WORKING PAPER 535

PEOPLE AND LAND: RESOURCE USE IN HOUSEHOLD LIVELIHOOD STRATEGIES IN RORO AND PAITANA VILLAGES IN PAPUA NEW GUINEA

DAVID A. PRESTON

February 1990

People and land: resource use in household livelihood strategies in Roro and Paitana villages in Papua New Guinea

1. INTRODUCTION

People in rural areas who live by farming, hunting, food-gathering and fishing are subject to pressure to change the mix of activities in which they engage. These pressures originate from within the household as its age and develop new wants and from without as production of different commodities varies according to the season and the weather and as the prices of goods purchased and sold by such people varies in response to national and world economic changes. In this paper we are concerned with the identification of broad patterns of changes that affect rural households and the extent to which these changes alter the importance of the use of local environmental resources in overall household livelihood strategies.

This is part of a programme of research which includes field work in rural communities in the Andes of South America, the Cordillera of Luzon, central Java and coastal Papua New Guinea. This series of case studies is intended to stimulate the development of meaningful generalisations concerning the process of social and economic change as it is experienced by rural people. Because a primary focus of this research is the relationship between natural resources and human use strategies it is appropriate that each case study be located in a different cultural and environmental situation in order to identify whether different cultural and environmental situations generate distinct use of resources. The Roro/ Paitana cultural zone in northern Central Province of Papua New Guinea is an area of low population density (perhaps 22 ha cultivable land per household in the main group of gardens) with ample land and water resources (fish and crustaceans) and where contact with the world-economy has barely existed for 50 years now connected to the capital by a highway but where environmental hazards (river course changes and droughts) cause fluctuations in the production of garden crops. This case study follows previous, related field work in two highland areas in central Luzon where major interaction with the world-economy has occurred during the past 70 years and where livelihoods are based on production from mountainside swiddens and pondfield terraces for rice, sweet potatoes and vegetables. Comparable fieldwork was also carried out in an area on the western fringes of the eastern mountain range of the Andes in northern Ecuador where settled areas include dry hillsides and terraces needing irrigation and better-watered but more isolated mountainsides.

The first objective of the research in Papua New Guinea was to identify the extent to which environmental changes have an impact on the evolution of household livelihood strategies. We studied how people attempted to overcome specific environmental problems, such as drought, flooding, salinization or soil depletion, and the long-term effects of such environmental problems on

the use made of different resources and on people's attitudes to farming, fishing or crabbing in comparision with other ways of making a living.

The second objective was to identify the role of farming, fishing and crabbing in the overall livelihood strategies of people living in rural areas and the changes in the relative importance of these activities since the end of the Second World War. In particular, we examined the extent to which these changes reflect the greater incorporation of households into the larger national and international economic and cultural systems.

The third objective was to identify changes in the roles of men and women, adults and children with respect to their contribution to the household livelihood strategy and to see whether such changes have resulted in or are a consequence of different uses being made of available natural resources. For instance, if many young people are absent at school or working in urban areas, how do households compensate for the loss of their labour or, how do households use the money or goods that migrants send back?

2. ORGANISATIONAL FRAMEWORK

2.1 Theory

We seek to locate this analysis in the context of two groups of social science scholarly activity. On the one hand anthropological and geographical human ecology which seeks to understand elements of the interaction between people and the environment which affords them the means to subsist; and on the other hand political economy which stresses the extent to which small-scale social and economic activity is dominated by national and world economic processes. The former tradition focusses on micro-level interaction between people depending largely for their subsistence on the use of the natural environment (farming, fishing, hunting, food-gathering) and 'gives rise to a more informed and accurate understanding of the structure and articulation of social relations and systems' and the 'formulation of statements relating to those functional relationships associated with environmental interchanges' (Ellen, 1982 275).

The latter tradition focusses on the structures of power that exist in the world economy and the ways in which those power relations are manifested at a national and local level. In the capitalist world this implies a focus on the means by which surplus production is engineered and acquired and the processes of social and cultural control that reinforce the means by which surpluses are generated and a demand for new goods stimulated.

We are specifically concerned in the study on which this paper reports, with populations living in rural areas who obtain a large part of the goods that they need to live by using natural resources to which they have access. We are concerned with the dynamic view of how households provide for themselves both as

their needs change as their members progress through different stages of the life cycle and as their moral economy (to use Scott's phrase [Scott, 1976,3]) evolves in a way which allows them to accept new ways of generating a surplus without surrendering too much of their traditional values and practices and thereby exposing themselves to regional ridicule and general anomie. We concentrate our attention therefore on the ways in which households balance their response to stimuli from superordinate economic, political and cultural structures with those from the range of resources to which they have access for ways of making a living. We can thereby blend an awareness of the complexity of the people-natural environment relationship within our awareness of the similar importance of a larger scale structure.

The specific context in which this paper is located is the examination of the processes of change in livelihood strategies in areas where there has been pronounced environmental stress, as a result of volcanic eruptions destroying farmland or irrigation systems, soil degradation, drought or excessive rainfall for instance, in order to determine whether such stresses induce changes that diminish the overall importance of the use of local natural resources in household livelihood strategies. We are also concerned with changes in the contribution of members of households to their unit's overall strategy according to their gender and age.

Our previous work in Andean America and in the Philippines has suggested that household livelihood strategies may be altering in such a way as to decrease the relative importance of farming and, in terms of the patterns of resource use, to concentrate activity in those areas most capable of producing a marketable surplus. The widely-observed general tendency in Third World farming systems to increase the proportion of production that is sold is also evident in the previous case studies. In related work in an ecologically diversified area in northern Ecuador (Preston 1990) we found an intensification of farming in areas formerly part of large estates, the abandonment of steeply-sloping eroded land but a variety of other adaptions to soil environment. In two areas of highland Luzon we found concentration of farming activity on pondfield terraces at the expense of hillside swidden plots and, in one area, increasing importance in household livelihoods to wood-carving and weaving at the expense of farming (Preston, 1989, Eder 1982).

These examples of changes that may be common to many rural populations indicates an increasing orientation of household effort towards the production of goods for money and a reassessment of the use of different categories of land. The analysis of these changes cannot be undertaken solely on the basis of an examination of the characteristics of the physical environment nor of the economic and cultural organisation of production as a classic human ecological focus would imply (cf. Rappaport 1968, Grossman 1984). Even if we accept the view that 'environment and culture are <u>intrinsically</u> and deeply interrelated, and that social and environmental processes affect each other in fundamen-

tal ways' (Hutterer 1985, 70), it is inadequate to examine the impact of commercialisation on a predominately rural society without accepting the importance of larger (national and global) economic and cultural systems that actively seek to promote the increasing role of capital/money in such societies. A rural household acquires clothing and tinned fish from a village or town shop rather than manufacturing the cloth or raising the fish because, firstly, the accumulation of the capital to purchase these items is less time-consuming or costly than producing them locally, and secondly because manufactured clothes and tinned fish are now culturally more acceptable than formerly. While the analysis of one factor is clearly in the realm of the local and national economy, the other is related to local and national cultural systems.

The theoretical stance of this paper is summarised in a highly simplified diagram (Fig. 1) which seeks to portray the main interrelations between the elements that comprise the people-environment paradigm and the spheres with which future interaction takes place (culture and economy) which are conceived as operating at different geographical levels - the locality, region, state and world which themselves interact with one another.

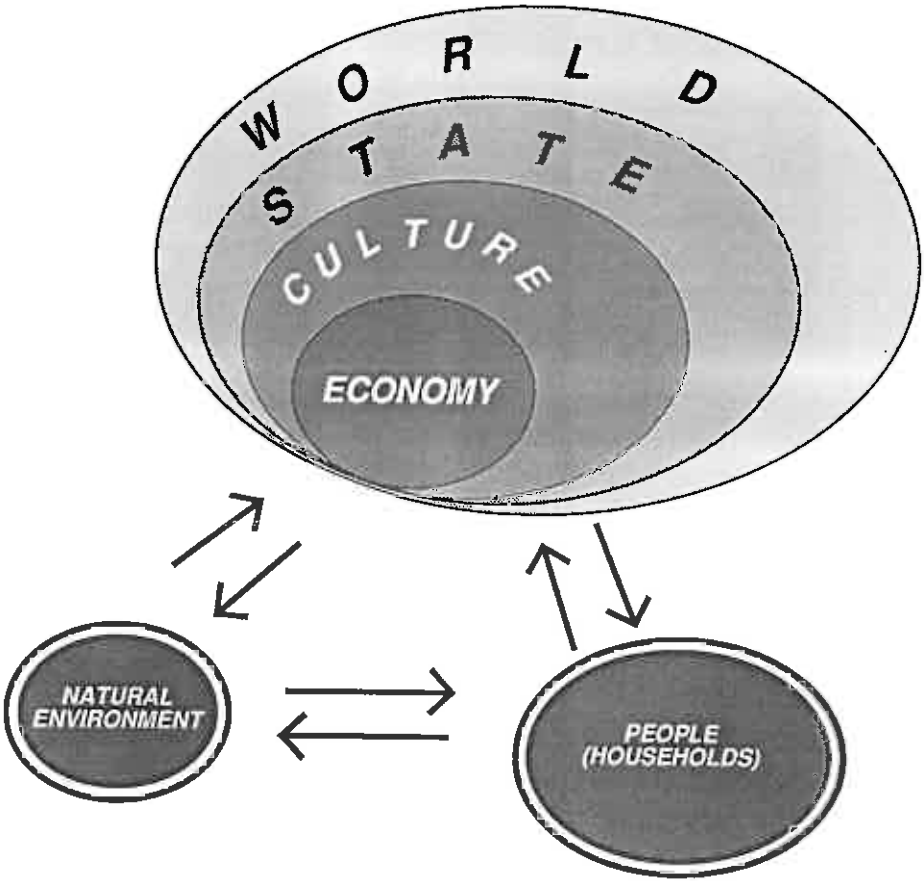

Figure 1

2.2 The context of Papua New Guinea.

Papua New Guinea provides a marked contrast to the Philippines and Ecuador when previous related work has been carried out and is culturally and historically very different from Indonesia with which it shares a border. The densely populated highlands were not effectively incorporated into any colonial orbit until the late 1940s although the northern coast and islands were exploited by Germany in the 19th century. Moreover colonial rule had less of an impact on highland and Papuan coastal areas than it did in those areas where plantations were introduced.

Important changes in livelihood strategies in Papua New Guinea have been most extensively documented for the Highlands and one such recent study by Bourke has summarised overall changes and the detailed sequence of changes since the Second World War in an area in the Eastern Highlands (Bourke, 1983 In press) while Brookfield has likewise described 20 years of change in one area of Simbu Province (Brookfield 1973). The general acceptance of cash cropping on the basis either of coffee or vegetables has altered the location of mixed gardens which have tended to be located peripherally to the central areas where coffee and associated crops are grown. In the example described by Bourke poor maintenance of pig fences and vandalism - consequences of the concentration of effort on cash-cropping but also general malaise and the increasing unemployment of young village men - resulted in village gardens being abandoned in the low-lying basin and relocated well away from pigs and upslope in forest and scrubland (Bourke, In press).

At the same time an increasing use of imported food, principally rice, sugar, flour and even tinned food, has been reported (Bourke 1983) as rural people become more involved in the cash economy. This involves both an increase in small-scale commercial activity in villages and in travel to local town markets where produce can be sold and necessary staples purchased. Short-term migration for wage labour also has become increasingly important for men. Brookfield writing in the late 1960s, characterised change in Mintima, Simbu as a 'partial acceptance of modern innovation into a continuing system whose essential variables have not been transformed' (Brookfield 1973). If by the 1980s in the Highlands, dependence on imported food and on purchased foodstuffs had increased as much as Bourke has described, it may now be argued that, while environmental use has not fundamentally altered, the household livelihood strategies have been transformed as the proportionate importance of women's work in gardens increases and male involvement with both cash crops and off-village labour becomes a fundamental component of household livelihood strategies.

Prior to European contact the peoples of coastal central Papua had developed a high degree of symbiosis with regular trading both along the coast to the north-west and the south-east where sago, pots, canoe logs, ornamental shells and garden produce were exchanged (Allen 1977, Monsell-Davis 1981). Trade also

took place between coastal people and those further inland, both with those like the Mekeo with fertile gardens and also with mountain and mountain fringe people such as Kuni or Goilala. Prehistoric human ecology thus implied considerable inter-regional trade which continued until the second quarter of the present century.

The Roro/Paitana people occupy Rabao (Yule Island) and the adjacent coastal areas and oral tradition records that they formerly inhabited areas further inland and to the north (Fig.2). They speak different dialects of the same language and, while Roro people inhabit the coastal villages of Pinupaka, Tsiria, Delena, and Poukama, the Paitana live further inland and occupy the villages of Mou, Rapa, Babiko and Bioto. The Roro-speaking people recognise a more important cultural division between Roro/Paitana people and Waima/Kivori. The villages of the latter group lie westward north of Bereina and a group of villages south of Rabao, including Nabaupaka and Hsiu. The Roro and Paitana areas of the Papuan coast were contacted by European evangelists during the 1880s, both Catholics from Europe and Protestants from the London Missionary Society's outposts in Tonga. Neither missionaries nor the eventual colonial civil administration seems to have been successful in transforming economic or social life other than by suppressing inter-village fighting and by relatively mild forms of tribute or taxation until after 1919, although the LMS, in particular, sought to suppress dancing and alter female roles. After that taxes were demanded in such a way as to stimulate either wage labour - in the case of Paitana/Roro people in coconut plantations - or the production of crops that could be sold (Stephen 1974, chap. 3). Roro and Paitana did not grow rice to the same extent as the Mekeo further east among whom rice growing had been encouraged by Catholic missionaries from Rabao (Yule Island). The Catholic Sacred Heart missionaries became the only group concerned with the Roro/ Paitana and Mekeo and the London Missionary Society was important in the Waima/Kivori villages but only retained exclusive control in Delena which was its regional headquarters (Monsell-Davis 1981). Most intensive interaction was with Mekeo rather than Roro and Paitana who were felt by both missionaries and colonial administrators to be relatively "difficult and frustrating people" (ADO 1961). This may explain why Rapa people did not grow rice or engage in commercial activity as early as or on the same scale as the Mekeo where mission outstations were established in 1890. After 1945 company stores were opened on Rabao (Yule Island) which bought local produce. By this time, travel by sea to Port Moresby had become more common and the town was used as a regular outlet where produce - in particular betel nuts and pepper fruit - was sold and where a number of young people easily obtained short periods of employment. The road to Port Moresby from Bereina (and Rapa) was not completed until 1974 after which travel was easier and faster although not less costly. The completion of the road is not engraved in village consciousness as a major event and from field work to date there is little evidence to show that more frequent travel to Port Moresby resulted in major village economic changes.

Although this area was only economically and geographically on the margins of the colonial system, people's ways of making a living did include increasing use of money but still the largest volume of trade was through barter in local markets. Hau'ofa attributes this high degree of cultural continuity among the Mekeo to the benign attitude of the Catholic missionaries to local customs in comparison with Protestants (Hau'ofa 1981). This, together with the abundance of natural resources, may explain the strength of traditional resource uses in regional livelihood strategies. The environmental resources used by Roro and Paitana people included gardens on the river flood plain, fishing and crabbing in the mangroves and in adjacent Hall Sound and hunting in the bush. Hazards to farming included regular seasonal flooding and major changes following the shift in the course of the Angabanga River which caused extensive drying up of land near its former course and increased encroachment of salt water which rendered some areas of gardens uncultivable.

In this specific context we set out to discover, by means of data collected about a series of representative households and from other sources, how individual and group lives had changed over a period in which there was a gradually-increasing use of money in the village but where most households could produce enough to eat.

3. METHODS OF DATA COLLECTION

Field work over a period of 8 weeks between February and April 1986 was concentrated in Rapa and Pinupaka, two villages in Bereina District 160km north-west of Port Moresby (see Fig 2). A previous visit to Rapa in September 1985 had shown that village livelihood strategies encompassed use of land and water resources and that the location of land suitable for gardens had been affected by the shift in the course of the Angabanga River in 1956 and that the droughts of 1979-82 had disrupted household subsistence. The second village, Pinupaka, depended to a much greater extent on marine resources although gardens are cultivated. Lobsters also are a contributor to household income during the season and in the years in which they are plentiful. Both villages offered the chance to assess the impact of improved access and increasing migration to Port Moresby on the use of water and land resources in an area where various environmental stresses occur.

After initial meetings with chiefs and elders to obtain consent to the investigation, using local field assistants (both male and female), studies were made of the life history and evolving livelihood strategy of seven households in Rapa and six in Pinupaka. Households were selected in order to include at least one at each of the different stages of their life cycle. Each member of the selected households over 15 years of age was interviewed on several different occasions, individually and collectively, focusing on their response to different environmental problems and their evaluation of different household activi-

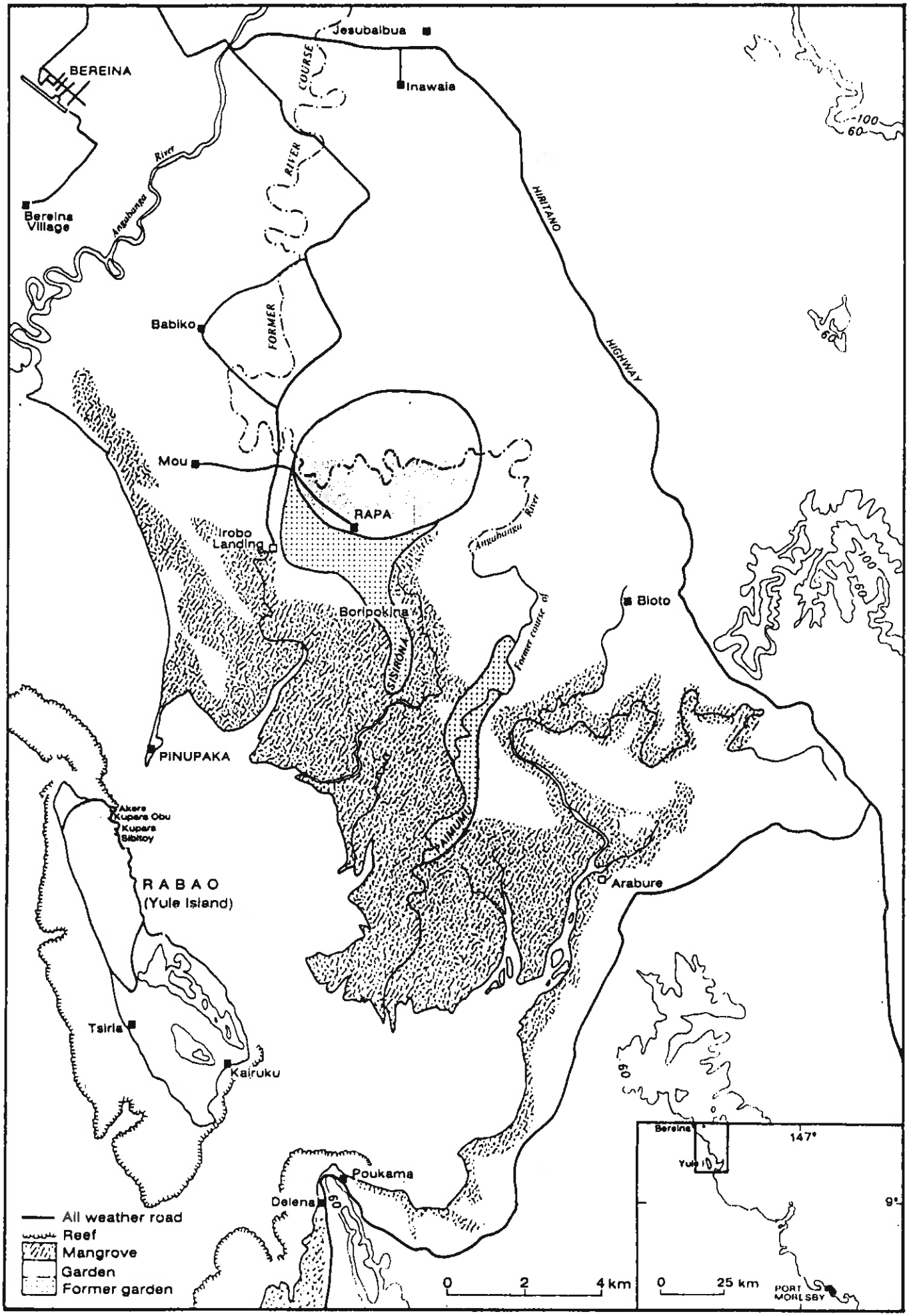
Jesubaibua
BEREINA
COURSE
Inawaia
River
RIVER
HIRITANO
HIGHWAY
Bereina Village
Babiko
FORMER
Mou
RAPA
Irobo Landing
Boripokina
Bioto
former course of
PINUPAKA
Akara
Kupara Obu
Kupara
Bibitoy
RABAO
(Yule Island)
Arabure
Tsiria
Kairuku
Poukama
Delena
All weather road
Reef
Mangrove
Garden
Former garden
0 2 4 km
0 25 km
PORT MORESBY
147°
9°

Figure 2

ties. Visits were made to gardens and to local markets. Additional demographic and household information was collected from all 74 households in Rapa and some similar information was collected from all 48 households in Pinupaka. Such data enable sample households to be compared to the village as a whole and comparisons to be made between villages. Additional interviews were made with older people for historical resource use information and participant observation provided a variety of further insights particularly into relationships within households.

4. ENVIRONMENTAL RESOURCES.

4.1 **The ecology of production.**

The two villages are situated close to the shore of Hall Sound which lies between the mainland and the long, low, coral limestone island of Rabao. The alluvial plains inland from the mangrove-fringed shoreline stretch some 25 km to where the Angabanga River emerges from the foothills of the Owen Stanley Range and the river meanders across a flood plain some 15 km wide marked by abandoned river channels and levees and back plains with seasonally flooded swamps (Mabbutt et al 1965). Rainfall averages 1240mm (1954-82 mean) at nearby Bereina, 56 per cent of which falls in three months January to March with a dry season from May to November.

Five ecological zones can be identified that are used in different ways by the inhabitants of the two villages (see Fig. 2):

(1) The bush within which Rapa gardens are made covers some 20 square kilometres of the alluvial lowland inland from the margin of the saltwater mangroves. It contains old river channels, levees and former beach ridges as well as some areas of marsh and small lagoons that increase in extent during the January-March wet season. The majority of this land is covered by tall grass and second-growth forest whose trees are of variable height. Gardens are made from both forest and grass-covered land, and cultivated for periods of from 2-15 years. Coconut and areca palms are planted in suitable sites adjacent to or in gardens. Pinupaka's gardens on Rabao are on thin soil derived from the underlying coral limestone and few gardens are now made from cleared forest land. Mango trees are planted in Rabao gardens and constitute a useful, though minor, cash crop. Gardens produce a variety of crops including bananas, yams, maize, pepperfruit, paw-paw and aibika and, occasionally, capsicums, pineapples, water melons, cassava and pumpkins but on Rabao cassava, maize, bananas, yams and maize are grown but not areca palms. Taro is only rarely grown. In Rapa, many gardens are located on old levees (raised river banks) adjacent to the former river course.

(2) The village sites contain the houses of almost all village members, although temporary shelters that can be used while gardening or fishing have been constructed in the bush and by

creeks. Pigs are free to roam although some are kept in pens near the houses. Pig fences surround Rapa village but are not pig-proof. A small proportion of houses in Rapa have tiny gardens where vegetables are grown as well as plants whose leaves are used for personal adornment. The village is the location of most domestic and all ceremonial activity. Stands of coconut and areca palms adjoin Rapa village on three sides and coconut palms grow adjacent to both old and new village sites in Pinupaka. Rapa is located on a sandy, former beach ridge, and the old village of Pinupaka on an eroded sandspit with the remaining houses now no more than three metres from the high water mark.

(3) South-east of Rapa, towards the sea, along what appears to be an old beach ridge, there used to be over two kilometres of gardens and coconut land beyond Boripokina to Sisirona. Sisirona is an early site of Rapa village and there were gardens there within living memory. All this land, except for that within 700 metres of the village, is now too saline for garden crops to grow.

(4) The coast and creeks are fringed by mangrove forest. This distinctive ecological area is where women catch crabs. In Rapa this is a year-round activity while in Pinupaka crabs are only caught during the dry season when there are fewest mosquitoes. Mangrove trees are also used to a limited extent for timber.

(5) The creeks that penetrate the mangroves, and the shallow waters of Hall Sound provide good fishing grounds. Shellfish and shrimps are also caught in the creeks and along the mangrove margins. A wide variety of fish is caught; barramundi are sometimes the object of special expeditions but they are also caught along the edge of the mangroves. An additional marine resource near to Pinupaka is the spiny rock lobster ('crayfish') which is caught on and adjacent to the reef that lies around the northern end of Rabao. The number of lobsters in the reef waters fluctuates considerably from year to year.

The village site of Pinupaka is divided between the remnant of the former village on the sandspit and the various new sites on the eastern shore of Rabao. Here houses are scattered along the beach (at Akere and Kupara Obu) and on sloping land above a low cliff (at Kupara and Sibitoy).

The ecological zones used by people in the two villages are summarised below in Table 1.

4.2 Access to resources

A high degree of equality of access to resources appears to exist. Inequality in resource use is largely related to available labour, tools or means of locomotion. Thus some may not fish because they have no net or no canoe; others may have a small garden because they live alone and have no children to aid the clearing and maintenance of a larger garden. Access to land on which to make a garden is controlled firstly by one's father

(or occasionally mother) and village land is divided into blocks that are each controlled by one of the clans. However, everyone has the possibility of obtaining access to land in the territory of other clans by asking a kinsperson in that clan to give them land. Such practices are reciprocal in the longer term and thus it is in the interest of an individual to allow access to land by a relative so that they too may be able to ask the beneficiary for access to land at some future time. Access may be limited by not permitting planting of trees such as coconuts or areca palms to restrict the period of time during which access is allowed.

Table 1: RORO AND PAITANA PHYSICAL RESOURCE BASE

Ecozone	Produce
Bush gardens	Yams, bananas, pepper fruit taro, capsicum, pumpkin, cassava, maize, water melon, pineapple, aibika, pawpaw, guava. Trees: coconut, areca palm (betel), mango
Fallow gardens	Coconut, areca palm, mango
Salt-affected gardens	Coconut
Bush/forest	Wild pigs, game
Mangroves	Crabs, timber
Creeks and sea	Fish, prawns, lobster, shellfish

When gardens are abandoned others have the right to hunt game and collect wild fruit or medicinal plants from that land. Likewise hunting is allowed anywhere on the land of the village and, when accompanied by friends or relatives from another village, on uncultivated land of other villages.

Areas of mangroves and water seem to be freely available to all people of the adjacent villages and there was no instance of household claims over specific territory. Even villages seem not to have exclusive fishing rights over creeks or sea and, although customarily Pinupaka people catch lobster in the areas of reef nearest their village, they also catch lobster on the west side of Rabao. One young man from Rapa went to stay with a friend in Tsiria in order to fish for lobster from the adjacent reef and there seemed to be no restriction on his access to the reef.

4.3 Environmental changes

One of the central issues to be explored in this investigation is the ways in which people respond to environmental change, whether human- induced, such as soil erosion, or accidental such as volcanic eruption or flooding. In the area studied the nature of the particular physical environment - a relatively dry part of the southern Papuan coast and the floodplain of the Angabanga River - gave rise to two recurrent hazards: flooding and changes in the course of the river and seasonal drought.

Two events stood out clearly in the memories of people in both villages as worthy of comment. The change in the course of the Angabanga River in 1956 affected both villages and its consequences are now well known even to younger people. The old course of the Angabanga River passed just north of Rapa village. The droughts of the early 1980s were severe but had much more impact on the people of Rapa than Pinupaka.

The change in the course of the Angabanga River in 1956 led immediately to a lowering of the water table in the vicinity of its former course and to the drying of those gardens on sandy ground, such as those on former beach ridges to the south of Rapa. Drinking water also became more difficult to acquire in Rapa village. Prior to 1956, Pinupaka people had gardens on the mainland at Paimumu on the levees of the Angabanga River near its mouth. These became barren because, as the level of underground fresh water fell - since it was no longer being replenished by percolation from the Angabanga - so underground sea water seeped further inland. In a few years, especially during the dry season, salt water rose to the surface of the soil and prevented the growth of any but salt-tolerant plants. Further inland formerly marshy areas became sufficiently dry to be cultivated.

The second event and that most frequently commented on was the series of droughts that took place in 1979, 1982 and 1983. In 1982 the rainfall at Bereina was 40 per cent below average and February rainfall was only one third of what was expected. Villagers in Rapa described the failure of food crops to grow and ripen and the areca palms produced few betel nuts. The degree of hardship depended on the situation of each garden but by 1983 after three years out of five had been affected by abnormally low rainfall there was little food in the village after 9 months or more of low production.

A third event of importance that affected Pinupaka was the gradual erosion of the land on which the village was built. This did not directly affect either fishing or farming but it caused two-thirds of the households to move across the water to settle on the eastern shores of Rabao.

5. MARKET AND EXCHANGE SYSTEMS

The majority of agricultural and marine resources are consumed within the village. Some specific items - betel nuts, pepper fruit, aibika, capsicum, crabs, bananas and coconuts - are also traded both at local markets and in Port Moresby. Some fish and lobsters are sold direct to Yule Lobster Co. on Rabao. Gifts of garden produce and game are frequently made between households within and between villages. The exchange and sale of produce at local and Port Moresby markets must be seen as dealing with only a small proportion of the total production of most commodities.

Weekly or bi-weekly markets at Bereina, Poukama, and Irobo are attended by village people and are predominantly dedicated to exchange although cash sales do occur. The pattern of exchange of goods is summarised in Figure 3. Coastal Roros (including Pinupakas) trade smoked fish, crabs, shellfish and prawns for bananas, betel nuts, pepper fruit and other garden produce with Mekeos and Paitanas who have more productive gardens. Rapas trade bananas, betel nuts and pepper fruit with Roros and crabs and occasionally smoked fish or game with Mekeos and other more inland people.

During times of food shortage such as during droughts, Rapa and Pinupaka people go inland to Mekeo villages to exchange crabs and fish for bananas and betel nuts. Visits to Port Moresby are made approximately monthly by Rapa people and less often by Pinupakas. The Rapas take betel nuts and pepper fruit as well as bananas, coconuts, aibika, etc. to sell for cash and also to give to relatives. Sugar, rice and clothing are the goods most commonly brought back.

6. HOUSEHOLD LIVELIHOOD STRATEGIES

6.1 **Strategies**

The household livelihood strategy is the total range of activities in which household members engage that in some way contributes to the maintenance of the well-being of both the unit and its members. This includes domestic work as well as work designed to produce money or goods which may be consumed by household members. It is a vital concept to use in order to begin to understand the context in which farming or fishing decisions are made and to comprehend the rationale behind the division of labour within the household. It is also vital in the development of a research methodology which treats all members of a household as sources of valid information about any single activity.

The household is seen as the smallest group of people who share a common interest in the maintenance of their collective functions of shelter and sustenance. It is the primary unit that can be defined both socially and geographically within which decisions are made about how resources are used. The household

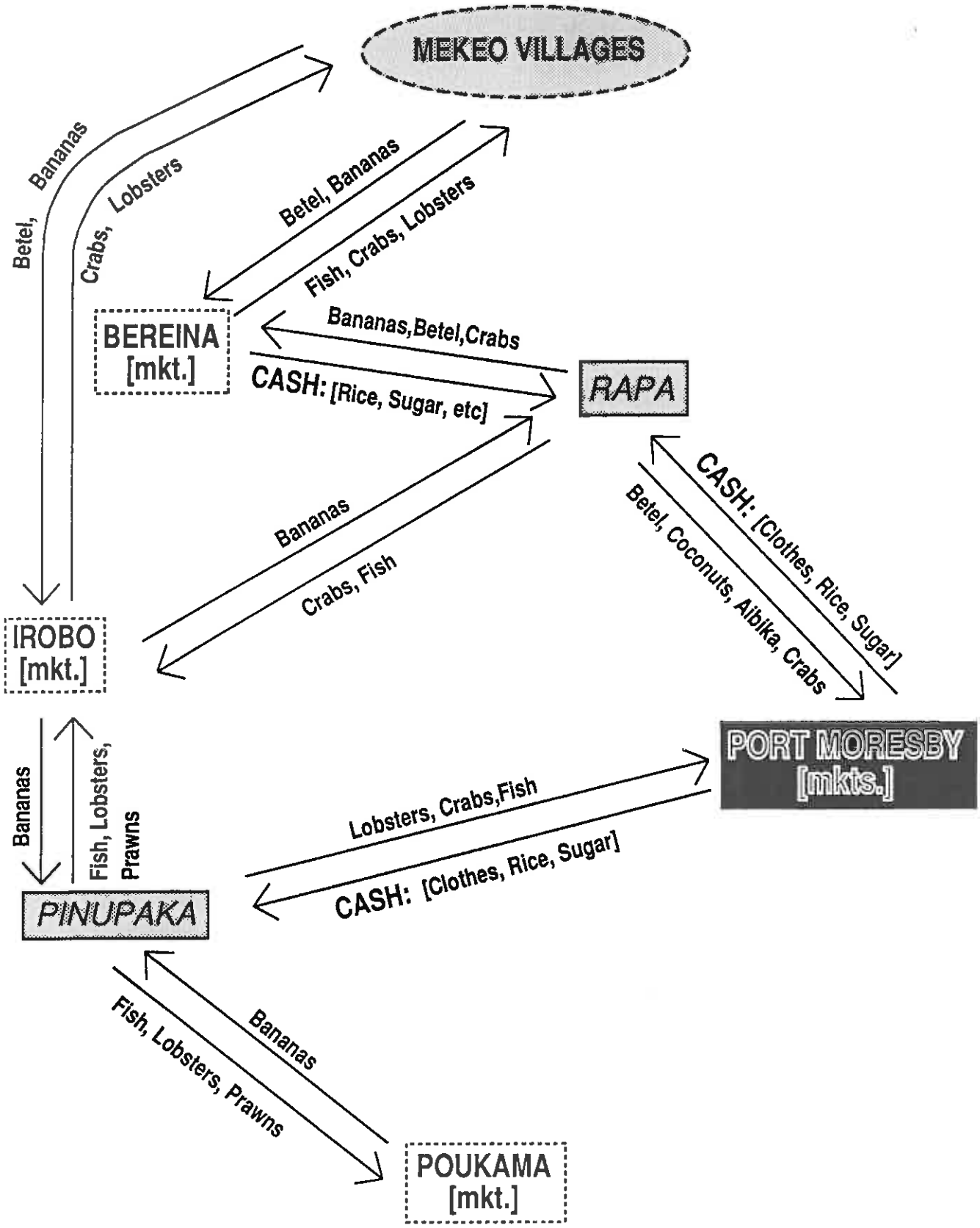

Figure 3: Roro/Paitana exchange patterns

is a dynamic unit and its composition changes through time just as the basic needs of the household change to reflect the different stages of the human life cycle through which its members pass. Households in both Pinupaka and Rapa were clearly recognisable entities and comprised an average of just over five individuals. The practice of adoption was widespread and adopted children often maintained contact with the biological parents. Migration was commonplace and regular marketing trips to Port Moresby meant that links with migrants were easily maintained. During field work it was clear that young moved freely to and from Port Moresby and likewise money or goods was as likely to be brought from the town to the village by returning migrants as it was that a village family would send or take food or money to support members of the family living in the city. Similar though more tenuous links were maintained with younger family members in other towns and even overseas.

Our focus was on the structure of the livelihood strategies of sample households and on the role of local resource use in these strategies. It is apparent that livelihood strategies must reflect the composition of the domestic unit. Both needs and activities of a household comprising a 70 year old widower with an adopted 20 year old daughter and a household headed by two 50 year olds with 10 children and associates, all able-bodied, are different. The basic structure of livelihood strategies in Rapa and Pinupaka will be outlined and the basic differences between strategies adopted at different stages in the life cycle will be indicated. Broad changes in strategies, irrespective of life cycle, will be identified. All examples refer to actual households.

The majority of the food that is consumed in the household is produced locally except for rice, sugar, tea and a small amount of tinned meat. Bananas produced in gardens supply the bulk of food in both villages, although in Pinupaka extra bananas are acquired by trading; in Rapa some of the fish is similarly acquired. Cassava is also widely grown and eaten in Pinupaka. A range of other foods such as yams, and green vegetables come from gardens. Animal protein comes irregularly from game - especially feral pigs - caught in the bush. Fish, crabs and shellfish are eaten regularly. Domestic pigs are consumed on ceremonial occasions. Although shop-bought rice and sugar are highly-esteemed foods, households are frequently without either but it is often said that younger people don't think much of a meal without rice, or of tea without sugar.

Fish, shellfish and prawns have always been an element in the diet but they are also caught, especially in Pinupaka, for sale and exchange. Fish is usually dried and smoked before being sold. Fishing is as exclusively a male task as catching crabs is exclusively female. Crabs in both villages are a vital source of money as well as food. Lobsters appear in local waters seasonally and the number caught varies considerably from year to year. Because of the unreliability of lobster catching, it was always referred to as an additional source of cash rather than a staple,

although it is possible to make a profit of 20-50 kina ($30-80) on a single night's fishing for lobster. Although some smoked fish are taken to Port Moresby for sale, fish are primarily for exchange in local markets.

Crabs have the advantage of staying alive after being caught for several days if treated carefully: they are a basic source of cash at all times. They are usually caught in the week to be sold or traded at Saturday markets or taken to town. In Port Moresby a basket of 30-40 crabs could be sold for 60-100 kina ($100-150) but a full basket would represent more than one day's work or else the amalgamation of several women's catches. Some crabs are always consumed by the women as they return from catching crabs and others are eaten at home regularly.

A third major element of household livelihoods is tree crops: coconuts in both Rapa and Pinupaka, mangoes in Pinupaka and areca palms for betel in Rapa. Both coconuts and betel nuts are an important part of life, the former for cooking and the latter as a part of social intercourse. Just as bananas are almost invariably prepared with the juice and grated flesh of coconuts so scarcely a conversation is begun or a task completed without one or several betel nuts (and the accompanying pepper-fruit) being consumed. All households have some coconut palms, all in Rapa have some areca palms and most in Pinupaka likewise have mango trees. Whereas mango fruit ripens during a short period of the year and is both eaten locally and sold, betel nuts and coconuts are produced year-round although with seasonal peaks of production and sold locally and in Port Moresby. The amount sold in a journey to Port Moresby varies with the cash need of the household or individual but, during field work, Rapa people taken into town usually carried 60-120 kina ($90-180) worth of betel nuts and pepper fruit. Coconuts are more bulky and a bagful would fetch about 20 kina ($30).

Farming and fishing provide the basic elements of livelihoods both for sustenance and for money. For younger people two other important elements are education and work and travel away from the village. Education takes people away from the households whether for the day or, if attending high school or a vocational centre, for longer continuous periods. This involves loss of labour - some jobs at home may be left undone or postponed and routine jobs, gardening or mending the village home may take longer - and costs money since such absentees need money for tuition fees and board. Many young people, particularly men, leave the village ostensibly to see relatives but in reality also to see new places and perhaps incidentally seek employment. This rite de passage for young people is commonplace in most rural societies but it also involves adjustments to be made in livelihood strategies to compensate for loss of labour or to provide financial assistance to the traveller. Some however obtain work and send money and manufactured goods home and thus contribute directly to the household economy. Several studies have examined the features of migration and its consequences in this part of Papua New Guinea (see, for example, Morauta 1984).

The importance of migration as a part of a household strategy is shown in two ways. Firstly, in each of the two villages there are a number of households that have recently returned to the village after a lengthy period living elsewhere, usually in Port Moresby or another urban centre. Heads of such households are typically in their 40s with some elder children of secondary school age. In Pinupaka 8 out of 61 households had lived elsewhere for a substantial time. In addition many of the older children of households now based in the village live elsewhere. In Rapa 44 per cent of children (over 15) of present heads of households live away.

The range of elements in household livelihood strategies commonly encountered in Rapa and Pinupaka are shown in Table 2.

6.2 Life cycle variations

Young, recently-wed couples frequently participate with a parental household as well as having their own, small-scale unit. Their garden is

Table 2: HOUSEHOLD LIVELIHOOD STRATEGIES

Elements	Participants	Gender
Farming predominate	All ages	Women
Hunting	Adults except old	Men
Fishing	Adults except old	Men
Crab catching	Adults except old	Women
Marketing, shop keeping	All	Women
Domestic maintenance (cooking, child minding, repairing)	All	Both
Travel and outside work	Young, pre-marriage	Both
Education	Young	Both

small, they have few or no mature trees (e.g. areca or coconut palms) and have few tools to facilitate independence (fishing net, canoe, gun). In some cases the livelihood strategies may include one partner being away working in the city but more commonly in such cases the couple would both be absent. As time passes, children are born, bigger gardens are made, trees mature and bear fruit and, with greater economic independence, equipment is acquired to permit diversification of livelihood strategies.

Mature households in Rapa or Pinupaka are larger with a highly diversified livelihood strategy but still with a strong dependence on farming and fishing - crabbing. Money or surplus

produce may be siphoned off by absent children living elsewhere in an urban centre but equally, employed children resident elsewhere may contribute to household income. The key features of the mature households are the high degree of diversification of the livelihood strategy facilitated by the number of members present and the range of resources that can be used because of the reservoir of both skills and tools available.

The old household is small, comprising one or two old people and a housekeeper - either a child or adopted child - who aids with gardening and marketing and maintains her own garden or semi-separate activity such as crabbing which contributes only in part to the subsistence of the couple. As Table 2 suggests such old people have ceased any productive activity besides gardening and they are frequently very conscious of the scanty nature of resources at their disposal. The prolonged period of mourning prescribed and undertaken by the spouse of a deceased person further strains the survival strategy of an old person's household which then is highly dependent on another household member. Several mature-aged informants, discussing poverty in Rapa and Pinupaka, associated it primarily with senility.

The small size of the household can make it vulnerable to sickness and absence of help at a critical time may mean disease in the garden is unchecked or planting is delayed.

Many aspects of the prevailing village livelihood strategies are esteemed by village people and by villagers living elsewhere. The very limited dependence on cash is prized and the range of sources of both food and money is some guarantee of security. By contrast town life is cash-dependent and culturally impoverished even for those living among wantoks - their cultural peers - and the potentially superior quality of economic life for townsfolk is balanced against fluctuations in wages and consumer prices over which a weakly-organised urban proletariat has little control. In both Rapa and Pinupaka more than a dozen families living in the village had lived in a town for ten years or more and returned while some of the children were at school. The reasons that were offered to explain their return were cultural compatibility in the village, both economic and personal security and confidence at being able to subsist from land and water resources.

6.3 Weathering crises

Two environmental situations have affected all households in the two villages and allow a glimpse of how households and their livelihood strategies cope with crisis. The consequences of the change in the course of the Angabanga River in 1956 had a different impact on Rapa by comparison with Pinupaka.

The year in which the river changed its course is remembered as being very wet with extensive flooding and in neither village were the consequences of the river course change really felt until the following dry season when gardens were drier than

usual. Although eventually some garden sites were changed the most immediate consequence of the change was the spoilage of gardens located closest to the sea as the salt water permeated the water table and over a two or three-year period, killed all garden plants except coconut palms. The distant but fertile gardens of Pinupaka in Paimumu were abandoned and thereafter only gardens in Rabao were cultivated. Even though this would have at least halved the volume of garden produce available to each household, older families recalling their livelihood strategies of the late 1950s do not mention any effort to increase yields from the poorer soils of Rabao. All households reported that more fish and crabs were caught with which to trade for extra garden produce at local markets but this was rarely stressed by informants as a noteworthy change.

In Rapa, however, much of the area of land in Boripokina and Sisirona that was salty and no good for gardens belonged to Obia Pokina clan and, for many clan households (that is households whose male head was from that clan), it was necessary to seek from people in other clans, land on which to make gardens. Although this presented no practical difficulty - according to custom, wives of Obia Pokina men would be from another clan and their kin could therefore be approached for authority to start new gardens - many people were hesitant at asking such a major favour, perhaps because of the reciprocation which could subsequently be requested. All informants however did acquire access in this way to new gardens in land unaffected by salt.

The droughts of 1979 and 82-83 were more serious in Rapa. While Rapa gardens dried up as the water table fell the soil moisture in Rabao gardens on the limestone seems to have been less affected. Few Pinupaka households mentioned acute food shortage in the way that all Rapa informants did. One probable reason is that cassava had become more important in Rabao gardens since 1945 and it is less subject to drought and continues to grow adequately even on poor soils. In addition, the greater importance of fishing and crab-catching in Pinupaka means that gardens are less critical for subsistence and fish and crabs are always relied upon to obtain more food.

In Rapa, gardens produced little during the drought and people were forced into alternative survival strategies. These included

1. Increasing effort to catch more crabs and fish

2. Trading their surplus more widely, in particular going to Mekeo villages

3. Travelling to Port Moresby to solicit aid from relatives and migrants in the town.

Trading direct with Mekeo villages is a strategy that has been regularly used when food is short. Catching crabs is quite the most important strand of the livelihood strategy to provide money

with which to buy rice and to otherwise augment the existing food supply.

6.4 Change since 1945

The end of the war with Japan was an important event and served well to identify a baseline date from which to chart longer-term change in livelihoods. The most important change by far over this periods the increasing importance of money with which to buy luxury food, clothes and other cultural gear to give an appearance of modernity. However, people went to town before the war and since the introduction of a head tax in 1919, money has always had importance in association with taxation. The new strands in livelihood strategies include some new cash crops (aibika, capsicum, pineapple) but to a considerable extent the observable long-term changes are more an increased emphasis on certain well-tried activities than the development of completely new activities. Older people repeatedly commented on time spent producing goods for money. One woman criticised younger women saying that they neglect their gardens because so much time is spent catching crabs for money.

Women undoubtedly have taken on a greater burden of work as commercial trade has increased in importance. All local marketing and much garden work is done by women while men spend a little more time fishing and maintaining the canoes. This is also reflected in the unequal division of domestic and garden work by late teenagers whereby young women do more work in the gardens and in the mangroves than young men do fishing or gardening. Several older informants, both men and women, felt that women worked harder now than previously but that men too worked harder but still less in total. All the failed and struggling transport initiatives in Rapa had been managed by men but more information is needed to analyse factors that are important in the initiation and failure of such enterprises.

7. ENVIRONMENT, MIGRATION AND LIVELIHOOD

The majority of time and energy expended by both Roro and Paitana people in sustaining themselves in their villages is associated with using their water and land resources. Their actual livelihood strategy makes use of a wide range of resources so that the land is used for perennial tree crops and a wide range of annual garden crops as well as for hunting while the watery environment of mangroves, creeks and sea provides crabs, prawns, lobsters and fish. With such a highly diversified environmental use households are not particularly vulnerable to the temporary or even permanent lack of a particular resource. Since there is ample land and neither fish nor crab stocks appear to be declining if gardens or tree crops do not produce in one season, then extra produce can be obtained by trading a surplus of one commodity in exchange for another in short supply. Likewise in years when there are few lobsters more fish or crabs can be caught during time which might otherwise be spent seeking lob-

sters.

Despite the importance of natural resource use it has long been commonplace for at least some younger people in the village to work for periods away in order to see other areas and to earn money with which to buy manufactured goods and items to improve the quality of village life, such as water tanks, metal roofs and consumer goods such as radios or radio-cassette players. Work in the village that is not associated with resource use is rare: there is only a handful of trade stores, or vehicles which can provide a cash income and the very limited circulation of money within the village means that cash payment for goods obtained from stores or for services such as transportation is notoriously difficult to obtain.

For a number of households, particularly in Pinupaka, livelihood strategies have included a prolonged period of residence in an urban centre such as Port Moresby, Lae or Rabaul after marriage and prior to settling once more in the village. Two male heads of households had been prominent labour leaders and others have been engineers, public servants or dock workers. Their wives have occasionally found urban employment and their children have been educated in urban schools. Even so they have maintained regular contact with the village and are felt to be sufficiently in touch with village affairs that, when they return, they are invited to hold office as magistrate or councillor. They retain rights of access to land and can usually establish themselves comfortably within a year or so of their return and develop a pattern of living similar to other villagers who have not lived for a decade in the capital city.

Reasons for return to the village are various and some reflect the specific conditions of the mid-1980s. The constant need for money for urban life puts great stress on the need to work for money at all times. Village life, with its high degree of self-sufficiency and the large volume of non-monetary transactions in a congenial cultural environment, is seen as attractive. The problems associated with personal safety in the urban centres have also encouraged some of those hesitating about returning to come back. Even so raskols pose problems in rural as well as urban areas.

Therefore, use of a range of physical resources to develop a diversified household livelihood strategy both minimises risk from the failure of a part of the resource base and offers a very attractive alternative to a wholly urban-based livelihood strategy which may potentially maximise financial return but with a high risk attached.

8. GENDER AND GENERATION IN RESOURCE USE

One of our principal objectives was to discover what changes have occurred in the tasks performed by young and old, men and women in household livelihoods and the causes and consequences of

such changes. Work by women is crucial in the most important parts of household livelihood strategies. Work in the gardens is predominantly by women and a critical source of both cash and trading goods - crabs - is exclusively controlled by them. Men also do garden work although less frequently than women. Men clear ground for new gardens and collect both coconuts and betel nuts. Considerable variations exist between the division of labour between men and women according to individual practice and the existence of other demands on time. Nonetheless there was no evidence that either changes in the importance of different elements in livelihood strategies or changes in village custom have materially altered the volume or importance of work performed by men or women during the past forty years.

Children are not important contributors to work in any particular productive activity in the village; they, but particularly girls, help in all tasks. Although girls are more active in gardens than boys and many establish their own gardens prior to marriage, this does not seem to represent a change from traditional practice. Boys in the past were controlled in men's houses and trained in warfare and ritual. No organisation or activity has replaced this. Because children perform less 'useful' work their absence in school does not create the labour shortage that has been remarked upon in other Third World areas.

The absence of acceptable work for young men does cause behaviour problems and older people frequently criticise non-participation by boys in productive activity. Many of the causes of the sense of cultural isolation and absence of purpose that can be readily observed among young men, especially in Rapa, are not greatly different from those in advanced industrialised countries. They reflect rapid cultural and social change and the inability of capitalist society in the village as well as the town to incorporate all young people into existing productive situations.

9. DYNAMISM AND EVOLVING LIVELIHOODS

Since 1945 the pace of change within Roro/Paitana society has quickened but very clearly making use of the same system of resource use as previously. Almost every aspect of change has been little more than an acceleration of processes already discernible in pre-war society and economy.

The links that bound some aspects of Roro/Paitana life to the world economy for the accumulation of taxes by the colonial state were made - in Rapa at least - by a brief flirtation with the plantation system as men worked on coconut plantations that were established nearby at Boripokina and Maiaera (near Bereina). Informants commented that they also produced copra from their own small plantations for sale through the plantations or the Australian Corporation stores that were established on Rabao after 1945. Certainly the period during which men worked on the plantations was only long enough to earn sufficient to pay the annual

tax.

Taxation was soon replaced as a incentive to produce a saleable surplus by the growing demand for manufactured and imported goods as people came into increasing contact with such goods either while in Port Moresby selling betel nuts and other produce, when travelling elsewhere or while working in domestic service as increasing numbers of people seem to have done during the 1950s. A Pinupaka informant commented that domestic work was so easy to find that country folk visiting Port Moresby were even stopped in the street and offered work. Not only did such experience create new tastes that could only be satisfied by the acquisition of more cash from urban work or from selling produce but, for those who worked in the city, some were introduced into the full process of proletarianisation and became wholly involved in living from the proceeds of the sale of their labour. Their consciousness of this new class position was highlighted by the participation of several villagers in the nascent labour union movement. Previously their labour had been appropriated by colonial officers who needed carriers, later many men served as carriers during the war against Japan but in neither case were they remunerated.

We have already shown that the resource use system that had been developed by Roro and Paitana people was diversified and capable of responding to needs by increasing the production of certain resources if others were in short supply or if demand increased. The current of out-migration from the village seems to have grown and in 1986 over 40 per cent of the children over 15 of Rapa households are absent. The village population has barely changed in the past 30 years largely as a result of this outward flow of people. On the basis of patrol reports of population in September 1956 and my 1986 enumeration, while Rapa population has decreased by 5 per cent (0.2% p.a.) of this period, that of Pinupaka has decreased by 10 per cent (0.3% p.a.).

If the villages have become more closely associated with externally- controlled economic and cultural systems it should not be surprising that changes have occurred within the villages with respect to traditional culture. We believe however that these cultural changes have not yet led to a breakdown in the most critical cultural elements that ensure access to resources for all village households but the decline of chiefly authority may signify that a series of profound changes may occur in the next decade.

Comments regarding change within the villages by chiefs and common people alike focus on four areas within which traditional practices have been much modified. Although chiefly authority is still clearly important it is also more circumscribed than forty years ago. Chiefs no longer monopolise pig ownership, the organisation of festivals or mediation in disputes. They do serve as coordinators of major village-wide festivals and clan divisions seem as important as ever. But household festivities are now often organised on a family basis without formally involving the

chief of the clan.

Cooperation in many tasks in clans and villages has decreased. The Rapa village pig fence has long been in disrepair and older people remember village-wide fishing expeditions after which the air of the village was heavy with smoke as the fish were subsequently smoked on every household hearth. Now houses and particularly resting platforms proliferate the construction of which would previously would have been controlled by chiefs. Formerly only chiefs would have platforms in front of their houses. Although Rapa and Pinupaka house styles now involve tin roofs, windows and solid walls less change is visible than in Mekeo villages close to the highway and little ostentation can be observed.

In other ways village society has not changed, most importantly in an absence of social or economic differentiation within the village. Whatever levelling mechanisms exist they are effective and various informants commented negatively on the range of informal sanctions (largely disapproval) that prevented the establishment of enterprises on a family basis if it was felt that they might enable that family to profit at the expense of others. Some people do have capital accumulated but either invest it outside the village - in Port Moresby - or not at all rather than risk general criticism or non-cooperation if they use it within the village. Redistributive mechanisms are rife and very little cash within the village is not readily loaned. Cash payment for services, either for labour between villagers or even by an outsider such as a research worker, is less common than payment in kind. Such issues are discussed in detail by Stephen (1974), and Monsell-Davis (1981).

Individualisation of land ownership has not occurred and thus absent migrants relinquish land, thereby avoiding an increase in tenancy as happens in so many other situations, but returning migrants do have a right to land on the basis of clan affiliation and parentage. Lack of access to land does not therefore discourage migrants from returning.

The process of change in village people's livelihoods since 1945 has been marked by a development of each of the strands of the traditional livelihood strategy which use different natural resources. Although the disposal of produce for cash is now more important than in 1945 it still only provides a small proportion of the total goods consumed; it does not provide any commodity without which households cannot survive, and it has not led to the atrophy of previously important elements in traditional livelihood strategies. For this reason it is possible to see village household livelihood strategies having undergone a process of involution - that is internal elaboration of a basic pattern similar to that described by Geertz (Geertz 1963,82) - rather than evolution which would assume the development of new village livelihood strategies.

The maintenance of largely traditional livelihood strategies

in the village has only been possible because a proportion of the village population obtained their livelihood elsewhere through migration, because of the sustainability of natural resource-use systems in relation to the resource availability, and because village institutions proved sufficiently resilient in the face of economic and cultural change to assure village households of the maintenance of a quality of life sufficiently high to attract long-term urban residents back to the village.

Acknowledgments

I have received valuable comments and criticisms from Bryant Allen, Michael Bourke, Michael Monsell-Davis and Rosemary Preston some of which have been incorporated in this revised paper.

REFERENCES

A.D.O. (1961) Assistant District Officer, Correspondence dated 1 September 1961.

Allen, J (1977) 'Fishing for wallabies: trade as a mechanism for social interaction, integration and elaboration on the central Papuan coast'. In J. Friedman and M.J. Rowlands (eds) The Evolution of Social Systems. London: Duckworth, 419-55.

Bourke, R.M. (1983) 'Fifty years of agricultural change in a New Guinea highland village'. Paper presented at First Papua New Guinea Food and Nutrition Conference, Goroka, Papua New Guinea.

Bourke, R.M. (in press) 'Subsistence food production systems in Papua New Guinea: old changes and new changes'. In D. Yen (ed) Pacific Production Systems.

Brookfield, H.C. (1973) 'Full circle in Chimbu. A study of trends and cycles'. in H.C. Brookfield (ed) The Pacific Transition. Geographical Perspectives on Adaptation and Change. Canberra: Australian National University Press, 127-60.

Eder, J.F. (1982) 'No water in the terraces: agricultural and social change at Banaue, Ifugao'. Philippine Quarterly of Culture and Society, 10, 101-60.

Ellen, R. (1982) Environment, Subsistence and System. The Ecology of Small Scale Social Formation. Cambridge, C.U.P.

Geertz, C.J. (1963) Agricultural Involution: The Process of Ecological Change in Indonesia. Berkeley, University of California Press.

Grossman, L.S. (1984) Peasants, Subsistence Ecology and Development in the Highlands of Papua New Guinea. Princeton: Prnceton University Press.

Hau'ofa, E. (1981) Mekeo. Inequality and Ambivalence in a Village Society. Canberra: Australian National University Press.

Hutterer, K.L. (1985) 'People and nature in the tropics: remarks concerning ecological relationships'. In K.L. Hutterer et al. (eds.) Cultural Values and Human Ecology in Southeast Asia. Michigan Papers on South and Southeast Asia, No. 27, Center for South and Southeast Asian Studies, University of Michigan, 55-75.

Mabbutt, J.A. et al. (1965) Lands of the Kairuku-Port Moresby Area. Land Resource Series 14, Canberra: CSIRO.

Monsell-Davis, M. (1981) 'Nabuapaka: social change in a Rora community'. Ph.D. dissertation, Sydney Macquarie University.

Morauta, L. (1984) 'Left behind in the village. Economic and

social conditions in an area of high outmigration [Gulf Prov. PNG]'. IASER Monograph No. 25. Boroko: IASER.

Preston, D.A. (1989) Changes in farming and household livelihood strategies in two areas of the Cordillera of Luzon, Philippines'. Working Paper 527, School of Geography, University of Leeds.

Preston, D.A. (1990) 'From hacienda to family farm: changes in environment and society in Pimampiro, Ecuador'. Geographical Journal, 156, 30-37.

Rappaport, R.A. (1968) Pigs for the Ancestors: Ritual in the Ecology of a New Guinea People. New Haven: Yale University Press.

Scott, J.C. (1976) The Moral Economy of the Peasant: Rebellion and Subsistence in Southeast Asia. New Haven Yale University Press.

Stephen, M.J. (1974) 'Continuity and change in Mekeo society, 1890-1971'. Ph.D. dissertation, Australian National University.