Focus

LAND TITLING ISSUES

On the economic value of customary land in Papua New Guinea

Tim Anderson
University of Sydney

In discussing the economic value of customary land in Papua New Guinea, we must recognise the ongoing polemic over land use. Much of this debate is driven by special interest groups seeking access to customary land. Customary landowners in Papua New Guinea, on the other hand, have been mostly well served by their system of custodianship. Land has been the basis for social cohesion, food security, cultural reproduction and ecological management. This is a view supported by the PNG constitution and reflected, in many ways, by the international discussion of the 'multifunctionalty' of small farming (Mazoyer 2001).

The practical question, however, is whether small-scale landowners are able to pursue the best income-generating opportunities while holding onto the various social and subsistence advantages provided by their customary lands? This paper suggests that they can.

I therefore present a model, and some data from pilot surveys in the Eastern Highlands and Madang provinces, of an opportunity cost valuation of customary land. Finally, I compare the distinct approaches to income-generating opportunities for customary landowners.

The land debate

The polemic over land use in Papua New Guinea is fairly clearly split between the indigenous recognition of the wider value of customary land and the western insistence on commercial reductionism. There was not always this dichotomy. In the late nineteenth century, and after observing the impact of the enclosure movement, Henry George asserted that the deprivation of land was the main basis for poverty and economic dislocation. Conversely, he believed that a person with land had 'an independent power which makes him a free contracting party in his relations to the community' (George 1979:112–13). In Papua New Guinea, which has possibly the most even distribution of land in the world, land assumes a special importance.

It is common to hear PNG intellectuals speak of the cultural, ecological and subsistence values of land, as additional to and underlying the potential commercial value of land. PNG writers also point to the sustainability and inter-generational equity values built into the customary ownership system. These values can be expressed in

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elegant language, somewhat inaccessible to normal economic discourse: 'Land is the link between the earth and the sky, the sea and the clouds, the past and the future. Because land is eternal, it is held in trust for succeeding generations' (Narokobi 1988:8). Similarly, 'the African saying that "land belongs to the few who are living, many whom are dead and the countless yet unborn" is relevant and deep-rooted' (Lakau 1994:80). Such statements have a resonance in traditional Melanesian culture but also point to important contemporary economic principles.

On the other side, a consistently opposed group of non-PNG intellectuals have insisted on the common themes of individual property rights, a market-oriented transformation of Melanesian institutions, and in particular the commodification of land. A crisis is often suggested, at the root of which is the supposed failure of Melanesian institutions. Hughes (2004:4) claims that the institution of customary land is 'the primary reason for deprivation in rural Pacific communities'. While the system of customary land (which she wrongly equates with 'communal ownership') has food security benefits, this is said to be 'at the cost of agricultural productivity and output'. Many western writers have repeated these points, sometimes drawing on some western liberal philosophers (for example, Lea 2004), to the point that the 'need for land reform' has become a form of accepted wisdom, especially amongst those with land-related commercial interests, such as those in the financial press (Callick 2005) and the development banks (Deininger 2003).

AusAID and the World Bank have in the past developed programs of land mobilisation and land registration, with the aim of shifting areas of land under customary title into the registered and indefeasible Torrens Title system. Economic arguments used to justify this particular form of 'land reform (see Deininger 2003) suggest first the macroeconomic desirability of export-oriented resource industries and cash crops (such as oil palm) and second that ordinary poor communities can better make use of their land assets by registration, which would give them access to mortgage finance, as well as income from leases.

These arguments rest, however, on certain presumptions about the operations of markets, which are inappropriate in Papua New Guinea. Lease values on rural land, relying on willingness to pay and prior transactions, have come up with values as low as 50 kina per hectare per year, plus some uncertain royalties (Gou and Higaturu 1999). In another case, a group of West New Britain villagers appear to have leased over 700 hectares of land for 40 years (under a lease–lease back arrangement, for an oil palm developer, but through the state) for only 20 kina per hectare (Mara et al. 1999). Valuer-General schedules on rentals for residential, commercial and industrial land show much higher values (Papua New Guinea 2001), but these are mostly based on urban areas and thus reflect the highly restricted supply of urban property. Rural land markets are highly limited; the customary landowners are asset-rich, cash poor and have very little information on the real opportunity cost value of their land. Better information on the opportunity costs might encourage higher lease values, but an oversupply through large-scale registration and transactions could lower them. The current reality is that lease values are extremely low.

Important implications of the limited nature of rural land markets include the fact that value is assessed in terms of cash income but typically excludes considerations of

- the land-based non-cash values, for example food, housing and other benefits
- the customary landowners' vulnerability in markets, due to money being scarce and highly valued and land being abundant and lowly valued

- town rental housing being scarce and highly valued
- food being abundant and relatively cheap in areas where land is widely held
- customary landowners having little experience in establishing and managing leases or mortgages.

The effect of this is that customary landowners typically value their land at very low cash rates and are vulnerable to (i) agreements for low value leases, and/or (ii) dispossession of their major asset, through registered mortgages and an inability to meet mortgage commitments.

The Pacific Islands Forum has repeatedly expressed the view that land disputes require 'deeper understanding and action' (for example, Forum Secretariat 2000). Consensual notions of land management are, however, often blended with economic liberal suppositions about particular market mechanisms (for example, Pacific Islands Forum Secretariat 2001; Lea 2004; Asian Development Bank 2004)—despite the highly attenuated nature of land markets in Papua New Guinea. In practice, a 'market' approach to land value in Papua New Guinea (which stresses 'preparedness to pay') seems artificial and inappropriate. Customary landowners are highly vulnerable to having their land undervalued and misappropriated.

The non-commercial economic value of customary land

A more appropriate way to understand land value in economic terms—but in a way distinct from simple commercial values—is to assess the value equivalence of subsistence production. Such assessments have begun through use of Papua New Guinea's household surveys, but have not yet been applied to a microanalysis of small farms.

Papua New Guinea is a country rich in resources, but is mountainous and suffers severe transport and access problems. About 30 per cent of its land is arable (UNDP 1999), and about half of this is thought to be under cultivation (pers. comm. Steve Rere, Goroka, 2004). That is, in the 1990s almost 7 million hectares of land was under cultivation, or about 1.5 hectares per person. About 97 per cent of Papua New Guinea's total land area is said to be under customary title.

Estimates of total food production in Papua New Guinea have been poor, according to Gibson (2000), and the national accounts seem to underestimate farming's contribution greatly. Using the 1996 PNG Household Survey data, he estimates that the total value of household food consumption in that year was K2.253 billion, while total domestic production was estimated at K1.3 billion. Locally produced food was also estimated as providing '80 per cent of available calories' (Gibson 2000:41–42). That is, domestic production accounts for the bulk of food consumption—80 per cent of basic nutrition, though only 58 per cent by money value. Bourke (2005:7) estimates that 4.5 million tones of energy (staple) foods are grown in Papua New Guinea every year—that is, 'a little more than one tonne a year for every rural villager'. He valued this production at K2,850 in 2004, based on the cost of substituting that food with the 'cheapest imported source of food energy'. Given its under-representation in the national accounts, this food production is poorly recognised in economic policy debates.

A mixture of indigenous and imported crops flourishes across Papua New Guinea. Van Helden (1998) identifies the main Bismarck–Ramu (north coast) crops as sweet potato, taro, cassava, yams, cucumber, corn, pumpkin, pitpit, rungia, beans, soy and lima beans, various greens, ginger, tobacco, chillies, spring onions, peanuts, oranges, bananas, passionfruit, pawpaws, pineapples

and melons. He lists a total of 46 cultivated food crops, 34 wild foods, 23 mammals and 44 birds hunted in this area (Van Helden 1998). Birds are hunted as food as well as for their feathers and for live sale. Chickens are an occasional food source and an economic option for villagers, while pigs are killed for food on special occasions. Fish form part of the diet in many coastal areas.

For example, garden produce in Pikosa village in the East Highlands was rich and diverse and included kau-kau, banana (7 varieties), peanuts, sugarcane, corn, snake beans, butter beans, pumpkin, pineapple, pawpaw, taro (2 types), cabbage, tapioca, yam, ginger, broccoli, cauliflower, custard apple, some rice, plus honey, building materials and firewood (pers. comms with Buno and T. Oruga, Pikosa village, 7 December 2004; author's observations). This is a quality of diet well above the subsistence levels of many other poor countries, even though these people are cash poor. 'Subsistence' production in Papua New Guinea should be recognised as having an enhanced meaning.

Bourke et al. (2004) list 180 traded ('economic') crops across the whole of Papua New Guinea. In 1995, the Fresh Produce Development Corporation estimated total PNG fruit production at 58.35 million kilograms (valued at K88.08 million) and total vegetable production at 47.32 million kilograms (valued at K53.53 million). The biggest fruit and vegetable crops by value were apples, watermelon, bananas and pawpaw, and potatoes, cabbage, tomatoes and carrots (Fresh Produce Development Corporation 2004). High and diverse production keeps the average price of fruit and vegetables quite low, K1.5/kg and K1.13/kg respectively.

In addition to non-commercial food and housing, customary land provides access to substantial non-commercial plant resources used as medicines, fuels, fences, weapons, tools, canoes, textiles, string bags, cords, musical instruments, artworks, articles of personal adornment and articles of ritual and magic (Powell 1976). Compared to food, the equivalent value of these resources is much more difficult to calculate.

Estimating subsistence food and rental equivalents

The most obvious and immediate loss to customary landowners from alienation of their land is that of food and shelter. These basic needs have to be replaced in some way if the landowners are to survive. More importantly, in terms of value assessment, the equivalent value of goods and services forgone by alienation of land should be calculated to indicate the opportunity cost and the ongoing value of traditional lands. In this sense, 'subsistence' food does not mean a bare minimum, or total non-commercial production, but actual household consumption from food grown in the family farm. For the purpose of this exercise, these value calculations do not include the risk management concerns of food security and social security, nor the important but less tangible values of social cohesion and cultural reproduction.

Land use varies quite widely, but there are important common themes to farming in Papua New Guinea. In this indicative study I have chosen to look at ordinary village production in three provinces, and to calculate the equivalent value of land for subsistence food production, cash crop income and housing value. The equivalent values can be estimated by comparison with existing market prices in fresh produce and rental markets.

This is not a representative study, as my pilot sample was small and have I made no attempt to calculate sampling errors. It is an indicative study, drawing attention to the

typically neglected features of land use, and suggests a broader perspective and a revised sense of proportion for land valuation. I have chosen what seem to be ordinary farming practices. My preliminary estimates will undervalue land to the extent that I omit the value of the full range of ancillary goods and services mentioned above (Powell 1976). More detailed localised studies would also have to adjust values to allow for the following considerations

- complete versus partial alienation or leasing of land
- differential pricing in distinct regional fruit and vegetable markets (for example, Port Moresby's Gordons Market versus Goroka or Madang markets)
- distinct regional rental markets
- the additional costs of urban lifestyles and processed food consumption (omissions here also make my calculations underestimates)
- adjustment for future value, in relation to the variously configured 20–99 year leases.

These provisos need to be borne in mind when looking at the following calculations.

As wider land alienation (through registration and commercialisation) would restrict supply and increase demand in fresh produce markets, acting to increase food prices, I have used a dual calculation of these prices. The assumption here is that widespread regional alienation of land would push food prices in regional markets like Goroka and Madang to Port Moresby market levels. On an unweighted price average for the 12 highest traded volume sales of fruit and vegetables (see Appendix Table One), Port Moresby prices (Gordons Market) are about double those of Goroka and Madang.

My approach to estimating the value of subsistence production—as opposed to the aggregate FPDC figures quoted by Bourke et al. (2004)—was to begin with household consumption. I surveyed small groups of villagers from coastal Madang, island Madang and the Eastern and Western Highlands to generate a preliminary idea of a household's ordinary daily diet, and from this a value-equivalence in local markets (some items do not have simple market equivalence, but most staple foods do).

Diet in Papua New Guinea can vary considerably. The coastal Madang diet includes occasional fish, while the island diet could have daily fish. Some additional marginal items were occasionally hunted, grown, baked and bought (pers. comm. Yat Paol, Madang, 14 December 2004) but, for the purpose of this analysis, the diet has been simplified to items that are produced for consumption. I interviewed people from three different villages to get a preliminary idea of the range and richness of diets and detailed descriptions of typical daily meals (Yat Paol, 14 December 2004; Howard Sindana, 2004; Grace Sinemila, 15 December 2004). I relied on the Fresh Produce Development Corporation (2002) for most fruit and vegetable prices, and on 2004 market prices for chicken, pork and fish prices, as estimated by some of my interviewees (pers. comm. Yat Paol, Howard Sindana, 2004)

This notional 'ordinary' household comprised two adults and 4–5 children, roughly the national average. Daily consumption figures were then multiplied into an annual figure, which could be set alongside annual cash income and annual rents in regional towns. The annual cost of purchasing the food consumed by such families ranged from K3,431–6,169 in regional markets and 7,260–11,388 in Port Moresby (see Appendix Table 2). I have rounded this to create a value range of K3,400–11,400 per year.

Rental equivalent values are difficult to apply, as town housing is limited and expensive, while village housing is constructed cooperatively, mostly from local

materials, and is rent-free. Rental rates of teachers' accommodation in villages in Madang and the Highlands seem to range from zero (where housing is simply provided for the teacher) to K20 per fortnight (pers. comm. Sinemila, Paol 2004). But teachers' accommodation is a special case. A more likely alternative housing option for landless families is settlement housing, on the fringes of the towns, but since squatting in this way offers neither security of tenure nor the relative comfort of village housing, I have chosen 'basic' town rental housing as the most reasonable equivalent. The annual cost of housing in Madang town can be as much as K1,500–2,000 per month for a 'decent' house, but a 'basic' house in town would rent for K500 per month, or K6,000 per year (pers. comm. John Chitoa, Madang, 14 December 2004). This seems the closest substitute for secure village housing.

Cash income from small farm produce

From a parallel and broader series of interviews, I collected data on villagers' cash income from small farm produce. Adults from four villages in the Highlands (Eastern and Western) and several villages in Madang Province were interviewed (see Appendix Tables 3 and 4). Cash income ranged widely. It could be more than K10,000 per year, but was also often less than K1,000 per year per family. From the 20 families surveyed, the mean was about K3,000. From the food and rental calculations above, I note that this cash income ranges from a tiny fraction to nearly the equivalent value of food and housing in many of these same villages. Median cash income was less than one-quarter of the equivalent food and housing values gained from the customary lands.

Coffee (an imported crop) has for some time been Papua New Guinea's major cash crop, though global price collapses in recent years (the price decline has been more marked at the producer end) have triggered a move away from, or neglect of, this crop. Many Highland families rely on coffee for their cash income. Coffee trees are mostly grown in family lands, but in one Eastern Highlands Province village there was a collective extension for coffee production (pers. comm. Buno, Oruga 2004). Collective farmland is, however, uncommon.

Villagers in the Eastern Highlands showed me coffee tree seedlings that had been cultured, but not planted, as their land had been turned over to other crops for the time being. Most PNG coffee is grown in the highlands because the tree prefers well-drained slopes, and the crop forms the major part of highland villagers' incomes. In the Jimi Valley, coffee was estimated at 60 per cent of the valley's income in the 1990s (Van Helden 1998). Healey (1986) estimated household income from coffee in this area, in the early 1980s, as only K50–100 per year. Several highland villagers told me that annual family income from coffee, despite the fall in prices, would range between K50–2000 and that coffee would comprise 50–80 per cent of family cash income (pers. comm. Buno, Oruga 2004; Thomas, Gauhuku Zuha village, 8 December 2004, B. Gunn, Goroka, 9 December 2004).

Between 1996–2000, coffee still outperformed palm oil (mainly a plantation crop, with some village inputs) and other agricultural cash crops (cocoa, copra, tea and rubber) as an export earner (Department of Trade and Industry 2001). The benefits of coffee are also spread far wider than those of oil palm. Much of the value coffee produces, however, has been captured by middlemen in the transport, processing and export stages. Highland village sources told me that, while coffee was still their area's major cash crop, it was supplemented by other crops such as sweet potato, broccoli, peanuts, and

watermelons (pers. comm. Buno, Oruga, Thomas, Gunn 2004). Vegetables command low prices in the Highlands, where they abound, but are also sent to market in Madang, Lae and even to Port Moresby, despite the considerable transport difficulties.

In Madang province, where there is much less coffee and no oil palm, betelnut (*buai*) seems to have been the single biggest cash crop, representing 13 per cent of total trade (Kasas 2003). Some growers have made even more from peanut sales. Production of both buai and peanut is entirely for local markets and their trade is often run by women, who sell directly and thus avoid being 'taxed' by middlemen. Van Helden (1998) noted that betelnut sellers in Madang province often supplemented this by selling birds, artifacts, marijuana and animal byproducts. From my interviews it seemed that the coast has a greater diversity of significant cash crops (for example, cocoa, coconut, vanilla, peanut, betelnut) and traders there often earn higher incomes. Highlanders did not seem to be doing so well from a reliance on coffee.

Sources of farm income other than coffee, fruit and vegetables and the other cash crops varied considerably. One village, close to the town of Goroka, gained income from handicrafts and cultural shows (pers. comm. Thomas 2004). In one Madang village, extra income came from small industries such as baking bread.

Investment in capital goods seems modest, involving basic tools (spades, knives, machetes), plastic bags for coffee, and weed sprays and pumps for coffee areas—at least before the notion of organic certification has become more appealing. Every year or two, family farms might invest K20–40 in tools, a few cans of Roundup (K30 per can), and occasionally K50 for a pump. Plastic bags for coffee are less than one kina each. Such investments might amount to between K50–200 per year.

Family income is needed for a range of goods purchased in the towns, but the largest consistent stated demand was for secondary school fees. Unlike primary school fees, which are subsidised by both the government and aid agencies, secondary school fees start at about K250 per year (pers. comm. Thomas 2004) and often go much higher than this. It is therefore simply beyond most village families' means to send more than one of their children (of an average four or five) to secondary school.

Supplementary income for customary landowners

In the course of interviewing small farmers it becomes obvious that most people in Papua New Guinea are small farmers, whether they have a role in the cash economy or not. This has important implications for understanding the income earning options for village people. Often a polemic is suggested between poor subsistence life and a transition into the cash economy, with the commodification of customary land suggested as a necessary part of that transition. It seems likely, however, that supplementing traditional land use with other income earning activities has greater potential than either traditional farming or migration to the cities.

The first indication of this comes from observing the farm income of those who are actually employed or self-employed, part-time or full-time. At first glance it appears (and this needs confirmation) that these people earn much the same, and sometimes more, than those who live and work full-time in the village. One Madang man I interviewed (L) worked part-time in a community group, while his wife baked and sold bread; their farm produce income was no less than others in their area. Similarly one Highlands woman (S) was employed part-time while

her husband worked full-time in the public service; their farm income was not much less than that of others in their area. One Madang man (H), while holding part-time work, said he earned as much as K11,000 per year on a variety of cash crops (cocoa, peanut, coconut, vanilla, betelnut). Two other Madang farmers earned over K10,000 per year (family equivalent) from peanut sales. These are exceptional incomes for small farmers, and some also faced considerable transport costs and difficulties. The common factor among this higher income group seemed to be their relatively high levels of education—either formal education or well-informed participation in markets.

There are two likely implications of this trend, if it is a trend. First, there may be an 'education effect' on the development of income-earning options, leading to a more efficient and focused pursuit of farming and marketing, which compensates for the time 'lost' in other employment or other small business activities. Second, it seems likely that full-time village farmers are not fully 'productive' in the commercial or marketing sense, though not necessarily in the output sense.

Confirmation of the 'education effect' seems to come from the example of a small agricultural college on the outskirts of Goroka, where an experienced teacher has taken on small groups of young people who have dropped out of school, providing a two-year course in farm management, technology and marketing, at the end of which the students have to prepare detailed accounts of returns from their family farm land. The first group of graduates reported an annual income of between K2,000–11,000 (pers. comm. Steve Rere 2004), which represents above-average to exceptional cash returns on family land. The highest income earner in this group was a young man who secured specialised vegetable contracts with a town supermarket. Others did well with more diverse production. Additional supplementary income streams are being developed in the tourism sector, handicrafts and more specialised export crops.

Further study of 'supplementary' activities amongst small farmers in Papua New Guinea seems justified, to confirm or refute the potential of 'supplementation' and the presence of an 'education effect'. A comparison with the income gained by those who have turned over their land to oil palm, or other forms of lease, also seems desirable. Such comparisons could provide valuable information to landowners faced with conflicting arguments about their best way forward.

'Supplementation' has been observed elsewhere, but perhaps not recognised as such. In a paper titled 'Subsistence or cash cropping', Allen (2000) discusses the improved food security prospects of the community of Malo Island in Vanuatu after it developed some cash-cropping options. Some of this income was used to supplement their homegrown diet with imported foods. As only 20 per cent of their food was gained from imports, however, and the subsistence sector is dominant, Allen is really describing this third path. Subsistence has not been replaced, but supplemented. Similarly, Mosco (2005) shows that a Central Province community has taken great advantage of the Port Moresby market, with average households making 5,000–24,000 cash income per year, mainly by marketing betelnut products (areca nut and pepperfruit). This had a marked impact on living standards in their villages, raising villagers' purchases of consumer durables and ability to fund their children's secondary education (Mosco 2005). Once again, Mosco is describing 'supplementation', rather than a transition from subsistence to the cash economy. These villagers have the best of both worlds, effectively exploiting market opportunities and maintaining customary lands.

Supplementation could occur through combining traditional farming with full or part-time employment (public, private or community sectors) or small business activities (production of food, trading, and various services including tourism services). Preliminary figures (combined in Table 1 below) show that it probably represents a superior development path for customary landowners. The income and equivalent income gained from farming seem to be considerably greater than that gained from low-paid employment in Papua New Guinea's cities. The cash income possibilities may also be greater, particularly because there seems to be no great opportunity cost for a family holding onto its traditional lands. Neither poor subsistence farming nor simple pursuit of the cash economy seem to offer the same possibilities, even on the basis of the limited economic assumptions spelt out above, which exclude many of the social, cultural and ancillary benefits of customary land ownership.

Discussion

With the above provisos, preliminary studies in Madang and the Eastern Highlands (in December 2004) suggest that, while cash income from family land production varied widely and was often very low, often less than K1,000 per year, the income required to replace the total value of production on an 'ordinary' hectare of farmland could be well over K10,000 per year, taking into account only the equivalent market value of subsistence food and housing. Other important values of customary land (including food security, social security, social cohesion and cultural reproduction) were not included in this model. Some assumptions were also made (set out above) which render these figures conservative and likely underestimates. But even this equivalent income is a stark contrast to low-value rural leases, and may help explain widespread dissatisfaction with and conflict over leases, including the conflict over

Table 1 **Economic options for customary landowners, per family, per annum, typical kina or kina equivalent**

	Cash income	Subsistence value	Employment income	Total av. gross income equivalent
Subsistence	100–16,000 (median 3,100)	9,400–17,400 (av. 13,400)	nil	17,600
Land alienation	50+ (royalties)	nil	2,000–10,000	6,050+
Supplementation	100–16,000 (median 3,100)	9,400–17,400 (av. 13,400)	2,000–10,000 (av. 6,000)	23,600

Notes: Cash income from CL may be *higher* for those with other employment.
Assumptions: 1. average nuclear family of seven with one hectare of good farmland; 2. employment income for 'supplemented' group = one full-time job equivalent per family, at low to middle wage rates; 3. land alienation means 100 per cent alienation
Source: see Appendix Tables 1–4

church-lease renewals (for example, Rynkiewich 2001).

The attacks on customary land tenure seem to have little to do with the economic options for customary land owners. As Lakau (1994:82) has pointed out,

> customary land tenure can be unfairly denounced for not being responsive to increased productivity and economic utilisation of land when the problem lies elsewhere. For cash cropping and agricultural development to be boosted, support services and incentives like agricultural inputs, favourable price policies, market outlets and credit provisions, amongst others, will have to be readily available.

Support services, infrastructure that supports small farmers (and not just big corporations), and access to finance (which is not guaranteed by the dangerous process of land mortgage) are all important. Equally important, and deserving of further study, however, is an 'education factor'. Greater access to education, including farm, market and service management education, could be a better investment in widespread economic development than subsidies to the latest plantation cash crop. This deserves further study.

The proper valuation of land should be subject to greater debate in Papua New Guinea, and not just one driven by the special interest groups (miners, banks and large domestic and foreign companies) that want access to customary land. The special value that Henry George attributed to land, more than a century ago, assumes particular importance in a country with Papua New Guinea's land-tenure system. Customary land seems greatly undervalued when it is transacted, which can be a tragedy for those families in the 'front line' of this commercialisation. Customary landowners are deeply concerned about means by which they can improve their families' prospects, to raise incomes and access education and health care for their children. To do this, they would best look at supplementing (rather than abolishing) their subsistence practices and maintaining (rather than alienating) their customary lands.

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Interviews

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Appendix Table 1 **Fruit and vegetable prices, Port Moresby, Goroka and Madang, 2002** (kina/kg)[a]

	Gordons (Port Moresby)	Goroka	Madang	Prices: POM/ Gor-Mad av. (per cent)
Sweet potato (*kaukau*)	1.24	0.67	0.8	168
Cabbage	2.87	0.98	0.65	350
Tomato	2.64	1.2	2.06	162
Carrot	7.01	2.02	2.21	331
Broccoli	5.9	3.17	2.69	201
Capsicum	6.41	4.77	4.63	136
Aibika (greens)	1.02	1.68	1.38	67
Banana (ripe)	2.21	0.77	0.82	276
Pawpaw	1.79	0.47	0.65	320
Coconut (green)	0.44	0.53	0.33	102
Lemon/lime	4.54	0.74	2.06	324
Mango	1.21	2.99	0.77	64
Unweighted average price ratio for 12 common vegetables/fruits (per cent)				208

[a] October 2002 mean prices, largest volume traded items.
Source: Fresh Produce Development Corporation, 2002. *Fresh Produce News*, Edition 162, Fresh Produce Development Corporation, Goroka:15–18.

Appendix Table 2 **Estimates of the value equivalent of a typical daily family village diet from subsistence production (two adults and 4-5 children)—regional and capital market prices**

	Madang coastal		Madang inland[d]		Highlands	
		Value equiv (mad/pom)		Value equiv (mad/pom)		Value equiv (GOR/pom)
Morning meal	Cooking bananas, 3kg; greens, ½kg	2.16+1.44/ 4.29+0.52	Cooking banana + taro (boiled or roasted); fruits (several), sago	2.16+1.60/ 4.29+3.80	Kaukau 1.5kg; local tea+sugar;[b] fried banana ½kg	1+0.50+0.60/ 1.86+0.50+0.90
Daytime snacks pineapple/	Either pawpaw, ripe bananas or pineapple, 2kg; coconut 3½[a]	1.60+1.32/ 3.80+1.54	Bananas, various fruits, nuts (galip, okari, peanuts), coconuts and beetles sugar cane/sugar fruit 1.5kg	1.60+ 1.44+1.32?/ 3.80+2.10? +1.54+ 0.62+3.00	Kaukau ½kg, one of bananas/	0.33+1.20/
Evening meal	Taro ½kg; kaukau 1kg; cooking bananas 1½kg; tomato ¼kg; onion ¼kg; carrots ¼kg; plus some ginger/ chilli/tumeric	0.36+0.80+ 1.08+0.52+ 0.83+0.55+1 /1.10+1.24+ 2.15+0.66+ 0.75+1.75+1	Soup (greens, coconut, banana, taro), mix of banana/ cassava/yam/kaukau/ tapioca, also tomato, onion, greens, various spices	1.44+0.80+ 1.08+0.36+ 0.80+0.52+ 0.83+0.55+ 1/0.52+0.92+ 1.24+2.14+1.10+ 0.66+0.75+1.75+1	Kaukau & banana 2kg; greens 1kg; tomatoes ¼kg; onions ¼k; beans ½kg	1.50+0.98+ 0.30+0.32+ 0.65/2.60+ 1.05+0.66+ 2.50+3.40
Weekly foods	Either medium fish 1kg, ½ chicken OR ½kg pork (K5–10)	1.1/1.6	nil		Chicken ½,[c] Pig ¼ kg	1.3+0.4/2.5
Monthly foods (K10-20)	Bandicoot OR Tree kangaroo	0.5/0.8 (equiv)	fish (4x year), chicken, goat and	0.80+0.40+ 0.20/1.20+	Cuscus— three times a year pig (2x year)	n/a but 0.3/ 0.3 (equiv) 0.60+0.30
Total daily equivalent value (kina)		13.26/31.20		16.9/27.71		9.38/19.89

[a] one coconut per person every second day; [b] fried banana perhaps every third day; [c] Some pig might be shared once every two weeks, [d] quantities estimated as for Madang coastal.

Sources: Diet estimates and meat prices: Madang coastal (Paol 2004); Madang inland (Sindana 2004); Highlands (Sinemila 2004); Prices: Vegetables, at October 2002 prices in Gordons (Port Moresby), Goroka and Madang markets (FPDC 2002).

Appendix Table 3 **Average family land and annual income equivalence, select Highland villages**

	Av. family land plots (ha)	Est. family cash crop income (kina)
Eastern Highlands village 1 (P)	0.5–3	av. 1,000 (coffee 50%)
Eastern Highlands village 2 (GZ)	0.5–3	av. 2,200 (coffee 65%)
Western Highlands village 1 (K)	0.5–3	1,200 (coffee 85%)
Western Highlands village 2 (N)	3–4	1,200 (coffee 80%)

Sources: Interviews with village members: P (Buno 2004; Oruga 2004); GZ (Thomas 2004); K (Gunn 2004); N (Sinemila 2004); T (Paol 2004; Sindana 2004).

Appendix Table 4 **Farmer survey, Madang, December 2004**

		Gardens				Kina per annum									
Region	Prov	L/ha	HMW	HMF	%F	Betel nut	Cocoa	Coconut	Coffee	Vanilla	Other	Other[a]	Total	P7P	Support services
Raicoast	MAD	6	7	15+	75	1,000	2,000	500	-	1,000	V,P,G,T	7,000	11,500	5,360	nil
Aiome	MAD	1,000	20	20+	100	2,000	500	-	3,000	not yet	M,V,P,B	500	6,000	2,100	DPI
Aparamu	MOR	3	5	15+	85	2,000	-	1,500	-	not yet	P,M,B	12,000	15,500	7,200	nil
Amele	MAD	7	9	9+	75	5,000	2,000	300	-	5,000		6,000	18,300	14,200	WV
Tokain	MAD	3	7	15	75	2,000	1,400	2,400	-	-		1,000	6,800	3,170	nil
Bogia	MAD	2	8	8+	75+	100	100	-	-	450		-	650	570	nil
Raikos	MAD	300	30	30	..	500	-	2,000	-	-		-	2,500	580	nil
Southkos	MAD	200	20	30	..	-	500	500	-	-		-	1,000	230	nil
Baitabag	MAD	2	7	7	..	480	-	-	-	150		100	730	730	nil
Baitabag	MAD	1	..	..	65	150	-	-	-	-		70	220	n.a.	nil
Gumine	SIM	3	2	5	60	-	-	-	90	-	Pineapple	110	200	280	nil
AA	MAD	65	7	10	75	7,300	-	-	-	2,400		-	9,700	6,790	nil
Bogia	MAD	12	5	7	75	800	3,000	-	-	-		-	3,800	3,800	nil
Aparamu	MAD	20	7	15	85	3,000	7,000	1,000	-	5,000	P,B	20,000	36,000	16,800	WV, DPI
Aparamu	MAD	80	20	30	80	500	3,000	100	-	320	P	5,000	8,920	2,080	WV, DAO
Saidor	MAD	1,000	50	50+	90	3,000	5,000	4,000	-	3,000	various	10,000	25,000	3,500	DPI, BRG
Transgo. Unitech st	MAD	10	20	20+	75	2,000	-	1,000	-	not yet	P	20,000	23,000	8,050	
EE	SIM	2	5	50+	75	-	-	-	500	-	V,P	300	800	112	nil
CC	EHP	20	5+	10+	75+	-	-	-	400	-		-	400	280	..
Average													4,210		

Notes: [a] Peanuts were the biggest 'other' crop. V = vegetable. L/ha = land in hectares. DPI = Dept Primary Industry (av of 17). P = peanut. HMW = how many people work this farm? WV = World Vision. G = greens. HMF= how many fed by this farm. DAO = District Agricultural Officer. T= tree crops. %F = what proportion of their food from farm?. BRG = Bismarck Ramu Group. B = brus/tobacco. P7P = annual income per 7 people (weighted family). M = mustard.
Source: interviews in Madang, Dec 2004 with assistance from Howard Sindana.

