the Korfena valley was made by three tribes: Kanusa, Korfena and Mondu. It is claimed by the old men that their ancestors came from the east and made their first settlement on the west bank of the Asaro, some miles below the junction of the Korfena and Asaro Rivers. The tribes moved north into the Miruma district of the upper Asaro, but were forced to move again after battles, and finally settled in the Korfena valley. The Mondu tribe penetrated to the upper valley, and Kanusa and Korfena occupied the lower ground. Originally, friendly relations are said to have existed between all three groups, but at a fairly early stage Kanusa and Korfena joined in battle against the Mondu (the 'casus belli' is not remembered), which resulted in the latter tribe being expelled over the Asaro Range to territory northwest of Watabung; they now speak a language very similar to Watabung, although they still claim some areas of land in the Korfena valley.[2] The Kanusa say that

---

[2] My field base in Fondiwe'i was a case in point. I had sought out the owner of the land and made an arrangement for its use during my stay in Fondiwe'i. About a month later, when the houses had been built, a strange luluai appeared and claimed that the land was his, and angrily demanded to know why I was living there. He proved to be from Mondu and still asserted some right to the land. It was possible, however, to placate him with some sticks of tobacco and assurances that I should be gone within a few months.

the Watabung people came to the Asaro soon after them and migrated through the headwaters of the Asaro, via Kwongi, to the Pompameiri district in upper Chimbu, and thence via Chuave to their present location. Walking tracks were made linking both Mondu and Watabung with the Korfena valley, and the Watabung were at different times allies of both Korfena and Kanusa.

Kanusa and Korfena maintained friendly relations for some time, and did not demarcate separate tribal territories: the cultivated lands of both tribes were intermingled. As the two tribes brought more and more of the valley under cultivation, land exchanges took place: a Korfena woman married to a Kanusa man would tend her father's or brother's gardens near her husband's village and eventually her husband assumed ownership of these gardens in exchange for land of his own near his wife's village. The reason for this seems originally to have been a simple matter of expediency in that it saved time spent in travelling to scattered gardens.

Then, about the end of the nineteenth century, fighting broke out between the two tribes, the hostilities initiated as usual by a dispute over damage by pigs. This fighting further accentuated the process of consolidating tribal land into something like clan units, as it would then have been not only laborious but also unsafe to tend gardens in hostile territory. The fights continued spasmodically until pacification, that is for a period of some forty or fifty years. Since the second world war, patrols have attempted to define tribal and clan boundaries, and in some cases in this area transfers of land were ordered and payments were made in the form of pigs and pearlshell. The men say that

the land was exchanged between tribes on the basis of soil type: black soil (mumusopa misumba and gwonombu misumba) for black soil, red soil for red soil. In the case of some clans, these transfers were not effected completely - the patrols would have been mainly concerned with the boundaries of clan territory rather than the land within the boundaries; in these cases, the clan members themselves carried on the process of transfer to make clan lands self-contained units. Thus in Fondiwe'i areas of fertile soil often have two owners, the 'hereditary' owner who may belong to another clan and tribe, and the 'cultivation' owner who belongs to Fondiwe'i. This duality of ownership rarely occurs on areas of poorer soil or difficult terrain, and some remanants of Korfena land appear on the land-use map under the clan title concerned, having never been claimed by Fondiwe'i members. Similarly, Fondiwe'i had to relinquish land in other parts of the Korfena valley, and it is most likely that there are pockets owned by Fondiwe'i scattered throughout the valley.

For this reason also, not all the clan territories are even now continuous parcels of land: Fondiwe'i occupies an almost continuous unit, but the second clan of Kanusa, Nosabe, has its land in two discrete sections, and the territory of Gofoyufo clan of Korfena separates Fondiwe'i land from Nosabe land along a large section of the Fondiwe'i perimeter.

The present situation is that the two clans of Kanusa have the bulk of their territory in the upper valley, and the seven clans of Korfena own most of the lower valley, plus a wedge of territory in the higher land near the headwaters. The history of settlement and the claims to land in the Korfena valley are

consequently complicated as some areas, particularly in the upper valley, may be subject to three claims: the current Kanusa claim, that of a Korfena clan, and that of the vanquished Mondu (these latter are in effect ignored, although they may be revived in a dispute). Recent attempts to consolidate clan lands have not been fully effectual, and they have not in any case eliminated the conflicting 'historical' claims.

Population and Settlement

In most of the clans of the Korfena valley members reside in two or three villages; only in some of the smaller Korfena clans is residence concentrated within a single village. In addition there are in all clans scattered residences which may be used temporarily or permanently. Of the Kanusa clans, Nosabe contains three villages, and Fondiwe'i three villages and three hamlets as well as a considerable scatter of individual dwellings. These individual dwellings have been classified according to whether the residence is temporary or permanent. In the former case, they are here referred to as garden houses, as generally they will only be used on occasions when nearby gardens are being worked. In the case of permanent residence, the individual dwellings are termed family houses: the husband does not sleep regularly in the men's house and such houses are in effect family units rather than women's houses. The development of this settlement pattern is attributable to mission influence in the first place, as most missions deplore the institution of the men's house, and to overcrowding in the established villages in the second place. Pigs are kept in both types of dwelling.

Plate 31. A garden house in Fondiwe'i. Also illustrated are the characteristic stake fences of this area, interplanted with cordylines, and cooking pots fashioned from hollowed logs.

The largest of the Fondiwe'i villages, Gulunufia, is a village of the traditional type: clusters of houses are strung out along the crest of a ridge, each cluster connected by a fenced path to keep the pigs housed in the village from the gardens. The houses are the typical low, round, thatch-roofed dwellings, differing from those in the Valley Floor only in that they are more strongly constructed as a protection against the cold. Planks are used rather than cane grasses and bamboo, but in any case there is no shortage of timber here. Gulunufia has a men's house and a young men's house, the latter presided over by a self-appointed 'tutor', who has undertaken to be responsible for the manners and morals of the youths. A few pigs are kept in the village, but most graze and are sheltered in the outer garden and fallow land.

The second largest village, Kawonda, is an 'artificial' or modern village, in that its members are converts to the Lutheran faith. Kawonda features a number of departures from the usual pattern: there is no men's house and each house is therefore a family house, not a woman's house; most of the dwellings are not of traditional design, but are either square or rectangular, with hinged doors, although they are still constructed of local materials; devotions are held every morning and evening in the village church.

The village of Lamungai'ye differs from Gulunufia only in that it is smaller; the two hamlets, Barebaregefendo and Lotogome are for all intents and purposes satellites of Gulunufia, but each has its own 'ground name' and is always referred to by this name. Longo is very small and might well be classed as a compound rather than a hamlet. Apart from these nucleated settlements there are

scattered through Fondiwe'i four family houses and 14 women's houses; of the latter, most are either near a village or in small compounds of two to three houses. This distribution is suggestive of the Chimbu pattern of settlement, as permanently-used residences outside a village are not typical of the Goroka Valley. Eighteen garden houses, which are used only occasionally, are also dispersed through Fondiwe'i land. With the exception of Lotogome and the dwellings east of Kawonda, all the settlements are located on ridges. Lotogome is in a small valley.

The total population of Fondiwe'i at the end of 1960 was 311. At the end of 1959 when the last official census was taken the population was 284, but the 1960 total of 311 includes 30 absentees (among whom were all the members of four families - husband, wife and children) and five men married to Fondiwe'i women living temporarily in the clan. The resident population was therefore 286. The first census, conducted in 1949, registered a population of 211 for Fondiwe'i, but it is likely that the increase to 311 was not the natural increase over the period 1949-60, but reflects under-enumeration in the first and early censuses. Of the men absent in 1960, two were employed on European-owned plantations in the Goroka Valley, four on plantations in the Kainantu district, three were mining gold near Kainantu, and others were employed variously as leather workers (on a mission station in the Waghi Valley), drivers and saw-mill hands. None of the five visiting men in Fondiwe'i has become an adopted clan member and their sons will not inherit Fondiwe'i land; they are cultivating under usufruct on land owned by their wives' fathers and brothers or by their brothers-in-law.

No Fondiwe'i men admitted to having more than one wife, which is somewhat unusual as although polygyny is not widespread in the Goroka Valley there are usually a few instances in each clan. Its absence here is possibly attributable to mission influence. There is a higher number of male than female children; most families have two or three children.

Social Organisation

The tribes to the west of the Asaro River have essentially the same social structure as those of the Central Valley, described by Read, but in addition there are present some similarities to the Chimbu culture which make them transitional rather than simply typical of the Valley culture. The similar ties are due to inter-marriage between the upper Asaro and upper Chimbu tribes, and to the migration of upper Chimbu groups into the head of the Asaro Valley. Chimbu influence is most pronounced in language relationships, in some aspects of dress and ornamentation, and in the possession of ceremonials not held further east. In the Nosabe territory of Kanusa, Nona, a village of Chimbu-speaking people, has been established for a long time. Although the Nona live in a village, which is a characteristic of the Goroka Valley but not of Chimbu, the houses in the village are built according to Chimbu design. They cultivate according to Goroka Valley and not Chimbu techniques. Several Fondiwe'i houses are of Chimbu design.

The basic units of social organisation in the Korfena valley are the tribe, clan and sub-clan. Kanusa tribe with only two clans and a total population of almost 600 is representative in size of most tribes, but a-typical in the number of clans. Korfena

on the other hand is exceptional on both counts, comprising seven clans (plus another two groups, formerly Korfena, which have been expelled and are now occupying land north of the Korfena valley, in the south Miruma district) and totalling about 1,700 people. The main reason for classing Korfena and Kanusa as tribes in the face of these variations is that each group claims descent from a different ancestor; the ancient Korfenas were originally known as the Maiyone, the Kanusa ancestors as Mamboro. Why they each have another name now is not known.

The two Kanusa clans cannot inter-marry, which is also unusual as normally clans, and not tribes, observe the rule of exogamy. Kanusa may marry into all the Korfena clans. In Korfena, some clans may inter-marry, others may not. The reason for this is uncertain, but possibly it indicates that the present Korfena tribe originated in an alliance of two or more almost decimated groups, and that the clans which observe exogamy are the remnants of separate tribes. There is no indication of this in the tribal legends, however. The Chimbu people of Nona may marry into all the Kanusa and Korfena clans, but exogamy still applies between Nona and two groups in the middle Chimbu, Negirima and Boglingewa, the three groups belonging to Gafanunda.[3]

There are no named sub-clans in Fondiwe'i but Nosabe clan consists of two named sub-clans, Nosabe and Nogondisenufo; however, the Fondiwe'i speak of two 'lines' of people within their clan, but these were not investigated genealogically and so it is

---

3 The definition used here for a clan in the Goroka Valley follows Read. See P. Brown, 'Chimbu Tribes: Political Organisation in the Eastern Highlands of New Guinea', Southwestern Journal of Anthropology, vol.16 (1960), 22-35.

not certain whether they are sub-clans or patrilineages. They are not locality groups, that is, they do not reside together. According to Read sub-clans in the western Asaro tribes are usually named. (Read, unpublished notes.)

A fertility rite is practised by the upper Asaro tribes which is not found elsewhere in the Goroka Valley. Read (unpublished notes) refers to this rite as the Kelewa, which is known to the Chimbu, Watabung, Chuave and Siane, but a similar (possibly an aspect of the same) institution was described to me as the Yavirisi. Kelewa is the name of rectangular wooden head-dresses which are worn during the pig ceremony, yavirisi the name of the fence surrounding the ceremonial ground at which the rite takes place. According to Read, 'The institution of the Kelewa is a complex of activities which surrounds the manufacture of objects which are believed to influence the fertility and growth of pigs'. The yavirisi ceremony is held either annually or on alternate years during the middle of the wet season, and is claimed to ensure the fertility and well-being not only of pigs but also of the men, women and children, and the gardens; it is believed that if the ceremony is not held the people and pigs will waste away. The ceremony was not witnessed, only described, and villagers were unwilling to show me the ceremonial ground. Although mission teachings have had some superficial results, traditions such as these survive for a long time.[4] The villagers stated that there

---

[4] The ceremonial grounds were made by the ancestors. The bush was thoroughly cleared and a strong fence (the yavirisi) erected around the cleared area. In the centre of the cleared area the ancestors made a hole and buried a sacred stone in it. Each yavirisi has such a stone, which has a 'face' and can talk; the stones are

were five yavirisi in the Korfena valley, that Fondiwe'i and Nosabe each had one, and that Nona village 'shared' the Nosabe yavirisi. There may be some significance between the social organisation in the Korfena tribe and the number and sharing of their yavirisi, but this was not investigated.

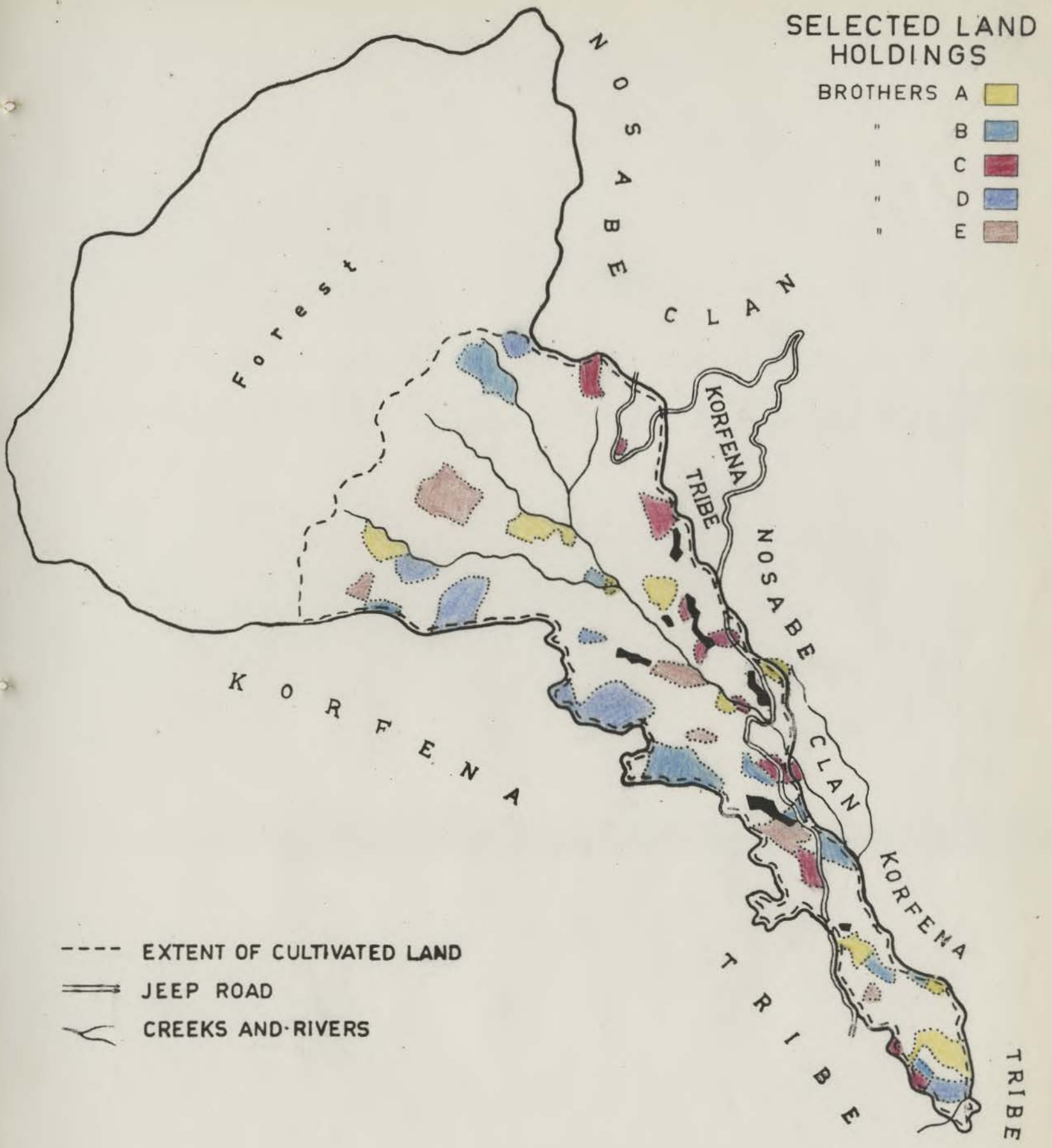
These ceremonies have been banned by Christian missions, and some groups seem to obey the prohibition. The substitute occasion for killing pigs in such cases has become the annual baptism ceremony!

Land Tenure

The pattern of land tenure in Fondiwe'i has become complicated by historical factors and in addition there are some variations from the system described earlier (Chapter IV). In the first place, land does not seem to be held in sub-clan blocks but rather there is an altitudinal distribution of land among clan members so that most men have land of Class A productivity and also parcels of land of Classes B, C and D. It is not certain how this arrangement evolved, that is, whether it was a system developed through

---

4 (continued)
believed to have come from the bed of a river near Bundi, over the north fall of the Bismarcks. This is likely as trade routes linked the upper Asaro with upper Chimbu, and the latter district with Bundi. In the case of some of the stones, they were stated to have been buried in unsuitable places, and after they had 'complained', were removed to more favourable locations. The actual ceremony is restricted to old people. At the appointed time, all the old men and women are ornamented, and foregather outside the yavirisi. Pigs are killed and cooked in earth ovens, and all share in the feast. (However, if the pigs are killed inside the yavirisi, only the old people can eat them.) Taboos are placed on the eating of pig inside the yavirisi by young people and childless men - if these taboos are broken, it is believed that the offenders' bodies will swell up, they will go blind, and then die. It is also forbidden for the participating members to leave their clan for several weeks prior to the ceremony. The ceremony at the yavirisi was followed by the killing of quite large numbers of pigs, which were distributed to members of related and formerly-allied clans.



TOTAL TERRITORY—FONDIWE'I

One half Mile

Aug.-Nov. 1960

first settlement, by internal transfers within the clan, or whether it arose through exchanges of land between Fondiwe'i individuals and individuals of the various Korfena clans who are claimed to have owned sections of the present Fondiwe'i territory. In the second place, in cases where a group of brothers are all adult, agriculture becomes a family rather than an individual activity. This is possibly due to the difficult nature of most of the land for cultivation. Although preparation is a joint affair between brothers, the produce is not shared jointly as each man will mark off his own section within the garden with cordylines, casuarinas, bamboo or ditches. Other combinations of this joint co-operation are man and sons, and man plus cousins or uncles. Enquiries about the ownership of fallow ground will be answered by giving the names of brothers, or father and sons, or if the father is dead the name of the eldest son, with the implication that his brothers have a joint claim on the land concerned. This seems to be one way of ensuring that the different classes of land are shared among all clan members. The inheritance of shared parcels of land is presumably adjusted according to the number of sons each of the present 'partners' has. Forested areas are, however, demarcated into clan sections, within which each individual has his own portion.

Land Use

In spite of the seemingly unpromising nature of most of the Fondiwe'i land, almost all of it is regarded as cultivable and, to judge by the extent to which casuarinas and cordylines have been planted, all the area cleared of primary vegetation must have

been cultivated at some time. The extensive clearing of land up to the timber line is not, judging by the regrowth, very recent; little of this land is at present cultivated and most carries a well-established second growth, although there are very few trees except in gullies. The original clearing and cultivation was probably carried out by the vanquished Mondu tribe at a time when the population density in the Korfena valley was greater than it is now. It may also be that with pacification it has become possible to occupy and cultivate more intensively in the more fertile lower valley.

The preparation of new gardens is the main activity of the dry season, not because there is any real necessity here to plant in time for the rains but because it is more convenient and efficient to do such work before heavy rains interrupt the tasks.

In 1960, the bulk of the new gardens had been planted by November, although some clearing was still in process. The initial stages of preparing a garden fall to the men, who first mark the boundaries for the fences and cut trees for fence stakes. Cane grasses are rarely used for fence construction in Fondiwe'i and even casuarina is not used often; a hard redwood from the forest, most probably a variety of beech, is the most commonly used timber. The men also make the first clearing of the fallow vegetation which is left for several weeks to dry before being burnt. Both men and women assist in the final clearing of the plot and in the turning over and levelling of the soil. At this stage, on land in upper Fondiwe'i, it is necessary to remove the stones from the topsoil; these are sometimes used to make earth retention barriers or to mark boundaries of individual plots, but are usually tossed

into the nearest creek. Fences are then erected from sharpened stakes and inter-planted with cordylines to preserve the boundaries after the garden has been left to fallow.

The garden is then ready for planting: the beds and ditches are marked out by the men, after which women prepare the earth mounds and plant the sweet potato runners. On steeply sloping ground, the long, wide beds are frequently dispensed with, and the size of the mounds is much smaller, perhaps only twelve inches across and six inches high. When planting is completed the women and occasionally old men have the responsibility of weeding and harvesting. Pointed sticks are widely used for cultivating the soil around the plants after the garden has been planted, but spades are commonly used in the initial preparation.

The areas in the Goroka Valley which are entirely dependent on subsistence (or almost so) are by now very few in number and are limited to locations at altitudes above 6,000 feet in hilly or mountainous country, and/or at some distance from either main roads or Goroka township. In Fondiwe'i a combination of all these factors means that this locality is as representative of the subsistence pattern as any that can now be found in the Valley. The important cash crops, coffee and peanuts, are unsuited to the colder and wetter conditions prevailing over most of Fondiwe'i. There are only two small coffee gardens, below 6,500 feet. European vegetables grow well, especially cabbages and onions, which are difficult to obtain in the Goroka market, but there is no incentive to produce them in any quantity as the town is over twenty miles distant and the nearest plantations produce their own vegetables.[5]

---

[5] The lack of opportunity to earn money, and the desire to do so, were so great that on my arrival in Fondiwe'i I was asked prices

The variety of crops in Fondiwe'i is noticeably less than at Makiroka or Nupasafa: in Fondiwe'i mainly sweet potato is grown, and subsidiary crops drop out, as the greater density of population here, coupled with the low productivity of much of Fondiwe'i, means that more land must be devoted to the staple. The range of altitude over which the gardens extend introduces some further differences in cropping practices. The complexity of the gardens as a result of inter-planting of crops, which is such a characteristic feature of Nupasafa gardens, is virtually absent in Fondiwe'i. The reason for single cropping here appears to be purely environmental, as it was observed that gardens lower in the Korfena valley are inter-planted with a variety of crops, but mainly sweet potato, bananas and sugar cane. In Fondiwe'i, a garden devoted to sweet potato will occasionally contain scattered clumps of sugar cane, but bananas throughout the whole of Fondiwe'i are grown in very small quantities and seldom above 6,500 feet. (Only one garden contained sufficient bananas to be mapped.) The land-use map indicates the few gardens which are inter-cropped: most of these are on Class A land. As a rule, separate plots are planted to subsidiary food crops instead of inter-planting them with sweet potato. These plots usually contain sugar and a variety of indigenous leafy vegetables as a ground crop. One large sugar garden between Gulunufia and the Fowopoko river was specially planted for the purpose of a food distribution to be held later in the year. About thirty men each planted a strip equivalent

5 (continued)
for food and firewood at several times the current native market rate: I obviously represented a source for acquiring money, and the Fondiwe'i people showed no lack of initiative in trying to exploit the situation.

in size to a sweet potato bed (two to three yards wide, ten yards long) with sugar and vegetables, the latter being mainly those eaten with pig on ceremonial occasions.

In the highest gardens, those between 7,500 and 8,000 feet, a special practice is followed in the cultivation of sweet potato: about three to four weeks after planting the leaves are stripped off the stems and the runners are bent over and covered with earth; the shoots later break through to the surface again. It is claimed that this produces better yields of sweet potato, and is probably a protective measure against the lower temperatures, although no frosts occur at this altitude. There is some selection of sweet potato varieties for the gardens above 7,500 feet, and those known locally as ikuwena, dagavena and fandene are most commonly planted.

Of the subsidiary crops, sugar is the most important. Bananas are of minor importance, and no yam or tapioca beds were seen. Corn is occasionally planted in the gardens below Kawonda village, but in very small quantities. Minor foods such as edible pitpit and wing bean are usually planted in conjunction with sugar or in one corner of a sweet potato garden, but the wing bean is generally only cultivated below 6,500 feet. Taro and tobacco are planted in very small plots adjoining the village houses.

The annual pandanus harvest is of considerable importance: pandanus are transplanted from the forest, and some of the pandanus in the forest are also claimed to have been planted. The nut-bearing pandanus is found generally above 6,500 feet, planted singly or in groves near streams or on steep slopes. The trees bear after two or three years, and have a bearing life of about twenty years. When a tree dies, it is replaced by another, but

Plate 32. Sweet potato garden on steeply-sloping land in Fondiwe'i with grove of planted Pandanus. At this altitude (7,000 feet) the growth is retarded and the sweet potato does not completely cover the surface.

Plate 33. Soil erosion in a recently-fallowed garden in Fondiwe'i. Observe the dense cover of Miscanthus in long-term fallow land in the background.

not in the same spot. The nuts are harvested at the end of the wet season, about May, wrapped in bundles in leaves, and placed in the rafters of the houses to be dried and smoked. They are distributed to relatives and friends at food distributions together with sugar cane, bananas and other foods. Pandanus nuts are also on occasion taken to the market for sale as they will not grow in most parts of the Valley and are regarded as a delicacy. The pandanus has several other uses: the inner pith of the stem is edible, and the leaves are used for making 'rain capes' and sleeping mats, and for fuel. There is no age or sex distinction in the planting of pandanus as there is for most other crops; the trees are inherited by a man's sons on his death.

Pigs are the only livestock of importance in Fondiwe'i and in similar tribal areas in mountain locations, and there is little scope for other forms of livestock apart from perhaps goats and poultry. The relative number of pigs kept in Fondiwe'i is less than at either Nupasafa or Makiroka, the ratio of the pig population to the human population being roughly 1:1, but several times greater in the latter two areas. The Fondiwe'i ratio, however, agrees with that for environmentally similar areas in Chimbu. Although in 1960 nearly three-quarters of Fondiwe'i land was under fallow (a proportion which probably does not alter greatly from year to year) it is not to be inferred from this that it would be possible to increase the grazing on this land for more effective utilisation as much of it is highly susceptible to erosion, and soil erosion is serious enough now, especially in higher ground near the forest where most pigs are grazed because of the greater

variety of grubs and worms found there. Pigs are killed for food on a wide number of occasions, but all are 'ceremonial' to some extent (see Chapter IV) - it seems that a pig is never killed without some rationale attaching.

The survey of Fondiwe'i land covered an area of 387 acres, and it is estimated that Fondiwe'i people own in addition some 600 acres of forest.[6] For reasons explained earlier, it is likely that a few Fondiwe'i men also own small pockets of land in the lower Korfena valley: if so, it would be of limited acreage and unlikely to be supporting crops, as the fertile land would have been claimed by the clan whose land surrounded it. Informants who regularly accompanied me when surveying assured me that the area mapped represented their total land. A comparison of the resident population with the area mapped gives a population density of approximately 470 per square mile, which is exceeded in the Highlands only by parts of upper Chimbu and parts of the Wissel Lakes region in Netherlands New Guinea. The only other part of the Goroka Valley where the population density is probably as high as this is the valley immediately south of the Korfena valley, occupied by the Koreipa, Yamieyufa and Manto tribes.

In 1960 there were 68 acres[7] of bearing subsistence food gardens in Fondiwe'i, which means a per capita figure of 0.24 acres. Almost 20 acres were being cleared in preparation for new gardens to replace old gardens in the following year, and about

---

6 This was calculated from air photographs, and based on descriptions of the extent of Fondiwe'i forest from informants.

7 The areas quoted here are rounded - Table 3 accompanying Chapter IX gives the areas to the first decimal place.

290 acres were under fallow: thus the cleared and planted land represents about 30 per cent of Fondiwe'i land. The area planted to cash crops was just over one acre, and a further 6.5 acres were occupied by settlements and paths, etc. A random sample of 10 per cent of the population produced figures in reasonable agreement with those derived for the total population: for the sample, the acreage of food crops per capita was 0.23 acres, and the total land per capita was 1.7 acres as against 1.4 acres for the total population.

Fondiwe'i was chosen as being representative of some thousands of people who occupy areas in the Asaro Range and Bismarck Mountains above 6,000 feet, and who therefore occupy not only difficult environments, but also environments which preclude to a large extent the production of cash crops. So far the differences in economic opportunity between tribes such as Fondiwe'i and those occupying more favourable environments have not produced much tangible difference in the way of life of the peoples concerned, but obviously these discrepancies in resource potential will become increasingly significant in the future. The implications of this, and the prospects for the mountain tribes, are discussed in Chapter IX, following the accounts of Nupasafa and Makiroka.

Plate 34

Air Photograph, Korofeigu.

Chapter VII

NUPASAFA

The territory of the Korofeigu tribe lies in the extreme southeast of the Goroka Valley, near the junction of the Asaro and Bena Bena Rivers. Nupasafa clan's territory, on the eastern border of Korofeigu, extends southeast from the Bena Bena River in a narrow belt about two and a half miles long and half a mile wide. The boundaries of the tribe's land, and those of the clans within it, were defined by patrol officers in the early 1950s after a series of land disputes between a number of neighbouring tribes. The present area occupied by Korofeigu, although large in terms of the size of the tribe's population, is nevertheless small compared with the area the men claim they once dominated, which extended west to Seigu and Asaloka, near the middle Asaro.

The Physical Landscape

Geology

The greater part of the area surrounding the confluence of the Asaro and the Bena Bena, including all of Korofeigu's occupied and cultivated land, consists of old colluvial slopes and old high-level lacustrine and alluvial deposits of Quaternary age. (McMillan and Malone 1960, 36.) The deposits are generally fine-textured clays and silts, with coarse and gravelly layers at intervals; observation of the deposits in gullies suggests that they attain considerable depth.

An outlier of the Goroka Formation runs parallel to the Bena Bena River through the Korofeigu territory, outcropping in a narrow belt about a mile back from the east bank of the river. The outcrop consists mainly of grey micaceous schist. (Ibid., 16.) Miocene sediments and volcanics outcrop in the southeast of Korofeigu's territory on the border of the Goroka Valley, where they form part of the watershed in this region. Fossiliferous shales and mudstones, conglomerates, and hornblende-feldspar porphyries are the main rocks found in this outcrop. (Ibid., 31, 34.)

Terrain

Korofeigu is in an area of comparatively low relief, for the most part between a range of 4,700-5,200 feet. Long narrow ridges, occasionally sharp but more often rounded, separate long shallow depressions or more open basins which have been gently dissected by small creeks. The landscape generally is mature and undulating. The steep concave slopes of some ridges have slumped, forming a series of long, low benches in step formation down the sides. This benching seems peculiar to the lower Bena Bena area, although along the River itself the slopes are terraced. The feature is clearly exhibited on the ridge forming the boundary between Korofeigu and Kapukumaligi tribe, along the crest of which the main road runs. The benches here are between ten and twenty feet in depth, and up to twenty yards wide.

Drainage is largely controlled by the ridge of outcropping metamorphic rocks of the Goroka Formation: the gradient from this ridge northward to the Bena Bena River is moderately steep, and

Plate 35. Bare, grass-covered hills in the dry lower Bena Bena, traversed by section of the road to Kainantu. Kapukumaligi and Korofeigu lands lie on the far side of this ridge.

Plate 36. Korofeigu territory, with Nupasafa land adjacent to the road masked by casuarinas. My field base under construction in the foreground, and section of the ridge on the right.

short streams have cut deep gullies here, sharply dissecting the slopes. On the south side the slope is gentler and creeks are small and intermittent; in the dry season they are greatly reduced in size and may dry up altogether except for a few water-holes. These creeks drain circuitously into the Asaro Gorge in the wet season, but during the dry season they tend to terminate in shallow, swampy depressions a short distance from their source.

Nupasafa at present occupies and cultivates a shallow basin embraced by low ridges on the north and east. The area is drained by the Abehefuto Creek and its tributaries, which flow out toward the open southern end of the basin. Over most of the basin the gradient is very gentle and the lower ground near the Abehefuto Creek is poorly drained as a result.

Soils

The soils in Nupasafa are generally poor and, supporting only a cover of short grasses, are deficient in organic matter. Heavy clays with very little loam predominate, making cultivation difficult.

On the upper slopes and ridge tops the topsoils are shallow, in some places skeletal, in others overlying deep accumulations of yellow-orange to red clay. Concretionary layers are common, occuring at depths from a few inches to several feet below the surface, and impeding the drainage where they are compacted. The dialect name for this soil type is gesegesepa. On the lower and benched slopes, two soil types predominate, nupami'e, a dark-grey to black clay with very little loam, underlain by considerable depths of clay variously yellow, red, or mottled red-brown; and gelipa, a brown, compact clay loam in the A-horizon, which is

generally shallow, and merges into lower horizons of reddish clays. In the nupami'e soil permeability is low and shrinkage cracks appear during dry spells. During the wet season the poor drainage makes for swampy conditions in depressions and along the creek beds. The black, waxy clay of the swampy areas is known as o'ifa'e.

Climate

The Korofeigu area is recognised as the driest part of the Goroka Valley. There are no rainfall records for the immediate vicinity but nearby plantations average between 50 and 60 inches annually. The middle months of the year are characteristically dry, but the dry season here is more severe and of longer duration than elsewhere in the Valley: on the available figures, the Schmidt and Ferguson quotient for the lower Bena Bena is 40.7, as against only 12.2 in the vicinity of Kanusa.[1] While droughts of long duration are probably rare, dry spells occur at intervals as a result of which food shortages are experienced.

There is considerable day-to-day variation in temperature, but the daily mean maximum is about 77 degrees and the mean minimum about 59 degrees. The diurnal range of temperature is usually about 20 degrees, and the range remains fairly constant although absolute temperatures are somewhat higher during the wet season.

---

1 The Schmidt and Ferguson method classifies climates according to the ratio of wet and dry periods. Taking the monthly records of a station, all months with over 100 mm (3.94 inches) are counted as 'wet' and all months with less than 60 mm (2.36 inches) are regarded as 'dry'. A quotient is obtained by dividing the number of dry months by the number of wet months; values of Q are separated into eight classes, A to H, e.g., stations with Q less than 14.3 are in class A, with no discernible wet season - this is equivalent to Köppen's Af climate.

Frost is unknown. There are no records of evaporation for any part of the Goroka Valley but in this area, with a predominantly open landscape, evaporation rates must be very high.

A characteristic phenomenon of the lower Bena Bena during the dry season is the strong winds, which begin soon after noon and are often sustained well into the night. They are easterly, and basically convectional in origin, although, as they are seasonal, they must also bear some relation to the southeast trade system. They are particularly noticeable by virtue of the absence of winds elsewhere in the Valley, except infrequently during the rainy season.

Morning mists are common at all times of the year, but hours of sunshine per day were observed to be higher here than further west in the Valley, as the absence of mountains precludes the formation of afternoon cloud cover to the same extent.

Vegetation

The Korofeigu and neighbouring tribes occupy an area in which stabilised short grassland is the predominant vegetation. Korofeigu has no forest, either primary or successional, nor do the Korofeigu own forest areas outside their tribal territory. Any products which the Korofeigu require from the forest, such as certain hardwoods and plumes and skins, they must trade for; formerly, they purchased such products with vegetable salt, which they manufactured themselves in the swampy Phragmites depressions.

Several grassland communities are observed in Korofeigu. On the upper slopes and ridge tops, the dominant community is an association of Arundinellum, Capillipedium and Imperata. Pines

Plate 37. Phragmites swamp in the bed of the Abehefuto Creek. Formerly these sites were used for the manufacture of vegetable salt. Kami Hills in background.

have been planted along the ridge tops by the DASF in an attempt to control soil erosion which is in places extensive, not only because of the shallow depth of soil and thin grass cover but also because small areas have been almost completely denuded of this cover by grazing pigs.

On the intermediate slopes Imperata is dominant, interspersed with occasional clumps of bracken, kangaroo grass (Themeda australis) and Crotalaria. This latter is a legume used extensively as a temporary shade for coffee gardens and is commonly found in the fallow areas as a garden escapee. The fallow gardens also contain stands of Saccharum spontaneum and Miscanthus floridulus, and clumps of bamboo. In addition, there are a variety of trees, usually growing singly, which have been brought down from the forest areas and transplanted, either for their edible leaves or seeds or for ornamentation.

Dense, continuous stands of Phragmites karka are found along the courses of the major creeks, interspersed with Miscanthus and varieties of Saccharum. The shortage of timber in this district means that there is a heavy reliance on cane grasses as building material. Two varieties of Saccharum are used for the construction of fences and houses (a'kepa and kaso'akepa), and Phragmites karka (ge'pa'i) is used in house construction. Informants say that the latter is no longer used for fencing, although it was in the past. Miscanthus floridulus (foghasa) is used for making bed platforms.

Throughout all the areas which are or have recently been cultivated, casuarinas are planted and particularly dense groves are found in association with coffee gardens. Casuarina

reafforestation is apparently an introduced practice in the Bena Bena and a most valuable one in an area of impoverished soils and with no natural timber.

Land Classes

The land classes described here for Nupasafa are of similar agricultural potential to the equivalent class in Fondiwe'i, although the environmental conditions in the two localities are very different. Comparison of the potential of the three areas studied is facilitated by using one classification throughout.

Agricultural potential in Nupasafa rests mainly on two factors, rainfall and soil type. However, as Nupasafa is too small an area for there to be agriculturally significant variations in rainfall within the area, it is taken as a constant factor, and not used as a criterion by which land classes may be distinguished. But the low rainfall of this area remains a determinant of agricultural potential. Rainfall rather than evaporation is the critical factor as in those parts of the Valley with similar temperatures to the Korofeigu area the rainfall is higher than at Korofeigu. Nupasafa is environmentally not a complex area and neither terrain type, degree of slope, nor altitude are conditioning factors on agricultural potential as they are at Fondiwe'i. The land classes are therefore separated primarily on variations in soil type.

Class A: there is no land in Nupasafa equivalent to the Class A land described in Fondiwe'i.

Class B land occurs in small pockets and strips along the Abehefuto Creek, in the floor of the Nupasafa basin. Although

TOTAL TERRITORY-NUPASAFA

One half Mile

May-July 1960

this land requires drainage in the wet season it maintains, through drainage and seepage into the soils here, an adequate balance of soil moisture throughout the year for the growing of such crops as are cultivated in Nupasafa. The productivity of this land class is moderate.

Class C land includes most of the cultivated area of Nupasafa. This class embraces the undulating areas of gentle relief and the intermediate and benched slopes, which mainly support Imperata on the gelipame'i and nupame'i soils. On these soils, with their low water-retention capacity, dry spells mean that the length of the growing season is invariably diminished by a month or two. No attempt is made to irrigate gardens, although ponds have been dug in several places to hold water during dry months. In any case, as the streams are small and ground water negligible, water for irrigation is not readily available; it is often necessary to walk some distance for water even to satisfy household needs. Productivity is low.

Class D land is generally only used for grazing pigs and on the whole is agriculturally unsuitable on account of the thin and generally dry soils. Class D land occurs in restricted areas only, along upper slopes and the crests of ridges. Yields of sweet potato would be very poor, and in fact when the land-use map was constructed for Nupasafa, no cultivation was found on this land class. Productivity would be very low.

Class E land is very limited: it includes deeply-gullied land in an area which Nupasafa cultivated until 1948-9, and very small perpetually swampy pockets.

In summary, then, Nupasafa is an area of low to moderate agricultural potential, and lacking as it does water resources, the potential is not likely to be increased in the short term. To suggest fertiliser application and irrigation systems is not realistic under the present economic circumstances of the native people and it is not feasible to intensify production during the wet season to compensate for the effects of the dry season, as the crops produced are short-term crops which do not permit the storage of a surplus. The implications of this for future land use are discussed later in the chapter.

History

As with all the tribes in the Valley, the record of Korofeigu's battles, alliances and migrations is complex and the facts are fragmentary. Korofeigu people have a reputation among both the natives and Europeans in the Valley for having been a strongly consolidated and powerful group in the past; the men of the tribe are proud of the exploits of their former fighting days, when they fought not only with their immediate neighbours but also with groups as far west as Goroka. Patrol Officer I. Holmes states that the Numuyugabo (a linguistic group of which Korofeigu was a member) '...before our advent held complete ascendency over all other groups and dominated the Asaro Valley grasslands almost to Asaloka'. (Patrol Report, Bena Bena 1957/8.) Holmes also mentions that they clashed with early patrols.

The Korofeigu have occupied and cultivated several different locations within their tribal territory in the past few generations.

At some time in the recent past they were settled in the east of their territory, near the Dunantina River, but when the Leahy-Dwyer expedition passed through this area they found the Korofeigu villages on the east bank of the Bena Bena River, some two miles upstream from its junction with the Asaro River. The date of this move could not be established, nor the precise reason for it, but it was most probably due to hostility with neighbouring groups such as Gitenu and Sirupa.

The most recent migration of the Korofeigu people occurred as a result of land disputes with the Katagu tribe, after the second world war. Katagu territory lies adjacent to Korofeigu, on the west bank of the Bena Bena River. The disputed land lies on the east bank, between the Bena Bena and the ridge a mile back from the river, which Korofeigu were then occupying. The latter claimed that the river was their boundary, and Katagu that the ridge was the dividing line. Katagu encroached on this land, planting gardens and trees, and grazing their pigs. After arbitration by patrol officers at different times between 1948 and 1954, a settlement was made under the terms of which the river was proclaimed the official boundary between the two tribes, Katagu were given five years in which to remove any trees or other crops which they had planted, and were ordered to relinquish all claims to the land. Korofeigu removed to their present location east of the ridge and built new villages; for the duration of the 'truce' they were deprived of the right to cultivate on the disputed land, but could graze their pigs and cut the timber and grass there. Full rights to the land were restored to Korofeigu after the five years had passed, in 1960. Although the final settlement was made

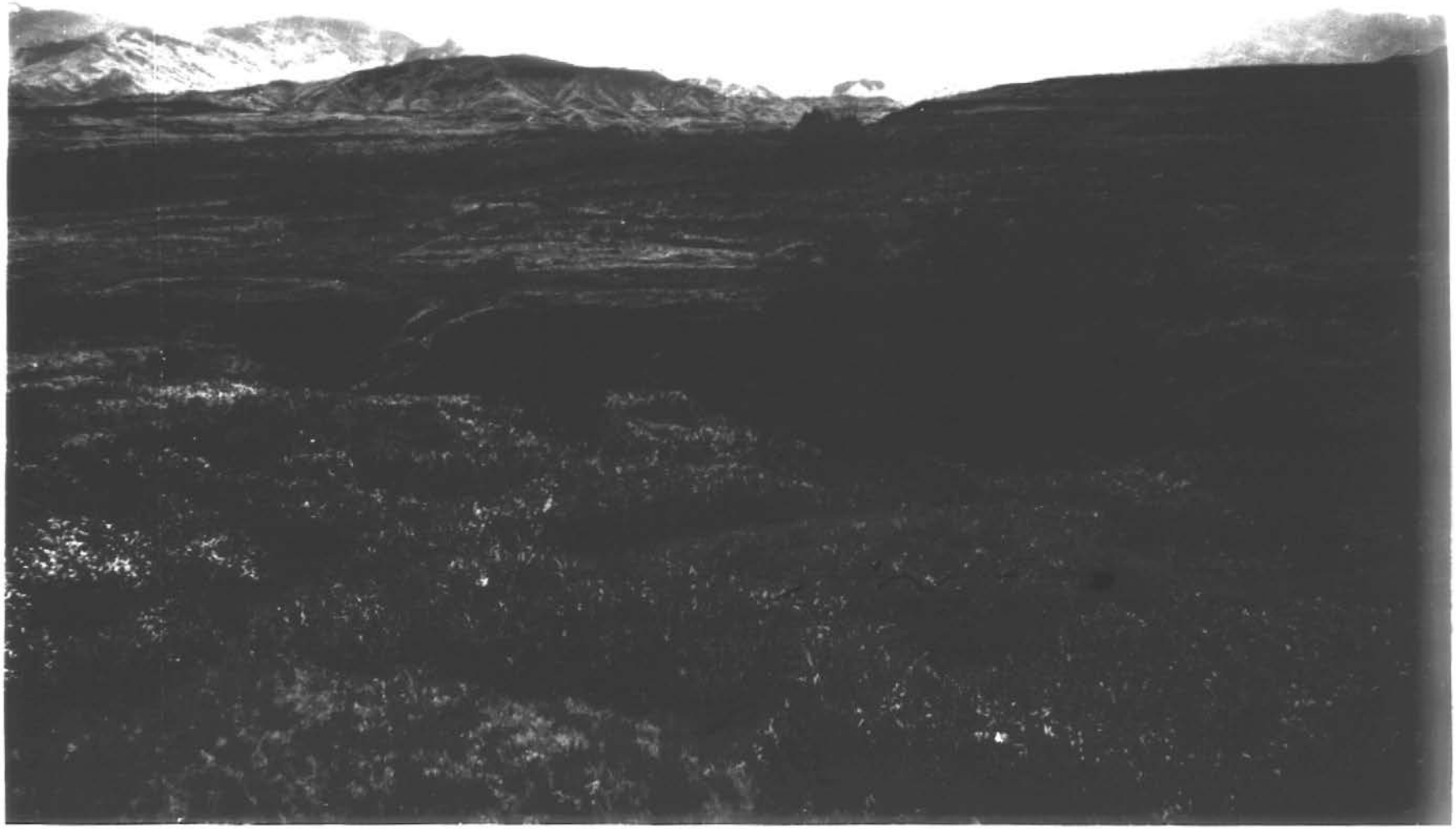


Plate 38. Nupasafa's formerly-occupied land, with old garden sites still distinguishable by cane grass hedges. This is part of the area which was under dispute by Korofeigu and Katagu.

only in 1954, it appears that Korofeigu removed to their present site in 1948 or 1949. This is based on the estimated age of children who were born in the former and present villages (Langness, personal communication) and on the extent of cultivation as shown on air photographs for 1955, which is indicative of at least six years' occupance.

Settlement and Population

In each of the Korofeigu clans there is a major village and one or more smaller villages or hamlets. A village is defined as any settlement with ten or more permanently occupied houses and a men's house. Settlements smaller than this are here termed hamlets; usually they do not include a men's house. The hamlets are sometimes extensions of a large village, and sometimes no more than a compound of two or three houses established by brothers or men who habitually garden together, near their gardens.

The villages in Nupasafa apparently had their origin as dispersed clusters of pig houses, and later became consolidated into permanent settlements as cultivation became concentrated in the adjacent land. Thus the first of the present Nupasafa villages to become established was Gunako, the closest of the present settlements to the formerly occupied land near the river, and the site where the pig houses of that time would have been located. Sapuro, centrally situated, became the main village as the remove to the new area gained impetus, and Gesegeto was established somewhat later: as the grazing land south of Sapuro was brought into cultivation, the pig houses there became residences. The air photographs for 1955 show a number of scattered houses in the vicinity

Plate 39. Section of Gesegeto Village

of what is now Gesegeto village, but the present village pattern had not been established at that time.

Nupasafa villages are all located on high ground, partly because the lower ground is poorly drained, and partly also because villages in the Valley Floor were usually located on such a site traditionally for defence. In 1960 the villages showed little sign of having departed from the pattern which must have existed before pacification. They are conglomerations of houses seldom in the orderly arrangement suggested by the pidgin term for a village, 'house-line'. Maintenance on the houses is rare, even granting the short life of the materials used, and old houses are left until they have virtually disintegrated. The pride in construction and decoration of the houses which is such a notable aspect of the Asaro villages is absent here. In addition, the number of pigs owned here is greater than elsewhere in the Valley and their presence in and around the houses contributes greatly to the unhygienic aspect of the villages, especially during the wet season, when mud, filth and flies make them most unpleasant.

Among the reforms planned by the recently formed Local Government Council in the Bena Bena district was a decision to improve the villages. Langness reports (personal communication) that a Council representative inspected the Korofeigu villages early in 1961 and ordered a number of houses to be demolished, including ten in Sapuro and four in Gesegeto. (It is surprising to learn that the number was not greater - see photograph.) The Nupasafans, suddenly ashamed of the condition of their villages, decided to build a new village on a new site. The site had been cleared and thirteen new houses erected on it by mid-1961. However,

only two of these were occupied, and in the meantime some forty new houses have been built in the uncultivated land south of Gesegeto and another fifteen on the slopes north of Gunako. (The land-use map made twelve months earlier shows only five houses south of Gesegeto and none north of Gunako.) The Nupasafans are apparently unwilling to adopt completely edicts from an outside authority, such as the Council, and their initial enthusiasm has now dissipated: the new houses on the fringes of the cultivated land are called pig houses by the Nupasafans, but according to Langness they are in effect women's houses and residence in them has already become more or less established. No doubt the site marked out formally for the new village will remain largely unused except for some official and ceremonial occasions, and in the meantime the actual new villages will develop out of the 'pig houses'.

The men's house is here a much more important institution than in areas nearer to mission stations and Goroka, where it seems to have lost much of its formal significance. Although there is a large mission village in Nagamitobo clan, in which a number of families of the other Korofeigu clans have taken up residence, none of the Nupasafa people have left their clan to live there. Men's houses are not elaborate buildings, and the Sapuro men's house is so small that the men do not sleep on the customary beds made of plaited cane mounted on platforms but on banana leaves on the ground 'like pigs' as one man unabashedly expressed it. Adjacent to this men's house is an initiation house where boys' puberty ceremonies are still carried out. All the villages have,

in addition, small huts for menstruating and confined women, another feature which is absent in Asaro villages.

Nupasafa had a population of 227 in June 1960: of these, six men were absent, working on coastal plantations under the Highland Labour Scheme, another three were absent at work in trade stores in the Valley, one was working at the coffee factory in Goroka and living in the town, and one was living in his mother's clan, Hofaga. The number also includes two men who have married and been adopted into Nupasafa and who now reside there permanently. The actual population being supported on the Nupasafa land was therefore 218. The nearby Government school was attended by 26 Nupasafa boys and youths and another three were at other schools in the Valley.

Polygyny is more common in Korofeigu than in Kanusa - the number of married males in 1961 was 47, the number of married females 64. (Langness, personal communication.) The numbers of male and female children were almost equal. The average number of children per family here is three.

Social Organisation

Social organisation among the Bena Bena tribes differs only in emphasis from that in the Asaro. Confederacies are now of nominal importance only, although Korofeigu still commemorates some former alliances with pig distributions. The tribe is a territorial unit and claims a common ancestor, but the only land rights common to all members of the tribe are grazing rights. The tribe is, however, a fairly closely-knit group, and at Korofeigu, perhaps by virtue of its position in a relatively sparsely

populated area, it seems functionally more important than do tribal groups in the central Valley, where the importance of the clan is relatively much greater.

This is not to underestimate the clan's significance in Korofeigu social structure: the clans are strongly unified and their members demonstrate a cohesion which is rarely expressed in larger groupings. Korofeigu tribe comprises four clans, Nupasafa, Wai'atagusa, Nagamitobo and Benimeto, with a total population of almost 700. As elsewhere, the clan's land is a clearly defined unit, but tenure rights are not so rigidly defined or adhered to in Korofeigu as they are in more densely settled parts of the Valley.

Five sub-clans exist in Nupasafa, four being hereditary and one adopted. However, the adopted group has been incorporated long enough for the rule of exogamy not to be operative. The clan is the largest group within which the rule of exogamy applies. The sub-clans are un-named. They are of no social significance in Nupasafa, mainly because of the custom of adoption and 'brotherhood', which cuts across kinship ties and diminishes their importance. It is not uncommon for a man to adopt a friend's child and look after it as his own, assuming all the responsibilities for the child as it attains adolescence and maturity. Similarly, a man may contribute pigs and other gifts to the puberty, marriage and other ceremonies in which a friend's child is involved. Although the adoption is informal, without any accompanying ceremonial, it is nevertheless a sincere arrangement and is honoured. Such relationships among adult men tend to be perpetuated among age grades, and thus socially functional small groups are rarely

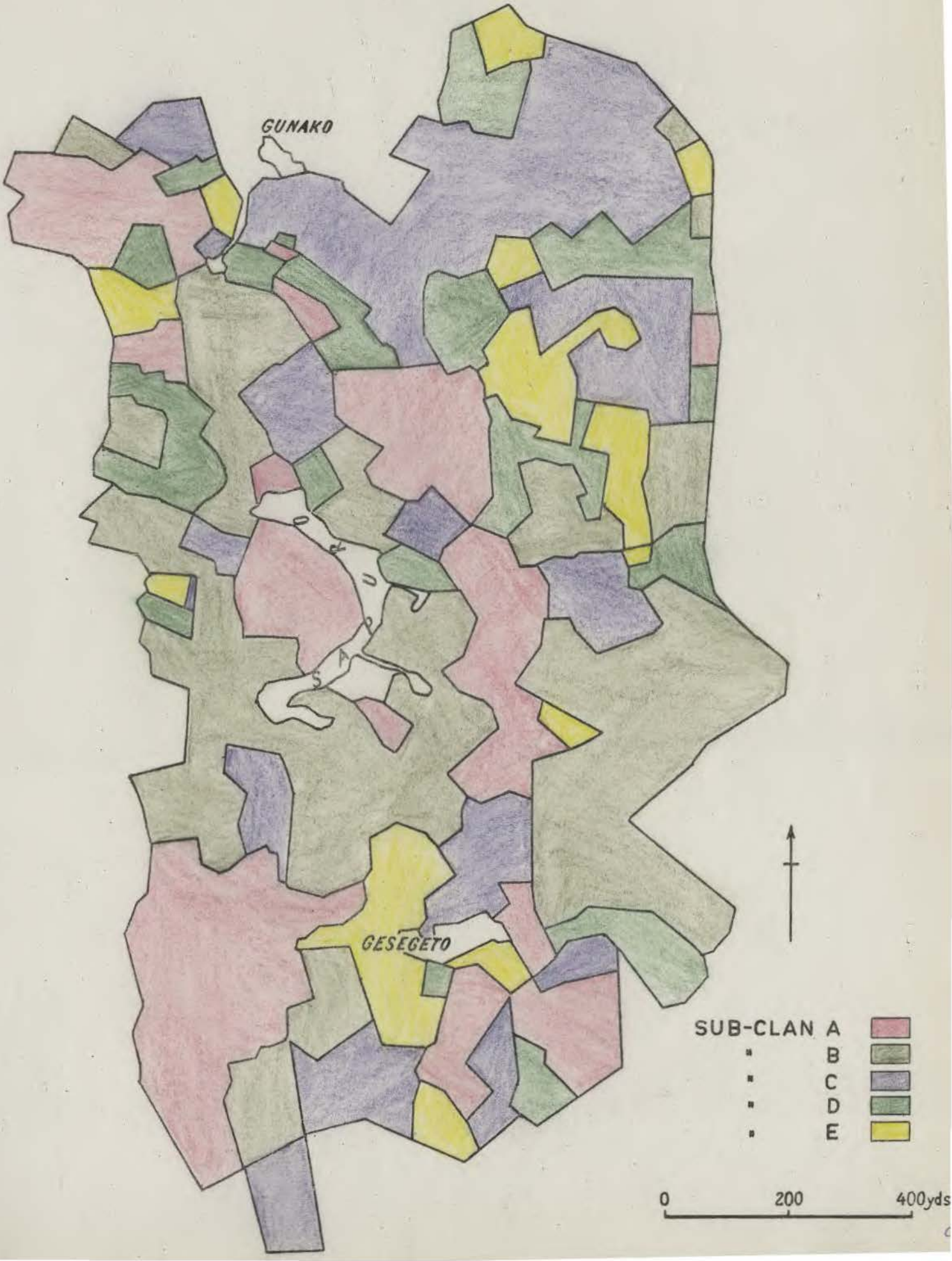
kin groups, as adoption cuts across them and in effect substitutes for them.

Land Tenure

Partly because of the nature of the social ties, and partly also because most of Nupasafa's land is of equivalent agricultural potential, there is only a slight tendency for men of the same sub-clan to hold their land in parcels discretely from other sub-clans. In Fondiew'i a different set of environmental factors produced the same result. Only in Makiroka is this tendency exhibited. Map 9 shows the ownership of land by sub-clan groups and while there are small cores of sub-clan gardens, the pattern is by no means suggestive of an explicit relationship between land-holding and sub-clan organisation. Due to the strength of non-kinship ties also, there is only a weak relationship between kin groups and place of residence: this is in marked contrast to some upper Asaro groups, in which separate sections of a village are occupied by members of different sub-clans, or, in the case of small villages, the residents may all be members of the same sub-clan. (Newman, personal communication.)

There is no shortage of land in Nupasafa or in Korofeigu as a whole: each of the clans has land which their members have never claimed or cultivated, and a man may at any time appropriate a portion of this land in his own clan's territory and cultivate it; having done so, he establishes ownership over it and may transmit it to his heirs. Formerly, the clan's traditional leaders (gibina'a) were consulted before new land was taken into cultivation,

LAND TENURE BY SUB-CLANS, NUPASASAFA



but today an individual has complete autonomy in his decision to cultivate unclaimed land.[2] However, a man will announce such a decision, usually in informal discussion in the men's house, and will invariably engage the assistance of relatives or friends in preparing the new garden. This freedom to claim and cultivate land at one's own discretion may also help explain the fact that land is not cultivated in well-defined sub-clan units.

In the case of the land occupied until 1948-9, the former claims of individuals to the land they cultivated there still prevail, although there is no cultivation at present. Casuarinas and other trees planted here constitute the main timber reserve and these trees too are owned individually by the men who planted or inherited them.

Land Use

Nupasafans are fortunate in that the relative abundance of their land tends to compensate for its generally low productivity. The total land owned by the Nupasafa clan is 870 acres, which is equivalent to almost four acres per capita; this contrasts greatly with Fondiwe'i, where the per capita acreage was about one-third of this. The population density is approximately 150 per square mile. The existence of a large land reserve means that there is no need to follow a rigid crop-fallow rotation system as in more densely settled parts. However, the fertility factor does restrict the length of time for which any land can be continuously

---

2 This is most probably an outcome of the break-down of the influence of the *gibina'a* with the appointment by the European Administration of luluais and tultuls.

recultivated. The low productivity may also explain the tendency to open up new land for cultivation rather than to recultivate plots which have already been gardened and fallowed, a tendency which is pronounced, judging again by the evidence of the air photos showing the amount of land brought under cultivation between 1949 and 1955, and by the amount cultivated since then, as observed in 1960.

Preparation of the ground for crops involves no arduous work: alternate burning and tillage is all that is necessary, and now that spades are in widespread use, the task is much easier than it must have been formerly, when the breaking of the surface soil, hardened during the dry season, would have been arduous with only pointed sticks. Today the construction of the fences is the most painstaking task involved. The preparation of the ground and the planting of crops is attended by strict conventions in which the roles of the men and women are clearly defined and adhered to. The division of labour is as follows: the owner marks the boundaries of the garden to be prepared; his wife or wives burn the grass cover; while the owner and such helpers as he has been able to muster construct the fences, the women break the soil for the first time; later, a second burning to clear the trash is carried out by the women, and following this, the ground is tilled a second time, more thoroughly; finally the owner will mark the gutters which separate the sweet potato beds. Men plant bananas, sugar, yam, taro, tapioca, tobacco, and also casuarinas, bamboo and cordylines. Cash crops such as coffee and peanuts are also normally planted by the men. Women plant sweet potato, maize, edible pitpit and wing beans.

'Marriage Gardens'

The practice of planting 'marriage gardens' seems common enough among the Bena Bena people, although the custom does not appear to apply elsewhere in the Valley. When a man buys a bride for his son he is always helped by a number of other men in the clan to raise the bride price, which has considerably inflated since money and consumer goods have been introduced. When the price has been raised the bride is bought and her prospective father-in-law marks out a large garden, which may be two to three acres in size, usually in land which is unclaimed and has not been previously cultivated. He is helped in the preparation and planting by those men (and their wives) who contributed to the bride payment, and each is allotted one row (or perhaps half a row), receiving the produce of the first harvest from it. After this has been distributed, the subsequent rights to the land rest with the father. As a man about to be married will not have gardens of his own, planting a 'marriage garden' ensures that he, his wife and his parents have an immediate food supply; furthermore it ensures that the son will ultimately inherit a fairly large block of land, although in Korofeigu this is not a critical factor.

On the surface the custom seems uneconomic as those who contribute to the bride price also help prepare the garden and apparently receive little in return. However, it means that at any given time a man has, in addition to his own garden or gardens, the right to harvest food from a number of others, as in some cases the custom extends beyond those gardens planted for a marriage but also to normal gardens if they are larger than usual. In an area where food shortages are experienced this is an important

consideration for a man whose gardens have failed or have been destroyed by pigs, or are at the point of diminishing returns.

The length of time for which land can be continuously cultivated for the production of food crops is two to three years for most of Nupasafa - this means at most three successive plantings of sweet potato. Only in the limited areas of Class B land is the cultivation period estimated to be up to four years. In 1960 much of this land was either lying fallow or was under coffee, but some food gardens in Class B land were claimed to have been planted three to four years previously and were still bearing good crops.

With very few exceptions, all crops are planted at the onset of the wet season, although sweet potato is planted throughout the year. The main activity of the dry season is the preparation of land and fences for the new season's gardens.

Sweet potato is the staple, with maize, tapioca, sugar and bananas forming the main subsidiary crops. As Korofeigu is a day's walk from Goroka, and thus from the main market, European vegetables (apart from tomatoes and beans, which the villagers like) are not widely grown. Crops such as yam and taro are not planted consistently by all individuals and are grown in small quantities only.

All subsistence gardens are interplanted in the first instance. The most usual combination is sweet potato, with either maize or tapioca or both being planted simultaneously along the borders of the beds; sugar and bananas are usually planted soon after. The short-term maize may or may not be planted a second

time, with the second planting of sweet potato, and one planting of tapioca or sugar usually outlasts two crops of sweet potato. Interplanting is so much the rule that gardens shown on the 1960 land-use map containing only sweet potato are either so recently planted that the combination crops have not yet been put in, or they are old gardens nearing the end of their productive cycle, and will shortly revert to fallow.

Many varieties of sweet potato were observed in the Nupasafa gardens, but apart from one, konivena'i in the dialect, there appeared to be no recognition that certain varieties were better adapted to dry conditions than others. Konivena'i, which has a large red-skinned tuber with white flesh, is widely planted, but it was noticed that this too showed signs of wilting after a month or more without rain. In spite of its popularity, no gardens were noticed in which this variety alone had been planted: most gardens contain a profusion of varieties, including a number of very poor strains, with spindly leaves and small tubers, claimed to have been grown by the ancestors. On the other hand, varieties are constantly being brought by the natives from other localities in the Bena Bena and tried under Nupasafa conditions. In an area such as this, variety trials would be most useful, and also some guidance in the selection of suitable varieties for planting.

The sweet potato beds here are about two yards wide, the length varying according to the dimensions of the garden. On these beds, separated by shallow gutters, mounds of loose earth are made, from twelve to eighteen inches high, and several lengths of sweet potato runner thrust into each mound. Sweet potato takes from five to seven months to mature, and can be harvested for

Plate 40. The southern edge of Nupasafa's cultivated land. The garden is interplanted with sweet potato, bananas and tapioca. The new 'pig houses' (p.157) have been built in the unclaimed grassland beyond these gardens.

about six months from the date of first harvest. Apparently there is no difference in the time of maturing between crops planted on the lower, moister ground and those on the slopes, but yields are usually better in the former area. Yields during the dry season are considerably lower and shortages of food may be experienced during July and August in particular. 'The practice of harvesting kaukau [sweet potato] as required rather than at once is necessitated by the fact that kaukau keeps for only about a week. As required harvesting also considerably raises the yield per acre.' (Montgomery, DASF Patrol Report, Bena Bena, 1959.)

If towards the end of a severe dry season a food shortage is anticipated, additional maize is often planted as a second staple. In extreme cases the Korofeigu call on several groups to the south, beyond the Dunantina River, to supply food[3] and later repay this with pigs.

There were indigenous varieties of maize, apparently of very poor quality. The Korofeigu say that for a long time they did not eat maize, believing that it would cause sickness, and maize was only used as a decorative plant in the gardens. However, an adventurous soul tried some and survived, after which it became incorporated in the diet. Improved varieties introduced by Europeans are now widely grown. Maize takes two to three months to mature here from the time of planting, and often several crops a year are planted. According to the DASF it is planted for grain for the first two or perhaps three years in any particular

---

3 The groups are Guruka, Uluguti, Hogobusa, Kami and Numugo. The Korofeigu and their benefactors meet at the Dunantina on such occasions and the food, and later the pigs, are exchanged between individuals and not in bulk.

plot. After this period the cob carries no grain, presumably because of lack of soil nutrient, and is then grown solely to produce the fleshy inner glumes which surround the cob; these glumes are cooked as a vegetable in earth ovens.

There are a number of minor crops, such as edible pitpit, wing beans, yam, taro, 'Kumu' (which embraces several varieties of indigenous leafy vegetables), tobacco, pineapples, tomatoes, ginger and herbs - the latter two are used medicinally. These crops are, with the exception of wing bean, grown in quantities too small to be shown on the land-use map, but most men cultivate all or most of these crops. Several varieties of yam are grown: fimepame, a red yam; and gioppa, mami, nekkamahi and umahi, all white-fleshed varieties. Traditional dress is still widely worn, by the men as well as the women and children, and the plants which are used to make bark cloth, purpurs (string skirts) and bilums (net bags) are also to be found scattered through food gardens, but again in very small areas.

Special mention might be made of the wing bean, of which two crops are planted each year. The first is planted at the beginning of the wet season, in October or November, and three to four months later the beans are harvested and eaten, together with the small root tubers, stems, leaves, and flowers of the plant. The second crop is planted about February or March. What little leaf growth appears during the dry months is harvested and eaten, but the roots are left in the ground. With the ensuing wet season, extra growth develops and then the whole plant, roots and aerial portion, is harvested. This plant is a major source of vegetable protein in the native diet.

The main cash crop, and only perennial crop, is coffee. A programme of coffee planting was sponsored by the DASF throughout the Bena Bena about 1955-6. However, some of the sites planted were unsuitable, and interest and attention were so poor that 90 per cent of these gardens had to be written off and new plantings organised. The second coffee-planting programme met with greater success and most of these gardens have by now borne several crops.

The main concentration of coffee gardens in Nupasafa is along the Abehefuto Creek in communal blocks, although there are scattered individual blocks as well. In most cases the owner of the land to be planted to coffee was assisted in the preparation and planting by one or more of his brothers or friends and they own the trees jointly. Individual boundaries within the communal block are marked by ditches, which were in any case necessary to drain the land here.

These coffee gardens, containing almost exclusively the variety Typica, are on the whole well-tended: there are few weeds and good stands of casuarinas (often covered with passionfruit vines) afford protection from the sun.[4] During the dry season the DASF sends teams of native trainees to apply insecticides as a precaution against ring-borer weevil which is prevalent in dry areas, at the nominal cost of 3d per 100 or per 50 trees, depending on age. During the 1959-60 season, which was exceptionally wet, a good crop was harvested in Nupasafa and sold at prices

---

4 It is now widely believed that the variety Bourbon has a greater tolerance to soil and climatic conditions than Typica, but almost all native coffee gardens contain the latter variety from the DASF nurseries.

averaging 2/- to 2/3 per lb parchment. One individual from Nagamitobo clan received over £250 for his crop.

Marketing in 1960 presented no problem, as the coffee factory in North Goroka sent a vehicle on request, and purchased the coffee at the price it would have received if delivered to the factory in town. This situation did not apply during the 1960-61 harvest, however, as marketing generally became more difficult. (See Chapter X.) Private European buyers also operated along the roads, but their prices were reduced by the cost of transport to Goroka.

It remains to be seen whether continued attention will be given to the blocks as they mature and the intricacies of pruning and perhaps fertilising are required. It is also reported by the DASF and the coffee factory that not enough care is taken in the selection of berries at harvesting, nor in the drying stages, and lack of attention here means poorer quality coffee and automatically lower prices. The agricultural trainees working at Korofeigu complained about the apathy with which their insecticide programme was received. Obviously the natives have not yet fully adjusted their expertise with short-term crops to the demands of long-term crops.

Peanuts are another source of cash income, although the market for them is uncertain. However, the DASF in 1960 intensified its peanut programme in an effort to increase the cash income of natives living some distance from Goroka, who cannot benefit from the opportunities for earning money created in the town. The DASF distributes seed, buys the crop (deducting a small margin of the price for the cost of the seed), and arranges its sale in Australia. During the 1959-60 wet season seed of the

Plate 41. The community peanut garden in Nupasafa, on one of the benched slopes. The photograph was taken after the first peanut harvest when the garden had been planted with sweet potato.

variety Virginia Bunch, for which there is some demand in Australia, was distributed, and in June 1960 the Korofeigu harvest was bought, together with the crop from neighbouring tribes.

Nupasafa clan prepared and planted a large garden to peanuts as a community effort, and the eventual proceeds were shared among the whole clan, although in other clans and tribes individual gardens were planted. The community garden in Nupasafa was subsequently planted with sweet potato and maize, also for sale (to European plantations in the Bena Bena) and replanted with peanuts in the 1960-61 wet season. I call this a community garden because there were no individual plots within it - at different times all members of the clan seem to have assisted in the preparation, cultivation and harvesting of the crop. From the 1960 crop, Korofeigu tribe harvested 195 bags of peanuts (in shell), of which the Nupasafa total was 47 bags.

There was very little other planting of peanuts in Nupasafa apart from the crop grown for sale, although the DASF has estimated that on the whole about two-thirds of the peanuts planted in the village gardens are grown for village consumption. The emphasis by the DASF on the 1960 planting as a cash crop, and the attention given to the community garden in Nupasafa may have discouraged individual planting for consumption.

Passionfruit is not cultivated seriously in Korofeigu: the incentive to do so has been lost for several years now, with the cessation of the road-purchasing scheme which cut out the necessity to take fruit to the Goroka factory. In any case, the distance from Goroka, coupled with the low price of passionfruit against

its bulk, put Korofeigu at a disadvantage compared with areas closer to the market.

Livestock

It appears that larger numbers of pigs are owned in Korofeigu (and possibly neighbouring tribes) than in most parts of the Highlands. Brookfield (personal communication) is of the opinion that the ratio between the population of most Highland groups and the number of pigs they own is generally 1:1, but in Korofeigu the number of pigs owned appears to be about three times as great as the human population. Three recent counts have been made of the pigs owned by Nupasafa and, allowing for some errors in information, the totals are all significantly high compared with the clan's population. In 1959 an agricultural patrol gave Nupasafa's pig total as 890, in 1960 my count came to 650, and in 1961 Langness gave the total as 680. As each count was made by a different individual, and because it is not possible to obtain information on the numbers of pigs killed or given away in each year, part of the discrepancy between the totals is explained. There seem to be no special festivals comparable to the bugla gende pig festival of the Chimbu, and I am of the opinion that the large number of pigs in this area represents a safety factor with regard to the recurring food shortages: pigs are not necessarily consumed at such times, but are a form of currency with which the food received from other tribes is paid.

According to Langness (personal communication) pigs are owned not only by men and women but also by children of both sexes. He found that in 1961, 77.9 per cent of the pigs were owned by adult

males, 9.6 per cent by adult females, 5.9 per cent by male children, and 6.6 per cent by female children. Of these, 5.5 per cent had been farmed out to other places. The latter practice is not so much a matter of obtaining agistment as of maintaining secrecy over the number of pigs owned: if it is believed that a man has only a few pigs then the obligations he will be called upon to uphold at various ceremonies will be fewer. On the other hand, a certain prestige attaches to the owners and donors of large numbers of pigs, so the man who hoards his herd can derive little but personal satisfaction from doing so.

There are disadvantages in terms of land use in the holding of large numbers of pigs in localities such as Korofeigu. On the whole, only a few are confined in the villages and the majority graze freely in the fallow and uncultivated land. This has led to local, but severe, over-grazing - in their rooting for grubs pigs cause extensive damage to the vegetative cover and the soil - and in turn to sheet erosion. Patches were in 1960 completely denuded of vegetation and although pines and raspberry vines had been planted earlier by the DASF in an attempt to control such erosion, the measures have not been successful. It would be more realistic, and more effective, to attack the problem at its source by controlling the grazing of pigs, possibly reducing their numbers, and possibly penning and hand-feeding a proportion of them to limit the number grazing freely.

Other livestock such as poultry are few in number, and because they also are not penned, poor in quality. A large pond was dug below Sapuro village and stocked with tilapia fish by the

Plate 42. Land denuded of vegetation by grazing pigs. Only a few woody shrubs remain.

DASF several years ago, but most people dislike them, and in several months I did not see anyone fishing or eating fish.

One interesting new development followed the receipt of income from the coffee and peanut crops in 1960. The land owned by Korofeigu and its neighbour Kapukumaligi, with its open, undulating terrain and moderate rainfall, is ideal for cattle raising. In fact, the only cattle-leases operated by Europeans in the Valley are in this area. The DASF encouraged both tribes to use part of their income from cash crops to purchase a small herd of cows, and loaned a bull to each group, and also assisted in the selection of suitable grazing ground and in the erection of cattle-yards. Five cows were bought by Korofeigu at sums varying from £20 to £30, the members of each clan contributing to the price of a beast for the clan. A similar number was bought by Kapukumaligi. The venture has thus far proved successful in Korofeigu, but the Kapukumaligi were less responsive and their herd was given to Korofeigu to tend. The original Korofeigu herd had increased to ten by mid-1961. The cattle are allowed to range over fallow areas at some distance from the gardens during the day, herded by youths, and pounded at night to prevent damage to crops and fences (which, while adequate barriers against pigs, are too flimsy to keep out cattle). The cows are not milked and the calves not weaned, and it remains to be seen whether cattle will be consumed in the same way as pigs, being shared at feasts, or whether they will be slaughtered and sections sold among the tribe.

It is still too early to predict the success of the venture, but Langness reports that a third tribe, Mohoweto No. 1, is also

about to purchase a pilot herd, and now that cash cropping has been reasonably well established it is to be hoped that cattle-raising will not suffer the fate of earlier attempts at improving the material welfare of Bena Bena tribes. There is no reason why, if the herds receive adequate attention, cattle-raising should not become an important activity in the lower Bena Bena, contributing not only to the status of the native diet, but also to the income of the groups concerned, as the herds increase in size.

In 1960, 93 acres were planted to subsistence food crops in Nupasafa, and 26 acres to cash crops, mainly coffee. Twelve months later the respective areas were 101 acres and 28 acres, but the clan's resident population had increased slightly. These figures give a per capita acreage of 0.4 for subsistence crops and 0.1 for cash crops. The per capita figures for subsistence crops also contrast greatly with those for Fondiwe'i, as the Nupasafans cultivate nearly twice as much land per head of population as the Fondiwe'i people. However, a proportion of the sweet potato is sold to nearby plantations and it was not possible to estimate the quantity as the demand is not constant and sweet potato gardens are not specially planted for sale; if a planter seeks to buy sweet potato, he will only be able to do so if there is a surplus, and this depends on a number of factors. However, the area planted to subsistence crops is still relatively much greater than that at Fondiwe'i. The per capita figure for subsistence crops from the sample was slightly higher again, 0.5 acres, and for cash crops 0.16 acres compared with 0.13 acres for the total clan population.

In Nupasafa, a community in transition so far as its economy is concerned, the two major problems facing further development are the low rainfall and the distance from the market. The latter problem is not a serious one except in the short term, but the difficulties imposed by water shortage are not easily overcome, especially as the native people themselves do not seem consciously aware of the problem and have not evolved any except negative solutions of overcoming it. In Chapter IX a proposal is suggested for the reorganisation of land utilisation in this area, based on a recognition of the land classes and their potential, and on a closer relation of the land use to the potential of the environment.

Plate 43. Air Photograph, Notofona.

Chapter VIII

MAKIROKA

Makiroka village is situated in the central Valley at an altitude of 5,200 feet, some five miles northwest of Goroka. The Makiroka people are members of Notofona tribe and of the Gahuku language group; they are part of that organisation of tribes designated by Read the Gahuku-Gama. Notofona territory extends north-northeast from the middle reaches of the Asaro River near Asaloka in a roughly rectangular swathe about a mile wide and five miles long. The Makiroka lands lie at the northern end of this swathe, adjacent to the tribal territories of Gahuku on the east, Kabiyufa on the north, and Yufiyufa on the west.

The Physical Landscape

Geology and Terrain

The deposits in this section of the Valley Floor are entirely alluvial and colluvial in origin, having been derived from the igneous rocks of the Bismarck spurs and laid down by tributaries of the Asaro River in broad fans. Deposition dates from the Pleistocene. The sediments in these fans extend to a considerable depth - both the Asaro and its tributaries have incised the deposits deeply, in places to 200 feet or more. They show definite stratification, the beds varying in texture from very fine sands and clays to very coarse material and boulders.

Notofona's land is situated on a section of the fan system. Recent erosion has resulted in extensive dissection of the fans, so that the landscape in this tribal area (as well as over a large part of the Valley Floor) now consists of remnants of the original fan surfaces, slashed into narrow ribbons by steep-sided deep gullies, which drain ultimately into the Asaro. The gullies in Notofona vary in depth from about 50 to over 200 feet; the shallow gullies are gently V-shaped, the deeper gullies have short steep sides and flat but narrow floors. In the smaller gullies streams tend to be reduced to a trickle or to become lost in swampy pockets during the dry season, although the large gullies usually contain perennial streams. The rapidity with which gullies form and the steepness of their sides may both be attributed to the easily-eroded nature of the alluvial sediments.

The gradient of the fan remnants is very gentle: the surfaces slope almost imperceptibly to the south-southwest. The strip which now contains most of Makiroka's cultivated land is nowhere more than 300 yards wide, although in other parts of Notofona the fan remnants are broader.

Throughout Notofona, the only variant in terrain type from the dissected fan system is a low ridge, a spur of the Bismarck foothills rising some 600 feet above the general level of the landscape, which forms part of the eastern boundary of the tribe's lands. The slopes of the ridge, moderately steep on the Makiroka side, have been maturely dissected but some deep gullying is to be observed. Ekekai'e Creek, which receives the drainage from this ridge, also exhibits characteristics of

Plate 44. View of Notofona territory, with Makiroka's lands in the foreground. The dissected fan is clearly illustrated.

maturity, meandering extensively on the flat gully floor; other stream courses in Makiroka are more youthful.

Soils

On the almost horizontal surface of the old fans, the soil under stable surface conditions is almost uniformly a fertile friable clay loam, with a dark brown to black topsoil up to 24 inches deep, underlain by extensive deposits of red clays, heavy-textured and sometimes concretionary at the junction of the horizons. The drainage status of these soils appears to be good, and on the whole the type of soil which develops on these sites is considered to be the most fertile in the Valley. Slope soils are lighter in colour, and the A-horizon is shallow and heavily leached. Drainage is excessive on virtually all gully slopes. In the gully bottoms, which tend to be poorly drained, small swampy and peaty patches occur, but in any case soils on these sites are usually heavy, receiving considerable moisture through seepage and drainage; they are mainly red or grey clays.

Climate

Makiroka's climate is virtually identical with the climatic regime described in Chapter I for Goroka. No rainfall or temperature recordings were taken at Makiroka, but observation suggests that the annual rainfall at Makiroka is equivalent to that on plantations within a mile of the village lands, and these receive a few inches more per year than Goroka. Temperatures daily and seasonally are similar also to those of Goroka, which is only five miles away. The annual rainfall probably

Plate 45. This gully separates Makiroka land (on the right) from Arikiyufa land, and is drained by Gikimegufa Creek. The Seventh Day Adventist Mission is in the left background.

Plate 46. Illustrating the level surface of the fan remnants and the grass-and-shrub-covered gully slopes.

averages 80 inches, with most rain received between November and April, but sufficient throughout the rest of the year to maintain a twelve months' growing season. The mean annual range of temperature is approximately 17 degrees, from an average maximum of 75 degrees to an average minimum of 58 degrees. Morning mists are experienced here as elsewhere over the Valley.

Vegetation

The vegetation pattern in Notofona consists almost entirely of induced communities - the only vegetation which might be primary is the remnants of forest to be found in the steepest gullies. Although originally covered by lower montane rain forest, a long history of burning, clearing, and intensive cultivation interrupted by relatively short periods of fallowing has suppressed the forest vegetation and replaced it almost entirely with grassland communities. Several such communities now appear in Notofona, the result partly of cultural practice, partly of environmental factors - that is to say, the presence of grassland is attributed to cultural practice, but the particular association depends on the particular site conditions of slope, soils, drainage, and so on.

On the level surfaces of the fan strips (which are intensively cultivated) land which has been recently fallowed reverts to Imperata almost exclusively, but in the long term Themeda australis and Miscanthus also appear in scattered clumps. Here too are dense stands of casuarinas and a variety of trees, usually standing singly, all of which have been planted.

In spite of the steepness of some of the gully slopes, all the slopes are fully vegetated and soil erosion on them, apart

from some slumping, is negligible. On the steepest slopes, which are uncultivable, the vegetation has remained relatively undisturbed and a variety of trees such as occurs in the lower montane rain forest is found here. More gentle slopes are covered by shrubs and grasses - Arundinellum and Capillipedium on the upper slopes, Imperata and Miscanthus on the lower slopes. The shrubs, and sometimes bracken ferns, form a moderately dense cover on the gully sides, which suggests that these are seldom cultivated, even when not particularly steep.

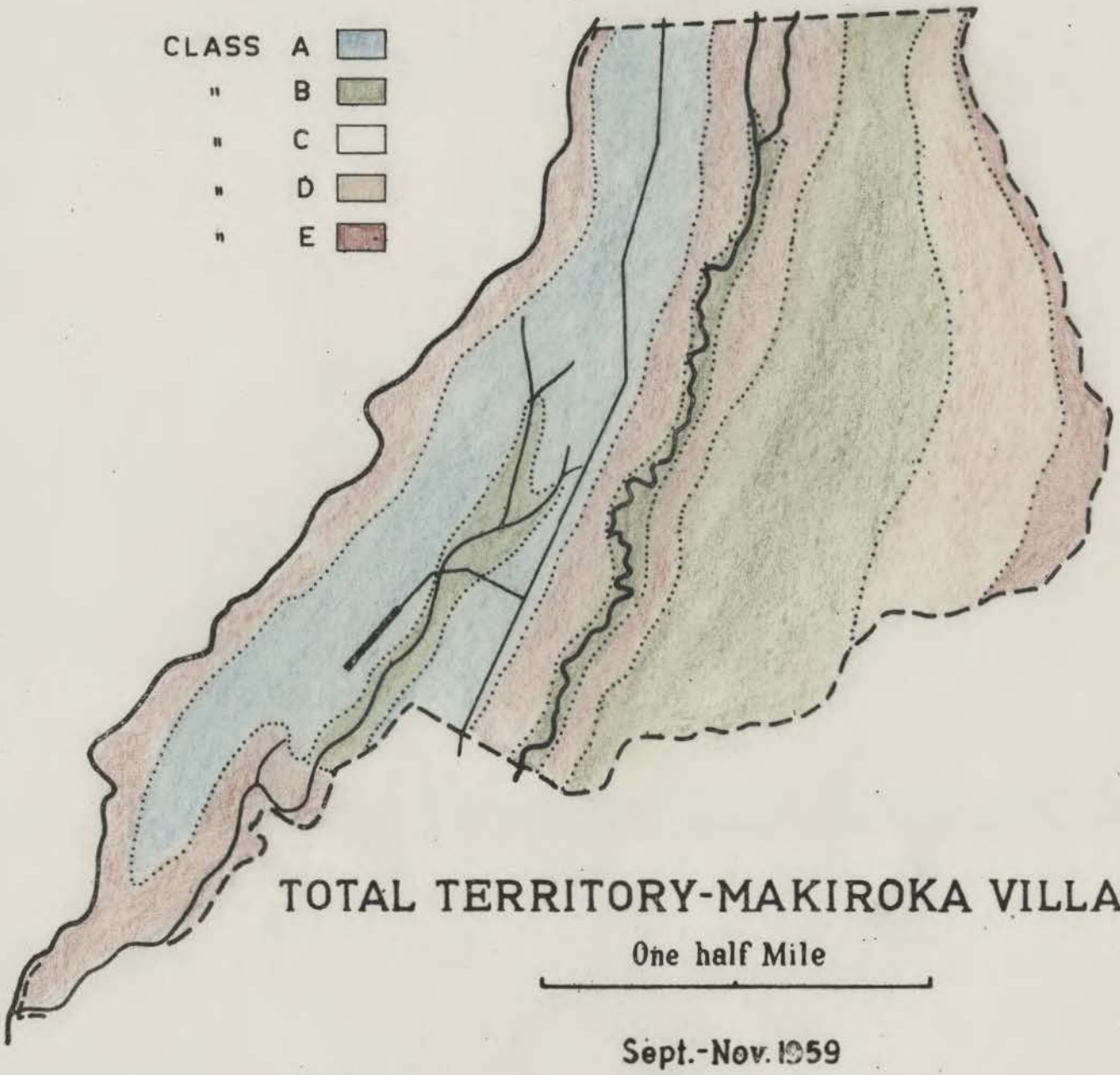
Finally, in the gully bottoms are to be found dense continuous stands of Phragmites karka and Saccharum spontaneum along the courses of the streams and creeks.

Land Classes

Neither altitudinal nor rainfall differences are of sufficient range within Makiroka territory to be useful criteria in distinguishing land classes, and they are therefore separated on the basis of terrain types, which in turn give variations in the soils pattern.

Class A land, on which almost all cultivation is found, occurs over the level alluvial fan surface where soils have developed under stable conditions and are generally fertile. There are no problems of erosion control in this land class - gutters between sweet potato beds are quite shallow, and excess water drains into the gullies from the very gently-sloping fan surface with little loss of topsoil. There is a greater extent of Class A land in Makiroka than in Fondiwe'i, and if anything, the agricultural potential of this land for both subsistence

LAND CLASSES



TOTAL TERRITORY-MAKIROKA VILLAGE

One half Mile

Sept.-Nov. 1959

crops and coffee is somewhat higher than in Fondiwe'i. It is not cultivated as intensively in Makiroka where the per capita distribution of this land class is greater, and for this reason, as well as the fact that it is found at least 1,000 feet lower, the crop yields are thought to be somewhat higher than in Fondiwe'i on class A land.

Class B land in Makiroka is found in three belts: along the bed of the Ekekai'e Creek, where soil is fertile but requires drainage should cultivation be undertaken; on the short gentle slopes of the small gully between the village and the main road, and in a belt along the lower slopes of the ridge - the slope soils are poorer and while crops would probably mature in the same time as on class A land, it is thought that yields would be lower. This was not tested as there was no cultivation in this land class in 1959, and only newly-planted gardens in 1960.

No broad area of land in Makiroka is equivalent to the Class C land at Nupasafa or Fondiwe'i. Along the concave upper slopes and crest of the ridge between Makiroka and Gahuku soils are thin and on the whole excessively drained, and cultivation would be undesirable from both the yield and erosion viewpoints. This belt is classified as Class D. In fact, there is no cultivation here, the land being used for little except occasional grazing.

Finally, Class E land embraces the short, steep gully sides. These are uncultivable and heavily vegetated with regrowth vegetation, as well as some planted casuarinas and stands of cane grasses, which form reserves for building purposes.

History

In Makiroka, whose members have been under mission influence almost from the time of European discovery,[1] no one was able to tell of legends relating to the ancestors. Undoubtedly the old men remembered such legends but they did not reveal them, perhaps because of some sense of shame inculcated by the mission for their past ways.

Recent history repeats the usual pattern of changing alliances, battles, victories and defeats. Probably the most significant of these battles was fought between Notofona and the adjacent and (at that time at least) powerful Gahuku tribe. It is estimated that this battle took place at some time just prior to contact during the 1920s, as it is well remembered and the main warriors were the fathers of the present generation. During this battle, which was fought in Makiroka territory, the Gahuku swept down over the ridge which separates the two territories and killed and wounded many Notofona, principally members of the two nearest clans, Gahukuyufa and Gortegamayufa. Those who could fled and sought sanctuary from two tribes, Korfeika to the south of Notofona, and Lunipe, a few miles to the northwest.

Those who went to Lunipe were given land and a few stayed permanently. In Korfeika, however, a new village called Garumaruka was established by the refugee Notofona people on land which the Korfeika were apparently not using. Eventually,

---

[1] The Lutheran Mission at nearby Asaloka was established in 1934.

most of the Gahukuyufa men returned with their families to their former land, together with some Gortegamayufa members. However, most of the people of the latter clan remained in Garumaruka, which still exists in Korfeika territory, the members of that tribe apparently having no objection even now to the prolonged 'squatting'. Thus the residents of Makiroka actually belong to two clans, and for this reason they are referred to collectively by the village, and not a clan, name.

Social Organisation

Notofona was one of the groups included by Read in the Gahuku-Gama organisation of tribes, but by his definition Notofona constituted a sub-tribe or 'district group' whereas Notofona is here classified as a tribe. The component district group which formed Read's tribe or 'political group' with Notofona was Ufeto, whose lands lie against Notofona's eastern border; Ufetove-Notofona was thus a confederacy according to the terminology employed here.[2]

There are approximately 600 members in Notofona, separated into five clans: Samogayufa, Asaroyufa, Arikiyufa, and the two which comprise Makiroka, Gahukuyufa and Gortegamayufa.[3] the characteristics of clan organisation have been described, and as Notofona is typical they will not be further elaborated here, except to mention that the residents of Makiroka and Garumaruka villages observe exogamy.

---

2 See Chapter II.

3 The suffix '-yufa' (or '-dzuha') means the people of one stem or one root among the Gahuku speakers.

The Makiroka residents belong to clearly defined and recognised sub-clans, which are functional social units to a greater degree than in Fondiwe'i or Nupasafa: this gives support to Read's assertion that 'the sub-clan is a highly integrated unit' (unpublished notes). In other parts of the Valley the membership of the sub-clans could not have been established except by genealogical investigation, but in Makiroka (and doubtless in other Gahuku-Gama groups) most informants could name the members of the sub-clans in their clan. There are two un-named sub-clans in the Gahukuyufa clan at Makiroka, and those members of Gortegamayufa clan who now live in Makiroka all appear to belong to the one sub-clan: this is to be expected as the sub-clan unit is strongly bound by kinship ties here. Bonds of kinship are honoured far more consistently in Makiroka than at Nupasafa, for example, where an artificial system of 'brotherhood' operates.

Patrilineages are also distinct functional social groups to a greater degree than in Nupasafa, although in one respect the Fondiwe'i custom of gardening with one's brothers indicates a still greater emphasis on the close ties with the patrilineage, as this is not observed to the same degree in Makiroka.

Marriage links are established by the Makirokans over a considerable part of the Goroka Valley, from as far west as Korfena to Kami in the south. Two marriages of interest took place during my second visit in 1960 - after a brief visit to Kundiawa two Makiroka men returned with Chimbu brides, which is unusual as the languages are very different and the husbands and wives had to communicate in Pidgin. In addition, it is not

often that men overcome their suspicion of 'external' groups to the extent of marrying into them, or that the families of such groups would permit their young women to reside so far away.

Population and Settlement

Almost all the people at Makiroka live in a single village containing some thirty houses. Apart from this there are a few scattered family houses and women's houses, as the village site is fully occupied by houses and is now almost entirely surrounded by coffee groves, so that contiguous extensions to the village are impracticable. The houses are not arranged in sub-clan or patrilineal groups in Makiroka - this custom seems to be most frequently observed in the upper Asaro villages.

In spite of long mission contact, two men's houses are to be found in Makiroka; a number of those who have accepted mission teaching have left the village and now live in specially created mission villages such as Kawonda village in Fondiwe'i; there are two such villages in Notofona.

Pig houses are found mainly in the long-fallowed land south of the village and on the uncultivated slopes of the ridge separating Makiroka from Gahuku. Others have been built along the edges of the gullies.

Makiroka's resident population in 1959 was 92, but twelve months later (at the end of 1960) it had increased to 101. This increase is accounted for by several births, by the marriage of the two Makiroka men to Chimbu women, by the return of two men who had been employed elsewhere in 1959, and by the return of another two men who had been serving gaol sentences in Goroka in 1959.

The population density at Makiroka in 1959 was equivalent to 235 per square mile, and in 1960 to 260 per square mile. Makiroka is capable of supporting a much greater density of population than these figures suggest, however: the relatively small number of people living there now is most likely due to the decimation and dissemination of the clans after the battle with the Gahuku.

Daily Life in Makiroka Village

The following account of day-to-day life in Makiroka village could have been written for many villages in the Goroka Valley, but it must be pointed out that Makiroka is almost 'sub-urban' by comparison with villages in the mountains - the close contact with the main core of European settlement (in the town and on neighbouring plantations) has been responsible for a number of elaborations to the traditional theme of daily life. Therefore only some sections of the following description may be regarded as typical for the Valley as a whole, while other sections apply in general only to those communities in close contact with Europeans, roughly in a ten-mile radius of Goroka.

The day begins perforce with the dawn around 6 a.m. when the stillness of the morning is disturbed by the crowing of cocks and more particularly by the relaying of messages to people in other clans. Voices carry considerable distances in the calm air and many arudous journeys are eliminated by this custom which is held throughout the Highlands. The message is delivered in a powerful voice and prefaced with the typical

ululation or yodel; then the query, request or announcement is given out in a strong chant.

This heralds a general movement - people emerge from their houses hugging themselves to keep warm in the cool air, fires are replenished, children are sent to the creek for water, men who are going to Goroka or visiting during the day wash and shave, and the women prepare a meal of sweet potato by baking the tubers in the coals. An hour or so later, Makiroka being in a Council area, a 'rally call' is made on a bamboo pipe by one of the Council members and most of the villagers foregather in the cleared space in front of the Rest House for a roll call and the assignation of tasks. However, unless there is some special task which involves most of the community (such as road-work or a special harvest) this is simply a matter of form and most adults go their own way. During this daily meeting while I lived in Makiroka it soon became customary to hold a 'clinic' at the Rest House door to dispense first aid. It was of mutual benefit, as I was able to learn of any special events and follow them up.

After this the women, wearing net-bags suspended from their heads and hanging down their backs, and carrying machetes or a firestick, make their way to the gardens to spend the day weeding, cultivating, perhaps planting, and later harvesting enough food for the evening meal. The net bags may contain a variety of things - food, tools, tobacco, fibre for new bags, even very small babies! Men engage in a variety of occupations: some may be preparing new land for gardens, burning, fencing or repairing fences, cutting cane grass or splitting wood;

Plate 47. Makirokans repairing the road into their village. This gully lies between the main road and the village.

others may attend to coffee gardens, weeding or pruning; some may be going to Goroka with coffee or passionfruit for sale, or to buy some article from a trade store; others again may elect to spend the day visiting men in other clans or the mission station, or inspecting their pigs.

Adolescent and unmarried girls have little to do - they may look after very young children, spend the day adorning themselves, or occasionally give help in the gardens. Youths similarly have little to do - they do not yet have the responsibility of providing for others and usually do not have land of their own before marriage, so their day is usually an idle one, and the time is passed as their energy, initiative or whim dictates. The young children are free, apart from those few who attend a school, in which case they generally spend only the weekends in the village; the rest may play with age mates, go visiting, spend a few hours on the road watching people or vehicles go by (always with the hope of securing a ride), go stalking birds with their arrows, or playing in the creeks, adorning themselves with mud. Depending on the season they may have to help pick passionfruit, or harvest coffee, or attend to the pulping, washing and drying of the beans.

By about 9 a.m. the village is deserted except for a few children and one or two old men who have been brought outside the houses into the sun to while away the hours in reminiscence. The only other signs of life are contributed by a few fowls, a pig or two, and perhaps a scavenging dog. The village usually remains deserted, unless it rains, until well in the afternoon, when people begin to return from their places of work.

The women come back laden with bundles of sticks for the evening fires and netbags which may contain 40 or 50 pounds of sweet potato. They halt at the creek to wash the vegetables (and, occasionally, themselves), exchanging gossip before coming into the village to set about preparing the evening meal. Children are sent again for water and fires are lit outside the houses for cooking. For me the return of the villagers heralds a busy period - vegetables and firewood may be brought for sale, and a second clinic is held to attend to those who acquired real or imaginary ailments during the day. People drift by the Rest House to inspect the activity there and to enjoy unaccustomed experiences - the clothes on the line are admired and fingered, the sight of the houseboy performing his duties is an amusing spectacle, as is the sight of those taking doses of medicine; strange words and music from a transistor entrance children and adults alike. A group of younger men may decide to play a game of 'golf' as evidence of their sophistication, with clubs fashioned roughly from casuarina, with balls which are either spheres of sweet potato or passionfruit on a one-hole course. Some will bring out bows and arrows which they are making or repairing, others will talk or play with their children.

At dusk the evening meal is eaten, the men sometimes joining their families and sometimes eating in the men's houses. With darkness, the women and children go to bed, enclosed in their houses by narrow slabs of wood placed across the entrance; they sleep usually on platforms of woven bamboo around a small fire which burns in the centre of the house. The men gather

Plate 48. A game of 'golf' in Makiroka.

in their own houses, to build up the fires and then spend several hours smoking, exchanging news of the day, perhaps gambling on 'Lucky' (a card game), listening to a story from an older man, or singing traditional songs in a strong chanting rhythm. Someone may haltingly decipher a Pidgin newsheet for an attentive audience. The young men may go courting, the sound of their small flutes carrying clearly on the night air.

Every Tuesday the villagers turn out to spend the morning repairing that section of the main road which passes through their territory - storm-water gutters have to be cleared, stone and road metal thrown back onto the road, and the edges cleared of grass and weeds. Each clan in the Valley has an allotted section of some road to attend to once a week. A more welcome interruption to daily routine occurs on Saturday - market day. Men and women are out early in the gardens selecting vegetables and pawpaw and bananas for sale; the vegetables are washed and made up in bundles which will be offered at sixpence or a shilling each. Then the Makirokans, the women usually heavily laden with the produce, the men strolling along empty-handed, join scores of other natives on the road leading to Goroka. At the market the Notofona people always occupy the same stall, setting out their produce for display. Bargaining is rare, as all produce has its set price and as a rule the villagers will relinquish a sale rather than reduce the price. Not all the villagers go to the market to sell things - it is a social occasion for many, a chance to show off personal finery, to meet friends, and to exchange news. Selling is usually over by noon, after which the trade stores are visited, and the

sports-grounds where Europeans may be playing cricket or rugby with teams from coastal areas. Some may take food to friends in the hospital. Late in the afternoon the villagers return, and talk usually lasts late into the night as the day's highlights are recounted. Sundays are for many a day to 'go walkabout' visiting friends or the mission, although a number work in the gardens as usual. After Council meetings, which are held regularly and attended by Councillors and Committee members, the villagers may be called together in the evening, and will sit around fires outside the houses listening to reports of Council affairs. Such occasions are often an opportunity for laying complaints and also for indulging in oratory.

On the occasion of a 'sing-sing' or ceremony, most regular activity is suspended. Men assiduously round up and inspect their pigs, and spend much time discussing and deciding which ones and how many to contribute. Very little sweet potato is harvested or eaten (it is saved for the feasting) and the diet consists of sugar, bananas, maize and peanuts. Finery is brought out and redecorated, and new decorations are made. In the men's houses singing may continue through the night for many nights, and the darkness echoes with the sound of ceremonial flutes. Earth ovens are made to cook the huge quantity of food eaten at the feasts; with the daily practising of dance and songs, and visitations from the guest clan or clans, excitement mounts infectiously as the appointed day draws nearer. Finally, after the culmination of dancing, singing, exchanges and feasting, village life returns to normal and the daily routine is taken up again.

Plate 49. Completing earth ovens to cook food for a 'sing-sing'.

Plate 50. The feasting in progress.

Land Tenure

Following the usual pattern in the Goroka Valley, Notofona's land is totally divided among the component clans, the territory of each being a unit separated from that of its neighbours by creeks, gullies and so on. The potentially cultivable land in Makiroka is divided into sub-clan parcels; except under special circumstances, the members of each sub-clan cultivate only in the sections claimed by their group. Within the recently-abandoned garden areas individual plots are clearly recognisable and their ownership remembered, but within the areas which have been under fallow for longer than about ten years, it is unlikely that a man or his heirs will recultivate the precise areas which he gardened before, as the individual boundaries may be forgotten or obscured. When this land is again cultivated, each sub-clan will claim a certain area, and its members will appropriate the ground according to their status and their needs. A man will not, and cannot, cultivate ground outside his sub-clan sections in Makiroka unless he has been given permission to do so by the influential men (the akuligazive) of the sub-clan concerned.

Individual claims to land in Makiroka are somewhat complicated by virtue of the present scatter of Gahukuyufa and Gortegamayufa clan members in three tribal areas (Notofona, Korfeika, and Lunipe). In the main, about 60 per cent of the land is cultivated by the Gahukuyufa members, and about 30 per cent by the members of the Gortegamayufa sub-clan in Makiroka. The balance is claimed variously: some by men or the sons of men

who are absentees, living either with another tribe or in a mission village;[4] some by men who have married Makiroka women and after long residence with the group have been adopted and given land.[5] In effect, therefore, there is in Makiroka a certain amount of absentee ownership and cultivation of land, although it is small in terms of both the number of individuals and the area of land involved.

Land Use

Of the three communities described, Makiroka has more land in relation to its population than either the Fondiwe'i or Nupasafa clans, and a greater area of fertile land, in both a relative and an absolute sense. Gardens are therefore mainly concentrated along the remnant fan surface which is the most fertile, the most easily cultivated, and the most free from problems of soil erosion and conservation. In 1960, however, some clearing and planting had been carried out on the slopes towards Gahuku and in the south of the main occupied area: the extent of this is shown on the land-use map for 1960.[6]

---

4 The Local Government Council representative for Makiroka in 1959-60 was a member of Gortegamayufa clan, but lived in Garumaruka village in Korfeika. However, in 1959-60 he was cultivating land close to the village at Makiroka, having inherited this land from his father.

5 If such a man has sons, those sons will normally inherit land from their father in the clan of his birth; they may also inherit the land he has received in the clan of his adoption.

6 Most of this land was owned by a man with four wives, and under the necessity of planting separate gardens for each of them he established claim to part of this unclaimed grazing land through cultivation.

Clearing is carried out by slashing the grass and uprooting the clumps with spades, after which the trash is left to dry for a period of several weeks before burning. Any trees, such as casuarinas, on the land, are felled. Later a second clearing of weeds and a second burning is undertaken to thoroughly clear the ground. When clearing is completed the topsoil is broken and turned over, any trash remaining being turned into the soil. The garden is then left for some weeks before planting takes place. During this time the fences are constructed, invariably from cane grasses, which may be cut from old gardens or from the gully slopes. Each man owns his own reserve of cane grass, and he may sometimes even plant a fallow area with a stand of cane grass.

Gardens are normally prepared by individuals, with perhaps a brother or kinsman assisting, but in 1955 a large area was cleared in preparation for a number of gardens as a community effort. This area, which now contains the greatest concentration of food gardens in Makiroka, lies adjacent to the Seventh Day Adventist mission, and may be clearly seen on the air photo for 1955. The clearing was done with tractor and harrows, an exceptional measure which was made possible by a long-standing friendship between the Makiroka people and one of the earliest European settlers in the Valley, who loaned his machinery for the purpose. While clearing by such methods is most unusual, it is possible that the Makiroka men may seek to employ such labour-saving methods again: the area concerned will shortly have to be fallowed and another large block brought into cultivation, and it may be possible now to hire the necessary

implements from the Lowa Local Government Council, which purchased a tractor and harrows in 1960.

In contrast with the systems at Fondiwe'i and Nupasafa, at Makiroka sweet potato planting is determined as much by individuals' needs as by climatic factors: in spite of the lower rainfall of the middle months of the year, there is still sufficient to support the growth of the crop throughout the year. Sweet potato in this locality takes from four to six months to mature, depending on the time of planting. When mature, the gardens on class A land bear for nine months or more, after which the tubers are too small to harvest, and the garden will be replanted or given over to grazing by pigs.

The great variety of factors influencing yields of sweet potato has been mentioned; although the DASF has run experimental trials on sweet potato yields in various parts of the Highlands, they do not exactly parallel the native methods of cultivation, and at Makiroka an attempt was made to estimate yields in a different way. A garden was selected and over a period of five weeks all the sweet potato harvested from it was weighed daily before it was consumed. From this one week's harvest was eliminated, as during the period a food exchange was held and very large quantities harvested - the actual harvest was taken therefore for four weeks. From the monthly figure an estimate was made for the yield from the garden over the time the owner estimated it would bear, and from this an annual yield per acre was estimated.

The garden was almost one acre in area, on slightly sloping ground near the edge of the fan remnant. It had been cleared

Plate 51. Illustrating how the 'sweet potato experiment' was conducted, with the owner of the garden and his wife and son.

of its fallow cover of Imperata and giant kangaroo grass at the end of the dry season in 1957 and the first crops - sweet potato, wing bean, maize and peanuts - were planted about May 1958. By September the secondary crops were ready for harvest, and the sweet potato was mature by the end of the year. The owner estimated that the garden would yield until the end of 1959, that is, for a period of twelve months. The yield estimate was made therefore toward the end of the bearing life of the crop, but as this was the first crop after the fallowing, the figures recorded would be equivalent to those early in the bearing period of the second or third continuous crop.

From the figures obtained, it is estimated that a garden of one acre in size will yield about 1,400 pounds of sweet potato in one month, and, allowing for some falling off toward the end of the bearing period, this is equivalent to an annual yield of the order of 7-7½ tons. This is thought to be a slightly higher than average figure - it is somewhat rare for gardens to bear for a year, and the garden was on fertile soil which had not been cultivated for some years previously, with assured rainfall and moderate temperatures. It is emphasised that no attempt was made to interfere with the owner's practices of gardening and harvesting - the sweet potato weighed simply represents that which was harvested each day for consumption by the owner and his four dependants, and occasionally for his pigs.

Similar attempts to measure yields in Fondiwe'i and Nupasafa were not undertaken as my house was too far from suitable gardens, and there was no certainty that a man or his

wife would always carry a heavy load of sweet potato the long distance; it was not possible to leave the scale with a villager to weigh the harvest near the gardens as no one was able to count or to read a scale.

Of the secondary subsistence crops, bananas, sugar, maize and wing bean are the most important and the most widely grown. Small quantities of yam, taro, and native vegetables are also grown, as well as tobacco, bamboo, the Urticaceous fibre shrubs, oil pandanus and a variety of trees with edible leaves or seeds. These crops have all been described elsewhere and are not further elaborated on here. Most subsidiary food crops are planted late in the year with the beginning of the rains - maize is an exception, being planted throughout the year.

Interplanting is fairly widespread, and takes two forms - either subsidiary food crops are planted in narrow beds among the rows of sweet potato, or they are planted along the borders of the sweet potato beds. This latter form was most commonly practised in Nupasafa. The accompanying photographs illustrate some examples of interplanting.

Most food gardens in Makiroka are cropped continuously for at least five or six years before they are fallowed. As there is no land pressure in this locality the fallow period is often a very long one - in Makiroka a considerable area has been fallowed for so long that individual boundaries are no longer distinguishable and have been forgotten, and the land is claimed in sub-clan parcels only. This long-fallow land is densely vegetated with cane grasses, casuarinas, and other planted trees and bamboos.

Plate 52. Makiroka gardens interplanted with sweet potato, maize and wing bean. The ridge in the background is the boundary between Makiroka and Gahuku tribe.

Plate 53. Interplanted sweet potato, maize, and the indigenous ai'ipa.

Plate 54. Garden interplanted with sweet potato, maize, wing bean and peanuts (foreground).

Cash cropping assumes a position of greater importance in Makiroka than it does at either Fondiwe'i or Nupasafa, because there are no restricting factors on the planting or growth of these crops. Adequate land is available for coffee and for short-term cash crops such as peanuts and vegetables, the climate is eminently suitable for their growth, and furthermore, Makirokans are fortunate in being close to both a main road[7] and the town so that disposal of the crops presents little difficulty.

In areas where cash cropping is well-established, such as Makiroka, an interesting new trend has appeared: the employment of native labour by the natives themselves. During the last three or four years at least a dozen men in Makiroka with large land holdings have employed native labour to prepare land for coffee groves and also for sweet potato gardens to provide a surplus for sale. The villagers could not provide the necessary labour force, since some men were absent at work in other areas, and also because the preparation of coffee groves in particular requires a lot of labour.

In this instance the natives employed were non-local, largely from the Fore district southeast of the Goroka Valley. Labour has been readily available from this district in the past few years, as there are no opportunities for earning money within the district.[8] According to the men at Makiroka, they

---

7 The main Highlands highway to the west passes through Makiroka land.

8 During 1960, however, all absentee Fore men were 'repatriated' to their tribal territory to enable scientists to study the Kuru or 'laughing sickness' disease which afflicts this group. Although the edict was enforced as thoroughly as possible, there

employed the Fore under the conditions set down by the Native Labour Ordinance, which sets the minimum monthly wage at 25/-, and requires that food and housing also be provided. Although the latter two regulations were observed, it is doubtful if the wages were as high as this in all cases, and the working hours were certainly longer than those specified in the Ordinance. In most cases the labourers were employed for periods ranging from two to four months, in groups of two, three or four, although one man from Makiroka was employing seven Fore men at one stage. A few individual natives living near Goroka and owning large coffee groves regularly employ labour lines of 20 or more men.

As recently as ten years ago it is unlikely that such a situation could have existed, and in fact there is even now a fair degree of mutual suspicion between the employed and the employers: the Makiroka men expressed a fear of sorcery, notwithstanding mission teaching, and although some effort is being made to break down these barriers between tribal groups through local government councils and the election of native members to the Legislative Council, the entrenched fears and prejudices of generations will probably remain for some years to come.

Many of the coffee groves planted in Makiroka are very small in size and it appears that in an area such as this, with its reasonable land surplus, some encouragement should be given

---

8 (continued)
were still a number of Fore men employed in the Goroka Valley, most planters claiming that the men had been returned to their tribal territory and subsequently escaped again.

to plant larger individual holdings. Furthermore, it would be advantageous to individuals to plant additional areas on a secure basis of tenure, as the tenure of many existing groves is complicated and further confused by granting usufruct to kin and affines. No new plantings of coffee were made in Makiroka between late 1959 and the end of 1960, possibly because of the depression in coffee prices.

Apart from coffee, cash crops in Makiroka are peanuts, passionfruit and vegetables. Peanuts are not grown in great quantity here and very few were observed in the gardens during the re-survey in 1960. They are generally planted in narrow strips in the sweet potato gardens, and when harvested some four months later, another crop is planted in adjacent ground, thus forming a minor rotation crop. Passionfruit is still a cash crop in Makiroka because the people are not at a prohibitive distance from the town - as mentioned earlier, this crop can only be sold if delivered to the factory door by native growers. Vegetables are grown in great variety, although the acreage is small. Almost all the vegetables grown in Makiroka are produced for sale at the Goroka market, and only maize, tomatoes and beans are eaten in any amount by the villagers. To overcome the general shortage of seeds several plants are usually left from each crop to provide for a further planting, although this practice cannot be maintained for long as the quality of the vegetables deteriorates. Seeds were one of the most acceptable forms of gift that could be made in Makiroka.

In addition to the 'European' vegetables such as peas, beans, tomatoes, cucumbers, lettuce, carrots and potatoes, additional

sweet potato is often planted to provide a margin for sale. This is something of a gamble as there is no prior assurance that the crop will be marketable; Europeans came occasionally to the village to buy sweet potato and on several occasions bought half a ton at a time. To some extent such an amount is made up from the surpluses of a number of men, but a man needing money is likely to offer his sweet potato for sale in any case if a buyer comes, and will then rely on kinsmen for food if he runs short himself. I do not know that the natives ever plant an additional garden and then solicit a buyer for the crop, or arrange in advance of planting for someone to purchase the crop when it is ready. On the other hand I have never heard a man complain of having an undisposable surplus of sweet potato!

In 1959, the gardens planted to subsistence food crops averaged 0.27 acres per capita, and in 1960 the figure was 0.33 acres per capita. Because of the fact that some sweet potato is always sold, and this quantity cannot be estimated, the per capita figures may be somewhat higher than the actual amount which people subsist on. The sample gave a per capita figure of 0.24 acres for subsistence food crops, which may be a more accurate area in terms of subsistence needs. Cash crops (based on the area under coffee, peanuts and European vegetables) averaged 0.18 acres per capita in 1959, and 0.15 acres in 1960. Similarly, these may be lower than the real figure by the amount of sweet potato which is eventually sold. The lower figure for 1960 is accounted for by the fact that there were fewer peanut plantings (possibly a reflection of the DASF programme

for eradicating all existing strains in the village gardens before replanting with one variety) and also no large vegetable gardens as there were in the previous year. The sample indicated a per capita figure of 0.14 acres for cash crops: it is less likely that there would be the same degree of correspondence between the sample and the whole for cash crops as there is for subsistence crops, as many factors are involved in the planting of cash crops, such as the age of the individual (an old man will be less interested in coffee than a young man), the size of his family (a man with more than one wife, and several children, will have less surplus land to plant to cash crops), and his own personality - his willingness to adopt new ideas.

Considering the size of its population, Makiroka contains a large number of pigs - when the pigs were first counted here the villagers claimed to own 291 altogether, but a month later 38 of these were killed for a food distribution to a Lunipe group in recognition of their assistance during the Gahuku fight, reducing the number to 253. In 1960 the total was 246, almost the same. The reason why such large numbers of pigs are kept here is not certain - it may be that over most of the Goroka Valley the 'pig density' is greater than in more mountainous areas; it may be that Makiroka is exceptional in having rather more land than is usual for a group of its size; it may be that other groups farm out their pigs to Makirokans to look after because of this abundance of land: this practice is common in the Bena Bena (but for a different reason) and may also apply

here, but this is mere conjecture for which there is no actual evidence. Only a more widespread survey could provide the answer here.

As usual, some poultry is kept in Makiroka, and as usual they are not penned. They are kept for their feathers (which are used for personal adornment because of the scarcity of other birds in the grasslands) and for sale to Europeans. They have more nuisance value than anything else as they cause considerable damage to the surface root system of the coffee trees.

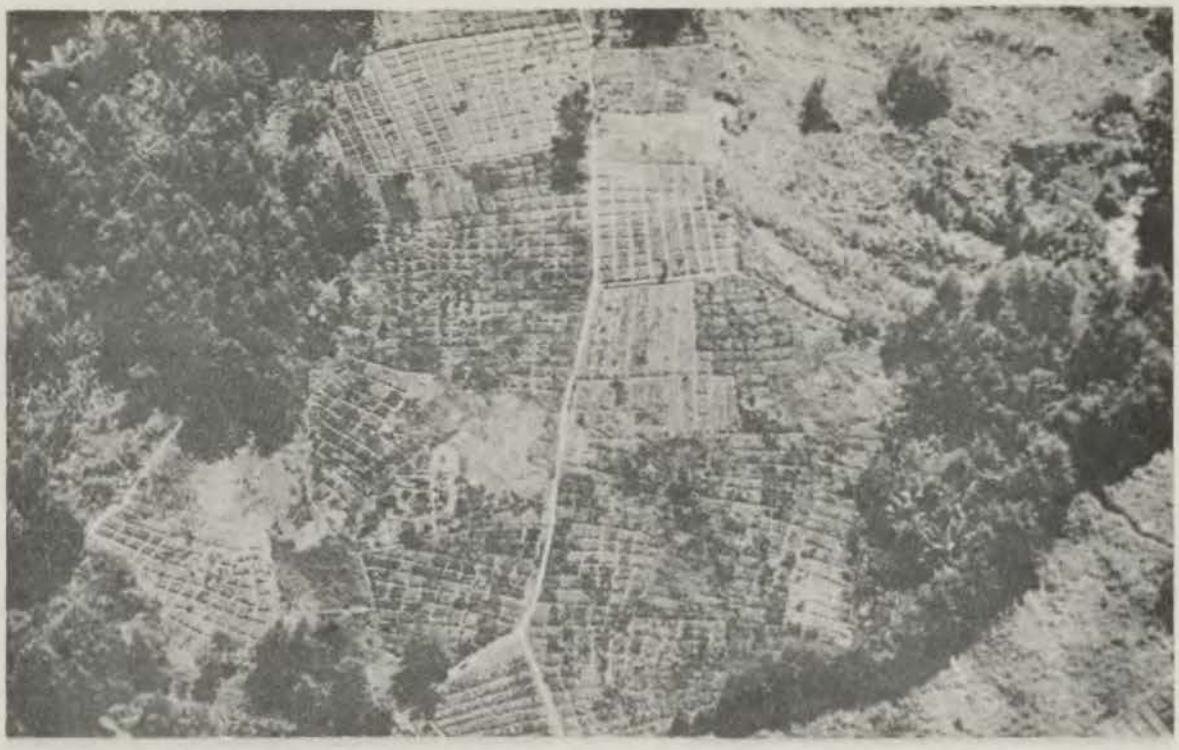
This completes the description of the three communities which were studied. In the following chapter some conclusions are drawn and proposals suggested for the economic future of these communities and groups living in similar localities.

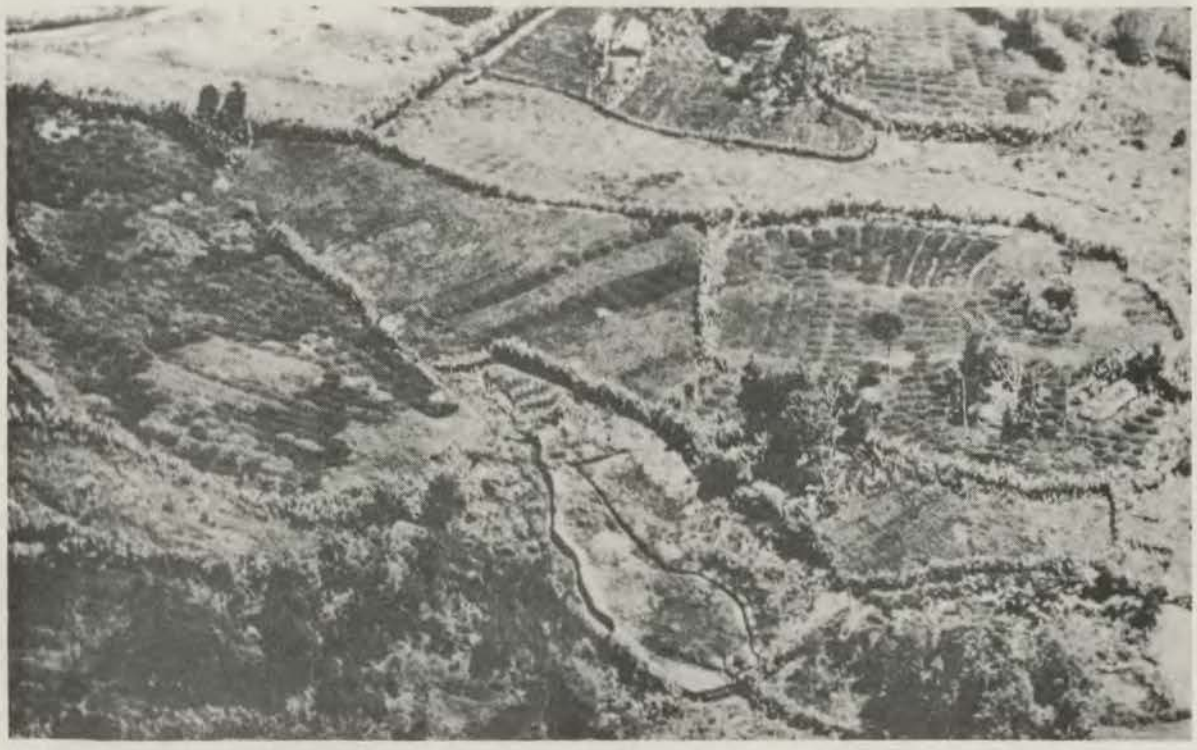
Chapter IX

THREE NATIVE COMMUNITIES: CONCLUSIONS

Throughout the Highlands in both Australian and Western New Guinea, sweet potato and pigs form the basis of the traditional agricultural system. Within this broad region, however, widely different techniques of cultivation, distinct enough to be labelled systems, have been evolved under a variety of environmental conditions to make the most efficient use of each locality's resources. Environments which cultures with sophisticated technologies would consider uninhabitable have been adapted to support considerable densities of population through the evolution of such agricultural systems. These systems incorporate a variety of methods of clearing, tillage, drainage, erosion control, fencing, and crop rotation; while not all have been perfected to the point where fullest efficiency is achieved, the main features of several such systems are worth outlining for comparison with techniques employed traditionally in the Goroka Valley.

In poorly-drained, swampy inter-montane basins, such as the Wissel Lakes area and the Baliem Valley of Netherlands New Guinea, and parts of the Waghi Valley in Australian New Guinea, a system of drains (which may be up to six feet deep) is dug, forming a gridiron or 'patchwork quilt' arrangement of beds which are usually about six feet square. Sweet potato is planted in the loose soil thrown up on the beds from the ditches,





Plates 55 & 56. Illustrating the 'patchwork quilt' cultivation pattern of the Western Highlands and Chimbu, with square beds separated by ditches. (Courtesy Y. Baron Goto.)

thus reducing soil cultivation to a minimum. Soil fertility and structure are improved by the subsoiling which results from the digging of the ditches. This system of cultivation, employing square beds separated by drains, is found from the Chuave area (between the Goroka Valley and Chimbu) west to Mt Hagen, and again in the Wissel Lakes area; however, the depth of the ditches varies in different localities and also in each place according to the level of the water table.

Dense populations are supported at Wabag west of Mt Hagen at high altitudes by the practice of composting sweet potato mounds: this not only improves soil fertility but apparently so increases soil temperatures at the higher altitudes that more rapid growth of the staple is achieved.

> Compost heaps are made by initially constructing a saucer shaped mound of soil into which all weeds and old sweet potato vines are thrown. Over a period of one month the sides of the saucer are thrown in, more weeds added, then the mound is completed. At 5,500' altitude the mounds average 6' in diameter and 2' high. At 6,500' the average is 12' diameter and 3' high and at 7,500' the average is 10' diameter and 4' high. (Kingston 1960, 2.)

On steeply-sloping land with a thin and unstable soil cover, such as is cultivated in many parts of Chimbu, the soil is cultivated and conserved by the use of unconventional techniques such as vertical drains which rapidly disperse water and prevent mass soil slipping; simple soil retention barriers, such as have been described earlier, further assist conservation. Casuarina planting is widely practised in Chimbu, being generally carried out well in advance of the fallowing of the gardens so that at least a partial soil cover is assured.

As will be realised, practices in the Goroka Valley do not, on the whole, achieve this degree of specialisation. Only in the dry parts of the Bena Bena do the practices of tillage, tantamount to dry-farming, compare to some degree with the specially-evolved systems briefly described above. Land availability is undoubtedly greater over most of the Goroka Valley than it is in the areas mentioned here, but this does not apply to the Kanusa where population pressure is relatively high and yet agricultural practices which are generally known are seldom adhered to - for example methods of soil conservation and retention are not carried out to any desirable degree.

In any case, it may be suggested that in the Goroka Valley at this time it will be difficult for extension officers and others concerned with native subsistence to encourage natives to perfect or improve their subsistence techniques: while it is obvious from any comparison of the different Highland systems that much could be beneficially introduced from one area to another, for the Goroka Valley the present generation of natives has been under considerable pressure to adopt cash crops, and has now acquired a desire for a cash income to such an extent that possibly attempts to return to subsistence farming, even if improved, will be somewhat belated and will be met with impatience and apathy. Notwithstanding this possible attitude, it is most important that this aspect of the agricultural economy is not neglected, and some suggestions along these lines are made later in the chapter.

Coffee is grown widely by natives throughout the Australian Highlands - in Kainantu, Henganofi, the Waghi Valley, and even

in Chimbu - and in addition peanuts and passionfruit are widely grown. At June 30, 1960 the Bureau of Agricultural Economics (Canberra) estimated that there were over 2,000,000 native-owned coffee trees in the Eastern Highlands, and 152,000 in the Western Highlands. (Coffee Report 1961, 55.) This is equivalent to nearly 4,000 acres of coffee. There is a second passionfruit pulping plant at Mt Hagen, although it handles a smaller quantity of fruit than the Goroka plant.

However, it is probably true to say that more opportunity has been created in the Goroka Valley for natives to produce cash crops: in most cases the Goroka Valley was the testing ground for the new crops, and the greater concentration of Europeans there, together with the existence of marketing and transport facilities, have given the natives of this area a lead over others.

The decade of the 1950s has in a sense been a period of initiation, trial and error in the Goroka Valley, not only for its native peoples but also for those Europeans responsible for introducing a new economy to the natives, and trying to implement it. Programmes designed to improve the welfare and economic status of under-developed peoples, no matter what form they may take, and regardless of how well-intentioned they may be, are frequently frustrated in the early stages by factors which cannot be anticipated, and are seldom fulfilled with uniform benefit to all sectors of the community. The policies designed for the Goroka Valley natives have been no exception, and in view of this it appears that the time is appropriate for

an appraisal of the land use generally in this area. Special reference is made to the three communities studied, but it is hoped that the proposals made here have a wider application to those groups of people whom the three selected communities represent.

Table 3 presents a synoptic view of the most significant features of each of the three communities, from which the following conclusions are drawn. A separate column is drawn up for each of the two field periods spent in Makiroka and Nupasafa.

Thousands of native people live in the mountainous valleys of the Bismarck Mountains and the Asaro Range above 6,000 feet altitude in environments which are not only difficult for subsistence but in which cash cropping is impossible or unfeasible at present. The altitudinal limit for Arabica coffee is uncertain, but no European-owned coffee in the Goroka Valley is grown above 5,800 feet and very little native-owned coffee is found above 6,000 feet. To date, the only cash crop which has been considered for these areas is pyrethrum. In the Highlands favourable conditions for this crop are thought to exist between 5,000 and 8,000 feet, with 7,000 feet and above as the optimum.

> A daisy-like plant...Pyrethrum... is the source of the valuable insecticide of the same name.... Pyrethrum has unique and important properties which enable it to stand the competition of modern synthetic insecticides. It is one of the few insecticides which is completely harmless to man and animals. The active pyrethrins also have a quick knock-down power when applied to most insects. About 85 per cent of pyrethrum is used domestically, about 10 per cent goes to industry and the remainder is used in agriculture. (Schindler 1959, 1.)

TABLE 3

THREE NATIVE COMMUNITIES - SUMMARY

	FONDIWE'I	MAKIROKA		NUPASAPA	
Altitude	6,300 - 8,000	5,200		4,700 - 5,100	
Terrain	Mountainous	dissected old high-level alluvial fan		undulating hill-and-basin terrain	
Soil parent material	granite, limestone	alluvial and colluvial material		alluvial and lacustrine; siltstone	
Vegetation: 1) primary	Lower montane rain forest	--		--	
2) successional	Miscanthus, bracken	Imperata, Saccharum sp., Themeda intermedia, small trees and shrubs		Imperata, Themeda australis, Saccharum sp., Phragmites	
Est. Ann. Rainfall	90 - 100 inches	80 inches		55 - 60 inches	
Est. Mean Max. Temp.	70 deg. F.	75 deg. F.		78 deg. F.	
Est. Mean Min. Temp.	50 deg. F.	58 deg. F.		60 deg. F.	
Frost	Nil	Nil		Nil	
Wind	Negligible	Negligible		Local dry-season winds	
Schmidt/Ferguson Quotient	12.2 (Type A)	31.1 (Type B)		40.7 (Type C)	
Population	1960: 311 (resident 286)	1959: resident 92	1960: resident 101	1960: 227 (resident 218)	1961: 231 (resident 225)
Population density	c.470/sq. mile	c.235/sq.mile	c.260/sq.mile	c.150/sq. mile	c.160/sq.mile
Settlement pattern	3 villages, scattered garden and family houses	1 village and scattered residences		3 villages and scattered residences	
Type of Economy	Subsistence	Mixed: Subsistence/Commercial		Mixed: Subsistence/Commercial	
Clearing methods	trees felled; slash, burn stones removed	trees felled; slash and burn		burning	
Ground Preparation	Complete tillage, parallel ditches, small mounds.	Complete tillage, parallel ditches, small mounds.		Complete tillage, parallel ditches, small mounds.	
Erosion	Gullying, land slips, sheet erosion	Negligible		Local sheet erosion	
Erosion and water control	field drainage, soil retention barriers	--		Dry Farming	
Intercropping	Negligible	Moderate		Extensive	
Staple crop	Sweet Potato	Sweet potato		Sweet potato	
Other main crops	Sugar	Sugar, bananas, maize		Sugar, bananas, maize, tapioca.	
Tree Crops (subsis).	Pandanus	--		--	
Cash Crops	--	Coffee, peanuts, passionfruit, vegetables, sweet potato.		Coffee, peanuts, sweet potato.	
Livestock	283 pigs	253 pigs	246 pigs	650 pigs	680 pigs; 10 cattle
Total area clan land	387 ac.(+ 600 ac. forest)	510 acres		870 ac. (+ tribal reserve not calculated).	
Ac. Subsis. Food Gdns	67.9 acres	24.7 acres	33.4 acres	93.2 acres	101.2 acres
Ac. new clearing	19.5 acres	4.6 acres	15.5 acres	19.0 acres	13.4 acres
Ac. cash crops	1.2 acres	16.2 acres	15.2 acres	26.4 acres	28.4 acres
Villages, paths etc.	6.4 acres	1.6 acres	1.6 acres	8.1 acres	8.1 acres
Ac. claimed fallow	292 acres	78 acres	70.4 acres	165 acres	190.7 acres
Reserve Land	600 acres (uncultivable)	385 acres	374 acres	558 acres	528 acres
Subsis. Crops/capita	0.24 acres	0.27 acres	0.33 acres	0.43 acres	0.45 acres
Cash crops/capita	--	0.18 acres	0.15 acres	0.12 acres	0.13 acres
Total land/capita	1.36 acres	5.54 acres	5.00 acres	4.00 acres	3.87 acres

Experimentation is being carried on at Aiyura near Kainantu, and meanwhile in the Goroka Valley some natives are growing seed experimentally for the DASF. However, little more has been done to date; a necessary first step is the establishment of a processing plant as the flowers lose weight if transported far after picking, the pyrethrin content deteriorates, and little margin of profit is left. Other than this, there have been no cash crops mooted for the mountain people. On the other hand, it must be pointed out that in Kanusa, and probably in other mountain tribes, the density of population is greater and the amount of land per head somewhat less, than over the rest of the Goroka Valley, so that there would be a smaller surplus area of land here to devote to cash cropping. It might be possible to teach mountain groups in the Goroka Valley high-altitude techniques of cultivating sweet potato, such as those employed by the Wabag natives, to improve the productivity of their land and to support the population more adequately; on the other hand it would be perhaps wiser to try to find alternatives which did not require this land so near the forest line to be used at all, in the interests of arresting soil erosion and promoting the re-establishment of forest.

In Chapter VI it was observed that so far differences in economic opportunity between tribes such as Kanusa and those occupying more favourable environments have not produced much tangible difference in the attitudes and way of life of the peoples concerned. In the early stages of cash cropping the advantages for certain areas as against others are not remarked by the native people, but as the one group is able to continue

development and the utilisation of its resources for earning money, while another has very little to utilise, the inequality of opportunity may well make for under-privileged and discontented tribes.

Environments such as those which the Fondiwe'i occupy cannot be pressed far beyond a subsistence economy, and although some alternatives are possible for the 'advancement' of people occupying them, none is really satisfactory. One proposal which is commonly considered under such circumstances involves the migration of at least a number of people out of the area, either as migrant labourers or through re-settlement schemes. However, there is already an over-abundance of unskilled labour available in New Guinea, much of it from districts where far less development has taken place than in the Goroka Valley, and there is not enough employment opportunity to absorb it. In addition, allowing large numbers of men to seek employment elsewhere creates many undesirable disruptions to community life in the home territory, and in any case the regulations imposed by the Highland Labour Scheme guard against more than 30 per cent of the potential labour force being absent from a clan at any one time. On the other hand, wages are rarely adequate to allow a man employed non-locally to take his family with him and support it. This proposition is therefore untenable on any scale.

Although adequate land might be found in the Goroka Valley for the re-settlement of a proportion of the native people, it is unlikely that enough land could be found in parcels large enough to support many groups of say 100 people or about 20

families. Even if the mountain people were willing to remove from their home territories, the means of placing land elsewhere at their disposal would be complicated: surveys would be necessary to establish where land surpluses existed, and the Administration would have to alienate such surpluses from the present owners - problems of language and custom, and fear and suspicion, would still remain. Some informal re-settlement, on a very small scale, is traditional, and a clan which does not count among its residents at least two or three families from other clans is rare - it must be pointed out, however, that this inevitably involves moving to live with affines, and furthermore, as mountain groups as well as those in the Valley Floor have such 'adopted' members there is not even a slight solution to the problem in this traditional custom. However, some intensification of this custom, but one-way only, from the mountains to the Valley Floor, might contribute slightly to an easing of the situation.

It would seem that the proposal which holds most promise, in the long term, is to initiate as soon as possible a system for apprenticeship training in manual trades locally, for local natives at least. This would benefit not only the individuals concerned, but also the community at large, as improvements in the standard of living do not automatically follow upon the acquisition of money - carpenters, metal-workers, mechanics and so on will not only be an asset in townships and on government stations, but also among a peasant-farming community. A training is available for native agricultural field-workers, and has been for some years in Goroka, but the number which can be

Plate 57. Agricultural trainees spraying cattle on a European plantation.

taken is limited due to lack of staff, and in no way meets the need for training in some skills. It may be suggested that as staff will inevitably be limited, preference be given to those men and youths who have little or no opportunity of earning money by other means in their home territories, so that the lack of opportunity would be to some extent evened out. As such men would come from localities too far from Goroka to 'commute' daily by walking, residential quarters could be provided at the training centre, but locally-drawn trainees would be able to return to their villages over weekends and so maintain contact with their own people.

For those people living in environments where cash cropping is possible it is envisaged that an agricultural community of peasant farmers, operating a mixed subsistence-commercial economy, will persist. Indications are already evident that greater efficiency in agricultural techniques will emerge - the use of new clearing methods and the employment of native labour by native people, as at Makiroka, are no doubt examples of things to come. Some further innovations could well be suggested. The traditional agricultural system, which has not been displaced but merely superimposed upon by the introduction of cash cropping, is by no means adequate in terms of diet, being conspicuously protein-deficient: so long as the price- and market-instability of the present cash crops (described in Chapter IV) continues, the importance of adequate subsistence cannot be overlooked.

There is some scope for mixed-subsistence farming of a more organised nature than the present sweet potato/pig economy

represents. Within most clan territories the fallow land could well be more effectively utilised for livestock if attention were given to the introduction of nutritious short-term pasture grasses and to adequate fencing.[1] Many clans can probably support small herds of cattle, as at Korofeigu, and improve the quality of their pigs at the expense of reducing the quantity. In any case, large numbers of livestock would not only be detrimental to agricultural land, but perhaps to health as the villagers lack the means for storage of meat and milk. An example of the 're-organisation' envisaged is made on the basis of observation at Nupusafa.

The generally low fertility of most of the lower Bena Bena has been stressed, but at the same time the efforts of the agricultural extension service in providing new ways of utilising its potential have not been unsuccessful. Now that experiments with cash crops and cattle have had some effective results, it seems that it would be profitable to consider some aspects of land-use in more detail.

There seems to be greater promise for development in Korofeigu than in Kanusa, for example, because in terms of European culture at any rate it is less difficult to increase production through improving soil fertility or conserving water than it is to find crops which can be grown over a variety of environmental conditions and which at the same time require only a low level of skill in cultivation and are economically viable.

---

1 Trials with various pasture grasses are being carried out by the DASF in parts of the Valley, in particular the drier areas; legumes, buffel grass, molasses grass, etc., are considered suitable.

However, in the context of the indigenous culture, the one is as difficult to achieve as the other at present.

Assuming that land-improvement techniques on an expensive and highly technical scale cannot be applied, the most obvious solution for groups in the dry parts of the Valley is to concentrate production of both cash and subsistence crops as far as possible along the narrow belts of more fertile land bordering watercourses. That such a selection of land in these areas is not already made is somewhat surprising, but it may have been due in the past to the tradition of nucleating not only settlements but also garden areas for protection against marauders, and in the present to the abundance of land. There is no reason why such a land-use pattern, namely, the concentration of gardens into intensively-cultivated ribbons of land along the streams and creeks, should not appear in Korofeigu and neighbouring areas. It would not be wise to devote the most fertile land entirely to long-term crops such as coffee, as the income derived from cash crops will for some time to come be only sufficient to maintain the clans at something close to peasant level, even if the bulk of the money earned is used to provide the basic necessities of life - if it is not, then subsistence food crops must continue to be cultivated. Such a reorganisation of land-use would be more profitable not only in terms of yields but also in terms of man-hours, the longer cultivation period possible on more fertile land reducing the labour involved in preparing land and fences. It has been suggested elsewhere that investigation be made of the most suitable varieties of sweet potato for this and other localities - if

certain varieties could be demonstrated to give better yields or better withstand the peculiar conditions of climate, the risk of food shortage might to some extent be overcome. The land released from agricultural production should be reforested with casuarina or pine plantings.

Now that the use of money has become customary in some spheres, and the natives here are able to earn money on their own land, the economic necessity for keeping large numbers of pigs has somewhat diminished: food received from other areas during shortages in the lower Bena Bena need no longer be repaid with pigs. On the other hand social obligations will demand for some time to come that pigs be kept for ceremonials. It is suggested therefore that the natives be encouraged to reduce the number of pigs in this area to that which will be adequate to meet social commitments - that is, to perhaps a third of the present number; also, pigs should be periodically penned and stall-fed on maize and sweet potato: in this area pigs require a large acreage per animal for grazing, and by reducing the number and penning them from time to time soil erosion (illustrated in Chapter VII) would be lessened, and more land made available for other purposes. Penning constantly leads to disease and parasite infestation, but this can be controlled if correct pens are constructed and some grazing allowed.

If proven short-term pasture grasses can be introduced the size of the cattle herds could be increased somewhat due to the increased carrying capacity, to make a more regular provision of meat products available to the tribe. Furthermore, animal manures would contribute to soil fertility. Problems would be

to ensure that the natives did not neglect the herds, as they are at present unaccustomed to organised animal husbandry; to provide adequate veterinary services; and to prevent damage to food crops - cane grass fences are not strong, and permanent wire fences are impracticable where land is fallowed frequently, so herdsmen would have to be appointed.

In summary, it is thought that in the lower Bena Bena especially, but possibly in other areas of the Valley Floor, the economy might take a new emphasis, in terms of a mixed-subsistence farming system combined with the production of cash crops rather than of an almost entirely agricultural system such as operates now: this seems to imply a more realistic, more profitable, and more stable use of the environment.

Reviewing the events of the 1950s in relation to the introduction of commercial crops (as outlined in Chapter IV) several points must be stressed. In the first place, cash cropping is a very recent innovation. In less than ten years quite remarkable changes have occurred in the agricultural regime in the Valley. While new crops, new cultivation techniques, the use of tools and simple machinery, the employment of labour and the use of coinage are now widely accepted, there is scope for greater efficiency in all stages of production.

The natives themselves have been eager to follow the examples suggested to them, and have at times acted on their own initiative in adopting European techniques of cultivation and management. J.L. Taylor, reviewing his thirty years of experience among the Highlanders said of them that the secret of their success lies

in their enthusiasm for new ideas, and their tremendous imitative ability. (Personal communication.) The fact that they adopt new ways (especially when concerned with their land) so eagerly suggests that when such enthusiasm wanes, as it has done periodically with different groups who have taken up cash cropping, the disillusionment must be attributed partly at least to the Europeans who have professed to be their counsellors and guides. It is undeniable, although it has not always been avoidable, that European plans and activities for improving the natives' welfare and economic status have not always had the happiest results - this is reflected by the outline of cash crop production given earlier. The Highland natives, in many respects still primitive, have for example, been taught to grow coffee, a crop which they cannot eat, for sale to countries overseas of whose existence many of them are only vaguely aware, for people of whom they know very little. Unawares, they are being brought into competition with producers in many parts of the world, and also unawares, they grow their product in the face of economic crises, fluctuations in production, demand, and prices.

Very few crops which can be grown by natives on a commercial basis in the Highlands have an assured internal market in the Territory, which means that markets have to be sought in Australia or elsewhere. The level of native education and experience is not yet such that the native growers themselves can organise marketing arrangements or unite for bargaining purposes, so that this aspect must rest either with the Administration (acting through such agencies as its Departments of Agriculture

and Native Affairs) or with private individuals, companies and organisations. Of the cash crops grown in the Highlands, only coffee is not produced in Australia, the nearest and most obvious market. Australian coffee buyers have well-established commitments with overseas producers in the first place, and secondly the market potential for coffee in Australia is limited so that to absorb the Territory's production is not a simple matter. With those crops which are produced in Australia as well as in the Highlands, such as tobacco, peanuts and passion-fruit, the usual concomitants of newly-established industries (for example, irregular quality and supply) and their lack of organisation put the New Guinea producers in an unfavourable position for competing against mainland growers; and there is an added resentment against 'cheap coloured labour' by Australian growers. Furthermore, although the Territory is in all main respects economically part of Australia, as management, capital investment, banking and trade balances are all related to Australia, the tariff organisation is anomalous in that for some products New Guinea is regarded as part of the internal economy, for others as a foreign country. At the moment this discrimination operates more against European producers in New Guinea than against native producers, but in the light of current events this situation will no doubt change rapidly.

The Australian Government and the Administration of Papua-New Guinea is committed to a policy of promoting native welfare in the widest sense of the word. So far there has been no positive expression by the Highland natives of loss of faith in their European advisers, but it would be unwise if the latter

were to ignore the potential for discontent and disillusionment in the existing situation, and perhaps for consequences of a more serious nature.

Chapter X

THE EUROPEAN PLANTATION ECONOMY

Introduction

The gold prospectors and patrol officers who discovered and opened up the Highland valleys in the 1930s do not seem to have considered seriously the possibility of white settlement and development in the Highlands, although they did realise that the dense population of warlike peoples might eventually provide an important labour pool. During and immediately after the second world war, however, a considerable degree of pacification had been achieved, and the eastern Highlands in particular had been visited by a number of Europeans, including air force and military personnel. Optimistic assumptions were made about the climate, the fertile soils, and the potential of the Highlands for contributing to the Australian economy by the production of those tropical and semi-tropical crops which Australia had to import from overseas; and great enthusiasm for white settlement in the high valleys was thus generated.

These assumptions were, however, characterised by an unrealistic appraisal of the area and its resources, as in fact the activities both agricultural and industrial which can here be engaged in by Europeans are limited. Granted a favourable environment in terms of soils, rainfall and terrain, a number of other pre-requisites must be satisfied for agricultural

development. Among these are an adequate supply of suitable land; capital sufficient to establish operations and maintain them; the labour and/or machinery for developing the land; a system of transportation which will deliver the product to the market as efficiently as possible; and an assured market.

When these criteria are examined now, after some ten years of European settlement in the Goroka Valley (which is to date the most highly-developed part of the Highlands), it can be seen that the amount of land available for white settlement was limited and its extension is now virtually impossible; that many of the plantations are under-capitalised; that labour, although plentiful, is not very efficient, and it is costly to bring plant into the area; that the relative isolation of the Highlands results in a heavy dependence on air transport, which is costly and by no means reliable; and that the market is notoriously unstable.

Leaving aside agricultural development, there is virtually no scope in the Valley for any but light industries such as food processing: there are no deposits of economically important minerals, no source of power except hydro-electric power, the full potential for which has not yet been determined (but it is not great), and the problems of transportation and marketing apply here as they do for primary production.

The above reasons posit the necessity for producing a crop with a high return per acre and high value in relation to its bulk, and requiring a low level of skill and a minimum capital outlay for processing plant - coffee is one of the few crops which is able to meet these requirements.

The main features of European agricultural development in the Valley are here outlined; as suggested, this development has been limited, being based on the establishment of some thirty plantations all geared to the production of coffee.

Acquisition of Land

The acquisition of land has been one of the most important factors controlling the extent of European settlement. The Uncontrolled Area Ordinance, imposed after the murders of missionaries and prospectors in the 1930s, was not repealed for the Goroka Valley until about 1947,[1] precluding any activity by settlers until the late 1940s.

The first agricultural land was alienated in 1949 - some 350 acres - and no further land was alienated in the next two years.[2] Between 1952-4, however, a total of 3,550 acres was alienated, or nearly 75 per cent of the total agricultural land to date. The dense native population, the nature of native

Table 4

ALIENATION OF AGRICULTURAL LAND*

Year:	49	50	51	52	53	54	55	56	57	58	59	60	Total
Acres:	357	-	-	1238	1393	851	279	110	206	-	51	157	4642

* Not including land alienated for missions, airstrips, township.

---

1 This Ordinance is still in force for some remote parts of the Highlands.

2 The acreages of alienated land given here were compiled from information received from the Goroka Valley planters. Official figures for the Goroka Valley alone are not available, being published for administrative districts such as the Eastern Highlands District - this includes land alienated in an area from Chimbu to Kainantu.

Plate 58. A European coffee plantation in the middle Asaro Valley. The Asaro Range in the background.

land claims (which extend over all cultivable land and much which is not, such as forest), coupled with the Administration policy of protection of native interests, meant that only limited areas of land could be alienated to Europeans. The Native Lands Ordinance states that before land may be considered alienable, enough land must be reserved to the natives to meet their present and prospective needs. The precise definition of this clause is not a simple matter, but some rules of thumb were established from late 1952 by field officers in the Eastern Highlands District for guidance on this question. Reviewing land alienation in this district in 1953, Downs, then District Commissioner, wrote:

> I could see no reason for not attacking the problem of European land needs on its merits in each particular area as the occasion arose, provided I had before me in each case the area of land 'owned' by the group or tribe, a summary of the potential, the condition and usefulness of such land, and a true record of the population occupying such land or likely to occupy such land in the next 20 years. (TPNG File 34/1/2-378.)

In 1955 it was resolved that the alienability of native land be determined 'mathematically' on three fundamental assumptions, postulated as constant over the next century, namely:

1) a per capita need of 3.3 acres of arable land,

2) a natural population increase at the rate pertaining to the individual villages in the area under review,

3) that non-arable land cannot be deemed so in perpetuity.

From 1955, persons wishing to acquire a lease of alienated land had to submit detailed information on the following points to the Department of Lands in Port Moresby:

1) type of crop or crops intended to be planted,

2) locality preferred,

3) programme of anticipated development during the first few years, including equipment, machinery, and buildings proposed,

4) ability to develop the land and experience for the project in view,

5) financial resources available, and

6) any other information considered relevant.

A successful applicant was expected to commence development within a reasonable time subject to seasonal conditions, and to develop the land to the satisfaction of the Land Board within a limited period. (Land Inquiry Circular L.G. 931/8-1, Lands Dept, Port Moresby.) Land available for settlement is advertised publicly, is open for application to 'all qualified persons' and the applications are dealt with by a Land Board. The land is acquired from the natives concerned by the Administration, and then leased at 3/- per acre per year for a period of 99 years to the successful applicant; the length of the lease at least ensures some security of tenure so that 'get-rich-quick' attitudes do not automatically follow - they are however promoted by some other factors such as political insecurity.

Already in 1952 there was concern by members of the Administration over the extent of alienation in the Eastern Highlands District, and a 'go-slow' policy was being adopted in the face of numerous applications for land from intending settlers. This policy was later reinforced by a statement from the Minister for Territories, Mr Hasluck, in 1954 that '...there might have been too rapid and too extensive an acquisition of native lands' and that '...the long-term achievement of policy would not be hampered or limited in any locality by further acquisition of land'.

But the greater control exercised by field officers as a result of this policy led to considerably smaller areas of land being alienated after 1954. Transactions already commenced at the time of the Minister's statement were completed, so that the effect of the new controls was not at first obvious. Only one new plantation was alienated in the Goroka Valley in 1954, and another in 1957 - apart from these two properties alienation since 1954 has all been in the form of extensions to existing properties, or of land for cattle raising. The decline of alienation since 1954 partly reflects also the condition of the coffee market, which is elaborated on later.

By Australian standards the amount of land alienated to Europeans has not been extensive, but in relation to the Valley itself and to the amount of arable land available it has been considerable and has virtually reached its limit for agricultural purposes. While there are further areas which could be developed for cattle raising caution must now be exercised over this land too, having regard for the recent acquisition of cattle by natives and their future land needs in this respect.

Coffee Production

Production methods in the New Guinea Highlands differ in some ways from those practised in other countries, and there is some variation also from one part of the Highlands to another; the general pattern of production in the Goroka Valley is described here. Highlands coffee (Coffea arabica) is of two main varieties, typica and bourbon, although minor amounts of other varieties have also been planted. Arabica is a high-quality

coffee, tolerant of a wide range of soil and rainfall conditions, although its optimum environment is found at an altitude around 5,000 feet with deep, well-drained, slightly acid soils, and a monsoon-type rainfall regime with about 75 inches annually. In the Goroka Valley, however, it is also grown nearly 1,000 feet higher, and in areas with a rainfall as much as 25 inches on either side of the optimum. The early plantings in the Valley were almost entirely of typica[3] but since 1957 plantings of bourbon have exceeded those of typica: whereas in 1956 Barrie estimated that the ratio of typica to bourbon throughout the Highlands was 80:20, in 1960 in the Goroka Valley the ratio was 22:78. Barrie states, 'Apart from its apparent higher yielding capacity, bourbon coffee is preferred because of its obviously more vigorous and sturdy growth, and its greater tolerance under drier and unshaded conditions in the Highlands'. (Barrie 1956, 2.) Graph III indicates the increasing preference for bourbon.

Coffee is planted as seedlings from nurseries after twelve months. In the Highlands it is grown under shade, being a forest tree in its natural habitat. The usual practice is to plant the fast-maturing legume Crotalaria anagyroides as temporary shade, and at the same time to plant a cover of permanent shade trees which will be able to provide adequate protection by the time the temporary shade has expired. Permanent shade

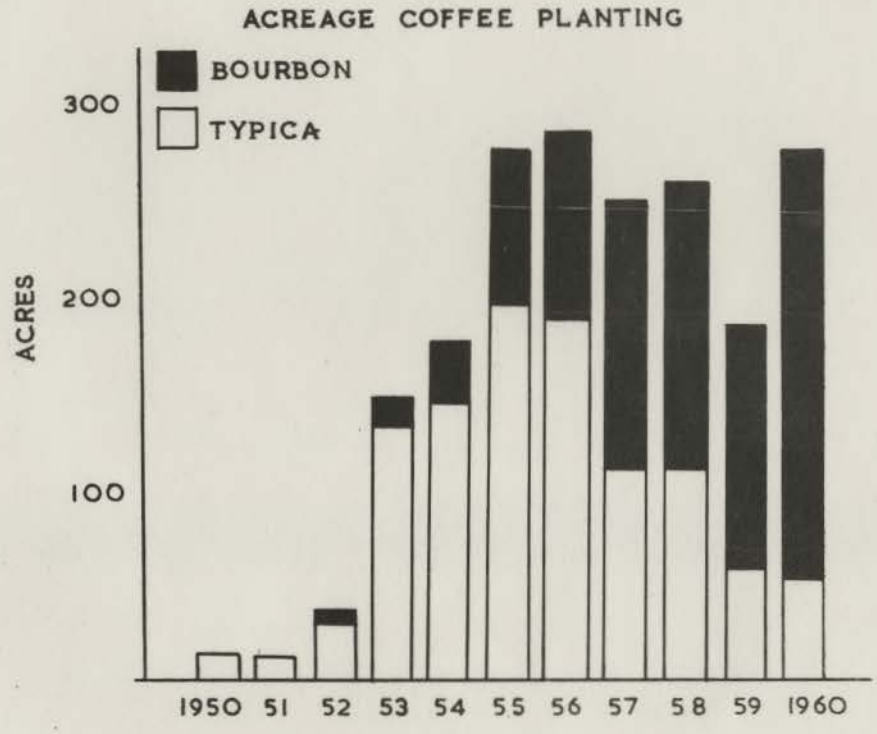
---

3 Initially most European plantings and even now almost all native plantings were of typica derived from seed introduced to Aiyura Agricultural Station in 1937, and disseminated from there.

Plate 59. A method of shading young coffee trees to protect them from the sun.

Plate 60. Mature coffee under established permanent shade cover of Albizzia stipulata.

GRAPH III


ACREAGE COFFEE PLANTING
BOURBON
TYPICA
ACRES
300
200
100
1950
51
52
53
54
55
56
57
58
59
1960

trees most commonly planted are Casuarina and Albizzia stipulata, but several others are also favoured.

Husbandry practices vary widely in respect of weeding, mulching, pruning and fertiliser application: this was clearly demonstrated on the surveys of the coffee plantations made during the course of field work, and is illustrated by Table 5. The variations in husbandry practices are partly due to environmental differences - for example, Tephrosia is only successful as temporary shade in the wetter areas, and the occurrence of the Ring Borer weevil is greater in the drier areas; in other cases financial considerations may influence husbandry practices such as the amount and frequency of application of fertilisers, and the extent to which weeding and mulching are carried out. In addition, a certain amount of experimentation contributes to the range of shade tree varieties and pruning methods.

Coffee begins to bear in about the third year, its economic life continuing for 25-30 years. The harvest begins when the beans (or 'cherries') are bright red. The crop may ripen at any time, depending on seasonal and environmental conditions, as it is markedly responsive to rainy periods, but there is a general flush season at the end of the 'wet', between April and May. The ripe berries are harvested by hand, as the crop does not ripen uniformly and thus mechanical pickers are unfeasible. Yields vary widely according to the rainfall, which has been shown to be widely variable throughout the Valley and also seasonally variable; yields also vary from year to year on individual plantations due to 'die-back' unless careful management is practised, and alternating heavy and poor crops are

Table 5

HUSBANDRY PRACTICES ON GOROKA VALLEY PLANTATIONS

Temporary Shade	
Crotalaria	21
Tephrosia	2
Leucaena glauca	2
Crotalaria + Tephrosia	1
Crotalaria + L. glauca	1
None	3

Permanent Shade	
Albizzia stipulata	5
Casuarina	4
Leucaena glauca	2
Albizzia st. + Casuarina	7
Albizzia st. + Wabag Albizzia	2
Albizzia st. + L. glauca	2
Casuarina + L. glauca	2
Albizzia st. + Casuarina + L. glauca	5
L. glauca + Wabag Albizzia	1

Pruning Methods	
Single Stem	5
Multiple Stem	11
Single + Multiple	9
Multiple + Agobiada	2
Multiple + Single + Agobiada	3

Mulching	
Practised	21
Not Practised	9

Fertiliser Application	
Practised	27
Not Practised	3

Weed Control	
Manual	27
Weedicides	3

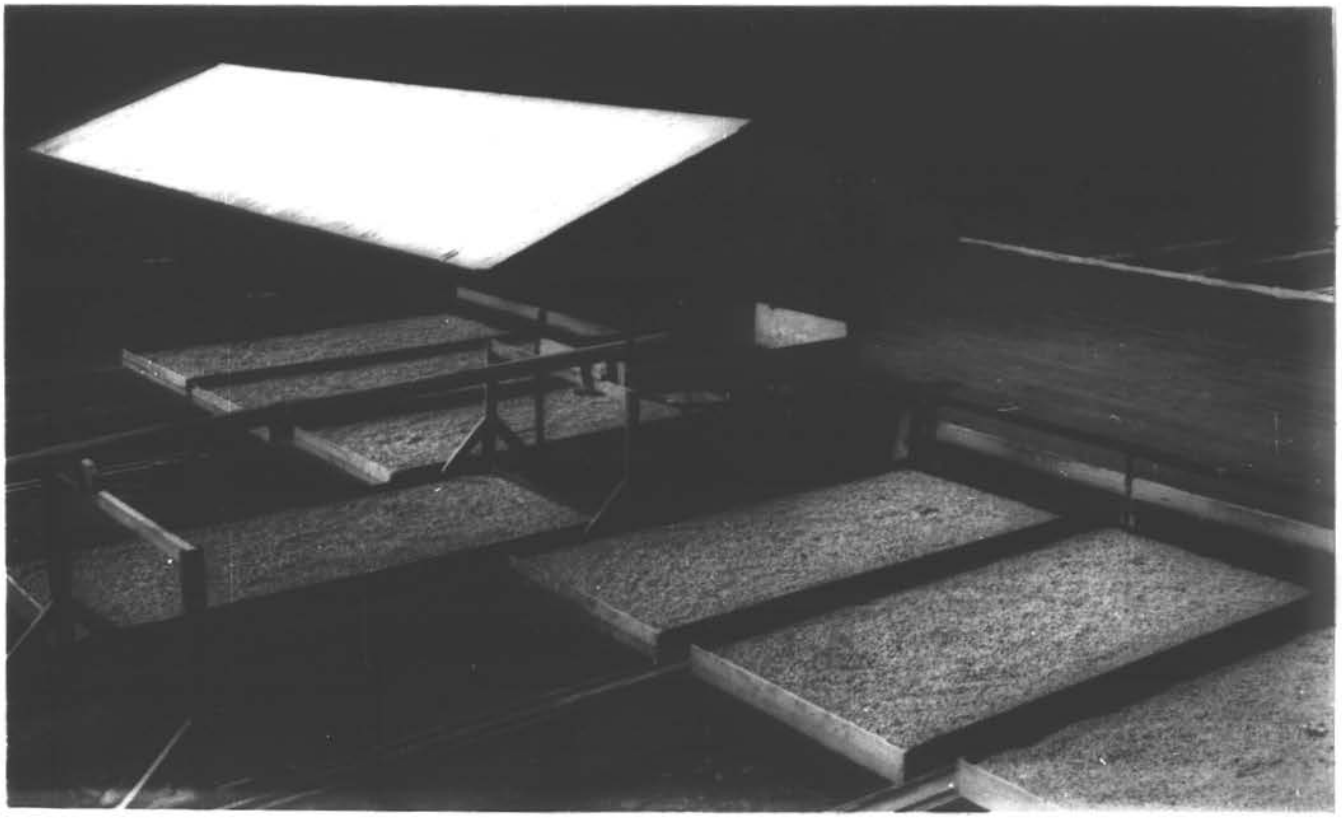
Pests and Diseases	
Ring Borer	14
Ring Borer and Leaf Roller	4
Other	2
None	10

Processing	
Parchment Coffee	25
Green Coffee	5

controlled by either pruning or the application of fertilisers. Average yields are in the vicinity of 0.5 tons per acre, but yields of over a ton per acre have been achieved on individual plantations, although not consistently. Graph IV illustrates the relation between acreage and yield, derived from survey statistics.

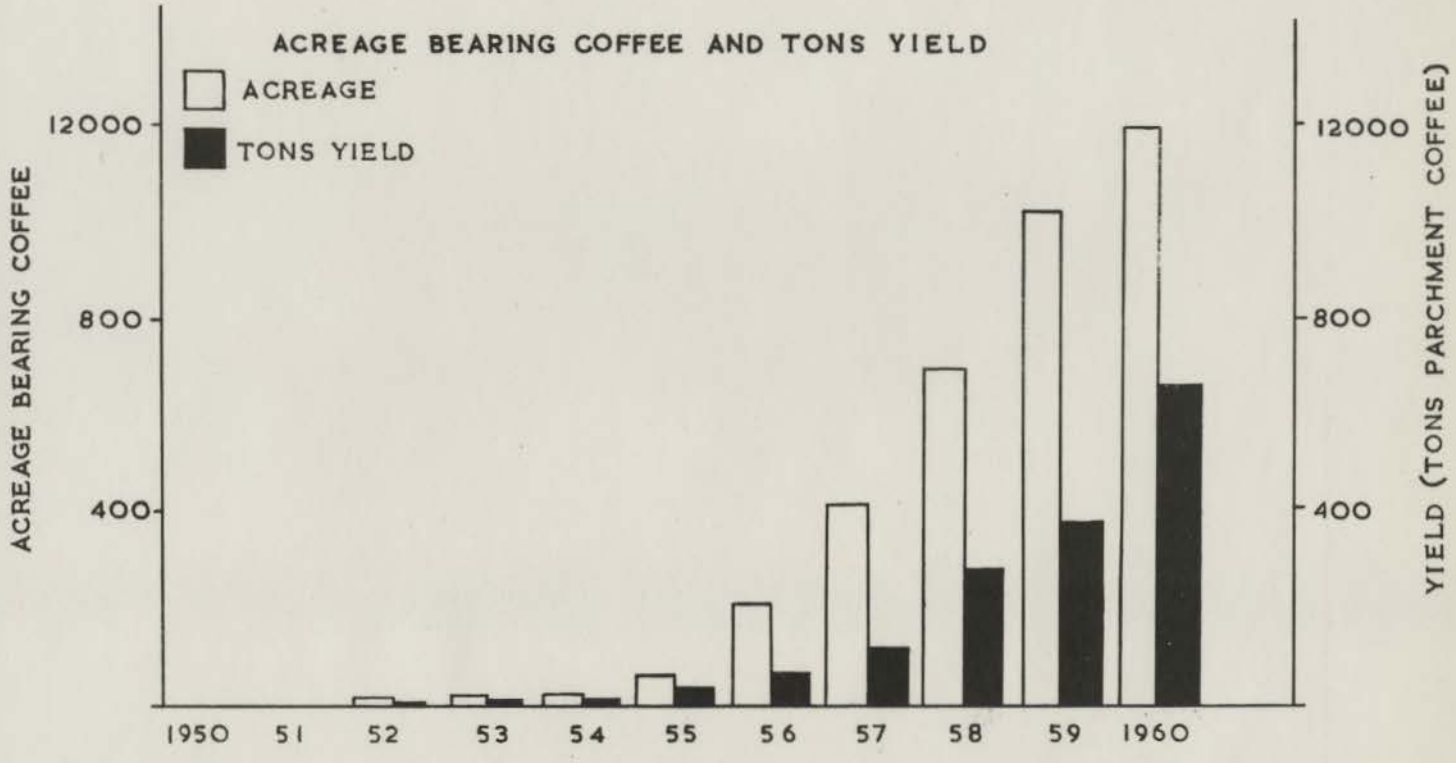
The wet processing method is followed throughout the Highlands. After harvesting, the cherries are pulped to remove the red outer skin, fermented in vats to remove the mucilage covering the beans, and thoroughly washed. A few plantations use an 'aqua-pulper' to carry out all these operations in one process. The beans are then dried, usually in the sun but sometimes mechanically, to a moisture content of about twelve per cent. When this stage has been reached the product is known as parchment coffee. The majority of the plantations carry out no further processing: parchment coffee is usually delivered to the mill in Goroka (operated as a company formed by a group of local planters) for further processing, which involves hulling, polishing and grading of the beans. The hulled, polished coffee is known as green coffee; it is graded into six classes according to the size of the beans and their liquoring quality. Graded green coffee is bagged and flown to the coast for shipment to Australia or other countries. The final processing - roasting, grinding, canning, and so on - is carried out in the country of destination.

The following extract appeared in a recent issue of the Journal of the Highlands Farmers and Settlers Association:



Plates 61 & 62. Two methods of sun-drying coffee on European plantations, depending on available finance. In the lower photograph the coffee is spread on sliding trays which can be covered at night or during wet weather.

GRAPH IV


ACREAGE BEARING COFFEE AND TONS YIELD
ACREAGE
TONS YIELD
ACREAGE BEARING COFFEE
YIELD (TONS PARCHMENT COFFEE)
12000
800
400
1950
51
52
53
54
55
56
57
58
59
1960

> New Guinea is one of the few countries of the world where either development or production goes on without subsidy.... In terms of efficiency, New Guinea pays higher wages, employs less workers per acre, and has higher transportation, fuel, food and equipment costs than any country in Africa. We still pay the highest price in the world for parchment coffee from peasant farmers, and, on a quality basis, we ask the lowest price in the world.
>
> A tour of 17 countries suggests that we may be the only country in the world harvesting a crop mainly consisting of beans at the proper stage of ripeness. Our machinery is generally more modern than that in other countries and, in terms of processing and quality, we not only stand in the world's first four but have laws and regulations which now demand more than does any other country of its growers. (HQB, vol.2, no.2, April 1961.)

Capital and Management

When coffee plantations were first established in the Highlands, little was known about the suitability of the New Guinea conditions for the industry. Coffee had been planted experimentally at Asaloka and Aiyura before the war and grew well, but few of the intending planters, if any, had previous experience in coffee growing: they came from a wide variety of occupations and were formerly Administration officers, gold prospectors, pilots, traders, and coastal planters. Many had insufficient capital and took other employment while their properties were in developmental stages. Table 6 reflects this - it will be noticed that a number of plantations were not occupied until well after the date of alienation, although it must be pointed out that this does not mean that no development had taken place before the date of occupation. (It will also be noticed that a number of properties were occupied before the legal processes of alienation had been completed.)

Table 6

RESPECTIVE DATES OF ALIENATION AND OCCUPATION OF PLANTATIONS

Plantation	Alienated	Effectively Occupied	Area (inc. subsequent extensions)
1	1950	1949	280 acres
2	"	"	77
3	1952	1951	237
4	"	1952	225
5	"	"	75
6	"	1953	145
7	"	"	90
8	"	1954	100
9	"	1956	410
10	"	1958	155
11	"	d.n.o.	36
12	1953	1951	220
13	"	1952	103
14	"	1953	106
15	"	"	125
16	"	"	110
17	"	1954	140
18	"	1956	85
19	"	"	376
20	"	1958	247
21	"	d.n.o.	100
22	1954	1954	60
23	"	"	130
24	"	"	123
25	"	"	216
26	"	"	230
27	"	1956	250
28	1955	1955	91
29	1957	d.n.o.	100 (total 4642 ac.)
30	not alienated	1956	99

d.n.o. = developed, not occupied

Costs of establishing and maintaining the operations of a plantation are considerable. A recent survey by the Bureau of Agricultural Economics (Canberra) estimated that the capital needed to develop a plantation and plant 100 acres to coffee would be £55,700 (rounded) over a seven-year period (Coffee Report 1961, 84), which is equivalent to £500-£600 per acre. This includes all costs involved for labour, plant and equipment, structural improvements and land improvements. Virtually no return can be expected in the first three years. After seven years, the plantation should transfer from an establishment budget to a production budget, as income should be increasingly greater than costs of operation.

During the first few years of the 1950s the Valley was virtually undeveloped as far as roads and other facilities and services were concerned. Although this situation has been steadily improved, the current prices being received for coffee are only half what they were in the period up to 1954-5; the situation overall therefore has brightened little. In the light of this it is not surprising to learn that many of the plantations are operating on bank credit, that over a third have changed hands since they were originally taken up, and that during 1960 another five planters had either put up their properties for sale or were actively considering selling out. The rush to take up land for coffee plantations in the early 1950s has frequently been described as an 'agricultural gold rush', and the metaphor may be extended to include the whole decade up to the present, as the gold rush symptoms of boom and depression are still evident in the coffee industry. (It can

probably be said that they are inherent in it.) Low prices, especially since 1957, a result of considerable world over-production of coffee and the relaxation by Australia of import restrictions on coffee (among other commodities) in 1959, and the additional burden of income tax imposed on European residents in Papua-New Guinea for the first time in 1959, have both contributed to the instability of the coffee industry in the Highlands.

Labour

A considerable amount of labour is required on a coffee plantation as there is little scope for mechanisation of the industry. Even in the preliminary stages of clearing much is done manually, and preparation for planting and harvesting must all be carried out manually. Weedicides, which could reduce the quantity of labour used to some extent, are expensive and are not widely used. Table 7, which sets out the numbers of natives employed on the Goroka plantations according to their occupations, shows that about 75 per cent of this labour is concerned with coffee production.[4] However, as the plantation is invariably monocultural, this is not surprising.

Labour drawn from the Highlands and employed in the Highlands is not hired on an indenture system but on a casual basis, that is, by the month. The Native Labour Ordinance specifies a minimum monthly cash wage to be paid, and in addition sets

---

[4] These figures are averaged out, as the labour allocation on a plantation may vary daily - groups are switched from pruning coffee trees to harvesting sweet potato or constructing fences as the necessity arises.

Table 7

ANALYSIS OF LABOUR EMPLOYED ON PLANTATIONS BY OCCUPATION

	Aug.-Sept. 1959	Dec. 1960
Coffee, all stages	977	951
All other crops	184	157
Livestock	45	45
Transport	9	5
Building and maintenance	41	22
Domestic	51	49
Stores (trade)	10	11
Total	1317	1241

out regulations which make provision of housing, food, tobacco, items of clothing and medical attention compulsory. During the harvesting season a common practice is to employ additional labour, often local women, at a daily rate. Apart from this, almost all plantation labour is male.

Native labour is not efficient, by and large, and planters are often outspoken regarding the carelessness and laziness of their labour 'lines'. There is no shortage of labour in the Highlands, and the wages which must be paid according to the Ordinance are not high, but little seems to have been done to increase efficiency, for example in the form of slightly higher wages. In the first stages of development economy could most easily be practised in the matter of labour wages, and although an Administration officer regularly inspects all employers of native labour, and often announces his intention in advance, there have been many breaches of the regulations in the matter of adequate wages, rations and housing. Inefficiency of management is enhanced, if anything, by the large labour reservoir in the Highlands - the turnover on many plantations is very high and as new labourers often have to learn different methods from

Plate 63. Plantation labourers grading coffee beans by hand.

Plate 64. Houses for plantation labourers, constructed of stones from river beds. Housing of this standard is rare on plantations, although inexpensive to construct.

ones they have followed elsewhere, operations are perforce geared to the pace of those who perform them.

Table 8 lists the numbers of plantation labourers according to place of origin. This table has some significance - it will be seen that only about 30 per cent of the total labour force comes from within the Goroka Valley, and this does not necessarily mean that an employer of this local labour hires people from the villages neighbouring his plantation. Planters often express unwillingness to employ men from adjacent villages - they say absenteeism is high among men whose wives, friends and gardens are close-by, whereas non-locals have less motive for absenteeism. Moreover, natives within about a 15-mile radius of Goroka have an increasing interest in their own land, with the maturing of their own coffee groves and the establishment of local government councils, and have less desire or need to seek employment on plantations. Of the other areas from which

Table 8

ORIGIN OF NATIVE LABOUR EMPLOYED ON PLANTATIONS IN GOROKA VALLEY

	1959+	1960*
Asaro Valley	277	292
Bena Bena Valley	96	125
Chimbu Valley (inc. Chuave)	627	540
Watabung	47	18
Waghi Valley	86	85
Bundi	14	45
Henganofi	65	45
Kainantu	-	5
Lufa	65	35
Fore	7	18
Okapa	12	20
All coastal areas	21	13
Total	1317	1241

+August-September 1959

*December 1960

labour is drawn, Chimbu, Watabung, Bundi, Henganofi, Lufa, Fore and Okapa are all undeveloped areas in the sense that there are no European commercial operations in them, apart from trading, and hence little employment opportunity. Most of the coastal natives listed are employed in the capacity of drivers and overseers.

The 1959 figures in the tables were taken in a survey of plantations during August and September, the 1960 figures in a re-survey in December. Neither of these periods is the peak for labour requirements, which occurs between May and June, but an estimate made by the planters of their maximum labour requirements at this time comes to a total of over 3,000, more than twice as much as is listed in the tables.

Race Relationships

The trend of changing ownership is significant in the context of race relationships, and to an extent in the availability of labour. In the earlier cases of land alienation the initiative was often taken by the settler seeking land, and the transaction was often a fait accompli well before it passed through Administration channels, so far as the individual European and the natives who owned the land were concerned. The natives generally regarded the release of their land as a private matter, being either a personal favour from themselves to the European concerned (from which, it must be added, they hoped to enjoy certain advantages) or sometimes a means of discomfiting a rival group by selling its land to the unsuspecting European; in either case the intermediary role of the Administration must have seemed

unnecessary. For the earliest cases of land alienation, relations between the settler and his native neighbours were amiable - the planter had a supply of labour to call on, and could be expected to purchase food and firewood, saving the natives a journey to the government station to sell their produce; he often set up a trade store where clothing, utensils, axes and knives would be purchased with the newly-acquired money. But the changes in ownership over recent years have meant a breakdown of the personal element which typified the first years of plantation development; the natives are not always so favourably disposed to new owners and managers and tend to resent them.

Another aspect of the plantation economy is relevant to the question of race relationships. In 1960, only three plantations had more than 100 acres of coffee, which is regarded as the ideal for a fully-developed plantation. On the other hand many plantations had not begun to develop large portions of their land. Table 9 indicates that in 1959, the totals under unimproved pasture and balance of holding (in effect, the undeveloped land) accounted for 42.5 per cent of the total alienated agricultural land, and in 1960 the figure was 41 per cent. The existence of land which is highly suitable for coffee production (otherwise it would not have been alienated) but remaining unused, and yet surrounded by a group of people increasingly aware of the value of such land, increasing in numbers, and rapidly acquiring political consciousness, may present difficulties if such land is allowed to remain undeveloped for too long. Admittedly, there is very little evidence at present of

Table 9

LAND UTILISATION ON PLANTATIONS, GOROKA VALLEY
(in acres)

Agricultural & Pastoral	1959	1960
Coffee	1633	1907
Sweet Potato	336	192
Maize & Tapioca	17	85
Vegetables	38	17
Orchard	6	-
Peanuts	36	-
Tobacco	8	5
Improved Pasture	92	115
Unimproved Pasture	708	570
Area Cleared, not planted	469	470
Balance of Holding (inc. buildings, roads, water races, undev. land)	1246	1381
Total (= total alienated land)	4589	4742

Livestock	1959	1960
Cattle	229	570
Sheep	196	200
Pigs	201	183
Horses	14	16
Poultry		
Hens	1310	850
Ducks	380	380
Turkeys	160	230

resentment against the European, and the natives may not actually need the land (otherwise, again, it would not have been alienated) but that is not to say that now, less than ten years later, they will not regret having sold it, especially if the original owner has gone and they have little personal regard for the present owner or manager.

Transport

Within the Valley, there now exists an extensive network of jeep roads serving all plantations, and although during every year it is necessary to renew several bridges (nine during 1960 on the main road and secondary roads), the delivery of parchment coffee to Goroka for further processing and airlift to the coast is reasonably well provided for.

Almost all coffee produced in the Goroka Valley is air-freighted to Madang for shipment to Australia. The usual system is to backload on chartered DC3 aircraft, which is the cheapest means available provided the plane can be fully loaded. Inward freight is 4d per pound, and 1d per pound (or about £9/10/- per ton) on outward freight, but may be up to 3d per pound for less than a full load.[5] At present there seems to be little in the way of organisation among the planters to ensure that charters are always filled so that the cheapest rates can operate.

There is little problem in shipping coffee to Australian ports, as shipping lines operate regularly between Australia and New Guinea ports. Freight rates for this stage are between

---

5 Rates in 1951 were 10d per pound on inward freight, 4d per pound on outgoing freight.

£12-£14 per ton. Additional costs are incurred at the port of destination for wharfage, cartage, storage, etc.

Air transport to the coasts is the weakest link in the transportation system. Before February 1961, air safety regulations had not always been observed, and to take greater loads than stipulated by the regulations was a frequent practice. The enforcement of these regulations since that date has had, to quote Dr Gunther, Assistant Administrator, 'a disastrous effect on the economy of the inland Highlands'. These measures reduced maximum loads in DC3 aircraft by up to 26 per cent and mean that more aircraft are necessary to handle the same volume of freight. More important than this, however, is that each year more and more coffee is coming into maturity, and the demands for aircraft will become increasingly greater. Apart from the disadvantage of the shortage of planes, the use of air transport is made unreliable by poor flying conditions, especially during the wet season when the bulk of the coffee crop is harvested.

It appears that the Lae road will have to play an important part in getting coffee to the coast, but at present it is not an all-season road and several of the Markham tributaries have to be crossed by hazardous fords, although one of the most difficult, the Leron River, is now being bridged. The distance by road from Goroka to Lae is about 180 miles, and it has been estimated that costs for road-transported freight on the Wau-Lae road, about half the distance, are £7 per ton. (Coffee Report 1961, 66.) Hence road costs from Goroka to Lae could represent several more £s per ton than the present air freight costs from Goroka to Madang, at charter rates.

Markets

A small quantity of Goroka coffee is exported directly overseas to the United Kingdom and Europe, but the bulk of the crop is sold in Australia. The New Guinea crop represents a very small fraction of total world production, and just under 30 per cent of the present Australian market potential (which is 0.4 per cent of world imports). (Ibid., 108.) Australian coffee agents have long-established commitments to overseas producers, in particular African countries, and the New Guinea growers have had to offer an unknown coffee of varying quality in competition with such countries.

Since 1957, concern at the low prices and at the fact that part of the annual crop was not being sold has led growers to agitate for some measure of protection for New Guinea coffee on the Australian market. Since 1959, several conferences have been held between representatives of the growers on the one hand, and agents and processors on the other. The New Guinea Administration, and the Australian Departments of Trade and Territories, have also been represented. At the first of these conferences, held in Goroka in January 1959, an Agents' Association was formed, and a voluntary agreement reached to establish a minimum price for A-grade Arabica at 4/- per pound for the ensuing twelve months. The agreement was renewed in 1960. In March 1961 a further conference was held to secure the maintenance of an assured minimum price, but a more critical factor at this conference was the acceptance of New Guinea's total crop, which is continually increasing as more plantations and native coffee groves come into bearing. The growers' main concern was to

obtain an agreement from the Agents' Association to purchase the total production, which amounted, at the time, to 28 per cent of Australia's requirements. A new price structure (4/2 per pound A-grade Arabica, 4/- per pound B-grade Arabica, duty paid, costs, insurance, freight, exchange, direct shipment ports, Australia) was submitted to and accepted by the Agents' Association with the proviso that it be reviewed in six months if developments required. But no guarantee to purchase the total crop was given.

Following upon this, it was announced by the Minister for Territories in August 1961 that if 28 per cent of any coffee-buying agency's imports were of New Guinea coffee, that agency would be exempt from the duty of 3d per pound on the remaining 72 per cent of its imported coffee.[6]

---

6 The Operative Rates of Duty on Coffee and Chicory are set out in Tariff Item 43 of the Tariff Act:

	B.P.R.	M.F.N.R.	G.R.
A) Raw and Kiln Dried			
1) coffee per lb.	3d	3d	4d
2) chicory " "	4d	4d	4d
B) (1) Coffee, roasted or ground; coffee in liquid form; coffee mixed with any substance other than chicory:	6d	6d	7d
(2) Chicory, other than raw or kiln dried; preparations containing chicory:	7d	7d	7d
C) Substitutes:	7d	7d	7d

B.P.R. = British Preferential Rate;
M.F.N.R. = Most Favoured Nation Rate;
G.R. = General Rate

Special Rates of Duty

Item 43(a)(1): Territory of Papua-New Guinea - free
Item 43(b)(2): New Zealand, preparations containing coffee and chicory - free

Other foods of New Zealand or Papua-New Guinea origin covered by the items listed above are dutiable at the British Preferential Rate.

However, before the effect of this new policy could reasonably be gauged, the Highland Farmers and Settlers Association made the following submissions to the Tariff Board:

1. That the rate of import duty on green coffee beans other than from Papua-New Guinea should be increased by 1/- per pound;

2a. that this duty should be remitted under by-law for each Australian roaster that purchases 35 per cent of his requirements of coffee beans from the produce of Papua-New Guinea at a minimum price of 4/- per pound for X-grade coffee, or alternatively,

2b. if all Papua-New Guinea coffee offering on the Australian market has been taken up;

3. duties on all other types of coffee included under Tariff Item 43 (7) be appropriately increased (in proportion) so that current imports of such coffee are appreciably reduced.

Hearings were held by the Tariff Board in October, November and December of 1961, and the case is at the time of writing (January 1961) still being deliberated.

The earlier voluntary agreements between the growers and users of coffee, because of their temporary nature, were unsatisfactory in that the grower had little security and little incentive to develop and plant more of his land to coffee. The present negotiations with the Tariff Board, if successful, will solve one of the most difficult problems facing growers in New Guinea. In spite of marked fluctuations in the world crop, world production has considerably exceeded consumption virtually since the 1920s, and the present supply is several times in excess of world demand. Arabica coffee is not used, except in very small amounts, in the production of soluble coffees which are so widely consumed in Australia, and the demand of the

Australian market is not expected to greatly increase in the next few years, but, as we have seen, New Guinea production continues to expand. For New Guinea as a whole, production of Arabica by both natives and Europeans in 1960 was just over 2,000 tons. For the Goroka Valley present European plantings alone have a potential yield of over 2,000 tons by 1965, and the estimated total for the whole country in 1965 will have reached over 7,200 tons. (Coffee Report 1961, 70.)

Prospect

There is little likelihood that the quantity of New Guinea coffee exported to countries other than Australia will be greatly increased, but growers were confident that so long as the production of New Guinea coffee did not exceed the Australian demand, there would be no major marketing problems. This, however, has proved to be an over-optimistic attitude, as in 1961 the buyers were reluctant to accept more than 20 per cent of Australia's requirements from New Guinea. Marketing arrangements, and therefore the immediate future of the industry, are at present in suspension: the voluntary agreements between growers and agents have been terminated, and negotiations with the Tariff Board have not been completed.

Few of the plantations at present are in a position to diversify production by introducing new crops: as has been pointed out, a considerable amount of capital is needed to establish a coffee plantation, and very few plantations are out of the establishment and into the production stage of operation. Processing plant cannot readily be converted for use with other

crops, such as tea. Tea has already been grown experimentally with success in the Highlands, but skilled native labour is essential to establish it on plantation scale, and the capital expenditure for processing plant is greater than for coffee. Cotton is considered to be uneconomic because in terms of the lower yields and financial return per acre it is unsuitable for the land available. Table 9 lists the acreages under crops such as sweet potato, maize, tapioca and vegetables: on the whole these crops are grown for consumption by labourers on the plantations and are sidelines only; none of the current crops is economically important enough to replace coffee should the coffee market collapse completely. There exists a local demand for meat and milk, but it is a small one and cattle-raising is unlikely to assume a position of importance or to be a feasible alternative to coffee.

Although the quality of Highland coffee can be improved by greater attention to processing, such measures will not necessarily ensure a greater demand for it in the face of competition from low-price coffee which can be imported from elsewhere, and of competition with coffees whose reputation for quality has long been established. It is difficult to buy New Guinea coffee in Australia, as it is rarely advertised or sold as such, and seems to be used and sold in the blended coffees - while an advertising campaign would undoubtedly assist in the demand for New Guinea coffee, it would be expensive and its promotion is beyond the means of the Highland Farmers and Settlers Association, which would probably have to sponsor such a programme.

It seems that only government subsidy and protection can ensure the continuance of the plantation economy in the Highlands.

Chapter XI

GOROKA

The growth and development of towns, especially towns in isolated rural areas, is seldom dramatic or spectacular. Any increase in size and in the number of functions they perform and services they provide usually occurs slowly, and static periods intervene when no noticeable expansion takes place. Goroka, however, while a small town even by Australian standards, has experienced a growth in the last decade which may be claimed to be somewhat unusual. The town had, at the beginning of 1961, a population of no more than about 450: yet it is the largest inland town in New Guinea, and its importance is far greater than its size suggests; its hinterland embraces for some purposes the whole of the Highlands.

In most centres of non-indigenous population in New Guinea, and in all the Highlands townships, the first settlement was made by agencies of the Administration,[1] but towns rarely develop out of government stations unless there is scope for private enterprise. Thus Goroka was initially the administrative centre for the Highlands, and by virtue of its central position was for a time during and after the war the headquarters for both the controlled areas to the east and the uncontrolled areas in the west. By 1950, however, there was little that could be

---

1 A few townships have developed out of mission stations.

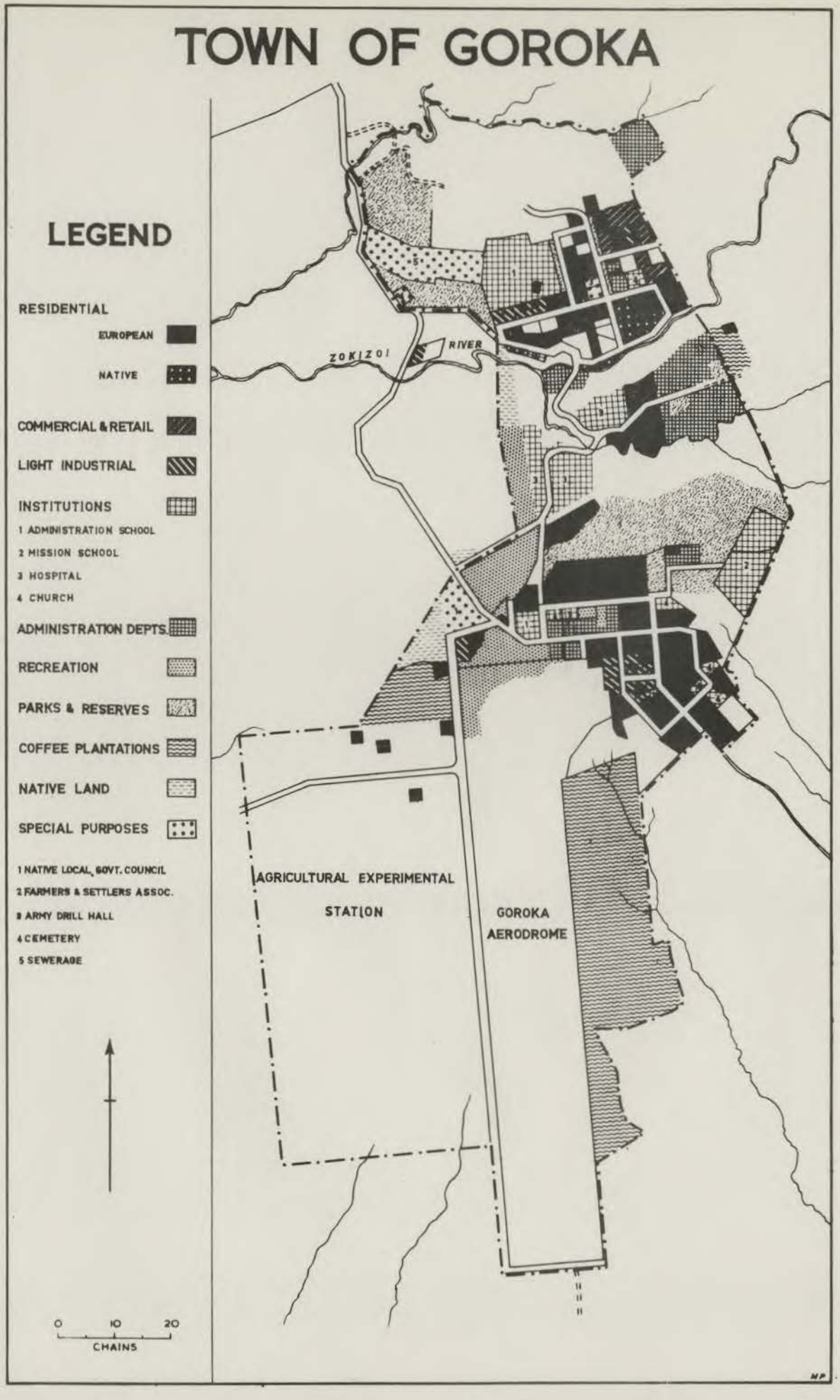
called a township at Goroka: the growth of the town to its present size has been in large measure an outcome of the 'agricultural gold rush' described earlier - the rush to take up land for plantations.

In 1950, the total population numbered about 15 Europeans, mainly Administration personnel, and the buildings (the patrol station, native hospital, residences, etc.) were of temporary materials. But the lifting of the restrictions on settlement by private individuals, and the advent of a settler community, coupled with the establishment of more government agencies, created a demand for goods and services which it was increasingly difficult to meet solely by the limited air links with coastal towns as had formerly been the case, and gradually a nucleus of retail and commercial services was established.

The present township, covering an area of about one and a half square miles, was surveyed and proclaimed under the Town Boundaries Ordinance on 19 March 1953. In the zoning plan then formulated, residential land was set aside for Administration personnel and for private purchase; other sections were reserved for Administration departments, for commercial enterprises and light industries, and for schools, churches and recreation areas.

The township has been built on a dissected alluvial fan against the foothills of the Bismarck Mountains; the main reasons underlying the selection of the site seem to have been its central position in relation to the Valley's population, and the existence of level areas suitable for airfields. There are now two sections of the town, North Goroka and Goroka proper,

TOWN OF GOROKA



separated by a low spur of the Bismarck piedmont: North Goroka was the original site of the Government Station when it was removed from Bena Bena, and a field for light aircraft was constructed there. During the war it became necessary to build a larger airfield, and this was located a short distance south of the Government Station. The government offices were rebuilt after the war near the main airfield when the original buildings were destroyed in a storm; the main commercial centre has now developed here too. North Goroka is now the centre for the town's light industries. The original airfield in North Goroka was closed after the war, and later became a Police Training Barracks - at the end of 1960 this too was closed and it was planned to convert the site to a training centre for native teachers.

At the beginning of 1961, Goroka was providing service facilities to a non-indigenous population of nearly 600 in the Goroka Valley itself (of whom over 450 lived in the town, about 90 on plantations, and the balance on mission stations), and also to a scattered European population beyond the Valley.[2] The township also has to cater for a considerable number of transients who spend brief periods in Goroka on business or vacation, and for that section of the native community which has a cash income. The services include educational facilities (a pre-school, a primary school, and a convent which takes boarders), a native hospital and a small European hospital, five churches, an hotel and a club, two banks, three general stores,

---

[2] The terms 'non-indigenous' and 'European' are used synonymously here although 'European' is in fact a misnomer as it embraces in the Goroka Valley some Chinese and some Eurasians, the children of marriages between Europeans and Chinese.

Plate 65. Goroka township, 1961. The airfield is shown, and on the far side the Agricultural Station, which will be subdivided for further expansion of the town.

Plate 66. North Goroka, 1961. The hospital is in the foreground; the original airfield was on the level terrace in the background.

two garages, a bakery, and a number of trade stores. The first trade store was established in 1951, followed in 1954 by the establishment of the three general stores and a garage; the two banks were opened in 1956, the three Chinese-owned trade stores in 1957, and in 1960 a second garage and a small bakery.

The industries are mainly concerned with building and food-processing: the first processing plant was that for passionfruit, opened in 1953; a timber mill was established in 1955 and a second one in 1958; a coffee-processing business, which roasts, grinds and cans local coffee for sale in the Territory was set up in 1957 (local peanuts and potatoes are also processed and packaged here); in 1958 the coffee mill and brick mill came into operation. Production figures for these industries are contained in Table 10. Power for domestic and industrial use is supplied from a small hydro-electric station in North Goroka.

There are two residential areas, in North Goroka and Goroka proper, and there is also in North Goroka a small native housing area for Administration employees. Virtually all buildings are constructed of timber, asbestos, or similar materials which are cheap to transport, as until the brick and timber mills came into operation all building materials had to be brought in by air. There are no local supplies of stone suitable for building purposes - the Valley has only two major outcrops of limestone, and the more accessible of these, at Geppavi Hill near Korofeigu, is also the smaller; it is crushed for road metal, the crushing plant being operated by prisoners under the supervision of a native policeman. The streets are unsealed and bordered by deep storm-water drains which are essential

Table 10

LIGHT INDUSTRIES, GOROKA

Industry	Available Production Figures	Where marketed
Sawmill A	1955-1959: 240,000 to 250,000 super feet/year. 1960: 314,000 super feet (785,000 logs cut).	Eastern Highlands District
Sawmill B	Average 35,000 super feet per month, excluding 3 months in wet season, i.e., c. 315,000 super feet per year.	Eastern Highlands District
Brick mill	1958-1959: 50,000 bricks 1960: 100,000 bricks Max. potential: 12,000 bricks per month.	Goroka, Kainantu, Chimbu, Lae
Coffee mill	1960: 680 tons processed from parchment to green coffee	Australia, Europe
Coffee Cannery		
a) Coffee:	1957-1961: 4 tons processed annually	Papua-New Guinea
b) Peanuts:	1957-1961: av. 7,000 lbs processed (roasted and packaged) 1960-1961: nil (DASF programme)	Papua-New Guinea
c) Potato Crisps:	1957-1961: av. 80,000 lbs potatoes processed	Papua-New Guinea
Passionfruit	Fruit Bought (lbs); Tins Juice; Tins Pulp	
	1957: 374,215 3,276 255 1958: 1,418,804 10,706 402 1959: 1,006,061 6,216 1,888 1960: 1,123,430 8,560 486	Australia, Papua-New Guinea

during rains - on the other hand, after a day or two without rain it is necessary to water the streets to settle the dust, and it is a common sight to see labourers from the business premises in the main street throwing buckets of water from the drains onto the road for this purpose.

Adequate facilities exist for sports and recreation - golf, tennis, cricket, rugby, polocrosse and swimming - and teams compete with the main coastal towns, travelling by chartered aircraft. By contrast, the town lacks a number of other facilities such as a cinema or cafes, and the stores provide little in the way of women's and children's needs: the absence of such things tends to lower morale and emphasise the isolation of the area, especially for women. The cost of living is high, and basic items such as fresh milk and fresh meat are in limited supply. There is no dairy in the Valley although in 1961 a proposal to convert an uneconomic coffee plantation to a dairy was being considered; some fresh meat is available locally but the bulk is received frozen from Australia; until mid-1960 all bread was flown in from the coast and a quantity still is. The native fruit-and-vegetable market supplies most fresh vegetables to the town's residents.

The extension of the transport and communications network has kept pace with the increase and spread of European settlement. Though figures were not obtainable for the road mileage constructed in each year, during the 1950s the main Highlands highway was extended from a section of some 80 miles between Goroka and Kainantu and extending a few miles beyond each town, to over 400 miles from Lae to Laiagam in the Western Highlands.

Numerous secondary roads serving plantations, outstations and mission stations have also been constructed. Several airlines, both internal and Australian, operate in the Highlands, but the volume of passengers and more especially of freight has increased to the point where there is a serious shortage of aircraft at certain times of the year, in particular during the coffee harvest, and this takes place during the wet season when poor flying conditions further reduce the rate at which freight can be moved. The situation is unlikely to be relieved until the Lae road becomes an all-season road - at present it is untrafficable during much of the wet season when the demand for transport is greatest. At present the road journey to Lae may take several days and even when the road is improved it will take about a day to complete with a fully-loaded vehicle, whereas Madang is only a half-hour flight from Goroka, and there are some obvious advantages therefore in air transport over road transport.

Considerable use is made of the radio-telephone communication network which embraces the main centres of population in the Territory. The township and nearby plantations are served by a telephone system but it has not been extended further than about five miles from the township - a telephone link to all plantations and mission stations in the Valley would be a great advantage to those in outlying areas when roads are impassable or during other emergencies.

In a census of Goroka's population taken during fieldwork in January 1961, a total of 444 Europeans was counted.[3] An

---

[3] The last official census was taken in 1954, when Goroka's population was only about 150, and it thus became necessary to take a census personally to obtain current information about the town's residents.

official census conducted by the Commonwealth Government on 30 June 1961 gave Goroka's population as 478; however, my census was conducted during school vacation when a number of residents were on leave, which to a large extent accounts for the difference. The following tables, compiled from my census questionnaires, illustrate some of the features of the town's population. No analysis of the official census figures was available for comparison, apart from the fact that 278 were males, 200 females. (In January 1961, the population comprised 251 males, 193 females.)

Table 11

ADULT POPULATION

		Married		Single	Widowed		Divorced	TOTAL
Males		88		66	-		2	156
Females	Home duties	60	88		1	2	-	121
	Employed	28		29	1		2	
TOTAL		176		95	2		4	277

Table 11 shows the proportion of married and single adults, and the usual imbalance between the numbers of single men and women which is a feature of most New Guinea towns. The high number of married women in employment is partly explained by the fact that domestic servants are readily obtainable and wages are low, partly also because the town's population is largely made up of young and middle-aged people, with very few old people.

A typical feature of Territory towns is seen again in Table 12 in the large proportion of the total population

Table 12

POPULATION UNDER AGE 21 YEARS

Age Group	Sex		Pre-School	School Goroka	School Australia	Employed Goroka	TOTAL
	M	F					
0-4 yrs.	41	31	72	-	-	-	72
5-9 "	29	18	-	44	3	-	47
10-14 "	17	16	-	16	17	-	33
15-20 "	8	7	-	-	8	7	15
	95	72					
TOTAL	167		72	60	28	7	167

comprised by the under-10 age group; although ages of adults were not obtained, this figure also emphasises the comparative youthfulness of the town's population. Table 12 also shows that about one-third of school-age children attend school in Australia; the ratio would be greater still if children from the plantations were included.

Table 13

a) ADULT POPULATION BY LENGTH OF RESIDENCE IN GOROKA

Less than 1 yr	1	2	3	4	5	6	7	8	9	10	10+	TOTAL
81	34	43	26	36	26	7	9	6	-	4	5	277

b) ADULT POPULATION BY LENGTH OF RESIDENCE IN PAPUA-NEW GUINEA

<2 yrs	2<4	4<6	6<8	8<10	10<15	15<20	20<29	30+	TOTAL
61	45	46	31	20	43	13	12	6	277

It was not possible to obtain figures showing the annual increase in population of the town, but Table 13 lists the length of time which the present residents have lived in Goroka, and in Papua-New Guinea. Over half the adult population has been resident in Goroka for less than two years, and 1955 is clearly shown as the turning point, after which the increase in population was far more rapid than in the previous years. The fairly

high number who have been resident in Papua-New Guinea for 10-15 years is largely made up of those who came to New Guinea immediately after the war. Most of those who have spent a long time in the Territory are Administration personnel - on the other hand those who have spent five or more years in Goroka are largely private settlers or Administration officers who have resigned to enter business; there is a faairly high turnover of Europeans in Goroka as Administration officers are transferred frequently, and those employed outside the Administration rarely have the intention of becoming permanent settlers.

Table 14

POPULATION BY COUNTRY OF BIRTH AND BY RACE

Country	'European'	Chinese	Eurasian (Sino-European)
Australia	270		
Papua-New Guinea	71	9	4
United Kingdom	38		
Germany	16		
New Zealand	5		
Indonesia	5		
Holland	5		
Hungary	5		
China	2	1	
Austria, Switzerland	2 each		
Canada, Norway, Latvia, Poland, Yugoslavia, Czechoslovakia, Italy, U.S.A., American Samoa	1 each		
TOTAL	430	10	4 (=444)

Table 14 lists the country of birth and the race of Goroka's residents. As is to be expected, the greater number are Australians and British citizens. In this Table, children constitute a high proportion of the Goroka residents born in Papua-New Guinea.

The growth of Goroka has created employment opportunities for the native population, and also the opportunity to use the money earned through various avenues, such as from the sale of cash crops, and from gold mining.[4] By far the greater number of natives employed in the town are either unskilled labourers or domestic servants, and Table 15 indicates that these positions are largely filled by the local natives, whereas skilled and semi-skilled positions are held by coastal natives. As observed in Chapter IX, the only forms of vocational training available for natives in Goroka are for medical orderlies and agricultural field-workers, and the number which can be trained at any one time is limited. There is a great contrast between the size of the Valley's indigenous and non-indigenous populations, some 35,000 as against 600. Although formerly the natives were virtually self-sufficient as subsistence agriculturalists, the urging and the example of administrators and settlers have given them new desires and even needs which cannot be satisfied by the old way of life. While most of the welfare services from which the natives benefit are provided by the Administration departments of health, education, law and agriculture, it is interesting to note in Table 15 that more employment opportunities and personal cash income to meet new demands are created by that section of the community not connected with the Administration. Trade stores cater for most of the needs of the

---

4 Apart from Agriculture, the only other form of 'primary production' yielding an income is the mining of alluvial gold, which is present in very small quantities in the streams of the Valley. Since 1956 the Valley has yielded about 210 ounces, bringing some £2,250 to the few men engaged in mining (probably no more than 30).

Table 15

GOROKA TOWNSHIP: NATIVE LABOUR BY OCCUPATION & PLACE OF ORIGIN*

Occupation	Goroka Valley	Other[1] Eastern Highlands	Western[2] Highlands	New[3] Guinea	Papua[4]	Total		
						Admin. employed+	Private enterprise	
Interpreters	4	1				5		5
Teachers	1	2		27	15	37	8(mission)	45
Medical Orderlies	48	21	3	6	6	83	1 "	84
Agric. & Forestry trainees	27	11	5	3	7	53		53
Surveyors				1		1		1
Police	12	3	1	42	2	62		62
Building industries	18	32	2	19	17	25	63	88
Mechanics, electricians	9	7		18	8	17	25	42
Drivers	2	2	2	14	13	21	12	33
Storemen	2	6	2	12	8	7	23	30
Food processing assistants	21	8					29	29
Clerks	1	1		9	15	22	4	26
Foremen	7	1	1	1		8	2	10
General labourers	117	160	18	8	8	112	198	311
Domestic servants	97	113	18	18	9	110	145	254
TOTAL	366	368	52	178	108	463	609	1,072

*January 1961

[1]Includes Kainantu, Chimbu

[2]Waghi Valley

[3]New Britain, New Ireland, Sepik, Madang and Morobe districts

[4]Gulf, Central, Northern and Milne Bay districts

Goroka Valley	366	34.5%
Other E. Highlands	368	34.5%
W. Highlands	52	4%
New Guinea	178	17%
Papua	108	10%
Total Highlands	767	73%
Total Coastal	286	27%

native community in the way of tools, food and clothing, but the quality of the goods is frequently poor. At the time the census was taken, no businesses in Goroka were owned by natives.

Goroka is the largest town in the Highlands and is likely to remain so for a few more years at least. The second Highlands town, Mount Hagen, about 150 miles west by road, may supersede Goroka eventually as it will serve a potentially larger community of Europeans (there is a greater reserve of land available for alienation), and when the far western areas of the Highlands are brought under control it will be more centrally placed in relation to the whole area. Goroka began as an administrative centre for native affairs, and by 1961 the following government departments were established in the town: Native Affairs; Law; Health; Education; Forests; Agriculture, Stocks and Fisheries; Animal Industry; Lands, Surveys and Mines; Posts and Telegraphs; Public Works; Treasury; and Civil Affairs, with branches for Police, Transport, Electrical Undertakings, Administration, Stores, and Libraries. However, by January 1961 the number of Europeans as well as natives employed in non-Administration capacities was already somewhat greater than those employed by the government: this is illustrated in Table 16. The Town Planner's Office (Port Moresby) envisages further expansion for the town and has made provision for this by the subdivision of the present Agricultural Experimental Station, on the southwestern side of the aerodrome. This land, at present devoted to various crop trials, has been surveyed and sections have been zoned for further residential and light industrial areas, for two more schools (one of which is to be

Table 16

OCCUPATIONS OF EUROPEANS

Occupation	Administration-employed	Privately employed or self-employed
Native Affairs	9	-
Education	7	9 (religious order)
Health	20	3
Agriculture & Forestry	4	-
Surveyors	4 Admin. 3 C'wth.	-
Police	2	-
Builders, engineers, electricians	7	8
Transport		
1) airways	6 Dept Civil Aviation	25
2) carriers	-	4
3) garages	4	4
Communications	6	-
Retail & Commercial	-	24 European 3 Chinese
Light Industrial		
1) Food processing	-	6
2) Sawmilling	-	3
3) Brick-making	-	2
Professional	1	3
Banking	-	8
Clerical	26	12
Religious	-	6
Planters	-	3
Retired	-	3
TOTAL	99	126

a girls' boarding school), and for a large new hospital, on which construction was begun in 1961.

The future of the town seems to revolve, at this stage, largely around the provision of education and medical facilities. Apart from the schools (existing and proposed) mentioned, there is the plan to establish a teacher-training centre at North Goroka; under the Administration's 'crash education programme' initiated towards the end of 1960, some 30 European teachers are now in the Valley[5] and the mission stations all have trained European teachers on their staffs.

With increased Administration personnel in the various departments, expansion may be expected in building and in retail services, and perhaps in the food-processing industries. With the improvement of transport facilities, the number of persons engaged in maintenance of roads, bridges, vehicles and aircraft will probably also increase. Little increase is likely in the number of people engaged in plantation activities, as there is little further agricultural land available for alienation, so that any growth of the town will be dependent upon factors other than the development of the hinterland. With improved facilities and services, some development of the tourist industry may also be expected, attracting people from both the coastal areas and Australia.

It is difficult to predict future trends for the European community in the Goroka Valley: the instability of the political

---

5 These are not listed in the tables as they did not arrive in the Valley until some weeks after the census was taken.

atmosphere, coupled with the economic situation of the coffee industry, may well inhibit continued development in the Valley and prolong the sojourner attitude which has not, in the decade since European settlement began, been effectively submerged.

Chapter XII

THE EVOLUTION TOWARDS A PLURAL SOCIETY

In the foregoing chapters an attempt has been made to present a picture of the native and European societies in the Goroka Valley. Some of the events which have been responsible for the evolution of these societies have been outlined, and certain communities have been described by way of illustration. Obviously the two societies cannot and do not exist independently of each other, but the gulf between the two is to date bridged infrequently and temporarily: basically the native communities and the European community are disparate groups, and so far they have been described and treated as such.

For the European community, settlement in the Goroka Valley has largely meant the continuance of an accustomed way of life in a new environment. Some adjustments have had to be made in this different environment, but on the whole the pattern of life is not greatly different from that in many rural areas in Australia. Although the existence of a large number of coloured and near-primitive people, and thus of a source of cheap labour, is not part of the Australian rural scene (except in parts of the Northern Territory), the size of the community, the isolation, the lack of amenities and the inadequacy of social services, the emphasis on sport, and the vicarious existence of many of the people in terms of other places (e.g. a

particular Australian capital city) are all characteristic features.

By contrast, the traditional milieu of the native peoples has been deeply eroded by the innovations which have been introduced during thirty-odd years of European occupance - in varying degrees these innovations have influenced the economy, the political structure, and the group morality and psychology of the Goroka Valley tribes.

It may be said that the Europeans' objective when settling in an area such as this is to maintain the basic patterns of their own way of life, and to provide themselves, so far as possible, with at least its material concomitants - their culture is transferred, as unmodified as possible, to the new environment. This action immediately reacts on the native culture, and the chain of responses so generated produces eventually a very different society. This process of culture change is to be observed in the Goroka Valley: the static traditional society has everywhere in the Valley been touched by European influence, and its breakdown and transition to a new order is proceeding at rates varying with the intensity of European contact; the chief characteristic of the native society now in the Goroka Valley is that it is dynamic.

This is regarded as desirable by those responsible for the government and welfare of the native people: the Minister for Territories has said

> Our great task is not simply to protect, to pacify, to heal, to teach, to give a livelihood or to create institutions for the people of Papua and New Guinea. It is to bring into being a new society. (Wilkes (ed.) 1958, 81.)

The new society envisaged in this statement is described thus:

> ...a society with a common language, with a cultural force of its own, and with a common feeling of social identity among all its peoples...a real political equality based on equality of opportunity, a common standard of living, universal access to educational and other services, and a common respect for the individual. (Ibid., 86-7.)

Where communities of non-indigenous settlers are to be found, the aim of administrators is the progress of both groups toward partnership and mutual co-operation in all matters pertaining to their common welfare. Looked at from the viewpoint of the above quotation, the reconstruction (or reconstitution?) of the Goroka Valley society has not progressed far. However, one cannot pre-determine the lines along which the evolution of a new social order must take place, and it will be recognised that many radical changes have taken place in the traditional order of things. In the preceding chapters, emphasis has been laid on the economic changes which have occurred, particularly in the last decade, but the picture is not complete without some mention of the social and political changes which have also taken place in this period.

Before examining these changes, however, it is proposed to recapitulate here and briefly summarise the factors which helped produce the kind of society which the first explorers encountered, and the events of the period 1930-50 which formed the foundation for a new society. The following passage from The Land That Time Forgot, while somewhat overstated, serves as an appropriate introduction:

> To understand why the central highlands of New Guinea remained so long unexplored in a day when both polar regions had been crossed and re-crossed by successive

> expeditions, it is necessary to remember three things: First, it is one of the most rugged countries in the world, with climate and topography both combining to keep the white man out. Take Switzerland and drop it down into the southern ocean near the equator, overspread its peaks and gorges with a rank growth of tropical vegetation, put in a wide barrier of malarial swamps to guard its borders, pollute it with tropical diseases, add a malignant assortment of poisonous snakes and insects for variety, and you have a good idea why New Guinea has remained one of the last spots on this planet to be explored and mapped.
>
> Second, there is very little in New Guinea, apart from gold, which white men value. Third, a natural result of the other two, the establishment of white control over the island was started only a generation ago, and is still far from complete. (Leahy and Crain 1937, 49.)

The isolation which for centuries preserved the Highland societies in an undisturbed state while explorers skirted the shores and coasts of New Guinea has been throughout the history of contact, and remains today, an obstacle to be overcome in the evolution of a new society: economic development is retarded, and contact and the exchange of ideas between groups is restricted.

But within the Valley itself forms of isolation other than physical barriers operated to produce a society fragmented into small groups: the isolation which stems from a variety of languages and customs, from the fear of sorcery, and from the perpetuation of hostilities between neighbouring peoples. Any unions achieved between tribes usually involved less than 2,000 people and were acknowledged to be matters of temporary convenience. Thus those who undertook the task of bringing to this fragmented, warlike society new economic, social, legal, political and moral codes were faced from the outset with a very difficult task, and its achievement is still far from being realised.

Intercourse between the Goroka Valley natives and Europeans between 1930 and 1950 was, except for a few groups, spasmodic, and of several kinds. Continued contact between the two groups was maintained only near the Government Station and the Asaloka Mission; for the rest, periodic patrols were the only occasions on which the two came into contact. By the end of the war, however, the rudiments at least of the 'pax Britannica' had been established. Some had learned of Christian principles, and at least superficial changes in group morality began to be felt. Although the Highlands played only a small and indirect part in the New Guinea campaign, the second world war made a considerable impact on the native people in the Valley because the Uncontrolled Areas Ordinance operated here until after the war, and meant that free movement of Europeans into the Valley, and of natives out of it, was still prohibited. Therefore the influx of troops, Australian and American, the construction of roads and airfields (largely by local native labour), and the movement of planes and vehicles, had at this stage an effect out of proportion to the numbers of people who contributed to it, by virtue of their novelty.

But these events were of slight importance compared with those of the period from 1950 onward. One of the most significant events in the process of inter-cultural and inter-group contact was the institution of the Highlands Labour Scheme. This Scheme, to which reference has been made in several places in preceding chapters, was begun in its present form in 1950. After the war there was a heavy demand for native labour to assist in the reconstruction and development of coastal areas,

Plates 67 & 68. These photographs illustrate an aspect of cultural change, in the person of the man in the middle of each case. In the top photograph he is shown in traditional Asaro costume, in the lower photograph in his role of Councillor for Makiroka.

but although the Highlands were declared controlled soon after the war, the recruitment of labour from the area was prohibited. The Native Labour Ordinance forbade the recruitment of native labour in any area above 3,500 feet for employment in, or passage through, any area of lesser altitude without written permission being first obtained. This restriction was imposed mainly to safeguard the health of Highlanders from coastal diseases such as malaria. (It was not widely known that malaria is endemic in the Highlands.) With continued pressure from would-be employers on the coasts, and the improved methods of malaria control developed during the war, the restrictions were eventually eased and recruiting permitted. The system by which Highland labour was made available to outside areas was carefully controlled: recruitment by private individuals was not permitted; those natives desiring employment were recruited on the periodic government patrols by patrol officers, who could accept only a set proportion of each clan's potential labour force (at first one-third, later 20 per cent, and later again 10 per cent); malaria prophylaxis was obligatory; all Highlanders seeking employment outside the Highlands had to pass through an attestation centre at North Goroka, and to pass through it again on their return after the period of employment. The Native Labour Ordinance of 1950-52 incorporated further health regulations - vaccination against tuberculosis, typhoid, tetanus and whooping cough.

From the outset, the Highlands Labour Scheme proved immensely popular with natives from the Goroka Valley and other areas of the Highlands, and in the first few years of operation

many thousands of Highlanders worked in coastal towns and plantations for periods of 18 months at a time; many returned for a further period or periods of employment after the compulsory six months back in the Highlands had elapsed. It is rare to find a clan in the Goroka Valley from which none of the males has undertaken coastal employment. The Scheme has had considerable impact, individually and collectively, directly and indirectly, on the Goroka Valley natives. Although the majority were general labourers performing unskilled tasks, they returned to their villages with a mass of new impressions, ideas and experiences. They had learned Pidgin, travelled in aeroplanes, seen large towns and the ocean, mixed (or co-existed) with coastal natives, experienced a different climate and different foods, and gained some appreciation of the size and shape of their country. Admittedly there is a negative side: the difficulties of adjustment to unaccustomed food, climate, and working schedules, the submergence of individuality on the plantation 'labour line', sickness, the difficulties of adjustment to village life on return, and the disruptions to village life caused by their absence (although this has never been serious, as over-recruitment has been guarded against as carefully as possible). As we shall see, however, this initial enthusiasm for coastal employment later dwindled.

The second major force which accelerated the evolution of a new social order during the 1950s was the settlement of Europeans in the Valley. In a country like New Guinea in which large areas and large populations are administered by relatively few government officers, the relations between the natives and

the Europeans, and the likelihood of partnership developing, depend quite as much on the rapport between private settlers and natives as on that between Administration representatives and the natives. In the Goroka Valley to date, as pointed out in Chapter X, the relations between natives and planters have on the whole been favourable: circumstances have mitigated against the acquisition of large areas of native land and the settlement of a large community of planters, as in Kenya; then too, the natives had no inherent political unity throughout the Valley and any grievances so far have not been made widespread but remained confined to the small tribal groups concerned. The formation of local government councils now provides a medium through which any grievances which do arise can be expressed with the voice of many people, but at present it is doubtful if this is realised.

The development of coffee plantations by Europeans has given some incentive to the natives to emulate (in a small way) their example, and thus to reinforce the Administration's plans for the conversion from a purely subsistence economy to a more advanced economic organisation, and improved living standards. The extension of settlement through the Valley has not only made the natives and Europeans neighbours over a wide area, but brought to the former the benefits of transport services and marketing arrangements provided largely for the latter. Mention has been made of the general lack of understanding among the natives of the wider implications of commercial activity, and in this respect the Highland Farmers and Settlers Association deserves some comment. This Association was formed in Goroka

in 1953, and currently has a membership of 95 per cent of all Europeans engaged in the coffee industry; as well, it admits to membership all natives who own a minimum of 2,500 coffee trees (i.e., about 4 acres). Its policy is stated as one of partnership with the Highlanders in the mutual development and progress of the region, and its charter expresses the belief of its members in 'certain obligations as citizens and settlers beyond our own self-interest'. At the 1960 annual general meeting a Goroka native was elected to the executive committee of six. However, it has been pointed out that many natives do not own even the desired minimum of half an acre of coffee trees, and a relatively small proportion of native coffee growers would own 2,500 trees. At the 1960 annual general meeting there were some twenty natives in attendance, but as none understood English they had to rely on hasty interpretation into Pidgin to follow the proceedings. The aims of the Association are worthy, but not so easy to translate into practical assistance; such benefits as the natives receive through the existence of the Association are usually gained on behalf of the European planters and automatically apply to native producers (for example the improvement of transport facilities and the reduction of freight costs). Many natives in the Valley do not know of the Association's existence, and in any case lack transport to enable them to attend meetings.

The establishment of Administrative agencies, and development by private enterprise, have opened up local employment opportunities, and at this stage it seems most important for the development of the Valley and the advancement of its peoples

that this should be so, rather than that those who desire employment should have to become, in effect, migrant labourers. Brookfield estimated that up to 1958 some 25,000 Highlanders had passed through the Goroka Attestation Centre for coastal employment. (Brookfield 1958, unpublished.) Since then, however, the numbers, particularly of those from the Goroka Valley, have declined considerably. There are several reasons for this: the availability of employment locally, the increasing interest in growing cash crops, and the establishment of local government councils which give natives greater involvement in the affairs of their own localities. The number of Goroka natives currently employed in other areas of the Territory cannot be estimated, as a large number work on a casual basis elsewhere in the Highlands and no record of this number is available, but a census of all native labour employed within the Valley in January 1961 revealed that some 2,300 natives were in employment (one-quarter by the Administration, three-quarters by private individuals), of whom one-third were local. An examination of the occupations of local natives locally employed shows that the majority are engaged as domestic servants or general labourers. (See Tables, pp.232-3 and 253.) Very few hold skilled or even semi-skilled positions. The implications of this situation are obvious: however much scope there is for employment of native labour in the Goroka Valley, the fact that the local natives are generally unskilled restricts their cash-earning ability to the minimum rates provided by the labour regulations.

Another difficulty arises out of this situation: the lack of acquired skills among local natives has led to the reliance

of Europeans on non-local (very largely coastal) natives, and their presence has created some difficulties already. For example, some 170 'stranger natives' had married local women in the Lowa Council area alone by 1959, which poses problems of land inheritance for the children of such marriages. The then District Officer at Goroka, F.G. Driver, estimated that 54 had been given land, 42 had houses in the villages, 37 had planted coffee and 27 food gardens (personal communication). Originally the 'stranger natives' were welcomed, as were the early European settlers, because they gave a certain amount of prestige to the villages concerned with their more sophisticated ways, but now there is considerable resentment against the coastal natives, whether or not they have connections with the villages. It is a resentment probably compounded of envy and a sense of inferiority, and it can only be overcome, as suggested earlier, by remedying the low level of education and technical skills. In theory much good could result from the presence of a core of skilled, non-local natives in the Valley, and a contribution could be made toward the society with '...a common feeling of social identity among all its peoples' envisaged by the Minister for Territories, but in fact the achievement of this goal seems unlikely for some time to come.

Part of the process of change from a subsistence to a semi-commercial economy involves the use of coinage. The money earned from cash crops, timber, gold, and employment circulates through several main channels. A large part is spent at the numerous trade stores on commodities such as clothing, utensils, canned meat, sugar and tea, tobacco, various items of adornment,

and tools such as axes, spades and knives. Virtually all the trade stores are owned and stocked by Europeans (on their plantations or along main roads), but most are in the charge of a native 'store-boy'. Adult men and women are required to pay an annual Personal Tax, the amount varying according to the system of local government of the district. Money forms the main part nowadays of bride-price payments, the amount of which has inflated enormously as a result: if this continues, problems will arise.[1] Pigs are also purchased with money. To date only one native in the Valley has been able to buy his own Landrover; many talk of doing so, and one of the Korfena luluais was planning to start a community fund to purchase one for his clan, but even bicycles are rarely owned. Many villages have purchased communally manual coffee-pulping machines, which cost £40. Some 2,900 natives in the Valley hold savings accounts with local banks, amounting to a total of almost £40,000. This represents a per capita figure of £14 among those holding accounts, and a little over £1 per head for the total native population of the Valley. An unestimated amount of money changes hands through gambling, and a similarly incalculable amount is simply hoarded by individuals who have no immediate use for it. Progress towards the establishment of a commercial economy cannot be achieved without fairly full and continuous circulation of money, and there is scope for greater education in this respect. Wise spending is not encouraged when the range of goods

---

1 The inflation of the bride-price has reached such proportions in some coastal areas that local government councils have stepped in and fixed a ceiling price for brides in those districts.

offered in trade stores is invariably of low quality, and those in the 'European' stores of high price; illustrated posters in the town advertise (through the medium of Pidgin) the advantages of banking rather than hoarding, and encourage investment in Territory loan programmes, but banking and investment are sophisticated concepts which are not understood by the great majority of the natives. Possibly annual patrols and Council meetings present an opportunity for giving explanation and advice on these matters.

At present local government councils hold more promise for furthering native commercial interests (although they were not formed for this purpose), and for promoting integration with other native communities and the European community, than any other body. The councils are a recent institution in the Goroka Valley: the first, the Lowa Council, serving an area in the central Valley, was proclaimed in December 1958, and the second in the Bena Bena in November 1960. Each embraces some 10,000 people, which means that over half the Valley's population is under Council administration. The areas covered by each Council, and those still operating under the luluai/tultul system, are shown on the accompanying sketch map. The Lowa Council received a revenue in 1959 of almost £9,000 from taxes and other sources (tax in this Council is 30/- for males, 10/- for females), of which over two-thirds went to a Capital Works Programme. This included the construction of medical aid posts and schools (the bricks made by Council members, the labour provided mainly by villagers in the Council area), and the purchase of a tractor and trailer for road improvements and other purposes.

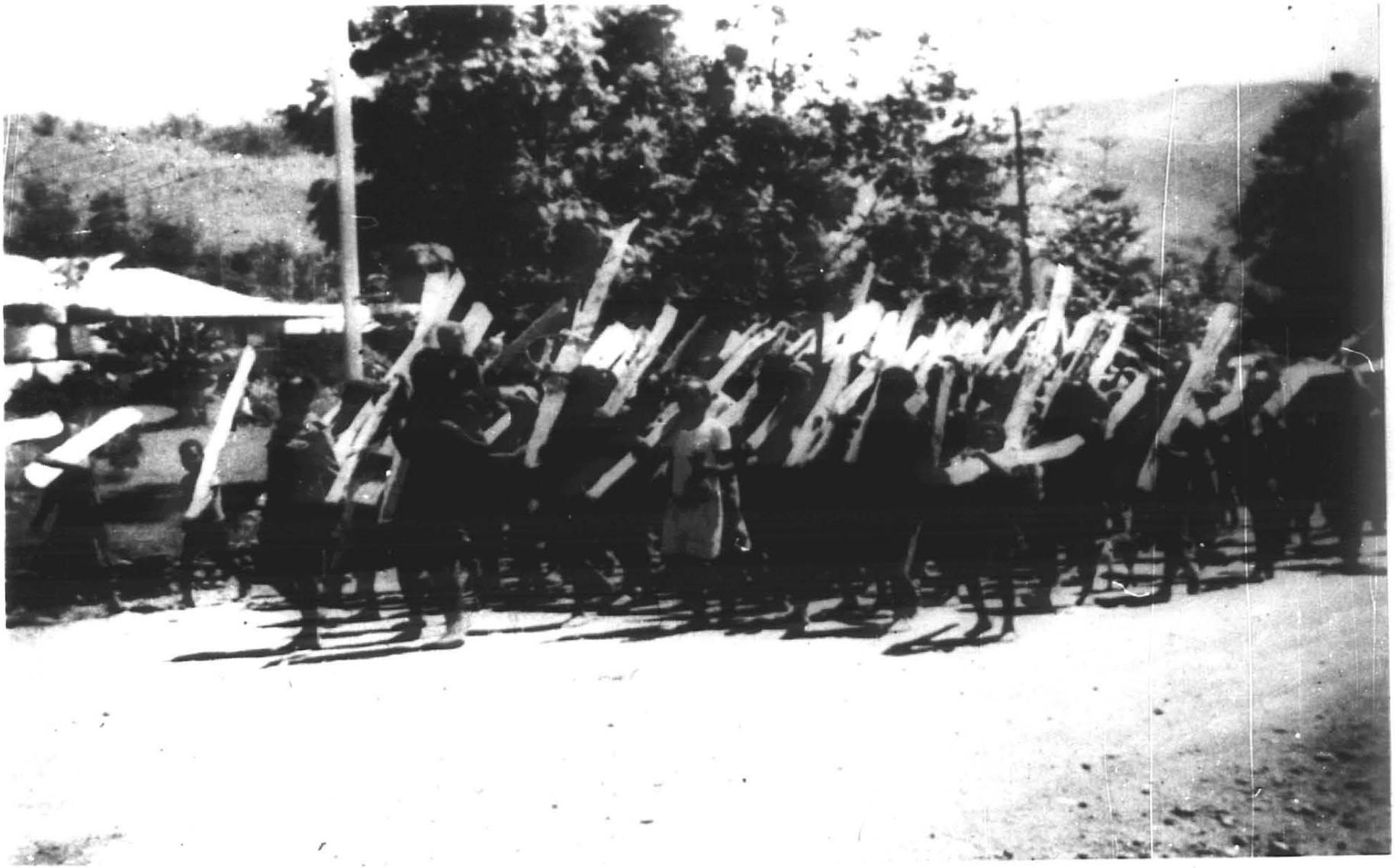
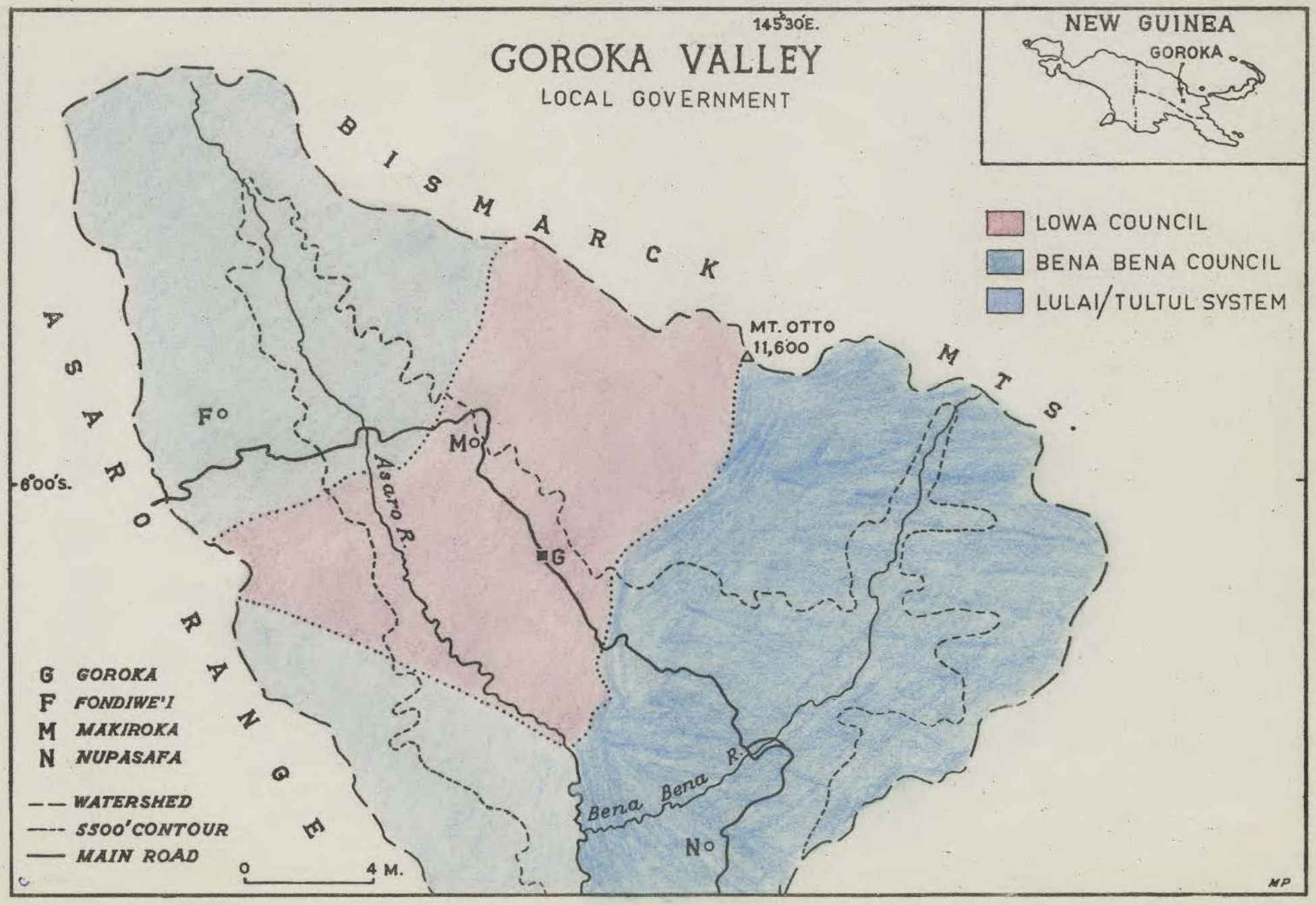


Plate 69. Men from the upper Bena Bena Valley carrying their annual tax into Goroka, in the form of firewood.

Plate 70. Korofeigu tribesmen and women listen as a District Officer explains the process of nominating candidates for Local Government Council elections.


145°30E.
GOROKA VALLEY
LOCAL GOVERNMENT
NEW GUINEA
GOROKA
LOWA COUNCIL
BENA BENA COUNCIL
LULAI/TULTUL SYSTEM
BISMARCK
ASARO RANGE
MT. OTTO
11,600
MTS.
6°00's.
Asaro R.
Bena Bena R.
F°
M°
G
N°
G GOROKA
F FONDIWE'I
M MAKIROKA
N NUPASAFA
WATERSHED
5500' CONTOUR
MAIN ROAD
0
4 M.
MP

The significance of the Councils lies in two important aspects. First in the experience gained in the mechanics of local administration and organisation. In the light of the progress made so far in Council areas, and considering the amount of money now in circulation, it seems likely that native co-operatives and rural progress societies may justifiably be formed in the Goroka Valley in the near future.

The second important function of the Councils is the part they play in transcending the purely tribal horizon. The first step is to bring together as far as possible people of similar language and custom to give them some awareness of mutual problems and their common identity; but this has for some been taken several steps further. Later on, delegates meet representatives from other districts at regional conferences where they gain an appreciation from more advanced Council areas of the achievements which are possible through such organisation; in 1961 a further step in political integration was made with the election of native members to the Legislative Council: one member represents the whole Highlands area, which involves considerable responsibilities for the elected man, and demands from his electorate that they place in him an unaccustomed trust, as to most of them he will be a complete stranger, and speak a different language.

A new society, involving the integration of many native groups and a community of non-indigenous settlers and sojourners, cannot, however, evolve to a specification. The means of achieving such integration may be within the reach of all, but there are not only economic and cultural barriers to be overcome -

psychological barriers also function. It is all too easy to take for granted that all sectors of the native community have welcomed the changes in their way of life, but often a resistance to change develops and persists. In this connection it is worth describing, in some detail, what may be termed the 'group psychology' of the Korofeigu, and of the Bena Bena tribes generally. Examples are taken from the Korofeigu in particular.

It will be remembered that Korofeigu tribe was the first of the Valley's tribes to be contacted by Europeans. The Korofeigu were proud and fierce warriors; in common with other groups they practised selective cannibalism, and female infanticide was a practice among the Bena Bena groups. Contact with Europeans was maintained rather more consistently in the Bena Bena than in the Asaro until European settlement began: there were the prospecting parties, and the patrols from Kainantu, in the early years, and the passage of Europeans through the district made possible during the war by the construction of the road to Kainantu through the territory of Korofeigu and other Bena Bena tribes.

Regardless of this history of contact, however, and of the material changes which have taken place in their way of life, the Bena Bena display a degree of conservatism and adherence to tradition which is without parallel elsewhere in the Valley, and Korofeigu is typical of this phenomenon. This conservatism is exemplified in a number of ways: a greater proportion of the men wear traditional dress, such as might be seen elsewhere only on ceremonial occasions, as everyday apparel; many men still follow the ritual of dressing their hair in long, pig-greased

ringlets, and this includes young men who have reverted to the tradition after their return from coastal employment (where all have their hair shaved as a health measure); although the number who have worked elsewhere, either under the Highlands Labour Scheme or on Highland plantations, is no less than the proportion from the Asaro, the number of Pidgin speakers is less than in these other groups; most men will not leave their clan grounds without carrying their bows and arrows, although such a sight is rare west of Goroka - in fact, I believe it is illegal.

Tradition is adhered to in the retention of men's houses (but this is not exclusive to Korofeigu or the Bena Bena tribes); the initiation rituals at puberty are still carried out zealously, and occasionally in the Bena Bena men are still seen carrying the long lengths of cane which are used for traditional purification rites, although I did not see the canes in other areas.[2] The architectural changes in house design, such as those illustrated in Chapter II at Lapeigu, are rare; in Nupasafa there were separate paths for men and women between the villages; the observance of hygiene and sanitation is rare, compared with Asaro groups.

Attitudes among the Bena Bena people to innovations such as cash cropping, missions, and local government councils, are no less tangible evidences of this conservatism, although the

---

[2] It is significant that at the Goroka Show in 1960, the cane-swallowing rite was demonstrated to Europeans (including women) by a group of Bena Bena men. This rite, which must not be witnessed by native women, was performed inside a darkened hut which was most carefully guarded.

acceptance of material changes occurs somewhat more rapidly. Mention has been made in Chapter IV of the initial failure of the coffee-planting programmes in the Bena Bena. In 1958, Patrol Officer I. Holmes reported that the lower Bena Bena tribes

> ...have virtually withdrawn into a shell with minds centred on the past, and show little interest or cooperation in economic development or Administration plans for their betterment. (Patrol Report, Bena Bena 1957/8.)

Although the Lutheran Mission established a village and a school in Korofeigu several years ago, it seems that the people who have taken up residence in the mission village are either old or curious (which was not the case with Kawonda Village in Fondiwe'i); the majority are not attracted to the mission's principles, which demand that 'sing-sings' and the men's houses shall be abolished.

During 1960, prior to the formation of the Bena Bena Local Government Council, Korofeigu people expressed no apparent interest in the new venture - to sound out attitudes on it I always had to initiate discussion. When a District Officer visited the tribe to give instruction in nominating candidates for the forthcoming elections, there was not a 'quorum' from Benimeto clan, and all those present were unanimous in nominating Koreto'e, a former gibina'a (or 'fight-leader'). Although some enthusiasm was generated during the elections and the first meetings, the way in which Nupasafa, for example, subsequently reacted to the edict concerning new villages (pp.156-7) scarcely suggests a readiness to adopt new ideas.

So far, although the Korofeigu and most Bena Bena tribes have now adopted economic changes, the rate of change generally has been slower than in other parts of the Valley where similar circumstances prevail, and while the rate of change will undoubtedly be accelerated with the maturity of the next generation, it seems safe to predict that these groups will not of their own volition be the protagonists of change.

Over the Valley as a whole, the achievement of a more advanced society is retarded by the comparatively unchanged status of the native women. Women have played very little part in the attainment of such progress as has been made to date - a characteristic of peasant communities throughout the world. In the Goroka Valley very few women or even girls speak Pidgin, very few have ventured far beyond the clans of their birth or residence by marriage, few do much beyond those tasks which were theirs traditionally - tending the gardens, the pigs and the children. Welfare officers and nurses, appointed by the Administration, travel to the villages giving instruction in child care and hygiene, advice on the effective use of foods, and, recently, lessons in sewing and knitting, but they are an insufficient number for the areas to be traversed and the number of native women who should receive such instruction: villages can be visited only infrequently and new ideas cannot be adequately reinforced. It is rare for women to be employed as domestic servants, so that apart from this contact between the native women and the welfare workers there is little or no association between native and European women; there are no

opportunities for social intercourse such as exist for the men, on patrol, on the plantation, or on the sports-fields.

Leaving aside for the moment the purely local scene, there is a widespread ignorance of other countries and races: I did not find one native from the Goroka Valley out of the many hundreds I met who knew, for example, of the existence of Netherlands New Guinea, or that there were coloured races in Australia and elsewhere.[3] This is an extreme example of the widespread lack of knowledge of the outside world which prevails throughout the Pacific. This lack of knowledge is not overcome easily, nor in the short term, but it would seem that in many parts of New Guinea the seeds of such knowledge have not even been sown, let alone begun to germinate.

In essence the evolution of a plural society to the point where there is, if not complete equality, at least mutual co-operation in striving for its achievement, takes place through the economic, political, and social advancement of the under-developed and under-privileged sectors of the community. Political and social advancement can usually only follow from economic advancement, but the setbacks and instability which have accompanied the introduction of a commercial economy in this area indicate that any complete change from the traditional pattern of subsistence will take a considerable time to achieve. Actually it is not certain that it is desirable to make the natives

---

[3] During 1961, however, John Akunai, the Goroka native who is a member of the Highland Farmers and Settlers executive, was brought to Australia for the New Guinea exhibit in Australia's Trade Fair.

fully dependent on cash income: tropical crops generally are not in short supply - many are produced for foreign markets on plantation scale - and it has been difficult not only for New Guinea but for other tropical countries to find products acceptable to world markets which would also improve the economic status of the producing countries. Of the cash crops produced, coffee has been most publicised as the catalyst which will produce a new order out of the old. We have seen that it is a dangerously narrow base for the economy.

All this is not very encouraging: the Goroka Valley is the most highly developed part of the Highlands, and the place where the pace of development has been greatest, and yet this pace has not kept up with the actual rate of change of ideas (which is being encouraged to accelerate even more rapidly with the extension of Councils, the intensified education programme, elections to the Legislative Council, and so on), nor with the desired rate of change of ideas. Possibly this has been due to the lack of men and money - in spite of the energy and enthusiasm of field officers, the resources available to them have had to be spread too widely and too thinly. In effect, the evolution of an integrated plural society in the Goroka Valley is still at the embryonic stage.

Appendix A

SOIL SERIES IN GOROKA VALLEY[1]

Banz

This series occurs on flat to gently undulating alluvial plains, 20-100 ft above river level, on intermediate terraces, on irregular gentle colluvial slopes in sedimentary rock areas and dissected level alluvial deposits, and on mudstone ridges, under a vegetation of grassland (often wet types), and at an altitude of 5,000-5,500 ft.

Short description

Deep (more than 4 ft) light grey but strongly brown mottled very plastic dense heavy clay soils with black to dark grey, friable to plastic clay topsoils (normally 9-22 in. thick), rich to very rich in organic matter.

The field pH is usually 6 in the topsoil, but ranges from 5 to 6.5 in the subsoil.

The soils are very slowly permeable and run-off is low to nil. In seventeen profiles a ground water table was found at a depth ranging from 4 to 38 in. The soils are poorly to very poorly-drained.

Bidnimin

This series occurs, always locally, on gentle to steep backslopes of limestone ridges, on undulating to rolling parts of high-level-alluvial and volcanic deposits (in the latter case always on the outer edge of the deposits, which are finer-textured and older), and on lower crests and basal slopes of sedimentary and metamorphic hills. The vegetation is mostly grassland, locally gardens and regrowth. The altitude is 4,800-7,000 ft, profiles above 6,000 ft having been observed only on limestone.

Short description

Deep (4 ft and more) firm to very firm heavy clay soils with friable clay topsoils (0-12 in. thick), poor to moderately rich in organic matter. The subsoils are usually brown in the upper part and red in the lower part.

---

1 From CSIRO Report 58/1, 29-65.

The field pH is 6-6.5 in the topsoil and decreases usually to 5.5 and even 4.5 in the subsoil. The soils have a moderate permeability. As they occur predominantly on lower grassy slopes, run-off is mostly high, which causes a tendency towards excessive drainage of the soils.

Daulo

This series occurs mostly on intrusive rocks and colluvial and alluvial material derived thereof, and on volcanic tuff and ash. Locally it occurs also on metamorphic rocks, limestone and coarse-textured sedimentary rocks. It is most typically and extensively developed under forest in steep mountainous country between 7,000 and 10,000 ft altitude, but it occurs also below this altitude in association with many other soils, mostly under forest or Miscanthus grassland, but also under regrowth and grassland.

Short description

Deep (4 ft and more) very friable dark brown clay loam to clay soils with strongly variable thickness (but usually 8-20 in.) of very dark brown loam to clay loam topsoil, which is rich to very rich in organic matter.

The field pH is usually 5.5-6.5 in the topsoil, and 6-7 in the subsoil, often decreasing to 5-5.5 below 30-40 in. depth. These soils have a rapid permeability and low run-off under forest, even on very steep slopes. They are well-drained.

Gitunu

This series occurs most frequently, but always locally, on rounded ridges of dissected old high level alluvial deposits and on gravelly rises in the somewhat younger and lower alluvial deposits in the Banz area. It is also locally found on more gentle lower slopes of sedimentary and metamorphic hills. The vegetation is grassland and locally regrowth. The altitude is mostly 5,000-5,500 ft and rarely up to 6,000 ft.

Short description

Deep (4 ft and more), strongly yellow brown, red and often light grey mottled firm to plastic clay to heavy clay soils, with a normally 8-21 in. thick, black to dark grey brown friable clay to clay loam topsoil, high in organic matter.

The soils contain high to very high amounts of red, brown and black hard iron concretions, beginning at a variable depth: from the surface to 19 in. and extending downwards to a depth which varies from 9-42 in. Several profiles, particularly those in the Waghi Valley, also contain considerable amounts of gravel.

The field pH is strongly variable, but usually ranges from 5.5 to 6.5. The permeability probably varies considerably: very gravelly profiles may have rapid to moderate permeability, profiles with compact subsoils only slow permeability. Run-off, too, varies from low to high, depending on slopes. Root development is impeded by the concretion layer. The net result appears to be that the soils are mostly excessively drained.

Kerebiji

This series occurs very locally in small depressions or on wet lower terraces with pure Phragmites or Phragmites-grass mixture. These soils are a kind of swampy colluvial soils.

Short description

Irregular 24->36 in. deep, dark coloured clay to sandy clay loam soils, rich to very rich in organic matter, overlying stony or sandy substrata or weathered rock. Field pH 6-6.5.

The soils are moderately permeable and have ground water tables at depths between the surface and 32 in. They are swampy to moderately drained.

Kerowil

This series occurs, mostly on 2-10° slopes, on almost flat to rolling old high level alluvial deposits, and on rounded low sedimentary hills. The vegetation is grassland, gardens and regrowth and the altitude mostly 5,000-5,500 ft, rarely up to 6,000 ft.

Short description

Deep (more than 4 ft) brown firm and often somewhat plastic heavy clay to clay soils with normally 8-20 in. thick, black to dark brown friable clay topsoils, rich in organic matter. They have a layer, usually 10-20 in. thick and usually beginning at a depth of 5-14 in. below the surface, which contains a high to very high amount of hard to firm black to brown iron concretions.

The field pH is 6-6.5 in the topsoil and decreases gradually to 4.5-5.5 in the deeper subsoil. The soils are moderately permeable and have very low to medium run-off. The layer with concretions appears to have a disrupting effect on the growth of roots and the movement of water in the soil. As a result of this and depending on the intensity of the concretion layer and the thickness of topsoil above it, the soils are slightly to distinctly excessively drained.

Kuli

These are typical soils of the low river terraces, approximately 10 ft above river level, but also occur widespread on colluvially disturbed dissection slopes of old high level alluvial deposits. The vegetation is grassland (often wet type) and locally gardens. The altitude is 5,000-5,500 ft.

Short description

More than 4 ft deep, light grey to dark grey, or blue grey, strongly brown mottled firm to plastic clay to sandy clay soils with normally 12-23 in. thick, black to very dark grey, often brown mottled friable to firm clay loam to clay topsoils, rich in organic matter. The subsoil may also be gravelly clay or sandy clay loam.

The field pH is usually 5.5-6 in the topsoil and 6-6.5 in the subsoil. The soils are moderately permeable. Run-off is very low to nil. The soils are poorly to very poorly-drained. A ground water table was found in eight profiles, at depths ranging from 16 to 40 in. (usually 30-40 in.).

Lithosols

These are residual soils with less than 12 in. of soil material overlying more or less weathered dense parent rock. The soils are mostly poor in organic matter, have a high run-off and are excessively drained. Shallow black soils on limestone are excluded from this group. Lithosols are most common on the Iliwochi and Limisate Hills south and south-east of Goroka, in a rather dry area. They occur also in all other hilly and mountainous areas, where they are virtually confined to the lower spurs and foothills.

Minj

This series occurs mostly on flat to gently undulating surfaces and surface remnants of old high-level alluvial fans, and locally in flat low areas of volcanic ash deposits. The vegetation is grassland, gardens and regrowth, and the altitude 4,800-5,300 ft.

Short description

Deep (more than 4 ft) soils with a normally 10-20 in. thick, black topsoil, very high in organic matter, overlying a normally 12-22 in. thick, very light grey, red and brown mottled layer of plastic, glazy heavy clay, which merges very gradually at a depth between 22 and 44 in. into a brown firm to friable clay subsoil. A 9-23 in. thick layer with high to very high amounts of black, brown and red iron concretions begins in the lower part of the topsoil (at a depth between 4-22 in.) and continues in the upper part of the light grey plastic clay layer.

The field pH is usually 6-6.5 in the topsoil and light grey plastic clay layer, and 4.5-5.5 in the brown subsoil.

The permeability is slow, because of the compactness of the plastic clay layer (the topsoil has a rapid, the deeper subsoil a moderate, permeability). Surface run-off is nil to very low, but lateral movement of water over the plastic clay layer is probably considerable. The combination of these features, combined with the serious obstruction of root penetration offered by the concretionary and compact horizons, tends to make these soils poorly to very poorly drained in wet periods and more or less excessively drained in dry periods.

Mombol

This series occurs on flat to gently undulating lower parts (probably younger or wetter or both) of the intermediate level alluvial deposits, on colluvial slopes associated with sedimentary rocks and old alluvial deposits, on wide or narrow drainage swamps and in some wide low parts of the low level alluvial deposits. The vegetation is wet grassland or Phragmites and locally gardens. The altitude is 5,000-5,500 ft.

Short description

Deep (more than 4 ft) grey, strongly brown mottled, very plastic heavy clay soils with normally 11-22 in. thick, black to very dark grey friable to firm and plastic clay topsoils, high to very high in organic matter.

The field pH is 6-6.5 throughout the profile, mostly 6 in the topsoil and mostly 6.5 in the subsoil.

The soils are slowly permeable and run-off is nil to very low. In thirteen profiles a ground water table was found, ranging in depth from very close to the surface to 35 in. below the surface. The soils are mostly poorly to very poorly drained and locally even swampy.

Ogelbeng

This series has a very wide distribution, but it is strongly dominant only on flat to steep hilly topography of volcanic ash deposits at an altitude of 5,000-7,500 ft. It also occurs frequently on the little dissected upper parts of old high-level alluvial fan surfaces and is a component of the very complex soil pattern of nearly all mountainous and hilly areas, usually between 5,500 and 8,000 ft altitude, but locally on broader crests up to 9,500 ft. In these areas it is most common on intrusive rocks and coarse-textured metamorphic and sedimentary rocks, and does not occur at all on mudstones. It occurs under a wide range of vegetation, mostly under Miscanthus grassland and forest, but also often under gardens and regrowth and grassland.

Short description

Deep (4 ft and more) friable bright brown clay to clay loam soils with strongly variable thickness (normally 6-15 in.) of black to dark brown clay loam to loam topsoil, rich in organic matter. Thick topsoils are most common in relatively flat areas and on mountain slopes, under or close to forest.

The field pH is usually 5-6.5 and normally lowest in the deeper subsoil. The soils are moderately to rapidly permeable. Run-off is normally low but may be rather high in grassy slopes. The soils are well-drained.

Dark Subsoil Variety. - These soils are similar, but have a dark brown layer in the deeper subsoil and usually poorly-developed topsoils.

Pale Subsoil Variety. - These soils are similar, but have pale, light yellow brown and often slightly mottled subsoils and deep (12-26 in.) dark topsoils. They are slightly less well-drained than the normal profiles.

Omahaiga

This series occurs widespread on intermediate level alluvial terraces, in depressions in, and on small remnants of, old high alluvial surfaces (which suggests that such remnants often represent depressions of the original land surface), and on gentle basal slopes of sedimentary hills and dissected old high-level alluvial deposits. The vegetation is gardens and regrowth and grassland of different types. The altitude is 5,000-5,500 ft.

Short description

More than 4 ft deep, light grey, plastic clay to heavy clay soils, with normally 10-22 in. thick, black to very dark grey friable clay to clay loam topsoils, rich in organic matter.

The soils contain a normally 7-20 in. thick layer with many to very many hard black and brown iron concretions, beginning at a depth ranging from 6 to 20 in. below the surface.

The field pH is usually 6-6.5 throughout the profile, but may decrease to 5.5 and even to 4.5 in the subsoil. As a result of differences in the structure of the subsoils and in the distribution of concretions, the permeability appears to vary from slow to moderate. Run-off is low to very low. Water tables between 11 and 34 in. depth were observed in six profiles. The soils are poorly-drained.

Ombun

This series consists exclusively of residual soils, developed on fine-textured sedimentary rocks, and is most prevalent on lower moderately steep slopes and crests. It always occurs as a component of an extremely complex soil pattern at an altitude between 5,000 and 7,000 ft. The vegetation is mainly grassland and locally forest.

Short description

These are usually more than 4 ft deep, red, brown and grey mottled firm to plastic clay to heavy clay soils with a normally 4-16 in. thick, very dark grey brown to brown friable clay loam to clay topsoil, moderately rich to poor in organic matter.

The field pH is 6-6.5 in the topsoil and usually 4.5-6 in the subsoil, mostly decreasing with depth.

The soils are slowly permeable and have usually high run-off. They are generally excessively drained, but locally, in moist positions such as at the foot of the slopes, they are moderately drained.

Pompameiri

These are mostly residual soils of mountain areas between 7,000 and 12,000 ft, and developed on intrusive and volcanic rocks, under a vegetation of forest and rarely alpine grassland. The series includes also soils which have developed very locally on intermediate river terraces in the upper reaches of the Kaugel, Chimbu and Asaro Rivers, and on colluvial slopes with material derived from intrusive rocks.

Short description

Moderately deep to deep (3 ft and more) brown very friable sandy clay loam soils with a strongly variable thickness (mostly 6-20 in.) of dark brown very friable loam to clay loam topsoil, rich in organic matter.

The field pH is 6-6.5 and often 5-5.5 below 40 in. depth. The soils are rapidly permeable. Run-off is low to very low and the soils are well-drained.

Singa

This series is an important or minor component of the soil pattern of many mountainous and hilly areas, old colluvial slopes and old high-level alluvial fans. It occurs on a great variety of parent materials, both consolidated rocks and alluvial deposits, but it does not occur on mudstone. The distribution

is very patchy and the soils are often confined to crests of ridges. The vegetation is mostly grassland, gardens and regrowth, sporadically forest. The series occurs between 5,000 and 6,500 ft altitude.

Short description

Deep (4 ft and more) firm to very firm strong brown heavy clay soils with normally 8-15 in. thick black to dark brown friable clay topsoils, high in organic matter. On grassy hills the topsoil is very locally removed by erosion.

The field pH is 6-6.5 in the topsoil and 4.5-5.5 in the subsoil, but in a few cases 6-6.5 throughout the profile.

The soils appear to have a moderate permeability. Run-off varies greatly with slope and vegetation, being high on grassland slopes and low on forested slopes and flatter areas. The soils are well-drained, but tend to become excessively drained on grassland hills.

Slope Soils (Brown)

These soils are very common on steep to very steep slopes of metamorphic and sedimentary rocks (least on mudstones). They form a major component of the intricate soil pattern in such areas. The vegetation is grassland, forest or gardens and regrowth. The altitude is 5,000-9,000 ft, but they are most common in the lower part of this range.

Short description

These are usually 3 ft to more than 4 ft deep soils, overlying strongly fragmented shale and siltstone. The profiles are irregular, both as a group and as individuals, with the texture varying from sandy clay loam to heavy clay (usually silty clay or clay) and with patchy brown to brown yellow colours. Varying amounts of weathered rock fragments are usually present in layers or increasing with depth. The topsoil (usually 5-13 in. thick) is moderately rich in organic matter, but in several cases it is completely or nearly completely removed by erosion.

The field pH is 5.5-6.5 in the topsoil and 4.5-6.5 in the subsoil. The soils are mostly moderately permeable and have moderate to high run-off. They are well to excessively drained.

Slope Soils (Mottled)

These soils occur only very locally on moderate slopes on metamorphic and sedimentary rocks and on dissection slopes in

stratified old alluvial deposits. They occur in seepage hollows in folds of the terrain, but, oddly enough, also on colluvial material on small sloping spurs. This can be explained by assuming that these spurs were once folds in the terrain in an earlier stage of slope development. The relief on these slopes is determined more by soil movement and land slides than by gully dissection and what once was a seepage hollow can become a spur, when the rises on both sides collapse in land slides. The vegetation is grassland (often wet types), or forest. The altitude is 5,000-7,000 ft.

Short description

These are usually rather shallow (30-40 in.) irregular soils, in which a normally 4-10 in. thick, (very) dark grey brown firm clay topsoil, poor to moderately rich in organic matter, overlies a 10-26 in. thick, very firm to very plastic grey and brown mottled clay to heavy clay layer, which merges into a brown firm to plastic sandy clay to clay subsoil with weathered rock fragments, which merges into weathered sand or siltstone.

The field pH is 5.5-6 in the topsoil, 5-6.5 in the subsoil. The soils are slowly permeable and have high run-off. They are poorly drained but at the same time droughty in dry spells.

Slope Soils (Sandy)

These soils occur most commonly on intrusive rocks and locally on sandstones, on very steep slopes with a stunted forest vegetation or gardens and regrowth. But they occur also on gravelly colluvial material of various types, on gentle to very steep slopes with a vegetation of grassland, gardens and regrowth, or alpine shrubbery. The altitude ranges from 5,000 to 11,000 ft.

Short description

These are deep (3 to more than 4 ft) yellow brown soils with a texture of either gravelly clay loam or layers of sandy clay loam to loamy sand. The 3-15 in. thick, dark brown friable clay loam topsoil is poor to moderately rich in organic matter, but is completely lacking in some profiles due to erosion. The field pH is 6 in the topsoil, 5-6 in the subsoil.

The soils are mostly rapidly permeable and have low run-off. They are well to excessively-drained.

Appendix B

CASE HISTORY OF A NATIVE LAND DISPUTE[1]

This case concerns an area of land lying between the Koreipa and Jamejuha tribes. The numerically stronger Koreipa are hereditary enemies of the Jamejuha and during the period of tribal warfare they compelled the latter to seek refuge with the Asaro. Two clans of the Jamejuha, Hanepoka and Mapanuharoka, are at present living with the Asaro. The third, Finanuparo've, live in the hills in close proximity to the Koreipa.

Since the cessation of tribal hostilities both the Koreipa and the Jamejuha have been extending gradually into the no-man's area which separated them. The exiled clans of the latter tribe claim that all this area belongs to them and that they were dispossessed by the Koreipa. The Koreipa, on the other hand, claim that the land belongs to them and they are able to point to a number of Koreipa gardens situated within the tract claimed by the Jamejuha.

Trouble arose over this same portion of territory in 1950, when the Koreipa sold part of it and managed to have themselves declared the sole owners. On that occasion a fight broke out, the Jamejuha being supported by the Asaro. As a result, over 100 individuals of both sides spent a term in gaol at Goroka.

The Jamejuha regarded this as a defeat and they were determined to even the score with the Koreipa. Meanwhile, however, the Koreipa decided to offer for sale a second area situated within the same disputed locality. This increased the anger of some members of the Jamejuha, for not only had their enemies been successful in the first manoeuvre but they were also preparing to repeat the performance. The Jamejuha accordingly decided that they would not only contest the claim of the Koreipa to this second area, but they would also repay the Koreipa in kind, by themselves offering a third section of the disputed locality for sale. In order to make things as difficult as possible for the Koreipa they decided, moreover, to mark out an area where the Koreipa were making new gardens. This was a deliberately calculated blow aimed at the Koreipa where the Jamejuha thought it would hurt them most. It must be noted also that the European for whom this third area was

---

1 Quoted from K.E. Read, unpublished notes 1952.

intended was not consulted in the matter. The Jamejuha made no attempt to discover his wishes. Their sole consideration seems to have been to even the score with their enemies, and if they could do this by asserting their ownership of land which the Koreipa were actually using or intended to use, then so much the better.

Probably the Jamejuha said nothing of their intentions to the Koreipa, deciding to act when the time came, which was in July 1952 when a patrol went out from Goroka to survey and purchase the second block of land, that which had been put up for sale by the Koreipa. By then the Koreipa had begun to make gardens on the land which the Jamejuha had decided to sell, but if anything this suited the plans of the latter group. The day before the Assistant District Officer was due to arrive they simply went round these gardens tying ropes of kunai grass to the newly erected fence posts, thus indicating to the Koreipa cultivators that their title was not recognised. They then asked the Government Official to survey the area and purchase it from them. No application, however, had been made by a European for this area and the Assistant District Officer told them he would not take any action. The Jamejuha then expressed the view that they were the sole and rightful owners of the block he had come to survey and purchase and they attempted to have the Koreipa excluded from the transaction.

During the investigation conducted on the spot by the Assistant District Officer it was apparent that strongest opposition to the Koreipa claims came from the representative of the Jamejuha clans Hanepoka and Mapanuharoka, the two groups residing with the Asaro. These people asserted that the Koreipa had no claim to the area in question. They pointed out with some heat that the larger Koreipa may have been able to defeat the small Jamejuha in the past but they could do so no longer. There could be no more fighting, they said, therefore the Jamejuha were as good as the Koreipa and could stand up for themselves. The Koreipa may have pushed them around in the past but the Jamejuha would claim their rights.

Eventually, however, the representative of the third Jamejuha clan Finanuparo've, asked his opinion as to the merits of the Jamejuha claim. This man was far less certain than his companions. Indeed, his attitude to the Koreipa was markedly conciliatory. He remarked in a tentative way that while it was true that the Koreipa had ousted the Jamejuha the Koreipa, nevertheless, had gardens on the area. 'If they are not included as part owners' he said 'their bellies will be hot and a fight will arise. It is better to put their names in too. It is their ground. It is ground of Koreipa.'

This division of opinion among the Jamejuha is understandable when the position of the Finanuparo've clan is taken into consideration. It will be remembered that of the three Jamejuha clans Finanuparo've alone had remained in the hills living in close proximity to the Koreipa with whom they had of necessity

to maintain friendship. Any action which the Koreipa were likely to take if the remaining Jamejuha clans were successful in having them excluded from ownership would in all probability fall most heavily on the Finanuparo've. The Hanepoka and the Mapanuharoka lived some distance from the Koreipa. In addition, they were surrounded by their friends the Asaro. The Finanuparo've, on the other hand, living next door to the large Koreipa group, had every reason for wishing to remain on friendly terms with them.

The decision of the Assistant District Officer went against the representatives of the Hanepoka and Mapanuharoka. Finanuparo've and Koreipa were registered as the owners of the land and as such received payment for it.

This decision, taking into consideration all the conflicting evidence, was undoubtedly a just one, or at least the most satisfactory one that could be made. The Hanepoka and the Mapanuharoka would normally share in the distribution of the money received by Finanuparo've, and as the Jamejuha are much smaller numerically it is likely that they would receive more per head than the Koreipa. It must be noted, however, that the 'defeated' Hanepoka and Mapanuharoka went away determined to hit back at the Koreipa again, and swearing that Finanuparo've had merely been afraid to support them. It is likely that the matter has not ended there. The Hanepoka and the Mapanuharoka will want to avenge themselves on the Koreipa, and there is still the piece of land which they had decided to sell solely for this purpose.

BIBLIOGRAPHY

Published Material

BARRIE, J.W., 1956, 'Coffee in the Highlands', Papua and New Guinea Agricultural Journal, 11 (1), 1-29.

BOWMAN, R.G., 1946, 'Army Farms in the Southwest Pacific', Geographical Review, 36, 420-46.

BROWN, P., 1960, 'Chimbu Tribes: Political Organisation in the Eastern Highlands of New Guinea', Southwestern Journal of Anthropology, 16, 22-35.

CHINNERY, E.W.P., 1934a, 'Mountain Tribes of the Mandated Territory of New Guinea from Mount Chapman to Mount Hagen', Man, 34 (140), 113-21.

- 1934b, 'The Central Ranges of the Mandated Territory of New Guinea from Mount Chapman to Mount Hagen', Geographical Journal, 84 (5), 398-412.

Coffee Industry of Papua-New Guinea, The, 1961, Bureau of Agricultural Economics, Canberra.

CSIRO REPORT, 1958, 'Lands of the Goroka-Mt Hagen Area, New Guinea', Division of Land Research and Regional Survey, Canberra, Divisional Report 58/1.

CURRY, L. and ARMSTRONG, R.W., 1959, 'Atmospheric Circulation of the Tropical Pacific Ocean', Geografiska Annaler, 41, 245-55.

DETZNER, H., 1921, Vier Jahre Unter Kannibalen, Berlin.

FISHER, N.H., 1944, 'Outline of the Geology of the Morobe Goldfields', Proc. Royal Society, Queensland, 55, 51-8.

HIGHLANDS QUARTERLY BULLETIN, 1961, Journal of the Highland Farmers and Settlers Association, New Guinea, 2 (2).

KARIKS, J. et al., 1960, 'A Study of some Physical Characteristics of the Goroka Natives, New Guinea', Oceania, 30 (3), 225-36.

KINGSTON, J., 1960, 'The Physical Processes Involved in Subsistence Agriculture and the Necessity Therefor', Proc. 3rd UNESCO Symposium on Humid Tropics, New Guinea. In Press.

LEAHY, M., 1936, 'The Central Highlands of New Guinea', Geographical Journal, 87, 229-67.

LEAHY, M. and CRAIN, M., 1937, The Land That Time Forgot, London.

MACKINTOSH, N.W.G. et al., 1958, 'The Blood Groups of the Native Inhabitants of the Western Highlands, New Guinea', Oceania, 28 (3), 173-98.

MASSAL, E. and BARRAU, J., 1956, 'Food Plants of the South Sea Islands', South Pacific Commission Technical Paper, no.94, Noumea.

McMILLAN, N.J. and MALONE, E.J., 1960, The Geology of the Eastern Central Highlands of New Guinea, Bureau of Mineral Resources, Canberra, Report no.48.

NEW GUINEA ANNUAL REPORTS, 1933-4, Dept of Territories, Canberra.

POSPICIL, L., 1958, Kapauku Papuans and their Law, Yale Publications in Anthropology, 54.

RICKWOOD, F.K., 1955, 'The Geology of the Western Highlands of New Guinea', Journal of the Geological Society of Australia, 2, 63-82.

READ, K.E. 1951a, 'The Gahuku-Gama of the Central Highlands', South Pacific, 5 (8), 154-64.

- 1951b, 'Development Projects in the Central Highlands of New Guinea', South Pacific, 5 (10), 202-7.

- 1952a, 'Missionary Activities and Social Change in the Central Highlands of Papua and New Guinea', South Pacific, 5 (11), 229-38.

- 1952b, 'Land in the Central Highlands', South Pacific, 6 (7), 440-49.

- 1952c, 'Nama Cult of the Central Highlands, New Guinea', Oceania, 23 (1), 1-25.

- 1954a, 'Cultures of the Central Highlands New Guinea', Southwestern Journal of Anthropology, 10 (1), 1-43.

- 1954b, 'Marriage among the Gahuku-Gama of the Eastern Central Highlands, New Guinea', South Pacific, 7 (10), 864-70.

- 1955, 'Morality and the Concept of Person among the Gahuku-Gama, Eastern Highlands, New Guinea', Oceania, 25 (4), 233-82.

ROBBINS, R.G., 1958, 'Vegetation of the Goroka-Mt Hagen Area, New Guinea', Division of Land Research and Regional Survey, Canberra, Divisional Report 58/1.

- 1960, 'The Anthropogenic Grasslands of New Guinea', Proc. 3rd UNESCO Symposium on Humid Tropics, New Guinea. In Press.

- 1961, 'Correlations of Plant Patterns and Population Migration into the Australian New Guinea Highlands', Proc. Tenth Pacific Science Congress, Hawaii. In Press.

SCHINDLER, O., 1959, 'Pyrethrum in the Highlands of New Guinea', Papua and New Guinea Agricultural Journal, 12 (1), 1-8.

SCHMIDT, F.H. and FERGUSON, J.A., 1951, 'Rainfall Types based on Wet and Dry Period Ratios for Indonesia and Western New Guinea', Kementerian Perhubungan Djawatan Meteorologi dan Geofisik, Verhand, 49, Djakarta.

WATTS, I.E.M., 1955, Equatorial Weather, London.

WILKES, J. (Ed.), 1958, New Guinea and Australia, Australian Inst. of Political Science, Sydney.

WURM, S.A., 1960, 'The Changing Linguistic Picture of New Guinea', Oceania, 31 (4), 121-36.

- 1961, 'The Linguistic Situation in the Highlands Districts of Papua-New Guinea', Australian Territories, 1 (2), 14-23.

Unpublished Material

BATES, Patrol Officer, 1933, Patrol Report 25, District of Morobe, Dept of Territories, Canberra.

BLACK, J., Patrol Officer, 1934, Patrol Report B16, District of Morobe, Dept of Territories, Canberra.

BROOKFIELD, H.C., 1958, 'Labour Recruitment and Migration in New Guinea', Dept of Geography, Australian National University, Canberra.

BULMER, S., 1960, 'Report on Archaeological Field Work in the New Guinea Highlands', Dept of Anthropology, University of Auckland.

CARNE, R.S., 1956, 'Problems in the Introduction of Perennial Crops to Native Agriculture', Dept of Agriculture, Stocks and Fisheries, Port Moresby.

HOLMES, I., Patrol Officer, 1958, Patrol Report, Bena Bena, Eastern Highlands District, Dept of Native Affairs, Goroka.

LEAHY, M., 1930-34, Diaries, National Library, Canberra.

MONTGOMERY, I., 1959, Agricultural Patrol Report, Bena Bena, Dept of Agriculture, Stocks and Fisheries, Goroka.

NOAKES, L.C., 1939, 'Geological Report on the Chimbu-Mt Hagen Area, New Guinea', Bureau of Mineral Resources, Canberra.

WURM, S.A., 1957, 'Preliminary Report on the Languages of the Eastern, Western and Southern Highlands of Papua-New Guinea', Dept of Anthropology, Australian National University, Canberra.

- 1959, 'Grouping of the Languages in the Highlands Districts of the Territory of Papua and New Guinea', Paper read to ANZAAS Congress, Perth, W.A.