

Oil palm and small farmers in Papua New Guinea

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**Report for the Centre for Environmental Law and Community Rights
on the economic prospects for small farmers in PNG's oil palm industry**

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1. Summary

1. Oil palm prices may hold up in the medium term, with strong demand from India and China. Yet, like other non-oil commodities, oil palm prices are likely to remain volatile, and to experience a long term relative price decline. (Chapter 3)

2. World prices are not the main problem for small farmers in PNG. Three factors are likely to place a ceiling on the economic benefits for small farmers: (i) small farmers remain at the highly competitive end of a large grower market, with little market power, keeping them as ‘price takers’; (ii) a large monopsony (all consuming), price-fixing corporate mill dominates small farmers, in the PNG ‘nucleus estate and smallholder’ model; and (iii) farmers in the export oriented oil palm business (unlike producers for local markets) are at the bottom end of a very long value chain, where other more powerful participants will always claim the largest ‘slice’ of value in the industry. (Chapter 3)

3. International Finance Institutions (IFIs) – in particular the World Bank and the Asian Development Bank – AusAID and the PNG Government have subsidised and promoted involvement in oil palm in PNG. Their interests (eg. corporate profit, commodification of land and gaining foreign exchange) are not identical to those of small farmers. The IFIs have pushed the interests of foreign-dominated export industries, with less regard for small farmers. (Chapter 4)

4. Small farmers, through cultivation on their own customary land (Village Oil Palm - VOP) and leased land (Land Settlement Scheme - LSS), contribute a large share of oil palm fruit production in West New Britain and the Popondetta Plains – less so in Milne Bay and New Ireland. These farmers, however, gain a very small share of the value from this industry. (Chapter 5.1)

5. Successive reviews of the price-fixing/payout ratio (the share of value between the corporate mill and the small farmers) have recognised the unfair compensation to small farmers, and have made very modest suggestions for improvement. Many of these suggestions have been ignored by the companies. The World Bank has tried to keep the PNG government out of the price-fixing/payout ratio process. (Chapter 5.2)

6. The price reviews, in producing costing formulae, have recognised that the mills (or 'nucleus estates') have several uncompensated economic advantages over small farmers. (Chapter 5.2)
7. Despite the efforts to secure a better share for small farmers, the price reviews have built in assumptions (common in PNG) which seriously undervalue customary land, and value village labour at bare subsistence levels, while recognising the commercial salaries and capital depreciation of the milling companies. (Chapter 5.2)
8. Average cash returns (per family of seven) on oil palm blocks in my pilot study in the Popondetta Plains were around 4,000 Kina per year, a figure not much different from (in fact less than) the average cash incomes demonstrated in a similar 2004 pilot survey of non-oil palm small farmers in Madang Province. (Chapter 5.3)
9. The highest returns of the two groups did not go to the oil palm farmers, but to those in Madang who had successfully marketed three or four cash crops, usually two domestic crops (such as peanut, buai and select fruit or vegetables) which gave best returns when the growers also directly sold their produce (at market or roadside); and one or two supplementary export crops (such as cocoa and vanilla), which expanded their markets. Two of these groups earned 14,000 and 16,000 Kina per year. The highest returns for oil palm farmer were around half this. While oil palm was the best cash earner for farmers in the Popondetta area, there does seem to be a ceiling on small farmers' returns on oil palm. My survey data seems to be confirmed by other data on LSS farmers. (Chapter 5.3)
10. Oil palm has important opportunity costs: (i) it reduces the diversity of crops in the oil palm area, as it does not allow for companion planting and encourages wide scale land clearing; (ii) the land clearing introduces soil erosion and siltation of rivers; and (iii) several forms of chemical pollutants are introduced, most notably fertilisers, which cause serious water pollution. (Chapter 5.3)
11. Small farmers must be made aware that their economic prospects in oil palm are limited, and that there are also serious opportunity costs - environmental problems and the exclusion of economic alternatives.

12. The ‘Mama Lus Frut’ scheme has been hailed as an important gender equity initiative of the oil palm industry. In practice, it involves tiny amounts of money. The relationship between the Mills and the poor families engaged in the industry is a far more important equity issue. There is massive inequality of rewards, in the industry; working, landowning families get a tiny fraction of oil palm revenue. (Chapter 6.1)

13. Land disputes and the undervaluation of customary land plague the oil palm industry, but not because customary land owners are unreasonable. They see that their families are not benefiting from a very productive industry (not sharing, in the way that traditional communities would), and are complaining about the distribution of benefits and costs. (Chapter 6.2)

14. Customary land is either given no value, or a nominal rate (applied to leases, and parts of the price review costing process) of 20 Kina per hectare per year. This is far less than the productive capacity of customary land, in terms of subsistence (food and housing) and cash crop values. Ordinary subsistence and cash crops values for customary land can exceed 13,500 Kina per year, on just one hectare. (Chapters 5.4 & 6.2)

15. Even those oil palm farmers who secure good medium returns (of 5,000 or 6,000 Kina per year) have a range of complaints about the crop, including the poor returns for the effort involved, and the social and environmental impact. Some of their comments are listed in this report. (Chapter 7)

16. Small farmers deserve much better information about the costs and benefits of oil palm, and alternative cash crops. They need to know more about their relationship to the industry, the implications for land use, the economic potential of customary land, the environmental impacts, and the relationship between oil palm and other cash crops. (Chapter 8)

17. Small farmers should consider the development of combinations of domestic and export cash crops at family and village levels. This means crops specifically designed for market and not just the sale of excess garden food. The domestic crops (eg. peanut, buai, cucumber, fruits) allow a far better share in the value chain, especially when the market or

roadside is close; supplementary export crops (eg. cocoa, vanilla) allow access to a broader market. (Chapter 8)

18. 'Informed consent', or informed rejection, must be at the root of small farmer participation in the oil palm industry. Advice and subsidies from the World Bank, the Asian Development Bank and AusAID has acted to mislead these farmers over the potential costs and benefits of oil palm. A rosy picture has been painted, to induce their participation; the benefits have been overstated and the costs hidden. Small farmers deserve better than this.

19. Community groups such as CELCOR should produce, distribute and promote accessible, good quality and independent information to small farmers on land value and leases, and on the costs and benefits of oil palm, and the alternatives. They should also produce, distribute and promote accessible, good quality and independent information to small farmers on the management of their oil palm plantations, and on (i) how to diversify their cash crops, (ii) how to manage the chemical impacts on their lands, and (iii) how to phase out unwanted oil palm plantations. (Chapter 9)

2. Introduction

This report looks at the development of West African oil palm crops in Papua New Guinea, with special reference to the involvement of and economic prospects for small farmers.

Under the influence of the World Bank and other foreign investment lobbies, the Government of Papua New Guinea promoted oil palm developments in the 1970s and 1980s. In recent years - despite resistance in PNG and environmental disasters associated with logging and rapid oil palm development in Indonesia - there has been a nationwide effort to escalate oil palm developments in provinces where these crops can be grown. There is a presumption that oil palm is highly profitable and would deliver significant returns to local communities and benefits for the government in the form of foreign exchange and tax revenue. Government revenue could in turn be used to deliver services to PNG communities.

The issue is highly contentious in PNG because oil palm expansion cannot proceed without heavy investment (either through international loans or foreign investment) and the temporary or permanent alienation of customary land. The World Bank and the Asian Development Bank (ADB) have provided loan moneys for oil palm in PNG, and they continue to offer more. This money has effectively subsidised private foreign investment in oil palm, by British and Malaysian companies. Further, the development banks are committed to the registration and alienation of customary land. Australia's aid agency, AusAID, also subsidises the industry and backs the unpopular calls for land registration.

Global demand for palm oil appears to be very robust and private company investments are likely to be secure. This has led the PNG government to present oil palm development as being risk free. However, little attempt seems to have been made, at a governmental level, to account for the economic, social and environmental costs experienced by small farmers in existing oil palm areas.

As a monoculture crop oil palm exposes communities to very high social and environmental risks. Additional studies are needed to properly inform communities of these risks. This report focusses on the economic prospects for small farmers.

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Those directly involved in the industry have played up the suggested benefits of oil palm cultivation to small farmers. For example, a spokesman for the Roundtable on Sustainable Palm Oil (RSPO) asserted that oil palm farmers and their families were paid K110 million from revenue generated by the local oil palm industry last year and that the industry was at “the forefront of positive environmental action” (CSR 2005). Similarly, a manager of Britain’s CDC group, a major shareholder in PNG oil palm plantations and mills, said that his company in Oro:

“buys produce from over 5,000 smallholders [and] generates an estimated 60 to 70% of the province's GDP as well as providing substantial tax revenue to local and national government. It has provided 700km of roads, 9 schools and 11 medical centres (Twite 2005).

However most economic and environmental studies carried out have been commissioned by the industry; few have been independent. Further, aggregate figures tell us little about oil palm’s impact on the incomes of small farmers and their families.

The Centre for Environmental Law and Community Rights (CELCOR) has requested a broad economic study which would: contextualise oil palm development in PNG, examine the macroeconomic presumptions, present a broad cost-benefit analysis (especially relating to small farmers/customary landowners), detail the economic and social risks involved (including a consideration of the future of the industry), and make recommendations (especially for community groups and landowners, and concerning any necessary preconditions for oil palm development) based on these economic understandings.

This report therefore looks at the global oil palm industry, before moving to an overview of oil palm developments in Papua New Guinea, and a pilot study of small farmers engaged in oil palm cultivation on the Popondetta Plains, of Oro Province. The method of microanalysis centres around an opportunity cost approach to land use, where subsistence as well as alternative commercial activities are given economic values. Problems, alternatives and recommendations are discussed in the final chapters.

3. The global oil palm industry

To understand the prospects for small farmers with this important global commodity, several aspects of the oil palm industry need to be recognised. First, its relative position in the global vegetable oil market has improved, with increasing and Malaysian-dominated management of supply. Second, prices are quite volatile, as with most simple, non-oil commodities. Third, and taking into account volatility, strong demand for palm oil has held up prices, despite the increasing supply. Fourth, like other commodities, and despite the previous point, palm oil is likely to be subject to *relative* price decline in the longer term. Fifth, there are serious environmental problems associated with the expansion and entrenchment of palm oil monocultures. Sixth, the long value chain and monopoly mill and marketing structures place very severe constraints on the opportunities for small growers. This latter point is a most important economic consideration for communities in Papua New Guinea, and I will deal with it in Chapter Five. In this chapter, I will review the first five considerations.

Palm Oil (when combined with Palm Kernel Oil) ranks equal first in the world, along with Soybean Oil, in the highly important vegetable oil market. It comprises around 30% of total vegetable oil production, by weight, reflecting the high productivity of the West African palm, when well cultivated and fertilised. Other oils such as corn, peanut, coconut, olive, sesame are valuable but smaller in terms of total output by weight. Further, palm oil is versatile, and is used in a very wide range of foodstuffs, as well as soaps, lubricants and cosmetics. Table 3.1 shows palm oil production in recent years, alongside other major vegetable oils.

	1994	1999	2003
Palm Oil & PKO	16,165	23,182	30,619
Soyabean Oil	18,684	24,783	31,373
Rapeseed Oil	9,970	13,211	12,456
Sunflower Oil	7,391	9,289	8,994
TOTAL vegetable oils	68,383	87,738	101,624

Source: MPOPC 2005: Table 6.3

Although the tree is of West African origin, the main producers of palm oil in 2003 were Malaysia and Indonesia, with about 58% and 33% of world production, respectively. Major

importers of palm oil are India, China and Europe, each of which doubled (or, in the case of India, more than doubled) their imports over the decade of 1994-2003 (MPOPC 2005: Tables 6.9 & 6.10). Malaysian companies dominate global production and processing.

The strong demand helps explain why prices for palm oil have held up in the face of increasing supply, mostly from new crops in Indonesia but also from increased productivity in the Malaysian plantations. The volatility of prices, with a peak in 1998 and a big crash in 2000-01 (Table 3.2), is a typical feature of major commodities. Who bears the risk of this volatility is an important issue. Concern over volatility has led, in the past in other countries, to floor prices and government marketing bodies. Australia, for example, has had publicly backed wheat and wool marketing bodies for many decades.

	RM/tonne		RM/tonne
1980	919	1993	890
1981	964	1994	1283
1982	829	1995	1472
1983	991	1996	1191
1984	1407	1997	1358
1985	1045	1998	2377
1986	578	1999	1449
1987	773	2000	996
1988	1029	2001	894
1989	822	2002	1363
1990	700	2003	1578
1991	836	2004	1610
1992	916	2005	1385 *
Source: MPOB 2005 - prices are in RM (Malaysian Ringgit) per tonne; * 2005 figures are for the first eight months; current prices			

In the longer term, we can expect to see a decline in the *relative* prices of palm oil - the 'terms of trade' of palm oil - against other goods, especially manufactured imports. The reasons for this are common to many primary commodities (except oil and gas). First, a homogenous commodity produced and able to be developed in many countries faces strong forces of competition. No grower can dominate the market. Second, palm oil is subject to forces of substitution so that, if prices rise strongly, purchasers can switch to soybean oil, or other vegetable oils. Third, commodities suffer price decline as the demand for manufactured goods is more 'income elastic' - individuals and countries buy proportionally more manufactured goods (than basic commodities) as they increase their income. The longer term

decline in relative prices of such commodities is well documented (Singer 1950; Prebisch 1962; Radetzki 1990). In practical terms, over time, more and more oil palm will have to be produced and exported to buy the same amount of manufactured goods (cars, computers). Such forces have commonly run down the relative prices for undifferentiated commodities such as coffee, fruits, minerals and many other basic, unprocessed commodities.

Major environmental problems are associated with the spread and entrenchment of palm oil monocultures. The global picture is not a happy one. Oil palm development has devastated communities and forests across Indonesia, following the financial pressures from the 1997 Asian Crisis. Globally, oil palm cultivation areas increased by more than 40%, to 10.7 million hectares, between 1990 and 2002 (Casson 2003: 4). More than 3.5 million hectares in Indonesia have now been cleared for oil palm (mainly logged and burnt out rain forest areas in Sumatra and Kalimantan), and Indonesia now follows Malaysia as the world's second largest exporter. The World Rainforest Movement brands the industry and its rapid expansion as yet another "destructive monoculture" which has devastated land rights as well as tropical rainforests around the world (WRM 2001). Similarly, the WWF says that oil palm expansion "not only pose(s) a threat to high conservation value forests, but also to freshwater ecosystems, the livelihoods of forest dependent peoples, biodiversity and the habitats of endangered species (Casson 2003: 6).

European activists have looked at the business links and consumer boycott possibilities (eg. van Gelder 2004), to obstruct or at least draw attention to these developments. On the other hand, some international NGOs such as the Worldwide Fund for Nature (WWF) have begun a process of "positive collaboration" with the oil palm industry, attempting to introduce some environmental safeguards and improve the image of a "sustainable palm oil" industry (WWF 2003). Such moves could well help strengthen the arguments for 'environmentally friendly' oil palm, and legitimise existing operations. Whether they will have any substantial impact is another question. This report will refer to, but not examine in any depth, the environmental impact of oil palm.

To the general problems of the palm oil industry we must add the particular economic problems faced by small growers in PNG. I will turn to these in Chapters Five and Six.

4. Oil Palm and the International Finance Institutions in PNG

This chapter backgrounds oil palm production in Papua New Guinea, with its roots in pressure for export oriented agriculture and land registration from the World Bank, the Asian Development Bank and AusAID.

The World Bank and the Asian Development Bank have pushed the PNG Government into taking out large loans to support oil palm development in PNG, through 'nucleus estates' and linked communities of villagers using both their own and leased land to grow oil palm. No doubt combinations of foreign investors and some local interests have strong self-interest in backing the industry. The ADB's approach to agro-industry is consistent with the World Bank's neoliberal view of 'good governance', incorporating greater levels of commodification and penetration by foreign investor interests (see Anderson 2003). The ADB's track record as a development agency in PNG, by its own account, is poor. ADB projects often fail in their stated aim of poverty reduction, and there has been poor compliance with its own environmental guidelines (Tan 2004). Primarily, agro-industry is seen as an opportunity for large foreign investors to access the resource base of PNG, and it is generally argued that such large operations are more 'productive'. We should note that the international experience does not always bear out the argument that large, mechanised cash cropping is 'more productive' - ie. producing more from the same land - because some small farmers can be very efficient. In any case, farming in poor countries *always* has a wider range social purposes (food security, social security, maintenance of culture and environmental custodianship) than simply maximising output. The PNG Government has acquired a share in some of the oil palm companies, and thus oil palm revenue.

Oil palm has been the main focus of IFI backed agricultural cash cropping for some time, in Papua New Guinea. Initially, the World Bank supported such projects, putting almost US\$100 million into agricultural, cash cropping projects between 1983 and 1992 (Table 4.1). In the 1990s the ADB took over this role - the practice of two Banks sharing tasks in this way is now common in this region. Palm oil has helped provide extra income to some small farmers. However, there have also been a range of harmful environmental impacts, and small holders have been at the economic mercy of price-fixing monopoly companies, getting very small returns for their fruit. There are other problems. In many places oil palm projects have

been a front for illegal logging operations. Oil palm often requires clear-fell logging (PNGSPS 2003). The large mills are most often the main beneficiaries of World Bank, ADB and AusAID subsidies. For example the road works in Oro Province (previously funded by the World Bank and now funded by AusAID) help the large Hingaturu mill trucks collect fruit from small farmers. In the Upper Ramu (Madang Province), conflict loomed over an oil palm agreement between the Provincial Government and Ramu Sugar; a contract signed behind the backs of the local landowners, and which the landowners steadfastly oppose (Paol 2003; Yambai 2003). Planned logging and oil palm development at Collingwood Bay (Oro/Milne Bay Provinces) was only blocked in 2002 by a landowner court action (Tararia 2003).

4.1 Some History

The Germans planted oil palm on the Rai Coast in the 1890s, and there were more plantings near Popondetta in the 1920s. However the first substantial plantings were in 1966, in a World Bank-backed scheme at Hoskins in West New Britain. The Bialla scheme followed in 1972, then Popondetta in 1976 (after independence), Milne Bay in 1985 and New Ireland in 1998 (Koczberski, Curry & Gibson 2001: 1-10). West New Britain set the pattern for all these developments, that is: a central ('nucleus') private (or joint venture) estate with land 'purchased' from the state, surrounded by small farmers on 99 year lease land (Land Settlement Scheme: LSS) and customary owners growing oil palm of their own land (Village Oil Palm: VOP). The LSS blocks were generally 6 hectare lots of land that were originally prepared for returned soldiers, in the colonial period. The VOP blocks were encouraged in 2 or 4 hectare lots. Later on, 'mini-estate' land was leased from groups of customary owners and added to the core estate land. All categories of leased or 'purchased' land (ie estate, mini-estate, and LSS) have been subject to disputes, due to the unsatisfactory nature of transactions in the colonial and post-colonial periods.

Financier	Started	Project	US\$m
WB	1983	Agricultural Support Services	14.1
WB	1984	West Sepik Provincial Development Project	9.7
WB	1985	Nucleus Estates and Smallholders Project (mostly oil palm, but also cocoa)	27.6
WB	1985	Agricultural Credit project	18.8
WB	1992	Oro Oil Palm Development Project [later extended by AusAID grants]	27
ADB	pre-1995	<i>[information difficult to obtain]</i>	
ADB	1995	Agricultural Research and Extension Project [oil palm, coffee and cocoa]	22.11
ADB	1997	Smallholder Support Services Pilot Project	n/a
ADB	2000	Agro-industry Development	0.5
ADB	2002	Preparing the Agriculture and Rural Development Project	1
ADB	2002	Agro-Enterprises Technical Assistance Loan [mostly focussed on oil palm]	5.9
Source: World Bank 2003d; Asian Development Bank 2003c			

In PNG in the mid 1990s, following in the footsteps of the World Bank, the ADB put over US\$22 million into an Agricultural Research and Extension Project, which focussed on the commercial development of oil palm, coffee and cocoa. The ADB had greater regard for the productive potential of oil palm than for coffee, noting oil palm's increased use of fertiliser (ADB 1998). The ADB's next scheme, announced in late 2001, the Agro-Enterprises Technical Assistance Loan, did not express very clear objectives. It was to provide loans with interest rates of only 1% (for the first 8 years) and 1.5% for the next 24 years, but 60% of this (US\$4.5 million) would be used as foreign exchange for the ADB's international consultants. Another US\$1.5 million was to be raised by the Government of PNG, including from its "private sector proponents" (ADB 2001b). The ADB said this Project was about developing: "feasibility studies for nucleus enterprise-based development projects in agriculture and agro-processing ... [and] pilot activities in and around potential nucleus enterprises" (ADB 2001b)

The ADB has often stressed the breadth of its projects, and the inclusion of small farmers in its projects, for example "to increase small holder incomes and national output" (ADB 1998). However it is fairly clear that the emphasis on "commercially oriented agriculture" (ADB 2001) is not aimed at subsistence farmers or micro-traders, and the idea of a "nucleus enterprise" is focussed on a private corporate development:

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"that provides small holders and outgrowers with market outlets, technical and financial support, planting materials and social services that cannot be provided by either the public sector or the small holders themselves" (ADB 1998)

This is a privatisation scheme. Using indirect language the ADB is effectively saying 'we will use public money (most of the finance is a low interest loan to the Government) to create facilities that will be privately owned, and which will then condition the surrounding farming activities of small players'. The outcome of such projects, unsurprisingly, is to link small holders into a large monopsony facility, such as the Higaturu mill in Popondetta.

The ADB refused to acknowledge that its agro-industry projects were either focussed on big, monocultural, commercial enterprises or focussed on oil palm. Writing to Ms Lee Tan of the Australian Conservation Foundation, ADB Environmental Economist Daniele Ponzi claimed that the ADB's Nucleus Agro-Enterprises Project (of which Daniele was Team Leader):

"[aims] to help PNG package new rural development ventures and partnerships with a focus on generating benefits for smallholders/outgrowers. Ideally we would like to use the market to bring about economic development and positive social change, while at the same time protecting and improving the environment ... with respect to oil palm we are well aware of the social and environmental risks and all the possible controversial aspects of such monocultural plantation developments." (Ponzi 2002a)

The risks of plantation monoculture are certainly well known: high use of fertiliser, leading to water and marine pollution, high incidence of pests, followed by pesticides and further ground and water contamination; and the displacement of small farmers and creation of settlements around big factories and mills. The ADB then suggested that oil palm was not really on its agenda, with the following statements in mid 2002: "there are no oil palm projects under consideration" (Ponzi 2002b), and

"There has been a slight confusion .. [due to] misleading statements by some representatives of the PNG Government .. We had in fact hoped that oil palm would constitute at most only part of the area of focus. However the Department of National Planning and Monitoring (as was) drew up an initial list which comprised mainly oil palm possibilities; [but] this is only an initial list of possibilities." (Van der Tak 2002).

The 'confusion' was understandable, since the ADB has a long history of funding oil palm developments, both in Indonesia and in PNG. This ADB project fizzled out.

However, backed by IFI and AusAID insistence on resource-based, export-oriented agriculture, the PNG Government maintains strong support for oil palm development. In 2002 the Government allocated five million Kina for "nucleus agro-enterprises" which "seek to expand the model that has operated successfully here, particularly in relation to our oil palm industry" (Philemon 2002). The PNG Government consistently puts out the message

that oil palm is a success. Finance, Planning and Rural Development Minister Andrew Umbakor said that oil palm is a success with "the potential for further expansion" (in PTQ 2001: 2), and Prime Minister Michael Somare said his Government has "identified the oil palm industry as a vehicle and growth strategy to enhance the economic and socio-indicators of Papua New Guinea" (Somare 2003).

A shifting group of regions have been targeted for palm oil development (see table 4.2). However, following community resistance, including one major court case (over the Collingwood Bay proposal), the emphasis seems to have shifted to consolidating and expanding the existing palm oil areas.

Table 4.2: Proposed new Oil Palm development areas in PNG, 2003		
Existing Oil Palm Areas	Areas PM Somare says ADB studies have identified as 'suitable' (June 2003)	Areas from 'government sources', based on studies (The Independent, July 2002)
West New Britain	Amazon Bay (Central)	Amazon Bay (Central)
New Ireland	Arowe (West New Britain)	Arowe (WNB)
Milne Bay	Turubu/Sepik Plains (E. Sepik)	Sepik Plains (E. Sepik)
Oro-Popondetta	Bewani (West Sepik)	
		Vailala (Gulf)
		Ramu Plains (Madang)
		Open Bay (ENB)
		Morobe-Gulf Border
		Collingwood Bay (Milne/Oro)
Sources: Somare 2003b; Peni 2002; Note that the Collingwood Bay proposal was blocked by a 2002 landowner court action		

Having delegated most of the financing responsibility for oil palm in PNG over the past two decades to the Asian Development Bank and AusAID, the World Bank returned to the game. In late 2003 the World Bank announced a US\$25 million package for expansion of oil palm in the four main existing plantation and mill areas (Oro, West New Britain, New Ireland and Milne Bay). US\$20 million of this would be a World Bank IDA loan (low interest, but strict conditions - this is the first IDA loan for PNG in almost 20 years), with the other \$5m from the European Union, PNG and "project beneficiaries" (World Bank 2003: 3). A series of general assertions about the PNG economy back up the Bank's loose argument in support of this new plan, with the central aim being:

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"to promote rapid growth in the rural areas in four oil palm growing provinces, by strengthening the small holder oil palm sector through capitalising on existing infrastructure, and by establishing replicable mechanisms for community driven development" (World Bank 2003: 3).

No evidence is provided by the World Bank to suggest these plans are "community driven". In fact, communities in New Britain and Oro (eg. Mamoko 2003) have been complaining for some years about land disputes and environmental damage from existing oil palm operations. Other communities have strongly opposed oil palm development on their land (eg. Yambai 2003; Paol 2003). And whatever might be the national economic benefits from oil palm, it is customary landowners and their communities who bear most of the costs.

Were oil palm simply an 'option' for small farmers (like cocoa, coffee, or vanilla), and not one linked to a socially and environmentally damaging monoculture, subject to domination by a single, large, price-setting company, its appeal to small farmers might be stronger. However construction of monoculture industries, each focussed on a private 'nucleus' (a big private company) seems likely to tie small farmers into an unequal system, and one from which it may be difficult to escape. The disadvantage is not so much a function of world prices, as the weak market position given to small farmers, at the bottom end of a long value chain.

The focus on resource-based, export-oriented agriculture has been driven by the IFIs, AusAID, some foreign corporations and successive PNG governments concerned with foreign exchange and government revenue. These concerns are not the same as those of customary landowners and small farmers, who typically want to maintain the quality of their land and enhance their income possibilities. Neoliberal ideology regularly seeks to conflate these differing interests. Those advising small farmers must note the differences.

5. Small farmers and oil palm economics

Small farmers in PNG are at the highly competitive end of a long international value chain, and their economics prospects are limited. I will explain why and to what extent, in this chapter. The domination of the PNG oil palm industry by local monopsonist mills ('nucleus estates'), which purchase all the oil palm fruit in their area, intensifies this problem.

The advantages of oil palm for small farmers have been summarised as including the following considerations: (i) pest and disease problems can be controlled, (ii) oil palm is very productive, and adapts well to different soils and conditions, (iii) the trees can be neglected, if prices fall, and resuscitated later on, (iv) oil palm trees produce fruit (and therefore also income) all year round, (v) the produce of small farmers can be completely bought up by the 'nucleus estate' mills in their area, and (vi) world prices appear to be holding up (Koczberski, Curry & Gibson 2001: 18).

These arguments, however, do not really address the issues of (i) small farmers' weak market position in a long value chain, (ii) the economic power of the monopsonist mill, (iii) the 'crowding out' of other cash crops by a commitment to oil palm, and (iv) the serious environmental damage caused by oil palm.

This chapter looks at the economic environment and experience of small farmers, particularly those in the Popondetta plains of Oro Province. It discusses their economic returns, the division of value within the industry and oil palm cultivation compared to the alternatives.

5.1 The place of small holders in the PNG oil palm industry

In November 2001, Koczberski, Curry & Gibson (Australian academics from Curtin University and ANU) published a detailed report on 'small holders' and oil palm in PNG, looking particularly at the West New Britain and Popondetta schemes. Small farmers, oil palm companies and support agencies were consulted, and fairly detailed surveys of smallholders were carried out. This academic study was co-sponsored by PNG's Oil Palm Research Association, and the main aim was "to help improve small holder oil palm

productivity" (Koczberski, Curry & Gibson 2001: xvi). That is, the report was directed to the industry. It might be useful to summarise the report's main findings here.

This study found, firstly, that oil palm was one of many economic activities pursued, and that alternative income sources were important for household needs, especially in the leased LSS blocks. About 80% of food for meals for families on LSS blocks came from gardens, compared to 50% for those on VOP. That is, LSS families were more dependent on garden food, despite their more intense focus on oil palm. The incentive to participate in oil palm for those on VOP blocks was not so much for consumption or investment income as for "redistributing wealth through kin exchange". (Koczberski, Curry & Gibson 2001: xvii-xix). Secondly, population growth was creating pressures and conflict for those on the leased LSS blocks. Population density had increased in the 20-30 years of the schemes, most LSS blocks were now multifamily, and sources of social instability included resentment at the 'outsider' settlers involved. Population pressures had led to an increase in reliance on garden food, though the Mama Lus program for women (see below and Chapter Six) may have offset some of this pressure (Koczberski, Curry & Gibson 2001: xx-xxi). Thirdly, there were diverse forms of family engagement with the oil palm industry. These included, single families, work groups (wok bung), rotation systems and varying levels of labour engagement. All these had implications for an industry aiming to increase participation and efficiency. Finally, there were land conflicts in relation to 'sold' and leased land, in relation to the estates and mini-estates, the LSS and the VOP blocks. Land conflicts were particularly serious in Popondetta. These conflicts were "undermining small holder commitment to oil palm, and the long term viability of the industry". Several industry interventions had been made to improve participation and efficiency, the most successful of which was the Mama Lus scheme, for women. (Koczberski, Curry & Gibson 2001: xxiii-xxiv)

	Hoskins, WNB	Bialla, WNB	Popondetta, Oro	Alotau, Milne Bay	Lakuramau, New Ireland
Company	New Britain Palm Oil	Hargy Oil Palms	Higaturu Oil Palms	Milne Bay Estates	Poliamba
Ownership	80% Kulim (Mal), 15% WNB Gov	50% SIPEF (Bel), 50% PNG Gov	54% PACRIM (Brit); 46% PNG Gov	60% PACRIM (Brit); 40% PNG Gov	79% PACRIM (Brit), 19% NIDC
Estate area, ha	23,927	5,600	7,785	6,990	6,000
Estate production, tonnes FFB	555,680	82,374	147,141	197,885	103,739
LSS area, ha	3,021	2,161	1,045	nil	nil
VOP area, ha	1,634	1,067	4,448	536	648
LSS/VOP production	277,642	119,730	113,665	9,609	10,616
Mini-estate area, ha	7,128	nil	2,051	1,975	309
Total production, 2000	833,323	202,104	260,806	207,494	114,355
Source: Koczberski, Curry & Gibson 2001: 6					

Table 5.1 above shows the variety of combinations of plantation and small farmer oil palm cropping. In West New Britain (Hoskins and Bialla) and the Popondetta plains small farmers on their own customary land (Village Oil Palm - VOP) or leased land (Land Settlement Schemes - LSS) form a major part of the industry. However, all small farmers supply to, and are price dependent on, a single large company mill ('nucleus estate') in their area.

The experience of oil palm around Popondetta in Oro province is instructive, for the rest of PNG. In 2003 there were over 40,000 hectares of 'village oil palm', comprising 5,825 growers, (most of their holdings are between 2ha and 4ha), and some land settlement schemes (LSS blocks) for tenant farmers (Ruki 2003). All these small growers sell their fruit to the big Higaturu mill which, due to the failure of earlier privatisation attempts, is still 40% state owned. Although it has been estimated that the VOP oil palm plots might be no more than 20% of the VOP villagers' total lands (A. Koja 2003), oil palm is expanding in the region. The Oil Palm Industry Corporation (OPIC), which services the region's oil palm industry, takes subscriptions from growers but has also received substantial finance from the World Bank and AusAID, mainly for developing feeder roads which help trucks from the Higaturu mill go out to collect palm fruit from outlying areas.

The benefits of oil palm for the small growers at Popondetta were argued by Mr Leo Ruki, a Highland man and Project Manager for OPIC. He says that people in the villages are

wealthier and healthier, with better access to goods (Ruki 2003). In addition, the 'Mama Lus' system allows women collectors (over 2500 registered as at December 2002) of fallen fruit to gain some income. Others say the 'Mama Lus' scheme is said to have:

"received universal acclaim amongst smallholders - wives, husbands and children - and has substantially increased revenue for oil palm companies" (Koczberski et al 2001: 200)

Certainly there is a good trade in the supermarkets in Popondetta, on paydays.

However, Higaturu as the only buyer in the area sets the prices, and small growers complain bitterly about the low prices they receive. The Growers Association say their portion, in the grower-company split on the value of growers' fruit (based on a formula applied by the company - see section 5.2 below) is 55% (A. Koja 2003). Many growers earn about 100 Kina a fortnight, but this is a family operation, and is said to be very hard work compared to coffee or cocoa. In addition, the company does not pay separately for the palm kernels, even though they are sold separately. The growers believe they should be paid separately (A. Koja 2003). They would like to see a new mill, but this is beyond their means, at the moment. Contrary to the OPIC Manager, the Growers Association does not see much improvement in living standards over the past 20 years. They believe growers have been kept at a subsistence level (A. Koja 2003). Higaturu will not collect fruit from small growers if the roads are run down, and this has led to the pressure for World Bank and AusAID loans to maintain feeder roads to the Higaturu mill. Insecticides are used, as oil palm attracts hordes of rats and flies, and the plantation, settlement and village crops use substantial amounts of fertiliser (Ruki 2003). Appendix Tables 9 & 10 give some indication of the types of chemicals used by Higaturu.

5.2 How is the small holder share determined?

Small farmer participation in the industry is largely conditioned by the regional monopsony mills ('nucleus estates'), which limit returns and keep small farmers at the bottom of a long value chain. That is, powerful groups dominate the industry and restrict the share of income for small farmers. In recognition of this problem, there have been several attempts to improve the relationship, through reviews of the mills' pricing fixing decisions (the 'payout ratio'). These reviews have made some modest suggestions for an improvement in small farmers share, but their recommendations have not been binding on the companies and have in many cases been ignored. The World Bank has tried to discourage government involvement in the price reviews.

Despite the very limited impact of the price reviews, analysis of their method gives us some insight into the rationale of value distribution within the industry. Following is an outline of the price review process, and its reasoning.

In 2001 two consultants prepared a report (Burnett & Ellingsen 2001) for the Commodities Working Group of the PNG Government on a price regulation formulation, to protect small holders from the economic power of the monopoly mills (nucleus estates). This was the fourth report in a series. The first price review in 1990 came after an earlier report (Heaslip and Maycock 1990) drew attention to conflict over profit sharing between the mill and smallholders. This price review led to negotiations between the PNG government and milling companies, to develop a 'new and fairer pricing formula' (Burnett & Ellingsen 2001: 23). A second report in 1996, commissioned by the World Bank (seeking a lesser role for the PNG Government and backed by the companies - the Palm Oil Producers Association - POPA), simplified the pricing formula and introduced the 55% payout ratio (POR) for smallholders. The 1998 report (also by the 2001 consultants, Burnett & Ellingsen) urged (i) a shift from the 55/45 POR ratio to 60/40, (ii) a reduction in 'sales costs deductions for Palm Kernel from US\$80/tonne to US\$70/tonne, (iii) a shift in extraction rates (from fruit to palm oil) from 22.88% and 4.97% to 22.66% and 5.27% (CPO and PK), and (iv) a more commercial costing of transport for fruit, so that smallholders further from the mill would pay more. Only the second recommendation was taken up by the companies (Burnett & Ellingsen 2001: 24).

In their 2001 report, Burnett & Ellingsen formulated a 'break even' analysis for both smallholders and the oil palm milling company (the 'nucleus estate'). They presented a formula which deducted a collection of company 'sales costs', then compared the relative costs of small holder production with the costs of mill production. Fresh Fruit Bunch (FFB) values were converted to Crude Palm Oil (CPO) prices by a calculated extraction rate of 22.66%; similarly, Palm Kernel is converted to Palm Kernel Oil (PKO) by an extraction rate of 5.27% (Burnett & Ellingsen 2001: 24). They came up with a total cost of production figure of K110.58/Mt-FFB, split into small holder costs (K65.40 Mt/FFB, or 59%) and milling company costs (K45.18Mt/FFB or 40.86%). On this basis they slightly revised their 1998 findings, to suggest a 59/41 revenue split - in other words a recommended increase from the then practice of paying 55%, to 59% (Burnett & Ellingsen 2001: 48). Appendix Table Seven sets out the assumptions and formula of this cost-based price share model.

While in its conclusion the report recommended a 4% increased share for smallholders, two broader issues are notable from the method of the report: (i) explicit benefits, outside the 'break even' rationale, were identified as accruing only to the company, and not to the small farmers; and (ii) there was a fuller accounting of company break-even concerns, and a more limited calculation of small farmers 'costs'.

The report draws attention to several benefits, outside the 'break even' and subsequent 'Payout Ratio' cost calculations which are available only to the milling company:

- Benefits from European Union duty exemption
- FFA ('free fatty acid') quality premiums
- Gains from the devaluation of the Kina (devaluation lowers costs of production; farmers are paid in Kina but revenue is raised in dollars)
- Non-payment to small farmers for company use of shell fibre and compost materials
- Benefits from hedging and forward sales (Burnett & Ellingsen 2001: 3).

Farmers in Popondetta also complain of no separate payment for palm kernel (A. Koja 2003).

The report endorses the company claim of a lump sum deduction of US\$80 in 'sales costs', before the Payout Ratio calculation. This sum is said to cover company costs in "freight, insurance, brokerage, sales commission and overseas port charges". However the figures are largely taken on faith, as detailed accounts could not be scrutinised due to 'commercial confidentiality' concerns (Burnett & Ellingsen 2001: 36).

A further category of problems, not mentioned but implicit in the pricing review, arises from the choices made in calculating company and small farmer costs. The items included in company costs seem to comprise a fairly full commercial costing. For example, full labour costs (including high managerial salaries), depreciation of capital and various separate overhead costs were included (Burnett & Ellingsen 2001: 33-34). On the other hand, labour costs for small farmers were set at the minimum rural wage (previously they were 70% of this) and, while some land rent was added to the 2001 calculations for LSS farmers, no land rent at all is included for VOP farmers (Burnett & Ellingsen 2001: 31). The implications of these omissions are that (i) the costs of small farmers include only bare minimum subsistence

wages, while the mill calculations include actual premium salaries¹, and (ii) no opportunity cost calculations are made for the land contributions by most customary owners (this discounts potentially profitable alternative uses of land) and no depreciation of land (eg. through soil depletion and chemical pollution) is added - in contrast to the depreciation allowances included for the companies' capital investments.

5.3 The returns on oil palm for small farmers

The participation of small farmers in the oil palm industry does seem to enhance the cash economy of the Popondetta area. However, this does not mean farmers are 'better off'. A fuller examination of the benefits, costs and opportunity costs is needed.

In 2003 the late Anderson Koja, former Chairman of the Popondetta Oil Palm Growers Association, Village Oil Palm (VOP), estimated that growers in the Popondetta area only received an average of about 100 Kina per fortnight for production from their average 2-4 hectare plots of oil palm. This family income required quite an amount of work, at certain times of the year, and the growers were constantly upset at the poor prices paid for their fruit by the Higaturu mill (A. Koja 2003).

Returning to the Popondetta area in August 2005 I was able to carry out an indicative (or pilot) survey of 21 small farmers, including samples of VOP, LSS and non-oil palm farmers, from a range of village areas. I asked them about their land, their gardens, their cash crops, their outside employment and the people fed from their gardens (see Appendix Table 7). I also asked oil palm farmers for their comments on oil palm (see Chapter Seven). Having done a similar indicative survey on 19 small farmers in the Madang region the previous year (see Appendix Table 6) I was able to compare the Madang results with those from Popondetta.

These indicative (or pilot) surveys, while broad, were not broad enough to be able to calculate sampling errors. They therefore cannot be said to accurately represent their regions. However they do indicate the possibilities of cash crop production, and are suggestive of patterns of production. They also demonstrate the achievements of particular farmers, and say

¹ New Britain Palm Oil Limited, for example, notes in its annual report that 40 of its employees are paid more than 100,000 Kina per year

something about the potential of particular crops. With these limitations in mind, the surveys can help us understand some issues of interest to small farmers.

1. The *average* cash crop income of Popondetta plains farmers (3,045 Kina per family per year) was not higher than the average for the Madang farmers (4,213 Kina), who were engaged in more diverse cash crop production. Nor did the average cash crop income of the 14 surveyed oil palm farmers (3,980 Kina per family per year) surpass that of the Madang farmers. It did however exceed that of the non-oil palm farmers in the Popondetta area. As mentioned, due to the small sample, these *averages* cannot be taken as an accurately representative figure for either region. (Nor do the figures say anything about the *relative effort* involved in producing the various cash crops.) However these survey figures can be compared to data published by Warner and Bauer (2002: 10) for LSS farmers (information which seems to have been gained from Higaturu, via George Curry). They put average annual single household income from oil palm (including Mama Lus income) at 5,476 per block, 2,952 Kina for two household blocks and 2,167 Kina for the average LSS block of 2.9 household. This tends to confirm deteriorating and below average returns from LSS blocks

2. Oil palm farmers and non oil palm farmers alike remain heavily dependent on their gardens for subsistence food. Most of the Madang group expressed a 75-85% reliance on their gardens as a food source, while most of the Popondetta group expressed a 75-90% reliance. This supports the observations of Koczberski, Curry & Gibson (2001: 50), who also noted the dependence by oil palm farmers on other garden crops for market income.

3. The *diversity* of cash crops seems lower in the Popondetta group than the Madang group. Seven in the Madang group of eighteen had substantial income (1,000 or more) from three or more crops. Only three in the Popondetta group of twenty had substantial income (1,000 or more) from three or more crops. Further, the highest annual returns per family in the Popondetta pilot survey (9,940 Kina per year) were from a family which had (for an oil palm grower) unusually high diversity of cash crops.

4. The higher income earners in the Madang survey (six of whom earned as much or more than the most successful oil palm farmers in the Popondetta survey) all involved some degree of specialisation of cash crops (ie. crops grown for market, and not simply excess home produce) and some level of diversification (three or more substantial cash crops).

5. The highest cash returns in either survey were from Madang, where two groups (from Amele and Aparamu) raised a family average (per 7 persons) of 14,200 and 16,800 Kina per year from peanut, vanilla, buai (betel nut) and cocoa. These figures were well above the most successful oil palm farming groups in the Popondetta group (from Gona and Kakandetta), at 9,940 and 7,420 Kina per family per annum.

6. The clustering of seven oil palm Popondetta farming groups in above average cash income levels of 4,000 to 9,000 Kina (at a median of 5-6,000) suggests a good medium cash potential from oil palm but also a 'ceiling' that may be very difficult to surpass. Further evidence for such a 'ceiling' comes from the comments by many oil palm farmers that a disproportionate effort goes into their oil palm crops (see Chapter Seven). Despite this effort, none seem to have reached the income levels of the top earners in the Madang group, who supplemented their export crops (mainly cocoa and vanilla) with important domestic market crops such as fruit, peanut and buai. Sales of peanut and buai in local markets involve very short 'value chains', where the grower is often also the seller, and so is not 'taxed' by middlemen.

7. From observations, the lower diversity of cash crops in the Popondetta area (despite a thriving buai market in town, supplied from surrounding areas) is due to intensive plantations, the voracious nature of the oil palm monocultures (which deplete the soil and require substantial fertiliser) and the substantial labour time involved in oil palm cultivation.

8. The reviewers of the pricing formula estimated that VOP farmers with 2ha of oil palm require 110 to 146 'man-days' of labour per year, in the first three years of oil palm farming, and 41 to 53 man-days per year after that. LSS farmers on 4 ha blocks required 220 to 289 man-days in the first three years, and 70 to 106 man-days per year after that (Burnett & Ellingsen 2001: 9, 11). This is a substantial and long term commitment to one crop and, given that each day in these calculations was specifically accounted for, is likely an underestimate. People are usually less efficient than exacting models.

9. An easily observable cost of the oil palm monoculture is the degradation of water and river systems on the Popondetta plains, from land clearing, erosion and nutrient-rich fertiliser runoff. Local farmers often comment on the changed physical features of the rivers, and it is

plain to see that many rivers have silted up and are full of green algae. No doubt these rivers are biologically as well as physically transformed. This issue deserves a full study.

I repeat that sampling error calculations are not available for any broad assertions based on these small surveys. A fuller, representative study is needed to confirm (or modify) these preliminary findings. My conclusions based on this survey are cautious, and I have looked for corroborative evidence.

A likely 'ceiling' on cash income from oil palm seems related to the problems of a longer value chain applying to many commodity export crops (including coffee, but setting aside niche market crops such as organic and fair trade coffee), but also to the well recognised subordinate relationship that small farmers experience with the local 'nucleus estate'. As mentioned in 5.2 above, reviews of the payout ratio have acknowledged this problem, but have done little to shift it.

Data from Higaturu Oil Palm Limited (HOP) in 2004 tells us a little more about the small farmer-Mill relationship (see Appendix Table 5). Small farmer output in the Popondetta plains has expanded to match the Higaturu estate's fruit output, in recent years. However, when the world price of oil palm is high (as in 1998, and to a lesser extent in 2004) the fraction of FFB payments to the CPO world price declines (HOP 2004). That is, farmers get a smaller fraction of the overall value, when world prices rise. Despite a constant payout ratio, the nucleus estates manage to effectively capture most of the benefit of a price rise. This is one benefit; the mills have several, as mentioned in section 5.2 above. Popondetta plains farmers, for example, have long complained (A. Koja 2003) of no separate payment for palm kernel or palm kernel oil, which the Higaturu figures show constitutes about 8 or 9% of total revenues (HOP 2004).

5.4 The opportunity costs

Countering the medium level cash income possibilities of oil palm, are two important opportunity costs (costs involved in excluding alternative activities) arising from small farmer participation in oil palm. First, oil palm cultivation tends to reduce the diversity of production, by occupying land that becomes closed to companion planting. Oil palm trees,

being highly productive but also voracious, then deplete the soil of nutrients. Others have observed that:

“Growers of other crops can survive price drops more easily because they can plant a variety of different crops together (like coconut and cocoa). This way the growers always have another source of income and protection from market price changes .. [however] oil palm will not allow any other crops to grow alongside it.” (CELCOR 2005)

This is a common complaint amongst oil palm growers (K. Koja 2005).

It is well to say that oil palm trees can be neglected when prices are low (Koczberski, Curry & Gibson 2001: 18), and that alternative crops (coffee, cocoa, copra) can "provide an alternative income source when oil palm prices are low" (Koczberski, Curry & Gibson 2001: 42-45). However neglected hectares of prime land are a wasted resource, and alternative crops compete for space with oil palm. Small farmers do not have unlimited land, nor should we regard their land as having zero opportunity cost. It seems a common failure of Mill assumptions and analyses to suggest that customary land has no real economic value, and no potentially productive alternative uses.

Yet customary land has important subsistence value, as well as alternative cash crop potential. This is noted in practical surveys, though usually not given a monetary value. Koczberski et al note that about 80% of the diet of Kavui and Popondetta LSS farmers was from garden food, and that most women (100% on LSS blocks and 52% on VOP blocks) regularly sold market food, many relying on the market as their main source of income (Koczberski, Curry & Gibson 2001: 50 & 57-58). This was despite the Mama Lus scheme (see Chapter Six).

Based on food market values (see Appendix table 1) and a consumption survey (see Appendix Table 2) I have estimated the subsistence value of food and housing from customary land at a rough average of 13,500 Kina per year (Anderson 2006; and see Appendix Table 3). This figure represents the amount an average family would have to spend on food and housing rent, in local markets, if they did not have their land and gardens. This subsistence figure is, in most cases, greater (usually much greater) than the cash income from crops sold by families. There are certain assumptions behind these calculations (see the notes to Appendix Table 3), but the principle is very clear.

Such subsistence values must be added to alternative cash crop options in estimating the opportunity costs of customary land, if and when it is given over to oil palm cultivation. Small farmers are entitled to ask, and should ask: what subsistence and alternative cash crop value will be displaced by the oil palm?

The second important opportunity cost of oil palm is the sum of environmental costs. This report is not a study of those costs, but such a study is highly desirable. I will just identify what seem to be the main elements. Oil palm trees require complete land clearance, including logging, and this has important implications for erosion, topsoil depletion, and the siltation of rivers. The principal chemical pollution from oil palm (and this does not seem to apply to other PNG crops) is the extensive use of fertiliser which (i) to some extent compensates for the oil palm trees' depletion of soil nutrients, (ii) adds to the productivity of the trees, and (iii) runs off into the water table and river systems, causing algae blooms and damaging natural biological processes. Others have noted the impact of oil palm on endangered species, waterways, coral reefs and the oceans (Tan 2004: 4.10-4.11).

The environmental costs of oil palm plantations and the large mills need to be fully considered with particular reference to: (i) the impact of this particular form of monocultural agriculture on crop pests (eg. rats, flies) and the local ecology (including soil erosion and biodiversity impacts); (b) water and soil pollution by chemical and other wastes (eg. rat poison, tree killing chemicals, weed poisons, fertiliser run-off, oil mill waste, general mill/plantation sewage). At least ten types of fertiliser and ten types of other chemicals (surfactants, herbicide, insecticides) are used by the Higaturu Mill (see Appendix tables 9 and 10). An understanding of the impact of these chemicals is necessary for a full accounting of the opportunity costs associated with oil palm. How will these risks be managed, and who will pay? Detailed, independent advice to small farmers on this is essential.

5.5 Conclusion: the economic prospects for small farmers

In summary, the economic prospects in oil palm for small farmers seem limited; not least because of the dominant role of the price-fixing 'nucleus estate' mill. Both VOP and LSS farmers are in a weak market position, and while the actual cash performance of oil palm farmers in the Popondetta plains is at good medium levels, it does not seem to rise as high as

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that of some other non-oil palm farmers. These other farmers have been marketing a combination of cash crops such as peanut, cocoa, coconut, buai and vanilla. A cash income 'ceiling' seems to apply to even the most hard working oil palm farmers.

Countering the modest cash possibilities of oil palm we must consider the significant opportunity costs associated with oil palm - its contribution to a reduction in crop diversity, inflexibility introduced over land use, and its impact on soil depletion and chemical and water contamination. These are important considerations for small farmers contemplating entry to, or continuation in, the oil palm industry.

6. Gender, land and equity

This chapter offers some observations on gender, land and equity in the oil palm industry, based on the literature, land lease data and small farmer survey information.

6.1 The 'Mama Lus' Scheme

The 'Mama Lus' scheme is said to be empowering women in the oil palm industry, by setting up women only accounts for the women collectors of loose oil palm fruit, scattered by the processes of harvesting and hasty road side collection. Koczberski et al did some surveys on the Mama Lus scheme in WNB and Popondetta. They observed that women:

"identified more closely with marketing than with oil palm production ... partly a historical legacy of women's marginal status in the oil palm industry [and] it also reflects the immense social significance women attach to marketing and the marketplace" (Koczberski, Curry & Gibson 2001: 63).

However they also calculated that the Mama Lus scheme at Hoskins (since 1997) had delivered an independent source of income to women, who spent this money far more according to family needs. The average weekly income in 2000 for those with a 'Mama Card' at Hoskins was 28 Kina per woman which they note was "93% of the average weekly wage for low skilled rural workers". There was apparently unanimous support for this scheme, which gave women greater financial autonomy, and "only a few women mentioned the strain on the back from bending over and collecting loose fruit and none mentioned the time or work conflicts between lose fruit collection and their other work roles." The program, they concluded had been a "resounding success" (Koczberski, Curry & Gibson 2001: 174, 178, 193).

There were qualifications. The scheme had in many ways formalised the gender division of labour, with the main family account now being termed the 'Papa Card', and this was often 4 times as big as the Mama Card, and used more for discretionary income. Most women spoke of "the meagre contribution" made by their husband to the household budget (Koczberski, Curry & Gibson 2001: 174). The Mama Lus scheme has been less successful in Popondetta. Introduced in 1999, the income has been much lower than at Hoskins, and the mill (Higaturu) has begin making loan deductions from the Mama Card, where it believes loan repayments are being avoided on the primary card. (The Mama card had been shielded from loan

repayments to the Mill, for supplied fertiliser and tools, but this was regarded as allowing debt avoidance.) Higher levels of debts avoidance were also linked to insecurity of tenure on the LSS blocks (Koczberski, Curry & Gibson 2001: 195).

However a focus on gender equity within traditional families - and the assumption that a powerful company might usefully intervene in familial relation - tends to hide greater issues of equity in the oil palm industry. Oil palm companies make a great deal of money, largely through the land and labour of customary land owning families in their areas. New Britain Palm Oil, for example, has gained substantial financial strength from the land and people of West New Britain. In 2004 the company anticipated profits of over 126 million Kina, after paying its six directors one and a half million Kina, and after paying more than 100,000 Kina per year to 41 of its executive employees (NBPOL 2004: 6). It has invested in a cattle farming, treasury bills, a new oil palm business in the Solomon islands and it intends to expand to 80,000 ha its oil palm lands in WNB. It has also become a member of the 'Roundtable for the Production of Sustainable Palm Oil', a group that engages with potential critics in the NGO sector, to defend its reputation (NBPOL 2004: 8, 11-12). Higaturu Oil Palm, similarly, has made substantial revenue from oil palm.

Koczberski et al estimated that, at Hoskins in 2000, there were over 3,000 women on the Mama card scheme, earning an average of 1440 Kina per year, which represented 26% of total smallholder oil palm revenues in that area (Koczberski, Curry & Gibson 2001: 173-174). Yet from the NBPOL accounts the average director's fee was more than 160 times the average Mama payment, 40 senior employees earned 70 times the average Mama payment, and payments to the 14 most senior managers were more than 270 times the average Mama payment (see Appendix table 4). On top of this, post tax profits for NBPOL now exceed 80 million Kina per year. It is useful to keep this perspective, when speaking of equity in the industry.

6.2 Land disputes and land valuation

There are substantial and multiple land disputes associated with estate, mini-estate and land settlement scheme (LSS) land, used for oil palm. The conclusion is inescapable that the ongoing disputes are aggravated by the customary landowner view that large amounts of

money are being extracted from their traditional lands by the oil palm mills, and the proceeds are not being properly shared by their communities.

There are ongoing conflicts on the LSS blocks in both Hoskins and Popondetta. In 1993 settlers on 173 leased blocks at Kavugara (WNB) abandoned their block following pressure from local customary landowners. This land was handed back to the original owners, who then leased part of it to Higaturu as a 'mini-estate' (Koczberski, Curry & Gibson 2001: 124). Similar evictions occurred in Popondetta, and a major election issue in 1992 was "Oro for those from Oro". Many blocks were abandoned across all LSS divisions (Koczberski, Curry & Gibson 2001: 128). At the root of these land conflicts is the social reality that PNG customary owners do not accept commercial dispossession, maintaining their relationship with ancestral lands despite lease and claimed 'sales'. This of course adds to insecurity for those growing oil palm on leased land, especially the small growers on LSS blocks (Koczberski, Curry & Gibson 2001: 129, 138).

In Oro the 'Sangara Crown lands', on which the Higaturu mill and estate, and Popondetta township, are built, have been under constant dispute since independence. An area of land amounting to more than 14,000 hectares was transferred from 'Natives to the Crown', beginning with deeds in 1910 and 1917 which purported to exchange a large amount of 'unoccupied ... good agricultural land' for tobacco, axes, knives and matches (Papua 1917). After independence, and after 'numerous' disputes, there was a 1979 National Lands Commission hearing into 14 different claims from the Sangara Pressure Group. At the final hearing in 1981 the landowners were awarded 200,000 Kina. This money was paid to Mr McKenzie Jovopa on behalf of the landowners on 26 January 1982. The settlement covered several villages (Hohorita, Kakandetta, Ahora, Soputa, Mangi, Waru, Iwore, Koipa, Hamburata, Kanari and Dobuduru villages). The state said it wanted to 'stop once and for all' any further claims (Secretary for Lands and Physical Planning 1995). But there are still land and environmental damage claims, for example from the Kakandetta and Ahora groups (K. Koja 2005).

In 1999, Higaturu acquired 20 year leases on land for the development of mini-estate palm oil plantations. This represented an extension of estate plantations, but on leased customary land, under the lease-lease-back system. The rental and royalty values of these leases tell us something about the valuing of customary land, by the oil palm industry. All lease-lease-back

arrangements have to go through a formal process of the land being leased to the state for a peppercorn rent (say 10 Kina) then leased back to the company, with the state playing a protector's role over the use of precious customary land. However, in practice, the 'terms and conditions' of the lease are a market relationship between a powerful company and a group of asset-rich but cash poor landowners, with no experience of land transactions.

The Gou and Heropa leases provide examples of agreed and actual returns to customary landowners. The 1999 Gou lease to Higaturu, for mini-estate oil palm land, involved a 20 year lease on 91 hectares of land, with a set rent of 20 Kina per hectare and royalties at 10% POPA per tonne FFB (subject to review) (Gou and Higaturu 1999). '10% POPA' means 10% of the farmer gate price (see Chapter Five and Appendix Table 8 for this calculation) per metric tonne.

The agreement on 88 hectares of Heropa land went through some negotiations, beginning with a 20 Kina per hectare per year offer, suggesting three options: either 50 or 100 or 150 Kina per hectare per year, and royalties ranging from 20% to 30% POPA per tonne (Heropa Enterprise 1999). Actual payments on the Heropa agreement up to 2001 suggest that rents were settled at 20 Kina per hectare per year. Higaturu paid the Heropa group 3,400 rent in 1999, 600 Kina in 2000 and 1,160 Kina in 2001 (based on 53 hectares of trees planted up to the end of 2000). An initial payment in 1999 seems to have been part of the agreement. In addition to these paid amounts, the Higaturu manager noted that "outstanding rental of 120 Kina from 1999 and 2000 is to be paid on 23 March 2001" (King 2001). Documents on royalty payments to Heropa in 2003 show that the group was paid 277.76 Kina royalty on 15.99 tonnes of fruit in March 2003 (17.37 Kina per tonne), and 430.07 Kina on 29.56 tonnes of fruit in April 2003 (14.55 Kina per tonne) (Higaturu 2003). These figures look to be about 10% or 15% of the farmer gate price for 2003. The landowners did not get their claimed higher rents and royalties. Summed for one year (at an average of 350 Kina) and divided by 53 planted hectares (the figure from 2000, there may have been more planted by 2003) we come up with an annual royalty estimate of about 80 Kina per hectare. Putting the rent and royalty figures together we come up with a combined land value payment of about 100 Kina (see Table 6.1).

Table 6.1: Combined land value payment on the Heropa mini-estate oil palm lease		
	2001	2003
Rent per hectare	20 Kina	20 Kina
Royalty per hectare	?	80 Kina (est.)
TOTAL		100 Kina (est.)

A payment of 100 Kina per hectare per year might seem significant for ‘unused’ land held by cash poor families; however it is a very small fraction of the potential earning capacity of good agricultural land in PNG. The oil palm industry itself proves this, but so do the combined subsistence and cash crop incomes for just about every small farmer surveyed (see Appendix tables 6 and 7). I have conservatively estimated that good land for gardens and family housing delivers around 17,000 Kina per year value to an average family (see the previous chapter, and Appendix Table 3). Even the low to average cash crop returns on garden land (500 to 3,000 Kina) far exceed this 100 Kina royalty/rental. And many farmers are cultivating only about one hectare. Small farmers could grow just about any cash crop for local markets, with minimal effort, and still make many times the 100 Kina royalty/rent paid by the oil palm company, without losing control of their land and without experiencing the environmental damage.

This mini-estate land is not immune to land disputes. In 2005 another group of landowners contested the Heropa lease, saying that group had signed over some land that belonged to the Hatapa group, based in Hohorita village (Hevari 2005). Such problems become more difficult to resolve when there is a corporate contract and land clearing for oil palm.

The lease examples demonstrate that, where customary land is given any value at all (and its value is zero in the price sharing calculations for VOP farmers, as discussed in the previous chapter), it is substantially undervalued. Burnett and Ellingsen (2001: 31), while not including any rent at all in their VOP ‘cost’ calculations, seem to have adopted the token 20 Kina per hectare rent figure, by incorporating an 80 Kina rent figure for the 4-6 ha LSS blocks.

6.3 Conclusion

While the Mama Lus scheme brings some welcome income to women in oil palm areas, it is hardly a breakthrough in equity terms for poor women farmers and their families. The domestic market remains womens' chief social focus, and a potential source of greater cash income. It is misleading to present the Mama program as a great success, when annual incomes of several hundred to 2,000 Kina really represent the 'bottom of the ladder' in the oil palm industry. The position of poor families in relation to the Mill is a far more important equity consideration.

Land must also be at the root of equity considerations. Land disputes represent ongoing and serious equity issues, aggravated by the apparent extraction of substantial revenue from traditional lands. The major equity issue in the oil palm industry seems to be the maintenance of a large group of oil palm workers, and (at Hoskins, Bialla and Popondetta) a large periphery of customary landowners, on subsistence level wages, zero land rents and zero profit share, while the company directors, managers and shareholders make a great deal of money.

7. Small farmers' voices

What do small farmers themselves say about oil palm? Any serious analyst has to listen to the voices of those involved in the industry, and of those nearby.

Previous studies have noted the concerns of 'small holders' in PNG's oil palm business as including worries about (i) poor prices, (ii) the maintenance of other produce as sources of market income, and (iii) the maintenance of garden food, and concerns over food security. They say "Now the price of oil palm has dropped, we rely on the chicken business and local markets"; "garden food is something that is very important; "if the [oil palm] price drops significantly, then where will we find food to eat?"; and "I worry about my children. What will they eat if we don't have garden food?" (Koczberski, Curry and Gibson 2001: 66, 150). In another report, elder Hubert Seheute of Hohota village, who has spent twenty years working oil palm, explained:

"I thought I would be a rich man, but I am still looking for it. I have no money at this time. I don't have feeder road to my block. Hunting, gardening and other vacant land are now needed for oil palm. Fertile flat lands are most suitable for oil palm and it is now consuming what used to be our gardening land." (in Aurere 2003: 3).

These concerns underline the precarious existence, the low returns for small farmers and the pressure on land created by the oil palm business.

In my indicative survey of small farmers on the Popondetta plains, as well as collecting economic data, I concluded by asking the interviewees their opinion of oil palm and of any particular concerns that they might have. I spoke with 16 oil palm farmers and 5 non-oil palm farmers, across eleven clan areas (see Appendix table 7). There was very little positive said about oil palm, even from those with the highest returns. They repeated the concerns noted by Koczberski et al, and added concerns over:

- Chemical, soil and water pollution
- The appropriation and loss of customary land
- Poor returns for the effort involved in oil palm cultivation
- The 'crowding out' impact of the oil palm plantations on other crops
- The lack of support services

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- Injustices of the industry, including broken promises about the benefits and services to flow from engagement in oil palm cultivation
- The impact of oil palm on biodiversity and wildlife management areas (WMAs)
- Health problems, which were attributed to oil palm in their area, usually linked to chemical, soil and atmospheric pollution
- Adverse impacts on surrounding garden areas
- Problems of access to and the cost of transport, and inadequate or poorly constructed roads

The comments of these 21 farmers are set out in the following table. Their family annual income (averaged out for a typical family of seven) from oil palm and other cash crops is in brackets, after their comments. Note that some families with low cash crop incomes have outside employment, and that this income is not included.

Table 7.1 Small farmers' comments on and concerns over oil palm cultivation		
	Clan area	Comments
1	Ahora	Non oil palm grower – the Wildlife Management Area (WMA) has been affected by oil palm – Higaturu spraying weed killer affects us – rat baits are also washed into our rivers – our water is polluted (156)
2	Sorovi	We struggle very hard to meet our families needs – all our needs are not being catered for – it is very hard to get cash – we get no help from OPIC (7,000)
3	Kakandetta	Land has been taken by the state – we have limited land – chemical pollution has an impact – our gardens are next to a plantation – there has been a change in the size and quality of vegetables – I have mixed feelings, oil palm has taken a lot of land/space and we have to buy chemicals (146)
4	Sorovi	Returns are not really what we are supposed to get – most costs are on the grower - chemicals, tax, shipments – the company gets most

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		benefit – we have all the risks – the world price is 450 Kina per tonne and we get 121 Kina, and no money for the kernel – oil palm is not helping our people – there is no feedback from services (OPIC) – Higaturu doesn't do anything for us (6,000)
5	Kakandetta	Oil palm is not a good return for the work (3,937)
6	Kakandetta	We didn't know about the impact before growing oil palm – I am beginning to hate oil palm – the problems are transport, price and the single factory (7,420)
7	Gona	We knew it would change our lives, but I find it hard to believe we are going backwards – the effort we give, we are not getting what we expect – the problems? shortage of land and land disputes, the money is not sufficient, it goes quickly (this is where price comes in) and the health problems - babies and water – there is a lack of water and the water is not clean – it used to be clean (2,145)
8	Sosoba	Oil palm has brought injustice – the company didn't look at our needs – land was taken by the company (the Ambogo Estate) – the promised electricity, but didn't deliver – they destroyed our land with polluted water – there are now typhoid, diarrhea, cysts, asthma – oil palm depletes the soil – I would like to get rid of oil palm, and move to other crops such as vanilla and cocoa (6,341)
9	Aeka	Local contractors pick it up (there is a bigger cost being further from the mill) – fruit is sometimes left to rot – it is grown as another option (it replaced cocoa, because of lack of support for cocoa) – there is much more effort in oil palm than buai and peanut – most time is spent on oil palm, more time than in the gardens – there is lots of abandoned oil palm lots in this area – it's just too hard – we are looking for an alternative, thinking to go back to cocoa, though there is no fermentary at the moment – oil palm has an impact on soil fertility, we tried to grow bush bananas with it, but they don't grow well together – gardens next to oil palm have problems (1,680)
10	Ahora	Oil palm was to have brought social development – but we have not got the maximum benefit – there is water pollution – people

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		were encouraged to plant oil palm for ‘better houses and services’, but this has not happened – there are price problems and land degradation (372)
11	Ahora	Oil palm is labour intensive – not maximum benefits – there is water contamination – land degradation – palm seeds are getting into the native forests (796)
12	Gona	Oil palm is hard work for less money – the price varies – problems with pick ups – problems with water – not good drinking water and people are sick – an outbreak of TB (4,783)
13	Ahora	Labour is intense, less benefit – could be a good means of income but a hard task – not fit to work alone, need the whole family – more time is spent, little benefit - it cannot support the whole family – water is contaminated with chemicals – no buffer zones [next to rivers] – health problems – rotten fruit in the river too – air pollution, rain is acidic and attacks crops – pollution causes respiratory problems such as asthma, especially in babies – oil palm is a threat to native forest, it may take over rainforest and destroy it – no better drinking water, all water is contaminated (2,975)
14	Gona	Best cash crop but a very hard job – payment to growers is not adequate – families with many children have many problems [lack of income] – OK for families with two kids – oil palm gives us sickness (TB) and shortage of water – fish from river and sea are also damaged or sick – our environment and land has been damaged by oil palm (9,940)
15	Oro Bay	Non oil palm grower – no view on oil palm (n/a)
16	Ango	Non oil palm grower – will not have oil palm on my land – no extension services and no-one told me about the impact of oil palm – ‘after 50 years all the land will be damaged’ – that’s why I don’t plant oil palm – there has been chemicals change from the estate and mini-estate – the river water was clear in the past and is now dirty – the culverts have been badly constructed, against my advice, causing erosion of my clan’s land, the road will wash away in the next big rains – oil palm pollutes the river, I hate oil palm – there’s

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		not enough money in it and there have been empty promises of better housing, sanitation, etc – but from experience, the benefits have been less (602)
17	Ango	Just began growing oil palm – problems with payments and the environment – I was misled into planting oil palm and there will be no more, no expansion – now afraid of land being damaged and water polluted – protein in the rivers (fish and prawns) has been damaged – there might be a problem in the food chain (450)
18	Embogo	Non oil palm grower – no view on oil palm (1,225)
19	Dombada	Non oil palm grower – no view on oil palm (1,272)
20	Erora	Non oil palm grower – water has been affected here – algae growth in the rivers (Ambogo and Erora) – fish have been affected, they are unhealthy, small and have sores – a new type of snake has appeared (black with a white belly, poisonous) – in 2003-04 there was a big oil palm leak at Oro Bay when a ship was being filled – in the 1980s there was resistance and arrests when the Ambogo Estate was converted to oil palm from Cocoa (1,470)
21	Sorovi	I grow oil palm on an LSS block but am a firm opponent of oil palm – campaigning to draw attention to the damage caused by oil palm - ‘I hate it’ (2,184)
Source: Interviews by this writer with farmers in the Popondetta plains in August-September 2005		

8. Problems and alternatives

The main problems facing small farmers in the oil palm industry could be summarised as follows:

1. Small farmers have poor information about land values (yet this is relevant to their decisions to lease or otherwise alienate land) and about the costs and benefits of oil palm cultivation, and the alternatives. They have also been misled over these issues.
2. There are limited economic possibilities for small farmers in oil palm cultivation. The limits are imposed by their weak market position in a long export industry value chain, and by their weak market relationship with a large price-fixing mill. There is really no way for small oil palm growers to escape this subordinate relationship.
3. Oil palm plantations act to limit the development of other cash crops, as well as imposing some constraints on the productivity of nearby gardens. There is lower diversity of cash crops in oil palm areas.
4. Oil palm cultivation is a relatively inflexible form of land use. Land must be fully cleared and companion planting (as is done with other export crops, such as coffee and vanilla, and most domestic market crops) is generally not possible. This contributes to lower cash crop diversity and greater vulnerability to the local mill, as well as greater exposure to volatile world price regimes.
5. There are substantial environmental impacts from soil erosion, and from chemical pollution of soil and water. Land clearing, heavy fertiliser use and run-off are much more strongly associated with oil palm monoculture than any other crop in PNG. At least ten types of fertiliser and ten types of other chemicals (surfactants, herbicide, insecticides) are used by the Higaturu Mill.

The main alternatives to engagement in the oil palm industry (based as it is on the 'nucleus estate' and smallholder model) could be summarised as:

1. Promotion of independent, good quality information on land value and the cash economy, and the costs and benefits of varieties of cash crops, including oil palm.
2. Retaining control of and independent development on customary land, avoiding grossly undervalued leases (i.e. 20-100 Kina per hectare per year) and avoiding other forms of alienating valuable customary land.
3. Development of combinations of domestic and export cash crops at family and village levels. This means crops specifically designed for market and not just the sale of excess garden food. The domestic crops (eg. peanut, buai, cucumber, fruits) allow a far better share in the value chain, especially when the market or roadside is close; supplementary export crops (eg. cocoa, vanilla) allow access to a broader market. The highest incomes for small farmers have not come from oil palm farmers, but from those who successfully cultivate and market 3 or 4 cash crops, often 2 domestic and 2 export crops.
4. Development of marketing cooperatives to reclaim greater value shares amongst export crops such as coffee, cocoa and vanilla, and avoid middleman 'taxation'.
5. Development of local customary landowner-led collaborations in land care and environmental management. This could include local plans for regulating and prohibiting pollution of rivers, soil and groundwater.

9. Recommendations

1. CELCOR and other community groups with the capacity should produce, distribute and promote accessible, good quality and independent information to those small farmers contemplating engagement with oil palm, on land value and leases, on the costs and benefits of oil palm, and on the alternatives.
2. CELCOR and other community groups with the capacity should produce, distribute and promote accessible, good quality and independent information to those small farmers already growing oil palm, on the management of their oil palm plantations, and on (i) how to diversify their cash crops, (ii) how to manage the chemical impacts on their lands, and (iii) how to phase out unwanted oil palm plantations.
3. CELCOR and other community groups with the capacity should research and publish the ‘good news’ stories of those small farmers who, while maintaining their customary lands, have at the same time engaged successfully in the cash economy.
4. A full and independent report is urgently needed on the impact of chemical and other pollution on the Popondetta plains, as a result of the oil palm industry, with particular regard to the use of organic fertiliser and other chemicals used and distributed by Higaturu. The impact on local rivers, ground water and soil seems most important. The report should also have regard to the impact of land clearing, topsoil erosion and river siltation.
5. Less urgent, but important, would be a full representative survey (with a measurable sampling error) of the economic performance of small farmers on the Popondetta plains, to confirm or modify the economic data suggested by the pilot surveys carried out for this report.
6. Oil palm farmers should seek out information on the costs and benefits of their crops (in particular, from the experiences of other oil palm farmers), and seek advice on (i) how to diversify their cash crops, (ii) how to manage the chemical impacts on their lands, and (iii) how to phase out unwanted oil palm plantations.

7. Small farmers should seek out detailed information on the costs and benefits of oil palm, and alternative cash crops, before embarking on oil palm plantation. They should seek out independent advice and consider the environmental impact of oil palm from others with experience.
8. Development advice from the World Bank and the Asian Development Bank in PNG should be regarded for what it is – partisan advocacy of the interests of private foreign investors.
9. The PNG Government, in its protector role of customary land rights, should provide detailed, non-partisan advice to small farmers on the possible alternative productive uses of their customary land, and the likely environmental impact of oil palm plantations, before approving lease-lease-back arrangements for customary land, related to oil palm cultivation.
10. Australian and PNG community groups should demand a moratorium on Australian aid to PNG's oil palm industry until a full and independent environmental study is carried out and published on the existing oil palm plantation areas, and until detailed information is made available to affected small farmers about the proper valuation of their land and the practical economic alternatives to oil palm.
11. Most of these recommendations are intended to help meet the most important precondition for oil palm cultivation in PNG - gaining the properly *informed consent*, or informed rejection, of the customary landowning families who happen to constitute the overwhelming majority of Papua New Guinea's population. *Informed consent* cannot be inferred from a process where landowning families have (i) inadequate or incomplete information on the economic prospects for small farmers in oil palm, the environmental impact of oil palm, and the economic alternatives; (ii) inadequate time to consider and absorb this information and to seek independent counsel.

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11. Appendix Tables

- A1. Fruit and vegetable prices, Port Moresby, Goroka and Madang**
- A2. Estimates of the value equivalent of a typical daily family village diet from subsistence production**
- A3. Subsistence and cash crop values of customary land**
- A4. New Britain Palm Oil Limited, some indicators for 2000-04**
- A5. Higaturu Oil Palm Limited, harvest revenues and payments to small holders**
- A6. December 2004 farmer survey, Madang**
- A7. August-September 2005 farmer survey, Popondetta Plains**
- A8. Calculations used in the 2001 'oil palm fresh fruit bunch pricing formula'**
- A9. Chemical use by Higaturu in 2004**
- A10. Fertiliser use by Higaturu Oil Palms in 2004**

Appendix Table 1: Fruit and vegetable prices, Port Moresby, Goroka and Madang, Kina/kg, 2002*				
	Gordons (Port Moresby)	Goroka	Madang	Prices: POM/ Gor- Mad av.
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				208%
Source: FPDC 2002, pp.15-18, * October 2002 mean prices, largest volume traded items				

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 ##		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; **fried banana ½kg	1+0.50+0.60/1.8 6+0.50+0.90
Daytime snacks	Either pawpaw, ripe bananas or pineapple, 2kg; Coconut 3½*	1.60+1.32/ 3.80+1.54	Bananas, various fruits, nuts (galip, okari, peanuts), coconuts, & beetles	1.60+ 1.44+1.32?/ 3.80+2.10+1.54+?	Kaukau ½kg, one of bananas/pineapple/sugar cane/sugar fruit 1.5kg	0.33+1.20/ 0.62+3.00
Evening meal	Taro ½kg; kaukau 1kg; cooking bananas 1½kg; tomato ¼kg; onion ¼kg; carrots ¼kg ; plus some ginger/chillie/tumeric	0.36+0.80+1.08+0.5 2+0.83+0.55+1/ 1.10+1.24+2.15+0.6 6+0.75+1.75+1	Soup (greens, coconut, banana, taro), mix of banana/ casava/ yam/ kaukau/ tapioca, also tomato, onion, greens, various spices	1.44+0.80+1.08+0. 36+0.80+0.52+0.8 3+0.55+1/0.52+0.9 2+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, # Pig ¼ kg	1.3+0.4/2.5
Monthly foods	Bandicoot OR Tree Kangaroo (K10-20)	0.5/0.8 (equiv)	fish (4x year), chicken, goat and pig (2x year)	0.80+0.40+0.20/ 1.20+0.60+0.30	Cuscus - three times a year	n/a but 0.3/0.3 (equiv)
Total daily equivalent value (Kina)		13.26 / 31.20		16.9/27.71		9.38 / 19.89

Sources: Diet estimates and meat prices: Madang coastal (Paol 2004); Madang inland (Sindana 2004); Highlands (Sinemila 2004); Prices: Vegetables, at October 2002 prices in Gordon's (Port Moresby), Goroka and Madang markets (FPDC 2002); *one coconut per person every second day; ** fried banana perhaps every third day; # Some pig might be shared once every two weeks, ## quantities estimated as for Madang coastal

Appendix Table 3: Subsistence and cash crop values of customary land - per family, per annum, typical Kina or Kina equivalent -				
	cash income	subsistence value	employment income	total av. gross income equivalent
subsistence	av. 3,000 - 4,000	av 13,500	nil	17,000
land alienation	50 plus royalties	nil	2,000 to 10,000	6,050+
supplementation	av. 3,000 - 4,000	av. 13,500	av. 6,000	23,000
Assumptions: 1. average nuclear family of seven; 2. employment income for 'supplemented' group = one f/t job equivalent per family, at low to middle wage rates; 3. land alienation means 100% alienation Sources: see Appendix Tables 1, 2, 6 & 7				

Appendix Table 4: New Britain Palm Oil Limited, some indicators for 2000-04					
	2000	2001	2002	2003	2004
Revenue (000 Kina)	229,030	206,676	319,111	340,099	392,176
Pre-tax profit (000 Kina)	63,495	37,289	101,709	109,223	126,317
Profit after tax (000 Kina)	47,464	6,844	68,001	76,654	88,355
Tax paid (000 Kina)				32,569	37,799
Average price CPO (US\$/tonne cif)	346	297	387	446	420
FFB from estate plantations (tonnes)	560,093	498,865	502,533	552,284	614,960
FFB from outgrowers (tonnes)	275,902	265,500	259,144	264,967	288,878
Foreign exchange gain (000 Kina)				12,228	5,170
Director's fees (6 directors) (000 Kina)				1,480	1,489
Numbers of employees (not directors) paid more than 100,000 Kina pa				40	41
Numbers of employees (not directors) paid more than 200,000 Kina pa				28	27
Numbers of employees (not directors) paid more than 400,000 Kina pa				17	14
Numbers of employees (not directors) paid more than 800,000 Kina pa				2	3
Source: NBPOL (2004) Report to Shareholders, Kimbe (PNG), pp.6, 13, 14 [2004 figures are projections]					

Appendix Table 5: Higaturu Oil Palm Limited, harvest revenues and payments to small holders

	1984	1986	1988	1990	1992	1994	1996	1998	2000	2002	2004
Average farmgate price to small holder FFB (K/tonne)	76.87	9.04	30.99	7.06	22.24	36.48	58.39	136.22	74.37	138.45	158.38
price in US\$ (a)	86.53	9.39	35.77	7.49	24.09	36.09	43.85	65.5	25.67	34.01	47.87
Annual average price of palm oil in US\$/tonne (b)	704.18	279.69	450.92	298.57	393.38	453.48	573.55	632.8	382.62	390.57	424.45
Proportion of FFB payments to CPO world price: (a) as % of (b)	12.29	3.37	7.95	2.51	6.13	7.97	7.65	10.36	6.72	8.72	11.29
Higaturu sales revenues (US\$000)	31,613	12,448	19,581	15,540	20,421	22,557	32,109	32,370	18,736	25,744	33,096
the same in '000 Kina	28,084	11,985	16,965	14,664	18,859	22,804	42,754	68,304	54,280	104,808	109,502
of which: Palm Oil (000Kina)	25,888	11,438	15,431	12,888	15,732	19,054	38,297	61,888	49,732	97,992	100,631
: Palm Kernel (000Kina)	2,198	547	1,534	888	1,891	2,013	3,984	6,418	0	0	0
: Palm Kernel Oil (000Kina)									4,548	6,816	8,871
Total Higaturu FFB harvested (tonnes)	108,668	117,683	106,574	135,784	134,531	138,435	155,306	142,352	146,586	143,098	149,731
Total Smallholder FFB harvested (tonnes)	68,288	83,693	73,082	70,177	60,190	57,519	71,726	94,279	113,109	140,034	146,291
Source: HOP (2004) <i>2004 Year Book</i> , Higaturu Oil Palms Limited, Popondetta (PNG)											

Appendix Table 6: December 2004 farmer survey, Madang

Region	Prov	Gardens				Kina pa							Total	P7P	Supp?
		L/ha	HMW	HMF	%F	Buai	Cocoa	Coco.	Coffee	Vanilla	Other	Other*			
Raicoast	MAD	6	7	15+	75	1000	2000	500	0	1000	V,P,G,T	7000	11500	5360	nil
Aiome	MAD	1000	20	20+	100	2000	500	0	3000	not yet	M,V,P,B	500	6000	2100	DPI
aparamu	MOR	3	5	15+	85	2000	0	1500	0	not yet	P,M,B	12,000	15500	7200	nil
Amele	MAD	7	9	9+	75	5000	2000	300	0	5000		6000	18300	14200	WV
Tokain	MAD	3	7	15	75	2000	1400	2400	0	0		1000	6800	3170	nil
Bogia	MAD	2	8	8+	75+	100	100	0	0	450		0	650	570	nil
Raikos	MAD	300	30	30	na	500	0	2000	0	0		0	2500	580	nil
southkos	MAD	200	20	30	na	0	500	500	0	0		0	1000	230	nil
Baitabag	MAD	2	7	7	na	480	0	0	0	150		100	730	730	nil
Baitabag	MAD	1	na	na	65	150	0	0	0	0		70	220	na	nil
Gumine	SIM	3	2	5	60	0	0	0	90	0	Pineap	110	200	280	nil
aa	MAD	65	7	10	75	7300	0	0	0	2400		0	9700	6790	nil
Bogia	MAD	12	5	7	75	800	3000	0	0	0		0	3800	3800	nil
aparamu	MAD	20	7	15	85	3000	7000	1000	0	5000	P,B	20,000	36,000	16800	WV, DPI
aparamu	MAD	80	20	30	80	500	3000	100	0	320	P	5,000	8920	2080	WV, DAO
Saidor	MAD	1000	50	50+	90	3000	5000	4000	0	3,000	various	10,000	25,000	3,500	DPI, BRG
Transgo.	MAD	10	20	20+	75	2000	0	1000	0	not yet	P	20,000	23,000	8,050	Unitech st
E	SIM	2	5	50+	75	0	0	0	500	0	V,P	300	800	112	nil
cc	EHP	20	5+	10+	75+	0	0	0	400	0		0	400	280	na
TOTALS						29,830	24,500			17,320		82,080		75,832	
AVERAGE												Av of 18 -->		4,213	

V- vegetables L/ha = land in hectares DPI=Dept Primary Industry (av of 18)

P=peanut HMW= how many people work this farm? WV=World Vision

G=greens HMF= how many fed by this farm? DAO=District Agric Officer * peanuts were the biggest 'other' crop

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 Supp?= support services

interviews in Madang, Dec 2004 - assistance from Howard Sindana

Appendix Table 7: August-Sept 2005 farmer survey, Popondetta Plains (ORO)

Region	Gardens				Kina pa (farm income)													
	L/ha	HMW	HMF	%F	Buai	Cocoa	Cocon	Coffee	Vanilla	P'nut	Oil Palm	Other	Other*	Emp	Total	P7P	OP?	
1 Ahora	130	3	45	90%	0	0	0	0	0	0	0	F,V	1000	y	1,000	156	na	
2 Sorovi	2	2	6	75%	0	0	0	0	new	0	6,000		0	n	6,000	7,000	LSS	
3 Kakandetta	5		120	65%	0	B4	0	0	0	0	2,500		0	y	2,500	146	LSS	
4 Sorovi	6	2	7	75%	0	0	0	0	0	0	6,000		0	y	6,000	6,000	LSS	
5 Kakandetta	55	16	16	75%	new	0	new	0	new	0	7,800	Chkn	1200	n	9000	3937	VOP	
6 Kakandetta	15	15	15	75%	0	0	0	0	new	0	15,000*	Chkn	900	n	15900	7420	LSS	
7 Gona	18	8	23	90%	1000	0	0	0	new	0	3,300	F,V	2,750	yy	7050	2145	VOP	
8 Sosoba	4	7	17	50%	400	0	0	0	new	0	15,000*		0	n	15400	6341	LSS	
9 Aeka	15,000	10	50	90%	5,000	B4	B4	0	1,000	1,000	5,000		0	y	12000	1680	vop	
10 Ahora	210	172	172	10%	300	0	550	0	0	0	7,800	F,V	500	n	9150	372	vop	
11 Ahora	130	45	45	50%	500	new	1000	0	0	0	3,380	F,V	240	n	5120	796	vop	
12 Gona	6	2	6	80%	750	0	0	0	new	0	2600	F,V	750	n	4100	4783	vop	
13 Ahora	90	8	16	10%	500	0	750	0	new	0	4,550	F,V	1000	n	6800	2975	vop	
14 Gona	10	2	5+	80%	1000	0	2,500	0	new	0	2,600	F,V	1,000	n	7100	9940	vop	
15 Oro Bay	98	3?	14	80%	0	0	0	0	0	0	0	F,V,fs h	??	y	n/a	n/a	na	
16 Ango	1000+	35	50+	90%	500	400	500	2400	new	0	0	F,V	500	y	4,300	602	na	
17 Ango	1000+	50+	50+	90%	130	300	130	2400	new	0	new	F,V	260	y	3,220	450	not yet	
18 Embogo	200	10	10	80%	new	new	0	0	new	0	0	F,V	1,750	n	1750	1225	na	
19 Dombada	10	11	11	60%	200	0	600	0	0	0	0	F,V	1,200	y	2000	1272	na	
20 Erora	1 or 2	2	5+	25%	350	0	250	0	0	0	0	F,V	450	yy	1,050	1470	na	
21 Soravi	10+	20	30+	50%	0	0	0	0	0	0	7800	F,V	1,560	n	9,360	2184	LSS	
TOTALS																	60894	
AVERAGE																		Av of 20 --> 3045

L/ha = land in hectares

HMW= how many people work this farm?

HMF= how many fed by this farm?

%F= what proportion of their food from farm?

Interviews in Oro August 2005

P7P= annual income per 7 people (weighted family)

Supp?= support services

Other = other farm income? (fruit, vege, chicken, fish)

Other* = other non-farm income? (work, pension, business)

Emp = outside employment

Appendix Table 8: Calculations used in the 2001 'oil palm fresh fruit bunch pricing formula'	
Payout ratio elements:	
1. CIF oil palm prices	Monthly average prices from 'Oil World', for month preceding FFB payment
2. Sales costs	A deduction before POR, for company sales costs, includes - freight, sales commissions, brokerage, insurance, overseas port charges
3. Extraction ratios	Converts FFB to oil palm products by ratios: CPO: 22.88; PK: 4.97
4. Exchange rates	Bank of PNG \$US and \$A rates, averaged
5. Transport costs	Deducted by company from millgate prices, eg HOP: 18K/Mt
6. VAT	Charged through a credit to farmers on the POR; reclaimable by the company
7. Levies	OPRA fees: 0.9K; OPIC fee: 3.5K (companies applying PPF pay a matching fee); and a fee of 1K for pest control is paid by farmers at Hoskins
8. POR	The post-1996 55% payout ratio is represented by this formula: $[A \times (\text{CPO CIF-US\$ Sales costs})] + B \times (\text{PKO CIF-US\$ Sales costs}) + C \times [(\text{PKE CIF-US\$ Sales costs}) / \text{US\$}/\text{Kina}] = \text{FOB Palm product value} \times \text{POR} = \text{millgate price} - \text{FFB transport, VAT \& levies} = \text{Farm-gate price}$ // A, B & C = industry standard extraction rates for CPO, PKO and PKE
Cost assumptions:	
1. Labour costs	= 5.50K per day (previously 3.85K - 70% min rural wage)
2. OPRA levy	= 0.90K per ton FFB (previously 0.56K)
3. OPIC levy	= 3.85K per ton FFB (previously 3.50K, now includes 10% VAT)
4. Land rent	= 80K per block per annum (LSS only - previously not applied)
5. House	= 1,000K (for VOP block, prev. 950K) = 3,500K (LSS block, prev. 2,500K)
6. Growers Assn fee	= 24K per block per year (previously 12K)
Example:	
Higaturu (Oro) 2001	Kina palm product value of 1 mt FFB = 238.89K; farmers payout at 55% = 131.39K; add 1% VAT = 1.31K; less OPRA levy = 0.90K; less OPIC levy = 3.5K; less VAT at 10% on OPIC levy = 0.35K; Mill-gate price = 127.95K; less FFB transport costs = 18K; = Farm-gate price = 109.95K
Source: Burnett & Ellingsen 2001: 25-28, 31	

Appendix Table 9: Chemical use by Higaturu in 2004			
Product name	Product type	Amount used	Value US\$
L1700 x 10	Surfactant	80 litres	447
24D amine	herbicide	4,406 litres	12,406
Activator 90	surfactant	1,980 litres	7,100
Trichlor tables x 10kg	chlorine	70 buckets	6,192
Glyphosphate 450	herbicide	17,022 litres	51,847
Gramoxone x 5 ltr	herbicide	3,685 litres	16,816
(Alloy) Metsulfuron x 500g	herbicide	169 per container	8,901
Icon 10WP x 50g	Malaria control insecticide	287 pkts	3,359
Diuron 500 FW	Herbicide	200 litres	1,005
Icon 2.5Cs x 500mls	Malaria control insecticide	18 per container	269
Source: HOP (2005a) 'Chemical use in HOP 2004, unpublished log			

Appendix Table 10: Fertiliser use by Higaturu Oil Palms in 2004		
	Total tonnes	Tonnes per ha
Organic fertiliser EFB:	45,027	17.59
Inorganic fertilisers:		
Am Chloride	1,757	1.6
Am Nitrate	96	0.49
Am sulphate	18	0.45
Calcium Borate	9	0.06
Potassium Chloride	1,376	1.72
Kieserite	56	0.97
Sodium Borate	39	0.04
Sulphur	6	0.19
TSP	10	0.15
Source: HOP (2005b) 'Estate report: fertiliser applied', 18 July, Pacrim Higaturu Oilpalms, Agrisoft systems printout, Popondetta		