

The Effects of Palm Oil Biodiesel in Producer Developing Countries:

A Case Analysis of Malaysia

Linking National Perspectives with Ground Realities

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Abstract

The growing economic risk of relying primarily on fossil fuels with unstable prices and which availability highly depends on limited reserves and poor global distribution has increased the international interest on modern biofuels as an alternative energy source. Moreover, the growing awareness of energy-related pollution and of climate change consequences, and the international and national strategies to comply with Kyoto Protocol, has put biofuels on the global agenda. This interest has created a new market opportunity especially for developing countries in the tropics, where the production of biofuels and their feedstock can be very lucrative and contribute to the sustainable achievement of Millennium Development Goals (MDGs), in this case particularly MDG 1 (poverty eradication) and MDG 7 (environmental sustainability).

A clear example of a developing country engaging seriously and at a large scale in biofuels development is Malaysia, the current leading global palm oil producer. Malaysia has started an extensive biodiesel program and has committed to expand palm oil production and set aside almost 40% of it for biodiesel. However, there are both environmental and developmental risks related to upstream impacts in that country that should be better understood and considered if the development of biodiesel as a means to contribute to meet the objectives of sustainable development is to be ensured.

Through a stakeholder analysis, this study seeks to understand how key actors related to biodiesel and sustainable development at the national level perceive the future development of biodiesel and the related key issues and benefits for Malaysia, and to juxtapose these views with activities and “realities” on the ground. At ground level this study assesses three case studies in the State of Sarawak –Borneo Island, East Malaysia – where palm oil plantations are currently expanding. The ground level analysis focuses on the effects of palm oil plantations development on the rural development objectives of this State and on the sustainability of local livelihoods.

The study concludes that although at national level the development of biodiesel and expansion of its feedstock production is an attractive opportunity, at local level this development involves significant trade-offs. While a clear potential for socio-economic benefits contributing to MDG 1 exist, there is a number of negative externalities that put at risk the local environmental sustainability (MDG 7) and also jeopardize the sustainability of local livelihoods by affecting native communities’ ability to fulfill their subsistence needs, thus making them more vulnerable by weakening their risk minimization strategies for self-sufficiency. Finally, this study suggests possible principles and strategies for further research that could enhance the contribution of palm oil plantations and biodiesel development to local socio-economic development (MDG 1) and minimize local environmental degradation (MDG 7) and sustainable livelihoods erosion.

“As the world’s main producer of palm oil, Malaysia’s involvement in the biofuel industry is timely since state of the art biofuel technology and innovation is to be deployed to complement the rapid progress of the palm oil industry”¹

“Rural communities must not be left out from the mainstream of development that is taking place in the country towards achieving Vision 2020. Landowners who are not prepared to change will be left behind; those who are left behind will remain poor forever. Large-scale plantation development is the most logical and perhaps the best option to bring them out of poverty”²

“Losing our land is like losing our freedom, our heritage and finally our identity”³

¹ Rahman A, Chief Executive Officer Malaysia Energy Centre,
² Ministry of Land Development of Sarawak, ³Laing H. ‘Dayak’ of Sarawak

Executive Summary

The rapid depleting sources of fossil fuels, concern about environmental pollution as well as escalating oil prices have catalyzed efforts to look for alternative energy sources that are both renewable and environmentally friendly. In this respect, biofuels have an important role to play as alternative sources of energy. For instance, biofuels can lessen the dependency on fossil fuels and contribute to energy security national strategies. Moreover biofuels are targeted in international and national agendas as means to comply with Kyoto Protocol targets and as Climate Change mitigation measures. This increasing interest on biofuels has created a new market opportunity especially for developing countries in the tropics, where the production of biofuels and their feedstock can be very lucrative and have the potential to contribute to poverty alleviation directly by the development of domestic industry, employment and national economic health. The main challenge lays in enhancing these benefits while minimizing the local risks related to biofuels and their feedstock development so that the objectives of sustainable development – sustainable achievement of Millennium Development Goals (in this case in particular MDG 1 and MDG 7)¹ in addition to economic growth – can be met in developing producer countries.

Malaysia started its research on biodiesel in 1982, however, the recent increase in global interest put on biofuels has kick-started the biodiesel industry in the country. Indeed, related to such developments, Malaysia set the national target to increase palm oil production to 19.6 million tonnes by 2010 under its Ninth Plan (2006-2010) – equivalent to an increase of 4.5 million tonnes – and the country has announced its commitment to allocate 6 million tonnes of its palm oil production to biodiesel in the coming years. Moreover, in line with its Five-Fuel Diversification Policy introduced in 2001, Malaysia issued the National Biofuel Policy in 2006 which provides a framework with concrete initiatives to promote palm biodiesel within the country. As such, the new window of opportunity provided by buoyant international and prospective domestic demand for palm oil and palm biodiesel presents a series of potential benefits for Malaysia at national level: expansion of their economic growth, growth of their palm oil industry and stabilization of palm oil market prices, decreases in reliance on fossil fuels that are highly subsidized in this country, contributions to local clean fuel consumption and climate change mitigation measures, improvements in export/import balance of fossil fuels and savings in foreign exchange.

In addition to the benefits of biodiesel development at national level, the production of its feedstock in rural areas – in particular in States where palm oil plantations are expanding such as the State of Sarawak in Borneo, East Malaysia – is promoted on the basis of a series of local socio-economic benefits. Namely that it is held to create employment opportunities, thereby ensuring sustainable source of income in these areas; to raise the standard of living of the rural people and contribute towards poverty eradication; and to be part of a more balanced development between the rural and the urban areas.

¹ Although all eight MDGs are enhanced by the introduction and expansion of renewable energy sources, the MDGs most critically influenced by modern biofuels produced in developing countries are MDG 1 (poverty eradication) by the generation of incomes and employment and productive opportunities in the rural areas; and MDG 7 (environmental sustainability) by providing alternatives to current patterns of conventional energy production and consumption based on fossil fuels, and ensuring that the production and use of cleaner fuels and improved energy efficiency contribute to a wiser use of natural resources, to reduce environmental degradation and to mitigate emission that contribute to climate change.

These local socio-economic and national benefits resulting from biodiesel and its feedstock development are in line with rural development objectives of the country States and also with the national development vision of Malaysia to become a developed country by 2020. However, there are related issues and risks at global national and local level that should be considered because they can be counterproductive to the country's objectives and can affect in particular the minor stakeholders who are the most vulnerable to negative externalities of such development.

The main key issues at national and global level for biodiesel development identified through a stakeholder analysis are price development for fossil fuels, demand for edible oil, palm oil commodity price fluctuations, and international and national strategies targeting biofuels.

On the one hand, crude palm oil commodity prices increase resulting from the global palm oil demand rise affects the profit margin of the biodiesel industry and also the food industry that constitutes an important and competing market. As a result, biodiesel projects development in Malaysia might slow down and edible oil and food production costs might go up with negative consequences for consumer countries, especially developing countries such as India and China. In the same line, demand for vegetable oil, in particular in these countries, is increasing due to population growth and relatively weak domestic oilseed production, causing in turn international edible oil demand to rise – a factor that also results in an increase in palm oil commodity prices. Last but not least, the recent decrease in fossil fuel market prices threatens the price competitiveness of biodiesel, especially in those countries that do not have any specific economic incentive to support its economic viability and/or development.

On the other hand, palm oil global demand rise and palm oil commodity price increase result in national revenues for Malaysia as palm oil industry is the third largest contributor to export earnings in the country. This means that if palm oil demand and commodity prices continue rising, it is of benefit to Malaysia to export it to those countries that offer the most and are bound by mandatory national regulations to reach biofuels consumption targets (i.e. the EU, Korea, China, India, Japan). On the contrary, if palm oil prices decrease it is in the interest of Malaysia and the palm oil industry to value-add and export and to create additional demand by implementing a mandatory target for domestic biodiesel consumption. On this basis, biodiesel is considered by many stakeholders a price leverage mechanism for palm oil in Malaysia whereby the Government – together with the palm oil industry - has to find on the basis of global dynamics the balance that would favour the most the country's economic interests.

Sustainability is also considered a key issue for the development of biodiesel in Malaysia, and a very sensitive issue as well. All the same, it is considered of major importance to maintain the demand of biodiesel and ensure its export market – in particular since demands and evidence of good (sustainable) production practices are emerging among the importer countries, especially in the EU. The issue is seen more as a matter of time, whereby more companies have to commit to already started work on sustainability criteria – such as the Roundtable for Sustainable Palm Oil Production (RSPO) criteria. In general, the national approach to sustainability seems to be positive, first in terms of economic sustainability due to the high productivity of palm oil compared to other oil crops, second in terms of performance because of the high environmental performance of palm biodiesel compared to fossil fuel and its high energy balance ratio and third, because it seems that the almost 30 years of palm oil production in Malaysia has allowed the industry to gain experience and develop sustainable practices to cope with future challenges.

Although at national level the opportunities related to biodiesel development and expansion of palm oil production seem to be appealing, at local level this option does not seem so attractive and involves significant trade-offs. The contribution to rural development from palm oil plantations development differs according to the development interests of the State², the level of involvement and participation of the communities, their attachment to traditional practices and the natural resources upon and within their land and the vision of the future they have. In socio-economic terms, communities involved and participating in large-scale palm oil plantation development schemes can benefit from additional cash incomes from labor opportunities in the plantations and from the palm oil production profits gained from giving their land to the scheme. In addition to cash incomes, communities can benefit from new services and infrastructure provided by the State Government as part of the condition for supporting State Government top-down development strategies and participating in the scheme.

However, although palm oil plantations under these schemes have the potential to bring socio-economic benefits to the native communities participating in it, there are related risks that can be particularly detrimental for the sustainability of these communities' livelihoods and the local environment. Firstly, development of palm oil plantations causes a change in the traditional land-use management practices and a shift in time labor spent in subsistence production activities, resulting in production reduction and intensification of traditional farming systems. Secondly, it reduces the access of native communities to traditional productive factors and natural resources such as forest resources and land. Third, it has a negative impact on the local environment causing forest fragmentation, biodiversity degradation, river water pollution, soil loss and affecting communities that depend on these resources and the ecological services that they supply (but are not traded on the market) to fulfil their daily needs. In short, the effects of palm oil plantation development on the local environment and the ability of native communities to practice the traditional socio-economic activities necessary to fulfill their subsistence needs jeopardize the sustainability of their livelihoods. As such, it increases their vulnerability and weakens their risk minimization strategies to secure their basic needs, one of which is food security. This can reach even higher levels, whereby current pressures on land, declining production trends and the State's objectives of palm oil plantations expansion jeopardize the State Government's food security objectives to reach 90% self-sufficiency in rice by 2010. Moreover, to consider cash incomes as a substitute that allows communities purchasing food instead of producing it, adds to the argument that communities become more vulnerable since once their ability to be self-sufficient is diminished, food security depends on external factors.

This situation becomes even more complex if one considers that these external factors upon which communities participating in palm oil plantation schemes depend now are very uncertain. For instance, communities participating under schemes such as the one promoted under the New Concept³ in the State of Sarawak rely now on: cash incomes from low wage labour on a daily basis contract in the plantations; additional cash incomes concentrated on an economic activity such as palm oil production – which similarly to cash crops depends on market fluctuations – as the alternative to diversify their economy; increasing labour competition due to Indonesians immigrants that settle in the region to work in the plantations

² 'State' and 'State Government' refers to the State of Sarawak and its Government.

³ The 'New Concept' scheme promotes the development of native customary land – land that belongs by customary rights to native communities – into large-scale palm oil plantations. In turn for giving their land to be developed, native communities become shareholders of a JV scheme together with the State Government and the private sector. As such, they are provided cash incomes from the palm oil production and in addition they have access to wage labor in the plantation and new services and infrastructure.

without demanding quality work conditions – in other words maintaining pressure for low wages at plantations; and less access to productive and natural resources as a result of giving away their land to be developed. On top of that, participating communities highly depend now on the State Government provisions – paternalism approach – for the welfare of the community. Moreover, despite being shareholders in the JV scheme, they do not have any participation in the decision making process related to the operations of the company neither access to regular information nor financial statements. Last but not least, communities do not have a comprehensive understanding of the modus operandi of the scheme; in particular there is no certainty in relation to recovering their land after the 60 years duration of the scheme project.

In sum, although schemes such as the New Concept have the potential to improve the socio-economic status of participating native communities, take them towards ‘progress’ and integrate them into the market economy, the uncertainties related to it increase their vulnerability, put at risk their risk minimization strategies to fulfil their subsistence needs and thus undermine the sustainability of their livelihoods.

In this line, the introduction of a certification system or sustainability/environmental requirements that lead to better sustainability performance in the palm oil sector would be in the benefit of Malaysia. Although the burden would be put on palm oil and biodiesel producer companies probably reducing profits, the externality costs that are currently borne by native communities and the local environment – and thus Malaysian sustainable development if considering MDG 1 and MDG 7 – could conceivably be reduced.

To conclude, it is worth mentioning that palm oil plantations have the potential to meet rural development objectives and the sustainable achievement of MDG1 and MDG 7 if there is commitment towards the wellbeing of native communities, attractive wage labour opportunities (likely to require significantly higher wages than currently offered), work requirements that include regulations to preserve the local culture and prevent social erosion caused by immigration overload, recognition and respect of native communities customary rights, high level of stakeholder participation, and transparency in the consultation and decision making process. It seems hopeful, or even likely that palm oil plantation schemes following such principles can raise standard of living of native communities and contribute towards poverty eradication in the rural areas (MDG1). Last but not least, there is a large opportunity gap in mitigating and/or preventing negative impacts on the local environment (MDG 7) that needs to be exploited further. Environmental responsibility and sustainable production practices should be a learned lesson from a long experience producing palm oil. Malaysia, as a country in its way to become a developed country in the next decade, could serve as example for other countries following the same path and thus take a position where its national development strategies account for ground realities.

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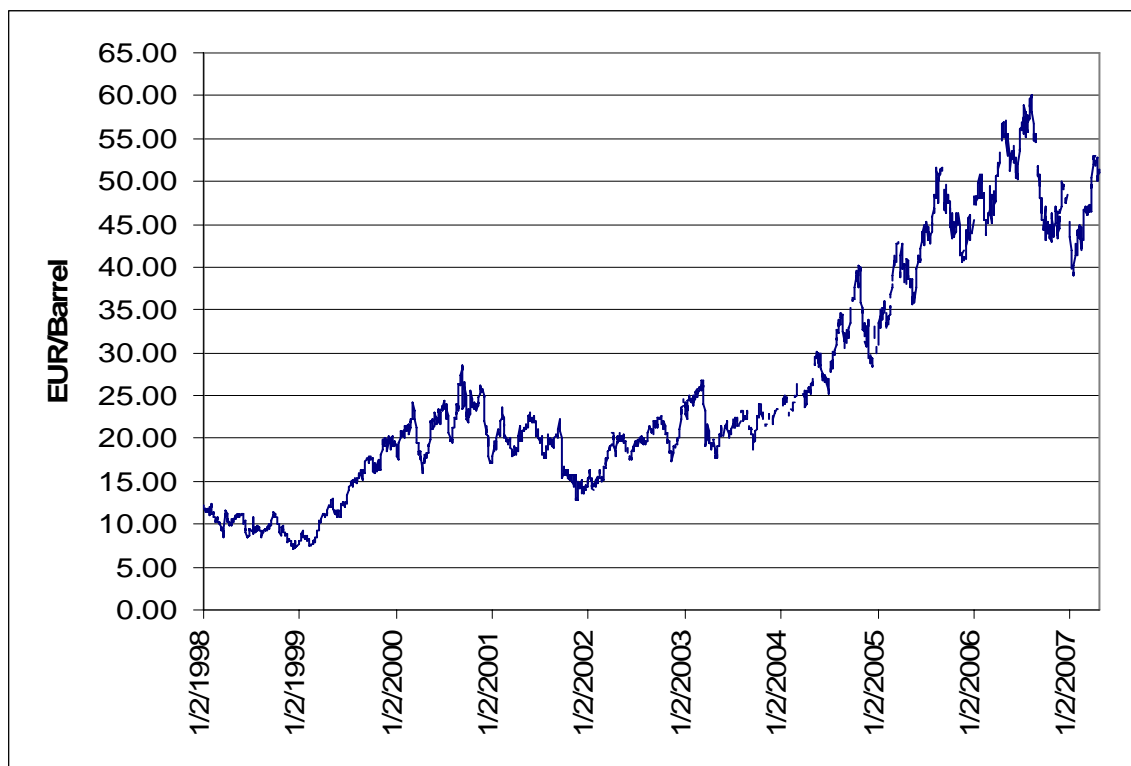
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1 Introduction

1.1 Background and Problem Definition

The economic risk of relying primarily on imported energy has grown in recent years as oil prices have become less stable, doubling in less than two years the price levels of 2004 and reaching in 2006 oil prices that surpassed the peaks seen in September 2005 (Flavin and Hull Aeck 2006, ESMAP 2006) (see Table 1-1). This chronology of events shows that high oil prices do not appear to be temporary and oil prices may raise again (ESMAP 2006). As a result of the increase in oil market prices, the commercial viability of alternatives to fossil fuel has become attractive. Moreover, the growing awareness of energy-related pollution and of climate change consequences, as well as the commitment to comply to the Kyoto Protocol targets that encourage the use of less greenhouse gases (GHG) emitting sources of energy, are clear messages for a change towards a more sustainable production of energy (Goldemberg and Johansson 2004, UNCTAD 2006).

Figure 1-1 Northwestern Europe Prices of Crude Oil (Spot Prices Brent Crude Oil)



Adapted from Official Statistics from the U.S. Government 2007 (Energy Information Administration)

One of the sectors that deserve special attention in respect to the issues above exposed is the transport sector. The demand for transportation is expected to grow rapidly in years to come and therefore gaining greater efficiencies and diversification in this area will be essential. Fossil fuel accounts for 97% of transportation energy in the industrialised countries, with natural gas (2%) and electricity (1%) accounting for the rest (Goldemberg and Johansson 2004). The transport sector is growing faster than any other end-use sector in these countries, whose increasing dependence on fossil fuel is one of the most challenging problems of the next decades. Growing dependence on fossil fuels is even more serious in the developing countries,

where energy demand is rising three times faster than in OECD countries (Goldemberg and Johansson 2004). With high oil prices and increasing environmental concerns, substitutions in the transport, energy and industrial sectors with alternative fuels are taking place. One group of alternative energy that has benefited particularly in this sector and that is of major potential importance to developing countries is ‘modern liquid biofuels’⁴ (UNCTAD 2006). At present, there are two main types of modern liquid biofuels – hereafter referred to as ‘biofuels’ – which are also often referred to as first-generation biofuels as the technology is already in place: bioethanol, which is alcohol derived from sugar or starch, for example from sugar beet, cane or from corn, and biodiesel, derived from vegetable oils, for example from rapeseed oil, palm oil, jatropha, or soy oil (Brown 2006)⁵. The European Union is a clear example of support of this substitution, by setting targets for increasing the use of biofuels in energy consumption for transportation to 5.75% by 2010 and 20% by 2020 (IEA 2005). The Biofuels Directive issued in 2003 by the European Commission set measures to promote the use of biofuels in EU countries and fulfil their commitments to achieve the proposed targets (Directive 2003/30/EC).

Furthermore, at the World Summit on Sustainable Development (WSSD) in 2002, the international community agreed that renewable energy must be part of the solution to achieve the Millennium Development Goals (MDGs) (Goldemberg and Johansson 2004, Flavin and Hull Aeck 2006). The rapid recent growth in renewables coupled with ongoing technology improvements and cost reductions, is making a growing selection of renewable energy options available to help achieve the MDGs (Flavin and Hull Aeck 2006). Although all eight MDGs adopted under the Millennium Declaration in 2000 are enhanced by the introduction and expansion of renewable energy sources, the MDGs most critically influenced by biofuels produced in developing countries are: MDG 1 (eradicate extreme poverty and hunger) by the generation of incomes and employment and productive opportunities in the rural areas; and MDG 7 (environmental sustainability) by providing alternatives to current patterns of conventional energy production and consumption based on fossil fuels, and ensuring that the production and use of cleaner fuels and improved energy efficiency contribute to a wiser use of natural resources, to reduce environmental degradation, to mitigate emission that contribute to climate change and to respect the local and global environment (Nishimoto 2004)⁶.

Moreover, in Chapter III of the Johannesburg Plan of Implementation⁷, on “Sustainable Consumption and Production Patterns”, governments agreed to boost substantially the global share of renewable energy sources, with the objective of increasing the contribution of renewable energy to total energy supply (Flavin and Hull Aeck 2006). In the Implementation Plan the role of national and voluntary regional targets and initiatives was recognized – for

⁴ A term used to distinguish processed biofuels like ethanol and biodiesel from “traditional biofuels”, like biomass, dung or wood, which are usually burned in an unprocessed state to provide heat and energy.

⁵ Second-generation biofuels – expected to be introduced on the longer term – include gas or biomass to liquid (GTL/BTL), in which biomass or gas is processed into synthetic diesel, or ethanol produced from biomass and cellulose (i.e. straw, corn cobs). These biofuels achieve higher CO₂ reduction and will be needed to expand the volume of alternative feedstock needed in the production of biofuels. There are already test projects across the EU and in other parts of the world; however, much more R&D is needed for production on a commercial scale at acceptable costs (Rabobank 2005).

⁶ MDG 4 and 5 (reduce health problems) are also influenced by the use of biofuels by reducing (indoor) pollution and related respiratory diseases. This however, is also close related to MDG 1 (poverty eradication) and MDG 7 (environmental sustainability) in that their achievement would partly contribute to the achievement of MDG 4 and 5. Therefore, the focus of this study is put particularly on MDG 1 and MDG 7.

⁷ The World Summit for Sustainable Development (WSSD) met in September 2002, and its Plan of Implementation made specific recommendations on energy access to facilitate the achievement of the Millennium Development Goals and established a clear link between energy and the eradication of poverty.

instance, regional targets as the ones set by the 2003 EU Biofuels Directive – and the need to ensure that energy policies support developing countries' efforts to eradicate poverty.

In addition, it is important to mention that the appropriateness of energy technologies depends on the service being met and on the context of need. Renewable energy technologies meet a wide range of energy needs, though their suitability and economic feasibility varies widely from country to country since it requires a balanced energy portfolio that is suited to the economic, social, and resource conditions of each individual country and region (Flavin and Hull Aeck 2006). The main challenge is to design and implement energy systems that meet all the objectives of sustainable development: economic growth, poverty alleviation (MDG 1), health and environment (MDG 7), security, etc. (Johansson 2001). Effective systems for producing and delivering energy services are a prerequisite for poverty reduction and for meeting basic economic and social rights. Therefore, setting up the right structures and establishing organizations such as regulatory agencies is fundamental to create the appropriate institutional framework and the environment for good governance for the implementation of successful strategies in the energy sector (Malm 2006).

The points above described are particularly interesting considering that demand of biofuels is expected to increase in the years to come and demand and production do not coincide geographically (Slingerland and van Geuns 2005). This mismatch between countries where biofuels can be produced at lowest cost and countries where demand for biofuels is rising most rapidly, has initiated an interesting international trade dynamic where biofuels have become one of the fastest growing markets in the world at 15% growth a year (Brown 2006). Particularly, this picture has created a new market opportunity especially developing countries in the tropics, where the production of biofuels can be very lucrative in particular since profits are assured by cheap labour, low priced land, abundance of renewable resources, and a short growth cycle (WRM 2006, Brown 2006).

Renewable energy projects carried out in developing countries support the creation of a diversified energy portfolio and can contribute to poverty alleviation directly by the development of domestic industry, employment and national economic health (Flavin and Hull Aeck 2006, Mohan et al. 2006). In particular, the production of biofuels as alternative fuel in developing countries can reduce the risk of over-dependence on fossil fuels that undermine efforts of the poor to meet MDGs, provide access to global markets and trade and create new economic activities (Flavin and Hull Aeck 2006).

A clear example of a developing country embarking into biofuels is Malaysia, current world number one palm oil producer and potential main player in the biodiesel global market. Malaysia has embarked on an extensive biodiesel program that has been intensified by the recent increasing demand for biofuels, especially from EU countries. Malaysia started its research on biodiesel in 1982, however, the new interest put on biofuels by the international community as a clean alternative fuel, jump-started the biodiesel industry in this country (MPOB 2005). This new window of opportunity presents a series of potential benefits for Malaysia at macro level: the expansion of their economic growth, the growth of their palm oil industry and stabilization of palm oil market prices and the decrease on reliance on fossil fuels that are highly subsidized in this country (National Biofuels Directive 2006). All this contributes to enhance macro stability and economic health for the country and to support the reduction of GHG emissions at global level (Basiron 2006). In line with these opportunities, in August 2006, the Malaysian and Indonesian governments announced that they would each allocate 6 million tonnes of Crude Palm Oil (CPO) as raw material for biodiesel. Although no time-frame was indicated, 2-3 million tonnes of CPO are estimated to be available at the end of 2008 for the energy sector. In Malaysia alone, a total of 12 to 15 biodiesel plants are likely

to be operational by 2008 (Suki 2006) which are estimated to contribute to a total capacity of 600 000 tonnes by the end of 2007 and 1.2 million tonnes by mid 2008 (Basiron 2007).

Based on the data above presented, it is possible to see that the high demand for biodiesel will spur initiatives to increase palm oil production in Malaysia. However, this fast growth may be hampered by the development of an also increasing concern on its feedstock production sustainability. Palm biodiesel feedstock has been highly criticized by international NGOs and media as a monoculture that is causing increasing problems to the environment, as a main driver for rainforest destruction and as a threat for small-scale farming and natives land (WRM 2006a, Friends of the Earth 2005, Rosenthal 2007, Rowley 2006, Wakker 2005, UNCTAD 2006, Brown 2006, Unmacht 2006, Friends of the earth 2006, Down to Earth 2006). The critics have escalated high up and reached in October 2006 the EU Parliament's Industry, Technology, Research and Energy Committee, which adopted a proposal to ban the use of biodiesel made of palm oil (ITRE 2006, Basiron 2006). The Committee noted that: "increasing palm oil production may affect natural forest, and traditional production, causing biodiversity loss and significant increases in greenhouse gases". At the beginning of 2007 the call to ban imported biofuels was amended to a call to subject them to certification schemes.

In addition to the macro benefits of biodiesel development in Malaysia, the production of its feedstock in rural areas – in particular in States where palm oil plantations are expanding such as the State of Sarawak in Borneo, East Malaysia – is promoted on the basis of a series of local benefits: it creates employment opportunities in the rural areas, thereby ensuring sustainable source of income in these areas; it raises the standard of living of the rural people and contributes towards poverty eradication; and contributes to a balanced development between the rural and the urban areas (Ministry of Land Development Sarawak 2006). After more than a decade of palm oil development in the State of Sarawak, an analysis of the local environmental and socio-economic effects can provide an understanding of the main benefits and risks of palm oil development in rural areas. This study seeks first to analyze the Malaysian national perspective in regards to biodiesel development in order to understand the internal drivers and issues and the national strategies for palm oil development in the country. Secondly, it intends to identify the main effects of palm oil plantations expansion at the ground level and its impacts (positive or negative) on the sustainability of local livelihoods. Finally, on the basis of the main findings, this study intends to recommend specific initial proposals to be considered for further research.

Box 1. SIDA's View on Modern Biofuels

To pick biofuels as one of the renewables. Recently there has been a debate concerning the environmental sustainability and equity aspects of modern biomass market development. How does SIDA take these concerns into account?

SIDA has actually not been involved in modern biofuels so far, but we might be in the future in one way or the other. I know it is a hot issue; also here in Sweden there are companies and parties that are interested to further develop that sector. Some fear that developing countries might be exploited in supplying Sweden and other developed countries with cheap energy. I do not have a specific answer to this, but we assist our partners to develop the appropriate frameworks to handle these kinds of issues in ways that are socially, environmentally and economically sustainable.

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1.2 Objective and Research Questions

In view of increasing global interests on biofuels, Malaysia is in a competitive position to gain benefits from biodiesel production and global trade. However, there are issues related to upstream impacts on local environment and the sustainability of livelihoods that should be better understood and considered in order to ensure the development of biodiesel as a means to contribute to the sustainable achievement of Millennium Development Goals – in this case particularly MDG 1 and MDG 7 – in producer developing countries.

On this basis, the main objective of this study is to understand the Malaysian national perspective and strategy in regards to biodiesel development and analyze what are the main effects of its feedstock expansion (palm oil plantations) on local livelihoods sustainability and rural development objectives.

In addition to the research objective and based on the results, this study intends to recommend initial proposals to be considered for further research that would support the development of biodiesel as a means to contribute to the sustainable achievement of MDG 1 and MDG7 in Malaysia.

The study aims to answer the following research questions:

What is Malaysia's national approach towards biodiesel development and what are the effects of biodiesel feedstock (palm oil plantations) expansion on the sustainability of local livelihoods, rural development objectives and the sustainable achievement of MDG 1 and MDG 7?

- a) *From a national-level perspective: what are the key issues related to palm biodiesel for Malaysia, what are the main drivers and benefits for the country and what are the strategies that Malaysia will follow?*
- b) *What are the main effects of palm oil plantations expansion on the sustainability of local livelihoods and how do palm oil development projects contribute to local rural development strategies?*
 - *What is the effect of palm oil plantations on the access to traditional productive factors (land, water, forest resources) and on subsistence agriculture production (food security)?*
 - *How do palm oil plantations affect the local environmental sustainability (MDG 7) and how does this affect the local socio-economic well-being?*
 - *What type of socio-economic benefits (MDG1) do palm oil plantations bring to the rural area and how are these distributed?*

1.3 Scope and Definition of Key Terms

The scope of this thesis is limited to palm-based biodiesel development and its feedstock production within the country-specific context of Malaysia. The study is divided in two research levels, the national and the ground level. The first level focuses on analysing how key actors related to biodiesel and sustainable development at national level perceive the future development of biodiesel and the related key issues and benefits for Malaysia. Thus, the scope of this first research level is limited to a national-level perception and national strategies. The second research level is focused on analysing the main effects of biodiesel feedstock development at local level. To do so, the physical scope of the second research level is limited to the State of Sarawak, where new palm oil plantations are currently under development and

the analytical scope is limited to the local strategies for rural development and land development in this State and the effects of such development on the sustainability of local livelihoods, MDG 1 and MDG 7. The local effects are assessed in terms of access to traditional productive factors and food security, environmental sustainability and socio-economic benefits. Other criteria for assessing the local effects are left out of the scope of this study due to the complexity of measuring its direct relation to palm oil plantations development, since they are influenced as well by other state strategies for rural development.

Sustainable development: The World Commission on Environment and Development defines sustainable development as development that meets the needs of the present generation without compromising the ability of future generations to meet their own needs (WCED 1987). Sustainable development is thus concerned with how the process of change affects the relationship between the state of natural resources (environmental sustainability) and human well-fare (economic sustainability) (Gerrits 1994).

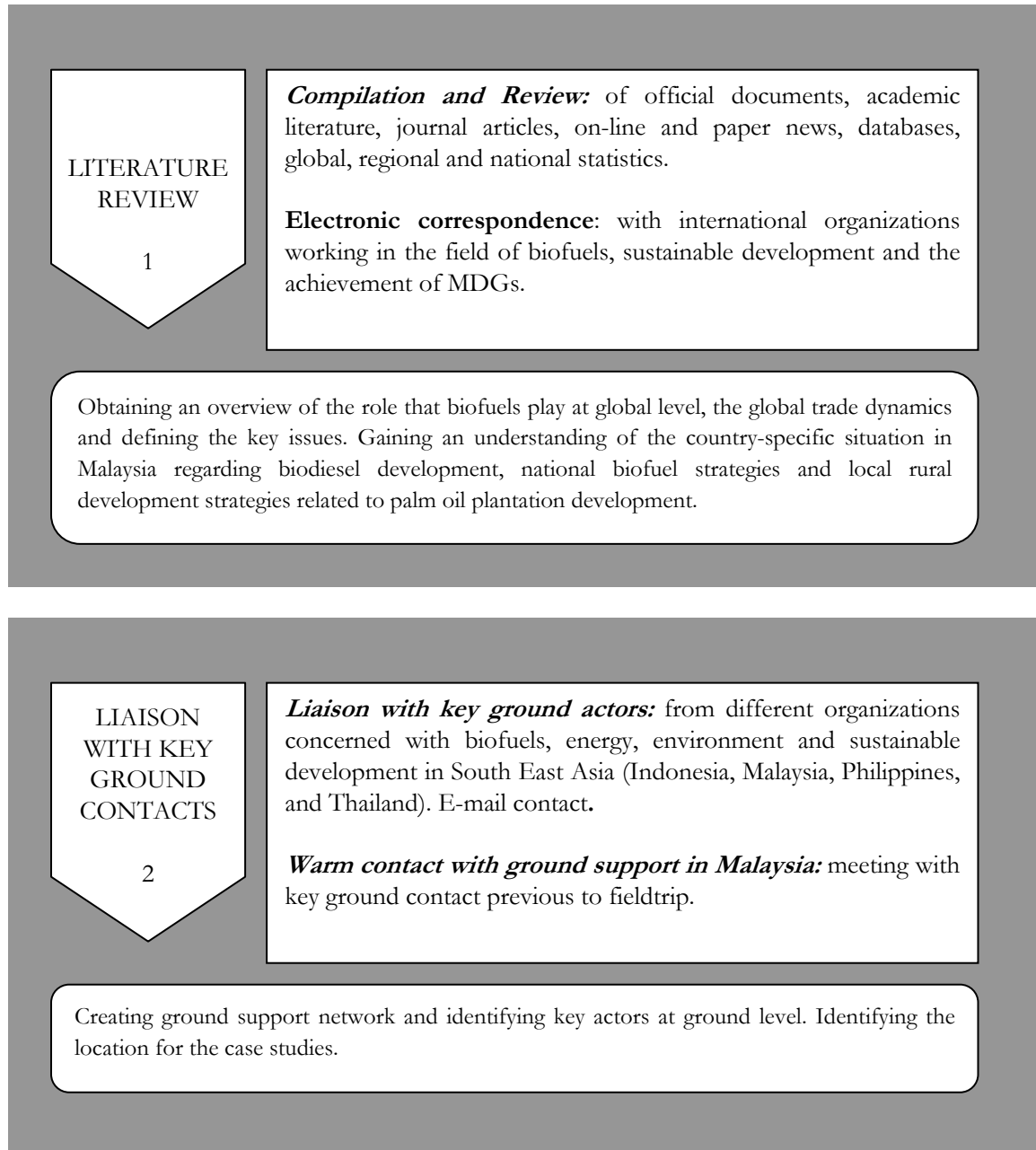
Sustainable livelihoods: The sustainability of native communities' livelihoods relies on the interdependency of natural resource quality (environmental sustainability) and socio-economic well-being (socio-economic sustainability), since natives traditional subsistence practices⁸ highly depend on the local environmental conditions. **Sustainable livelihoods is defined in this paper as the existence of the state of natural resources necessary to support the ability of a community and that of future generations to practice the traditional socio-economic activities necessary to fulfil their subsistence needs.** On this basis, the sustainability of livelihoods is inherent to native communities' risk minimization strategies to secure their basic needs.

⁸ Shifting agriculture, gathering, fishing, hunting.

1.4 Methodology and its Justification

The methodologies used for this study are several and follow 5 main research steps illustrated in the following flow diagram.

Figure 1-2 Methodology Structure and Research Steps



RESEARCH
NATIONAL
LEVEL

3

Stakeholder consultation - Semi-structured interviews with key actors from different organizations in Malaysia: research institutes, palm oil industry, governmental and inter-governmental organizations, NGOs and environmental consultancies.

Review of secondary data: official documents, academic literature, journals, previous research studies, on-line and paper news, electronic information.

Understanding of national perception on key issues, main drivers and benefits and national strategies related to biodiesel and its feedstock development in Malaysia.

RESEARCH
GROUND
LEVEL

4

Semi-structured interviews with local actors from different organizations: research institutes, palm oil industry, governmental departments, local and international NGOs.

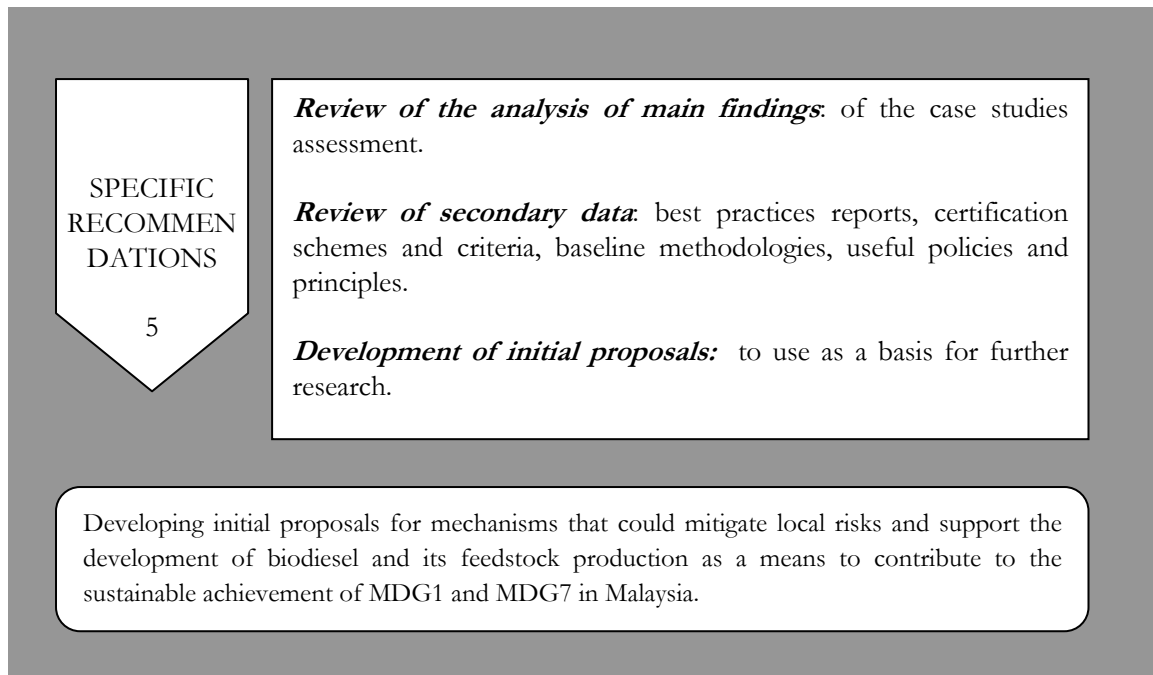
Review of secondary data: academic literature, official documents, on-line information, previous research studies.

Field visit and observation: to palm oil mill and palm oil plantations.

Case study analysis: three case studies located in the State of Sarawak are assessed using different methodologies:

- Focus group discussions
- Semi-structured interviews with key actors in the local communities
- Participatory rural assessment tools: resource matrix, transects, village resource map
- Participatory observation

Identification of benefits and key issues / risks that contribute / affect the objectives of local strategies for rural development and the local livelihoods sustainability



Justification for the Selected Methodologies

The above presented methods and tools allow **triangulation** of information at each research step and combine **qualitative and quantitative data analysis**. For the fieldwork mainly qualitative-based methodologies are used, however, the results obtained are supported with quantitative secondary data obtained from secondary sources. Moreover, the division of the study in different research steps allows information to be analysed in a **systematic** way which helps to develop the necessary level of understanding at one step to use as a basis for the next step.

Literature review and liaison with ground contacts are the first steps of the research. These allow gaining an overview of the main issues regarding biofuels and more specifically palm-based biodiesel in Malaysia. The development of a ground support network is essential to obtain the necessary support resources and proper information to conduct the fieldwork. Moreover, these steps are key to identify the main focus and scope of the study and contribute to triangulation of information.

In regards to the **semi-structured interviews**, interviewees are selected according to the purpose of each research level (national and ground level). In the national level, interviewees from different organizations that work at national level and are directly or indirectly related to biodiesel development issues are selected. The interviews are mainly carried out in Kuala Lumpur, Malaysia, and in Bangkok, Thailand, where regional United Nations offices and research institutes for South East Asian are located. The organizations interviewed for the national level are listed in Appendix 1 of this paper. The interviewees selected for the ground level are selected from organizations that work at local level both in East Malaysia (Borneo) in the States of Sabah and Sarawak (see Appendix 1). The semi-structured interviews were fundamental to gain better understanding of the key research issues and to corroborate secondary sources of information.

Concerning the **case study analysis**, three native communities in the State of Sarawak were assessed. The **first case study** is carried out with representatives of the longhouse communities of Selezu, Setulai and Sepadok located in Bintulu Division. The development of palm oil plantations in this region is being promoted by the State Ministry of Land Development through its Land Custody Development Agency (LCDA). The second and third case studies are carried out in Miri Division. The **second case study** is conducted in Kampong Ulu Teru, longhouse Kalong and the **third case study** is carried out in Kampong Sungai Bong, longhouse Rayong. The region of the second and third case studies is one of the pioneer palm oil development project areas under the '**New Concept**' scheme (see section 5). The reason for selecting these two case studies in this region is because of their different approaches towards the New Concept scheme, while the second case study is in favour of it and is participating in the Joint Venture, the third case study is opposed to it.

For the **first case study**, representatives of communities of Selezu, Setulai and Sepadok are **interviewed**. Due to time constraints no survey is performed; instead **focus group discussions** are conducted, where participants debate based on selected criteria and related survey questions. The list of selected criteria and survey questions is presented in Appendix 2 of this paper. The obtained perceptions are analysed using a **perception matrix** and **secondary data** are used to support the results. In this case study selected **participatory rural assessment (PRA) tools** developed by SEAGA⁹ such as 'resource matrix' and 'village resource map' are applied. The reason to use these tools is to gain a better understanding of the local traditional socio-economic system and the changes over time, as well as the value the native communities put on the resources they consider of most importance for their wellbeing (for more detailed description of the tools used see Appendix 3). Moreover, the combinations of all the methodologies used in this case study allow triangulation of information. The assessment of the first case study is carried over a period of 5 days during a visit of 57 representatives of these communities to Kuching, capital city of Sarawak.

In regards to the **second and third case studies**, a **field visit** is carried out to Kampong Ulu Teru and Kampong Sungai Bong for a period of 3 days respectively. During these days **interviews** with community leaders, regular farmers, palm oil plantation workers and participants in the New Concept scheme are conducted. Again, due to time constraints no survey is performed, instead **focus group discussions** are carried out in each community, where participants debate based on selected survey questions (see Appendix 2). Likewise to the first case study, the obtained perceptions are analysed using a **perception matrix** and **secondary data** are used to support the results. In addition, selected **participatory rural assessment (PRA) tools** are applied such as 'resource matrix' and 'transects'. A more detailed description of these tools and its objectives is given in Appendix 3 of this paper. Finally, **participatory observation** was performed during the period of stay in both Kampongs. The combinations of the different methodologies used in this case studies allow triangulation of information

As above mentioned questions based on **selected sustainability criteria** are used during the **focus groups debates**. These criteria have been selected from a compilation of sustainability criteria developed by different organizations that work on assessing projects' contribution to sustainable development: MATA-CDM¹⁰ sustainability criteria, used to assess the contribution to sustainable development of CDM projects; RSPO criteria, developed by representatives of

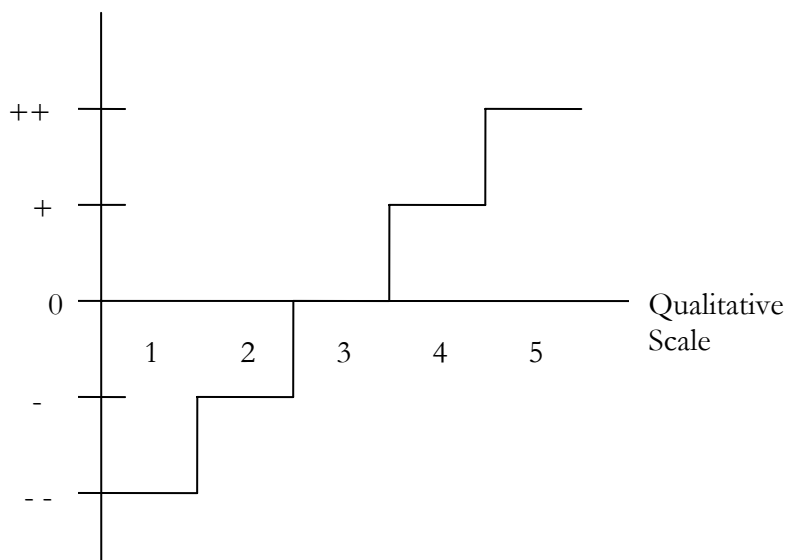
⁹ Socio-Economic and Gender Analysis Program (SEAGA), Food and Agriculture Organization of the United Nations (FAO).

¹⁰ Multi-Attribute-Assessment of CDM (MATA-CDM). Sustainability assessment methodology for CDM projects developed by Christoph Sutter, Swiss Federal Institute of Technology (ETH).

palm oil industry, government and NGOs with the intention to promote a sustainable development of palm oil production; Gold Standard criteria, used to assess the sustainability of CDM projects and its contribution to sustainable development; and CCB¹¹ standards, developed to identify land-based projects that can simultaneously deliver compelling climate, community and biodiversity benefits. The list with the compilation of all these criteria is presented in Appendix 4. From this list the criteria most related to the objectives of rural (land) development and palm oil development strategies of the State of Sarawak are selected (see section 7.1.2) and used to formulate questions for the focus groups debates. In addition, environmental sustainability criteria are also considered in the selected criteria (see section 7.1.2), due to their intrinsic relation to the sustainability of livelihoods. In doing so, the selected criteria intend to assess 1) what are the palm oil development effects on the necessary local environmental conditions and native communities' ability to practice the traditional socio-economic activities necessary to fulfil their subsistence needs (sustainable livelihoods) and 2) how do palm oil plantations development contribute to rural development objectives. The selected criteria and related questions are listed in Appendix 2 of this paper. For some of the criteria the respondents are asked to value their answers in a qualitative scale. The proposed scale is based on the MATA-CDM methodology developed by Sutter (2003) at the Swiss Federal Institute of Technology (ETH) and is not based on scientific results. The utilized qualitative scale is illustrated hereafter.

According to the nature of the question, the proposed scale can mean:

- 5 = greatly improved, very high
- 4 = improved, high
- 3 = no change, regular
- 2 = affected, low
- 1 = very affected, very low



¹¹ Climate, Community and Biodiversity standards developed by the Climate, Community & Biodiversity Alliance (CCBA). The CCBA is a global partnership of research institutions, corporations and environmental groups.

Finally, based on the main findings of this study and integrating these to palm oil production best practices, proposed certification schemes and criteria such as the RSPO, and propitious secondary information, initial proposals are recommended to be considered as basis for further research.

1.5 Limitations

It is important to consider that besides palm oil development, other development strategies and factors have shaped the life conditions of native communities in the State of Sarawak over the past decades. This adds complexity to the assessment of effects of palm oil development on local socio-economic and environmental sustainability. Although this research intends to assess key criteria that can give a clear picture of the trends over time and identify key issues, it is important to bear in mind that other factors such as urbanization, 'modernization' and education may have a great influence on these issues.

As mentioned in the previous section, only selected criteria are used to assess the effects of palm oil plantations development on local livelihoods sustainability and how does it contribute to rural development strategies in Sarawak. However, the fact that specific criteria have been selected to assess specific issues also means that there might be other effects caused by palm oil development that are not considered or studied under the scope of this study.

The time frame assigned for the fieldwork is adequate to gain different perceptions from a diverse range of stakeholders and analyse the three selected case studies; however, it is insufficient to use quantitative-based methodologies on field such as representative surveys. In order to avoid subjective results, the information obtained from qualitative-based analysis is complemented with secondary data obtained from previous research studies in the region as well as from official documents. It is also important to consider that secondary data used for the study, in particular national statistics, are subjected to estimations.

Although sustainable livelihoods is defined in this paper as the existence of the state of natural resources (environmental sustainability) necessary to support the ability of a community and that of future generations to practice their traditional activities necessary to fulfill their subsistence needs and thus takes into consideration the long-term perspective, this study will only focus on the current effects. Nevertheless, it is acknowledged that current changes in environmental conditions due to palm oil plantations will have an effect on the sustainability of local livelihoods in the long-term (as well as in the short-term). Having said so, it is strongly suggested that further research on the long-term effects should be considered on the basis of the findings of this study.

Although this study is not a socio-political research, it needs to look at socio-political matters to explain reactions, decisions and effects at the national and ground level related to the research issues. Moreover, due to the sensitivity of the research topic, information at the ground level was not always easy to access or available at all.

Due to language limitations, translation support is used in this study, in particular during fieldwork with the native communities. Some of the native communities' perceptions are therefore subjected to the understanding of the translators. In order to reduce subjectivism, two translators were used whenever possible.

1.6 Outline

The following paragraphs portray the structure of this research study.

Chapter 2 gives an overview of the role biofuels play at global level and in particular in the achievement of the MDGs and rural development objectives in developing countries. It also portrays the potential risks and challenges related to biofuel feedstock expansion.

Chapter 3 describes the main issues related to biodiesel within a global context. It first defines biodiesel and gives a brief description of its production and environmental performance. It then continues by showing the international biodiesel and biodiesel feedstock market dynamics and describing the main issues surrounding global biodiesel development.

Chapter 4 gives a brief overview of the development strategies in Malaysia during the past two decades with special focus put on poverty reduction, rural development and environmental sustainability national strategies. It also portrays the role that palm oil industry plays in the country's economy and it describes the national strategies concerning biodiesel development in Malaysia. It continues by describing briefly the land development and palm oil plantations development strategies in the State of Sarawak, East Malaysia which have been largely justified on the basis of addressing poverty among the native communities in the region. Finally, it concludes with a short description of native communities in Sarawak.

Chapter 5 portrays the national perceptions on biodiesel development in Malaysia by describing the findings obtained from a key stakeholders analysis on key issues, main drivers, benefits and national strategies related to the development of biodiesel at global level and in particular at national level.

Chapter 6 starts first with a brief description of each case study and then it continues by giving the main findings obtained from the use of different participatory assessment methodologies in each case. It then follows by portraying a comparative analysis between the three case studies and discussing the main issues identified during the assessment.

Chapter 7 gives a short summary of the main findings of chapter 6 and 7 and then it presents final remarks of the study. It concludes by describing specific recommendations and initial proposals to be considered as basis for further research as possible mechanism that could mitigate local risks and support the development of biodiesel and its feedstock production as means to contribute to MDG1 and MDG7 in the State of Sarawak and Malaysia.

2 Theoretical Review: Biofuels Potentials and Challenges

This section presents a brief description of the potential role that biofuels can play in the sustainable achievement of the MDGs and rural development objectives in developing countries. It also describes the possible challenges of biofuel demand increase and the consequent risks related to biofuel feedstock expansion.

2.1 Biofuels and the MDGs

Despite the relevance and direct linkage of energy services to human development, there is no dedicated MDG on energy. Experience and facts have proven that greatly increased quality, quantity and diversification of energy services will be required to meet all of the MDGs (Nishimoto 2004). Since the Millennium Declaration, a series of global and international events have reaffirmed that the MDGs cannot be met without energy services. This has been confirmed at the 9th Commission on Sustainable Development (CSD-9) held in 2001, at the World Summit on Sustainable Development (WSSD) in 2002, the UN conference financing for Development held in Monterrey as well as the Conference on renewable Energy held in 2003 in Bonn. Moreover, the global community has agreed in these conferences that renewable energy plays a key role as part of these energy services to achieve the Millennium Development Goals (Goldemberg and Johansson 2004). For instance, renewable energy projects carried out in developing countries have demonstrated that the creation of a diversified energy portfolio can contribute to poverty alleviation by creating employment, encouraging greater economic diversification and promoting rural development (UNCTAD 2005). Moreover, it enhances economic stability by reducing the dependency on petroleum products purchased from overseas.

As noted earlier in this paper, the MDGs more influenced by alternative energy services such as biofuels are: MDG 1 (eradicate extreme poverty and hunger) and MDG 7 (ensure environmental sustainability). Recognizing this close link, international organizations such as the United Nations Development Program (UNDP) are focused on strengthening national policy frameworks to support energy for poverty reduction and sustainable development; promoting clean energy technologies for sustainable development; and increasing access to investment financing sustainable energy. According to the Stockholm Environment Institute (SEI 2005), a key point is to identify sustainable solutions where synergies between the environment and development can be achieved for more rapid MDGs achievement and to secure long-term sustainability also beyond 2015. SEI (2005) claims that one core aspect to achieve this is energy for poverty alleviation.

In addition to contributing to the achievement of MDGs, renewable energy projects such as the production of biofuels as an alternative energy in developing countries can reduce the reliance on fossil fuel and contribute to energy security — for instance, the availability of energy at all times, in sufficient quantities and at affordable prices (Coelho 2005). Excessive dependence on fossil fuels has had serious consequences on the economic and social environment, biodiversity and the climate, particularly in the poorest developing countries (UNCTAD 2005). The domestic production of an alternative fuel reduces such dependence over the long term and reduces the impacts of conventional fossil fuel production and use on the environment, thus contributes to their sustainable development (Coelho 2005).

All the potential contributions above mentioned are reached if energy alternatives are developed and used at its best efficiency according to the specific context of need. As previously mentioned, effective systems for producing and delivering energy services are a prerequisite for meeting basic economic and social needs. If biofuels are intended to be used uniquely in the transport sector, in particular in developing countries, the total potential of this alternative source of energy may be not used as its best efficiency. While biofuels for transport are well designed for developed countries seeking to find solutions for reducing their CO₂ emissions, many developing countries and especially LDCs may not take full advantage of biofuels if they are only intended for transport (UNCTAD 2006). If biofuels are used to support other activities in addition to transportation, especially at local level, they have the potential to be part of a more integral and accelerate way to promote sustainable development in developing countries and enhance the achievement of MDGs based on a more local, decentralized, participatory and integral approach. For instance, modern liquid biofuels have the potential to remove the burden on women looking for fuels, reduce respiratory diseases caused by indoor air pollution from household use of solid fuels (MDG 4 and 5), and decrease the pressure on forests if commonly used (MDG 7) (UNCTAD 2006). Biofuels can also be an opportunity for small communities to become self-sufficient in energy (MDG 1). For instance, efforts to substitute diesel by vegetable oils from *Jatropha* in power generators, grain mills or water pumps is already successful in some rural communities of Egypt, Madagascar, Zimbabwe, Kenya, Zambia and Mali. In that sense, access to decentralized small-scale energy technologies, particularly if based on renewables (including biofuels), are an important element for successful and effective rural development policies (Goldemberg and Johansson 2002). Nevertheless, it is important to mention that the production of biofuels in developing countries, even if these are only to be used in the transport sector, enhance the development of domestic industry and employment, contribute to national energy security strategies, improve the national economic health, and the availability of public funding (Flavin and Hull Aeck 2006). These contributions lead to macroeconomic stability and growth and are therefore crucially linked to the achievement of MDG 1. Having said so, it is also important to highlight the important contribution of biofuels as a strategy to reduce GHG emissions and mitigate climate change (MDG 7).

2.2 Rural Development and Biofuels

The production of biofuels can enhance rural development in three different ways: by creating employment opportunities and improving infrastructure in the rural area; by involving smallholders into biofuel feedstock production for later processing; and by engaging local producers to produce their own biofuel for self-consumption (for instance, to become self-sufficient in energy). While the latter offers an excellent opportunity to create local economic growth and reduce poverty incidence, the production of commercial biofuels is only concerned with the two first schemes. In these two cases it is important to consider that there are economies of scale in the cultivation of many energy crops and in the transformation of feedstocks to biofuels. This is a fundamental underlying reason why the processing needs to be carried out in a centralized facility normally owned by large private or state companies (Zarrilli 2006). To facilitate smallholders' involvement, organizational support can be provided to help them participate fully in the production of feedstock. For instance, contract farming arrangements or cooperatives may be a suitable way of ensuring the participation of smallholders or local producers (Zarrilli 2006). However, the negative side of contract arrangements is that farmers might become highly dependent on the processing companies where they sell their production. For instance, they may have limitations to diversify their production, to sell it to a third party and may have to buy the company's fertilizers under contract (UNCTAD 2006).

According to Zarrilli (2006), under the smallholder scheme, small producers may be involved at the local level, while large companies will most likely take care of trading feedstock internationally. It is important to mention that the promotion of small-scale production may be conducive to the creation of sustainable rural development, whereas large-scale export production might generate income but provide less local benefits. Moreover, processing of feedstock into biofuels has the potential to contribute to rural development through the creation of employment, the improvement of infrastructure and the generation of more profitable agricultural activities (UNCTAD 2006, Coelho 2005).

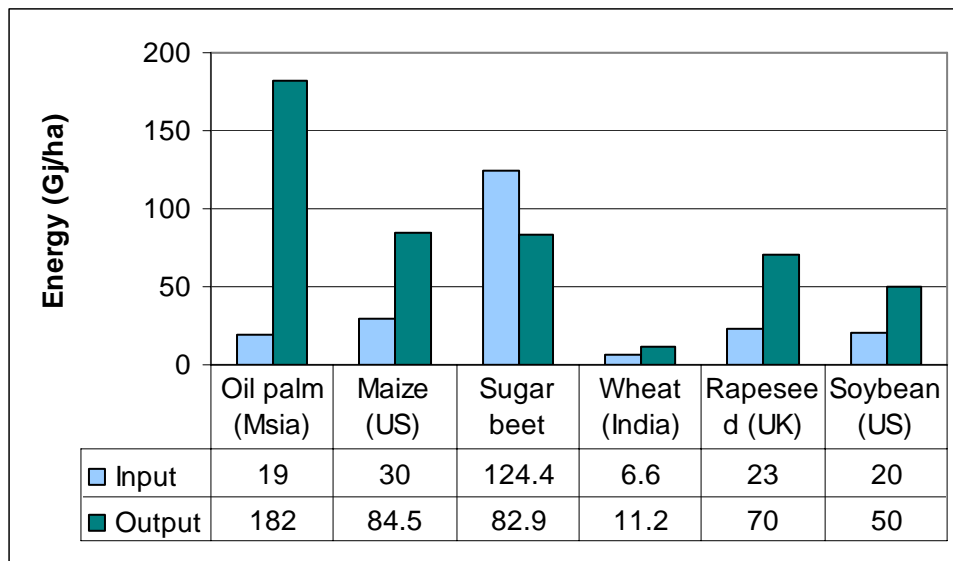
Concerning large-scale developments, Zarrilli (2006) argues that agro-industrial multinational companies are getting increasingly involved in the biofuel business by producing and transporting the raw materials and, above all, by building refineries. Moreover, they are also setting up strategic alliances with oil companies to secure the business of biofuels distribution using existing networks. According to Zarrilli (2006), alliances have been formed as well between oil and car companies both to produce and to develop new biofuel conversion technologies¹². So, while the above mentioned strategy indicates a participatory process from which farmers and smallholders may benefit, the increasing presence of agro-industrial, oil and car conglomerates in the sector may marginalize small producers in the future and benefit mainly large-scale companies.

2.3 Main Challenges for Biofuels

All biofuels are derived from conversion of sunlight to energy through photosynthesis. Plants take up carbon dioxide (CO₂) from the atmosphere and this is released when the crop-based products (biofuels) are burned in an engine. For this reason biofuels are called “carbon neutral”. Because of this biofuels do not contribute to Global Warming compared to fossil fuels, which release CO₂ which has been locked away from the atmosphere, and they are promoted as “green or clean alternative fuels”. However, the fact that biofuels can be considered “carbon neutral” is not enough to determine its environmental performance. Fossil fuels and agrochemicals are utilized in the production of biofuels, and therefore it is important to take into consideration, in addition to the emissions, the energy balance related to the production of its feedstock. The energy balance is derived from the output-to-input ratio of energy that an energy crop needs for its production. The energy balance considers the use of fertilizers and pesticides as well as the use of fossil fuel needed to produce a crop. Different energy crops have different energy balance, for instance, palm oil has an efficient ratio of 9.6:1 GJ/ha, rapeseed 3:1 GJ/ha and soybean 5:2 GJ/ha. Figure 2-1 below shows the output-to-input ratio for some crops.

¹² For instance, BP, Shell Group, Toyota, Mercedes Benz.

Figure 2-1 Energy Balance of Some Energy Crops



Source: MPOB 2006

Although biofuels have, as above discussed, great potential to contribute to the achievement of MDGs and rural development, and represent attractive alternatives to contribute to energy security and Climate Change mitigation, biofuels development faces as well several challenges as a main driver for land conversion, as a threat to biodiversity and local livelihoods, and as a risk for food security.

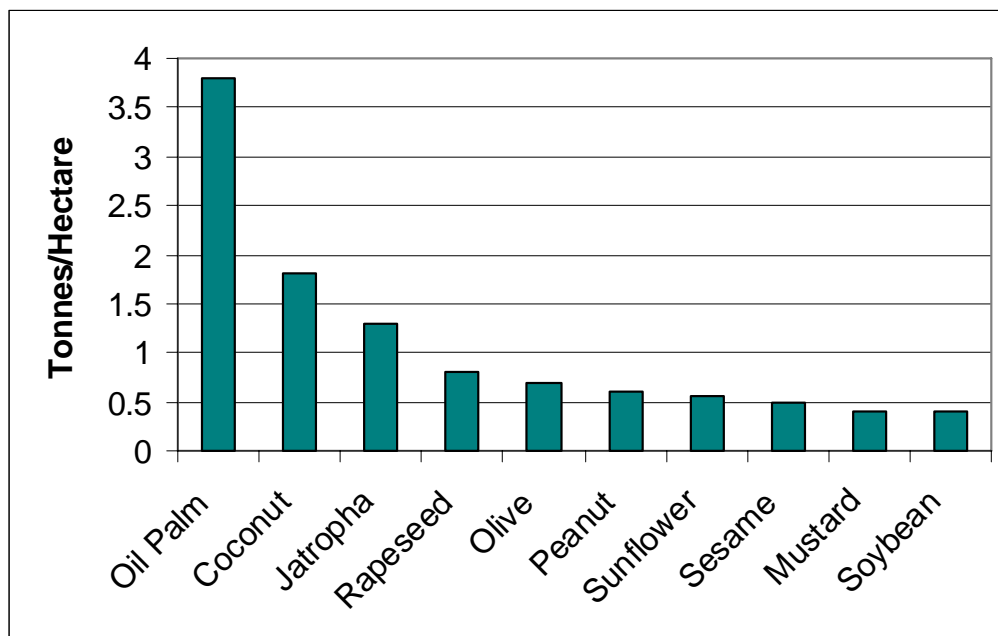
One great concern with biofuels involves land increasingly being shifted to fuel crops, with diversion from other purposes, such as food and feed production, forestry, animal grazing or conservation (Zarrilli 2006). Looking for new areas to crop, wild forests may be cleared, especially in tropical countries with large forest cover (UNCTAD 2006). These practices have shown to be disastrous and not sustainable in the long run, because of soil low fertility (Rowley 2006). Moreover, the real threat is on biodiversity, which is reduced for each square meter of cleared forest. According to Zarrilli (2006), effects on biodiversity due to changes in or loss of habitats vary considerably according to the level of change, for example, from mixed, low-intensity agriculture to intensively farmed monocrops, or from tropical rainforest to managed plantations. For instance, studies in Indonesia and Malaysia have shown that between 80% and 100% of the species of fauna inhabiting tropical rainforests cannot survive in oil palm monocultures (Wakker 2005). According to Unmacht (2006), by clearing forest and introducing plantations, habitat for threatened wildlife such as orangutans, Sumatran tigers, and rhinoceros is affected. Rainforest conversion into plantations has been partly stimulated by the financial opportunity logging brings for certain economic actors. Moreover, the land-use change poses a threat on the environment of local communities and may oblige them to leave or change their life-styles.

Furthermore, land conversion results not only in a reduction of biodiversity, but also in a vulnerability increase to catastrophic fires (Butler 2006, WRM 2006a). For instance, assessments showed that oil palm plantation companies in Indonesia have been identified as one of the main responsible in setting forest fires over the last 10 years (Friends of the Earth 2006). In 2001, the level of pollution caused by the haze in Malaysia and Indonesia was classified as dangerously high and unhealthy. The fires that cause the haze were identified to

be set primarily by palm oil plantation owners, taking advantage of the dry season to clear forested lands and to burn away the surface peat in swamp areas (Earth Observatory 2001).

In addition to biodiversity loss, biofuels feedstock production expansion can be considered a threat to the availability of suitable land, especially land for food purposes. The land requirements for biofuel production highly depend on what oils are used as feedstock (Steenblik 2006). Figure 2-2 illustrates the different yields for various feedstocks. For example, 1 hectare of rapeseed displaced is equivalent to 0.6 hectare of Jatropha, or 0.2 hectare of palm oil plantations (Steenblik 2006). It can be seen from this graph that palm oil is the oil crop with the highest yield, and therefore the most efficient crop in terms of land use.

Figure 2-2 Yields of Major Oil Producing Crops

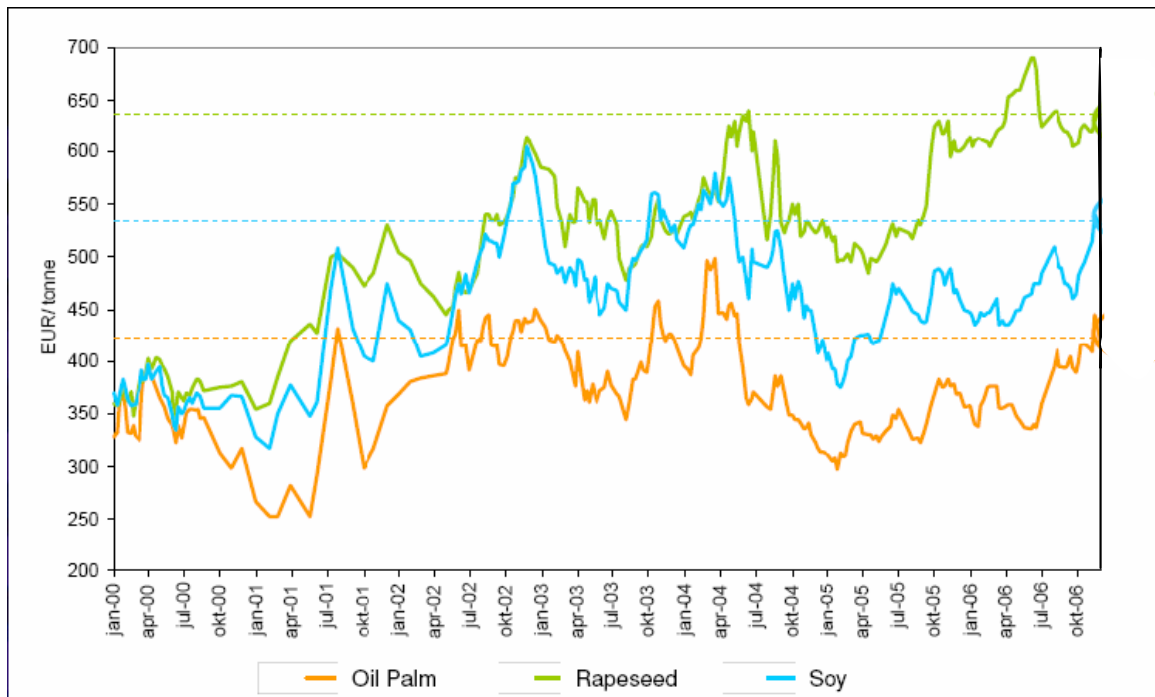


Adapted from Tickell 2000

Furthermore, in some regions, the availability of water rather than land may become a concern for growing energy crops. Due to land and water requirements, Zarrilli (2006) claims that engaging in large-scale energy-crop plantations may require a trade-off between lower food security for higher energy security.

This concern about food competition seems to increase when a net food importing country starts biofuels feedstock production. However, in response the UN Conference on Trade and Development UNCTAD (2006) argues that the agricultural production capacity is often underdeveloped in poor countries, which is the reason why these lack the capacity to feed their population. Many reasons explain this fact: market liberalisation which puts in competition small-scale production farmers with highly subsidized and intensive agriculture; lack of storage, adequate transport system, grading, sanitary control, investment and all types of infrastructure (UNCTAD 2006). According to the UNCTAD (2006), increasing agricultural productivity in developing countries is the first condition to mitigate food security concerns.

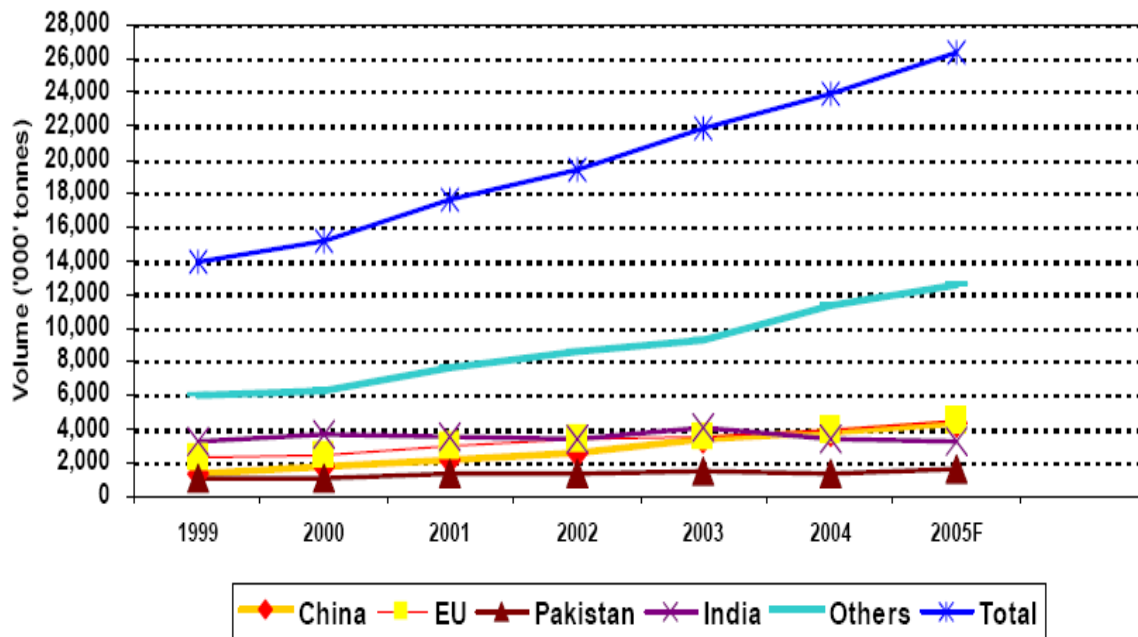
Figure 2-3 Prices of Mayor Oil Producing Crops



Source: Danisco 2006

Last but not least, another large concern around biofuels is centred on the “food for fuel debate”. Using food crops such as corn to produce biofuels has jump-started a heated debate around how morally appropriate is to “produce fuels burning food crops” (Reuters 2007). The increased demand for commodities such as soy and CPO due to the increasing interest in biofuels has caused a rise in their market price (see Figure 2-3 above) which consequentially has caused a price increase in food products using these commodities. It is important to note here, that the countries that consume the most edible oil from palm oil are developing countries such as India and China (see Figure 2-4), thus a price increase in edible products using this commodity will affect negatively the consumers in these developing countries.

Figure 2-4 World Main CPO Importing Countries



Source: BPS & Direktorat Jenderal Perkebunan, Department of Agriculture of Indonesia

2.4 Clean Development Mechanism for Modern Liquid Biofuels

Since the Kyoto Protocol came into force in 2005, many non-annex 1 countries have gained momentum in identifying and developing projects which can reduce greenhouse gas emissions. The appeal of the Clean Development Mechanisms (CDM) lies in the fact that it offers a useful financial incentive that can help attract sustainable development-related investments into developing countries, help reduce GHG emissions and represent additional source of income for the project developers (Coelho 2005). The implementation of CDM projects may also be part of a company's consideration on enhancing its global competitiveness and image.

Table 2-1 below shows that biomass energy projects are the most popular among CDM projects and also possess the largest shares of Certified Emissions Reductions (CERs) to date after hydrofluorocarbons (HFCs). Nevertheless, Table 2-2 also demonstrates the unequal distribution within these biomass projects and shows that no biofuel project (biodiesel or bioethanol) is currently running under the CDM scheme.

Table 2-1 CDM Projects in Pipeline

Type	number		All CDM projects in Pipeline			
			Accum. 2012 CERs (000)		CER Issued (000)	
Biomass energy	282	22%	112341	8%	2534	15%
Hydro	209	16%	92478	7%	722	4%
Wind	153	12%	84506	6%	127	1%
EE Industry	144	11%	101509	7%	240	1%
Agriculture	142	11%	36595	3%	995	6%
landfill gas	96	80%	144934	11%	73	0%
Biogas	74	6%	19798	1%	85	1%
Fossil fuel switch	47	4%	36146	3%	0	0%
Cement	24	20%	25483	2%	0	0%
EE Supply side	16	1%	29785	2%	0	0%
HFCs	15	1%	434927	32%	11714	70%
Coal bed/mine methane	13	1%	46168	3%	0	0%
EE service	10	1%	541	0%	0	0%
Fugitive	10	1%	70150	5%	278	2%
N2O	9	1%	120988	9%	0	0%
Solar	7	1%	1151	0%	0	0%
Geothermal	7	1%	10088	1%	0	0%
EE Households	4	1%	510	0%	0	0%
Afforestation & Reforestation	3	0%	2351	0%	0	0%
Transport	2	0%	1785	0%	0	0%
PFCs	1	0%	542	0%	0	0%
Tidal	1	0%	1104	0%	0	0%
Energy distribution	0	0%	0	0%	0	0%

Adapted from UNEP Risoe Center 2006

Table 2-2 Bioenergy (solid and liquid biofuels) CDM Pipeline

	Number of Projects				Generation		
	At validation	Request registration	Registered	Total	Only heat	Electricity	
Bagasse power	83	4	36	123	2	121	
Palm oil solid waste	6	0	8	14	1	13	
Agri residues: other kinds	38	1	17	56	9	47	
Agri residues: rice husk	28	2	17	47	0	47	
Agri residues: mustard crop	1	0	4	5	0	5	
Agri residues: poultry litter	2	0	1	3	0	3	
Forest residues: sawmill waste	0	1	7	8	0	8	
Forest residues: other	8	0	2	10	4	6	
Forest biomass	3	0	1	4	3	1	
Industrial waste	5	0	2	7	3	4	
Gasification of biomass	3	0	0	3	1	2	
Gasification of MSW	2	0	0	2	1	1	
MSW incineration	1	0	0	1	0	1	
Biodiesel	1	0	0	1	1	1	
Bioethanol	0	0	0	0	0	0	
Biogas flaring	52	8	52	112	112		
Biogas power	37	22	11	70	14	56	

Adapted from UNEP Risoe Center 2006

Although liquid biofuel projects are eligible for CDM status, since are treated as “CO₂ neutral”, to date the only liquid biofuel CDM project under consideration is "Biodiesel Fuel Production Project in Indonesia" which is currently undergoing the validation phase (NEDO 2005). According to Zarrilli (2006), the low flow of CDM biofuels projects is due to two main factors: 1) the lack of capacity in CDM project development; and 2) limited availability of CDM baseline methodology specifically developed for biofuels projects and geared to assess

their potential to contribute to global GHG emission reductions and sustainable development. In addition, there are controversies around the ‘additionality’¹³ requirement of these projects, since many countries already have biofuel targets or policy directives in place to promote the use of biofuels at national level. This leaves unclear what constitutes and how to demonstrate ‘additional’ effort.

Currently the methodology to assess biofuels projects is being developed and reviewed by lead experts under the UNFCCC (MPOB 2006). The CDM Executive Board (EB) has issued a communication that CERs for this type of projects are to be attributed to the producers of biofuels since they have to implement capital intensive changes to their operations in order to carry out the project. According to Radin and Noorly (2006) consumers are also allowed to claim CERs from displacing fossil fuel consumption with biofuels. However, it can be assumed that only very large consumers would be able to claim CERs due to high transaction costs involved. Currently, at the EB level, two methodologies for biofuels have been given preliminary clarification of which one is Palm Methyl Ester – Bio diesel Fuel (PME – BDF) Production and Use for transportation in Thailand (NM0142-rev). This methodology uses the life cycle approach incorporating all emissions involved from the feedstock of Crude Palm Oil (CPO) down to the end-user of the biodiesel (Pleanjai, Gheewala and Garivait 2004). Table 2-3 below presents all the activities involved in establishing the ER under the NM0142-rev methodology.

Table 2-3 Activities Involved in Establishing the Emission Reductions under the NM0142-rev Methodology

Baseline Emissions	Project Emissions	Leakage
Mining and transportation of crude oil refining and transportation of petroleum diesel	CPO transportation	Oil palm cultivation
Petroleum diesel consumption by vehicle	BDF production	Fresh Fruit Bunch transportation
	BDF transportation	CPO production
	BDF blended diesel transportation	Emissions from production of methanol that are used in the transesterification to produce BDF
	BDF blended diesel consumption by vehicles	
Emissions Reduction = Baseline Emissions – (Project Emissions + Leakage)		

Source: Radin and Noorly 2006

¹³ The additionality requirement is aimed at guaranteeing that the mitigation of GHG emissions only occurs as a consequence of the CDM project. This is in order to avoid projects representing the *business as usual* (BAU) case to be awarded emission credits. Moreover, under the additionality concept project developers have also to demonstrate that the projects under analysis would be unlikely to occur without the CDM, as they would not result economically attractive. This is to ensure that the credits are only recognized to projects that would not have occurred anyway. The concept of additionality therefore covers both an environmental and financial dimension (UNFCC 2005, Gervasoni 2006).

Finally, although this methodology covers adequately the overall emissions involved in a biodiesel project, the main challenge lies on the calculation of the leakage that could total up to be more than the half of the total ER, since it includes emissions due to deforestation/land clearing activities, fuel consumption involved in agricultural operation and the emissions associated with the fertilizers used for the cultivation (Radin and Noorly 2006). All this sets back the potential of producing ER to its highest quantity.

3 Biodiesel in the Global Context

This section describes key issues related to biodiesel in a global context. It first defines biodiesel and gives a brief description of its production and environmental performance. It continues by showing the trends in the international biodiesel market and describing the main issues surrounding its development.

3.1 What is Biodiesel?

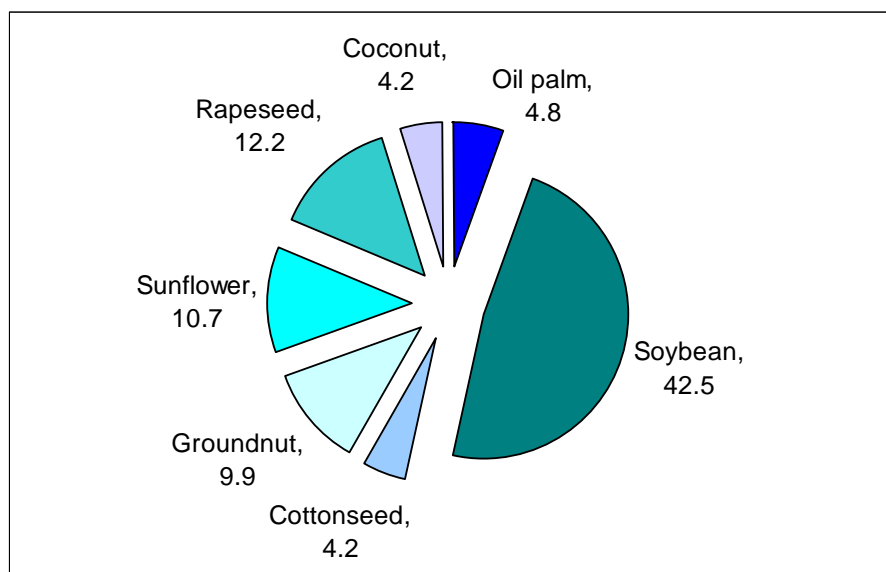
Biodiesel is the term that refers to methyl esters of long chain fatty acids derived from vegetable oil such as rapeseed oil, palm oil, and soybean oil (MPOB 2006a). Crude vegetable oils of free fatty acids content up to 30% can be used as the feedstock, as the process provides pre-treatment stage (esterification) to handle the fatty acids (Choo 2004). Palm biodiesel consists of methyl esters of crude palm oil or crude palm stearin prepared from reaction with methanol through a process known as “transesterification” using a suitable catalyst. Palm biodiesel can be used in compression ignition engines i.e. diesel engines without any modification (MPOB 2006a). However, it is more commonly used in blends of 2% or 5% of processed liquid palm biodiesel with 98% or 95% of petroleum diesel (MPOB 2005a).

3.2 Biodiesel Production

3.2.1 Palm Oil Feedstock Production

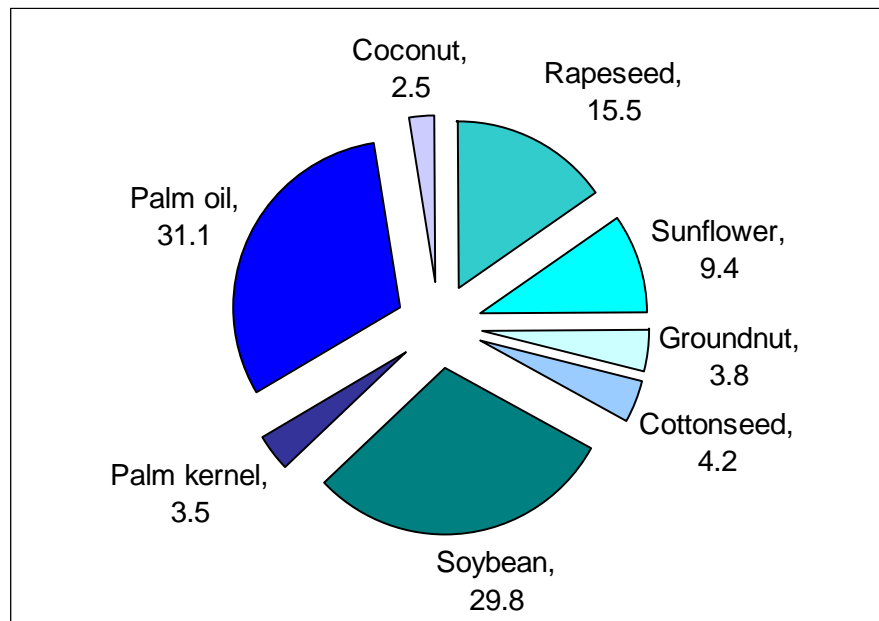
As above mentioned different energy crops have different yields. As a result some energy crops need more land area than others to obtain the same amount of oil used for biodiesel. Figure 3-1 below shows the agricultural area distribution among the major oil crops in the world versus Figure 3-2 which illustrates the percentage world production of these crops.

Figure 3-1 Major Oils World Area (%). Total area 220 million hectares



Source: Oil World 2007

Figure 3-2 Major Oils World Production (%). Total 118.4 million tonnes

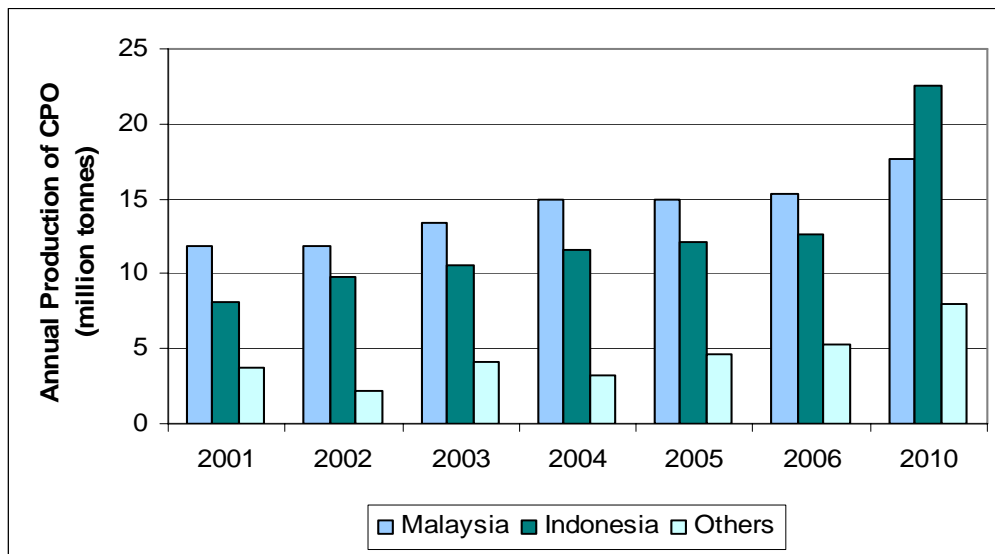


Source: Oil World 2007

Comparing both tables it is possible to see that although palm oil shares a large proportion of the world oil production (31.1 %, and 34.6% including palm kernel), it uses only 4.8 % of the global agricultural land, while soybean which also represents an important share in the global oil production with 29.8%, occupies 42.5% of the world agricultural land. This is due to the high yield of palm oil, which is almost 5 times higher than rapeseed and 10 times higher than soybean. According to Azevedo (2006), 1 ha of palm oil produces 6 000 litres of CPO. Research carried out by the Indonesian Biodiesel Forum (FBI) states that 0.95 litres of biodiesel are produced from one litre of CPO. This means around 0.2 ha of palm oil plantation would be needed to generate 1 000 litres of biodiesel.

As it is possible to see in Figure 3-2 above, palm oil is one the most produced oils worldwide. Its production however is concentrated mainly in two countries Malaysia and Indonesia. In 2005, Malaysia contributed with 47% to total world CPO production compared to Indonesia with 38% (Tambunan 2006). However, it is expected that in 2007 Indonesia will surpass the Malaysia position in CPO production. Based on Oil World estimations (MPOB 2006), in 2010 Malaysia will produce 17.7 million tonnes of CPO – below the national target set at 19.6 million tonnes –, while the level of production in Indonesia will reach about 22.5 million tonnes. Other important CPO producers in the world include Thailand, Nigeria, Cameroon, Colombia, Venezuela, and Cote d’Ivoire. However, total CPO productions from these countries is always much smaller than those from Indonesia and Malaysia (see Figure 3-3).

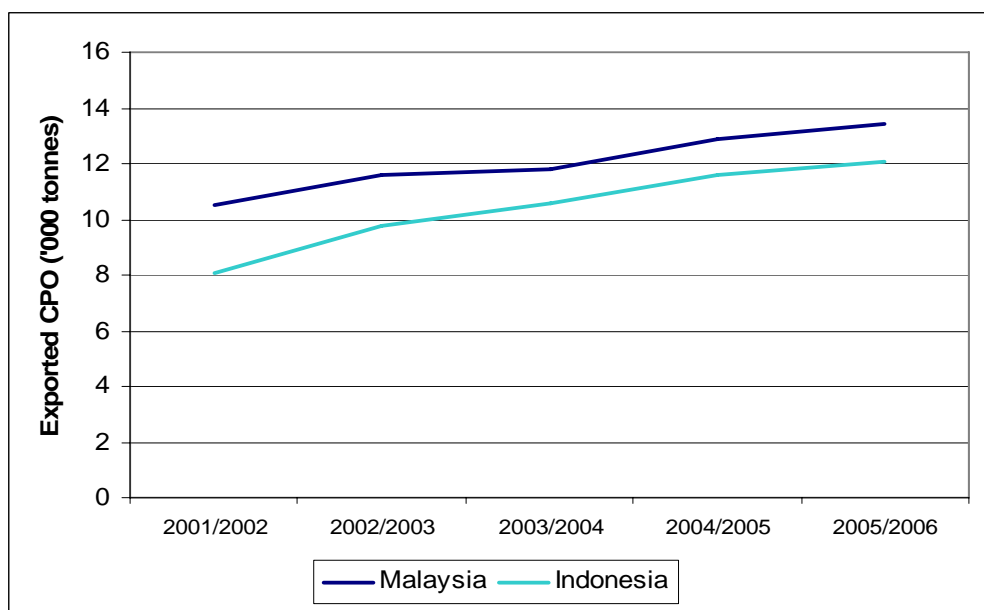
Figure 3-3 World Crude Palm Oil Production. 2001 – 2006 (Forecast for 2010)



Adapted from MPOB 2006 and Soeberman 2006

Moreover, Malaysia and Indonesia are not only the largest palm oil producers, but also the largest palm oil exporters. According to MPOB (2006), palm oil and palm kernel oil shared 56.3% of all world major exports of oil in 2005, followed by soybean oil with 19.2%. In 2003 Malaysia was responsible for about 58% while Indonesia 30.7% of world trade in palm oil (Tambunan 2006). Figure 3-4 below shows how the export of these two countries has been increasing over time. Tambunan (2006) claims this trend will continue due to the increasing demand for edible oils, in particular from India and China which demand will increase as a result of their population growth, and to the recent increasing demand for biofuels, especially from EU countries.

Figure 3-4 Malaysia and Indonesia Crude Palm Oil Export. 2001 – 2006



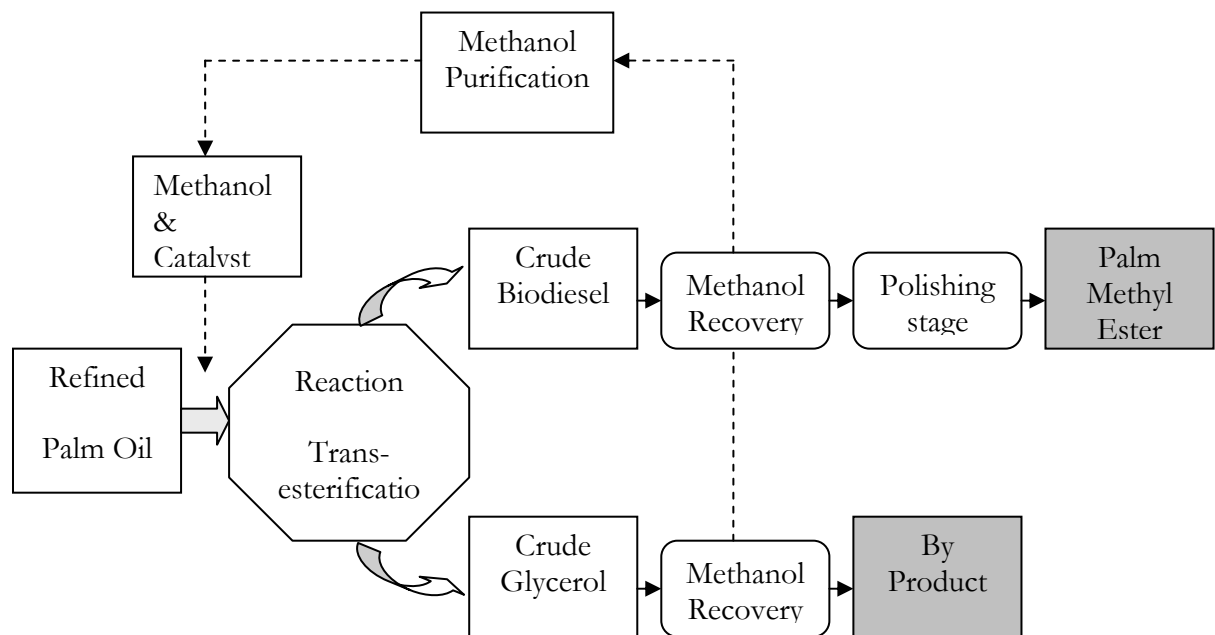
Source: UN Ddatabase 2007

Concerning the global vegetable oil production, the world output is projected to increase by around 30% by 2015. Developing and developed countries account respectively for three-quarters and one-quarter of the expected expansion (Thoenes 2006). The share of developing countries is anticipated to grow further and their average annual growth rate will continue to exceed that of developed countries. The EU and the US will remain the key players in the developed world. The production of rapeseed oil in the EU is set to raise 35% due to both area expansion and yield improvements (Thoenes 2006). EU and the US is expected respectively to produce 12.8 million and 11.3 million tonnes of vegetable oil – mainly rapeseed oil and soybean oil – in 2015 (Thoenes 2006).

3.2.2 Biodiesel Process

Methyl ester is generally produced through catalytic transesterification of the oil with methanol (MPOB 2006a). The process normally takes place at a temperature of about 50 °C to 70 °C and at atmospheric pressure (Choo 2004). The product from the process is ester, while the by-product is alcohol (glycerol and methanol). The esters are sent through a purification process, which consists of water washing, drying and filtration. Additives might be used to adjust the properties and characteristics of biodiesel. Figure 3-5 shows a simplified diagram showing the process of palm biodiesel.

Figure 3-5 Palm-Based Biodiesel Process

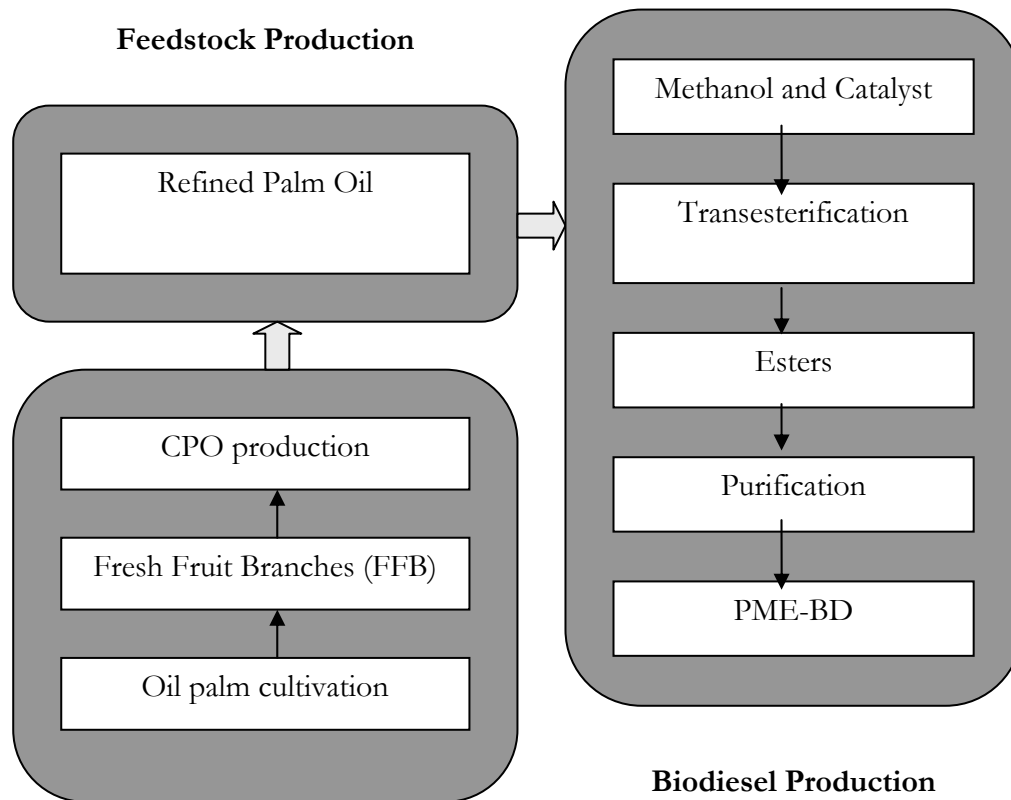


Adapted from MPBO and Lipochem Sdn Bhd 2006a

To sum up section 3.2.1 and section 3.2.2, the production chain for palm biodiesel is illustrated in Figure 3-6 below. Methyl esters have characteristics very similar to that of conventional diesel (see Appendix 5). When using blends of 2% (B2) or 5% (B5) engine performance and fuel mileage are virtually identical to that of regular diesel (MPOB 5a). In addition, biodiesel provides a significant lubricity improvement over petroleum diesel fuel and has a higher cetane number than most diesel fuels resulting in improved combustibility,

smoother engine running and quieter operation (National Biodiesel Board 2007). The following section describes the performance of biodiesel compared fossil diesel.

Figure 3-6 Palm-based Biodiesel Production.Chain

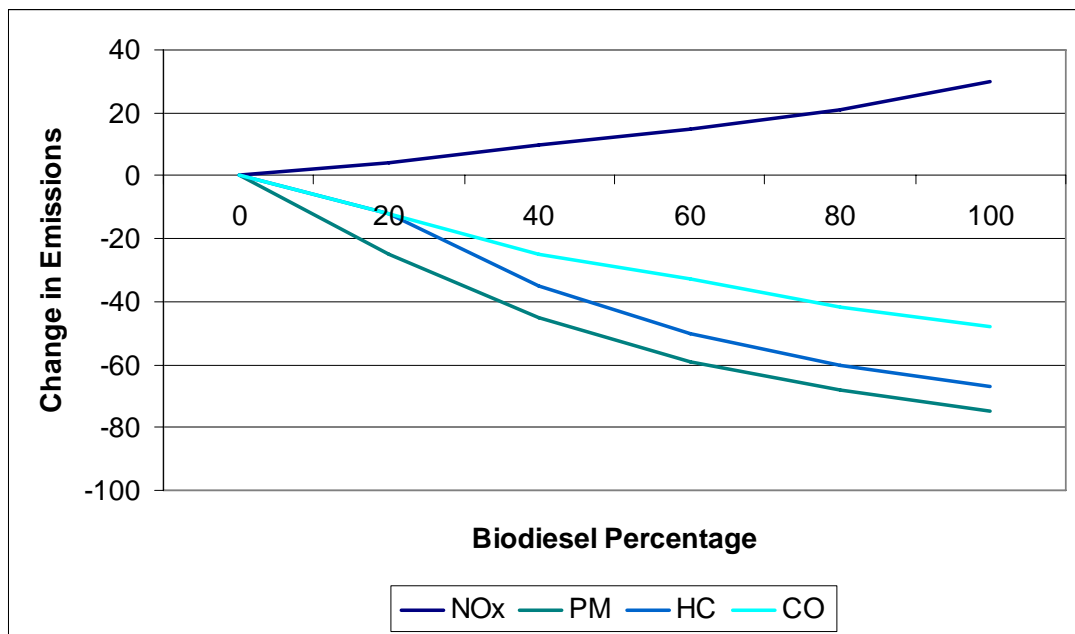


3.2.3 Performance Compared to Fossil Diesel

As above mentioned, biodiesel is a chemical compound that can be made from vegetable oils that can either be used in its pure state or blended with conventional diesel oil derived from petroleum. This section will focus on the environmental performance of biodiesel compared to diesel oil. Impacts on air pollutant emissions have perhaps been the most studied of all the potential environmental effects of substituting biodiesel for other fuels. Even so, results differ from one test to another, and appear to be affected by a number of variables, depending on the quality and type of the fuels being compared, the engine used for testing, and ambient conditions (Steenblik 2006). For instance, Steenblik (2006) argues that by comparing the changes in life-cycle emissions of air pollutants using 100% (B100) biodiesel instead of low-sulphur petroleum diesel, percentage reductions differ somewhat, depending on what types of biodiesel are being compared. He claims that two general conclusions can be drawn: emissions of carbon monoxide, volatile organic carbon and particulate matter are reduced when biodiesel is used, whereas emissions of nitrogen oxides are increased (by up to 30% when comparing biodiesel from rapeseed with low-sulphur petroleum diesel). Since biodiesel (from whatever source) contains only trace amounts of sulphur, emissions of sulphur dioxide (SO₂) are also substantially reduced. According to Steenblik, because of biodiesel's lower sulphur content, and other superior qualities such as greater lubricity, engines that use it have a longer operating life. Figure 3-7 below supports Steenblik's statement. It portrays the results of a 2002 U.S. EPA analysis based on data from different studies. The graph shows that the

environmental performance of biodiesel compared to diesel oil changes according to the percentage of biodiesel used. It can be seen for instance that the more percentage of biodiesel is used, the larger is the NOx emissions compared to diesel oil, and the less are the emissions of carbon monoxide, volatile organic carbon and particulate matter. According to McCormick (2005), with old engines (1997) B2 produces 2% more NOx than diesel oil and B100 10% more, while with current engines (2004) B2 NOx emissions are 4% higher than petroleum diesel and B100 30% higher (McCormick 2005). This difference might be due to the technology developed to enable significant reduction in NOx emissions in diesel engines (i.e. NOx adsorber catalyst systems) designed to meet more stringent EPA emissions regulation limits for NOx for 2004 and later diesel engines models (EPA 1997).

Figure 3-7 Biodiesel Emissions Compared to Petroleum Diesel



Adapted from U.S. EPA (modified data for 2004 engines)

In regards to life-cycle reductions in carbon-dioxide (CO₂) emissions, it depends on the source of the feedstock, production pathways, and the alternative uses of the land from which the feedstock is produced, especially if it has previously been forested. A recent IEA study carried out in 2005 reports “well-to-wheel” biodiesel reductions in greenhouse gases of between 44% and 63% per kilometre, compared with petroleum diesel. The European Commission’s more recent “well-to-wheel” study (EUCAR/JRC/CONCAWE 2005) concludes that the fossil energy and greenhouse gas (GHG) savings of conventionally produced biodiesel “are critically dependent on manufacturing processes and the fate of by-products”. Moreover, the GHG balance is particularly uncertain because of nitrous oxide emissions associated with the production of feedstock as mentioned above.

Moreover, another important parameter to consider when evaluating biodiesel environmental performance is its energy balance¹⁴, since it is essential to know that the production of biodiesel does not consume more energy (from fossil fuels) than the energy obtained from its

¹⁴ The energy balance calculation for the biodiesel production system is the sum of the energy consumed for each kilogram of produced biodiesel in the different stages of its production chain.

consumption. Research carried out on palm biodiesel production in Brazil show that the total energy output from biodiesel is 7.8 times higher than the energy input (da Costa and Silva Lora 2005). The study includes the agricultural production and goes on until the biodiesel processing, considering the stages of transport of the agricultural production and vegetable oil extraction (da Costa and Silva Lora 2005). For this reason, the results can vary according to the agricultural practices, the distance covered by the transport and the energy sources used for biodiesel production stage. The energy flows for biodiesel can be divided into direct and indirect ones. A direct energy flow corresponds to the energy consumed in the form of fossil fuel, methanol, electricity and steam in all the stages of biodiesel production (da Costa and Silva Lora 2005). As far as electricity and methanol are concerned, they are calculated as the consumed primary energy in its production. For diesel and other fossil fuels the low calorific value (LCV) is used (da Costa and Silva Lora 2005). The indirect energy flow is the energy consumed in the form of agricultural inputs (such as fertilizers and pesticides), equipment, machines and transport. Table 3-1 below shows the results of the energy-balance study (da Costa and Silva Lora 2005).

Table 3-1 Palm Biodiesel Energy Balance

	INPUT (MJ/kg biodiesel)	OUTPUT (MJ/kg biodiesel)
Agricultural Production and Transport	0.035	
Industrial Phase and Transport	3.001	
Shell		7.068
Palm kernel cake		0.973
Palm kernel oil		2.418
Biodiesel Production	3.673	
Biodiesel (LVC)		39.600
Glycerine Production		2.094
TOTAL	6.709	52.153
I/O	7.774	

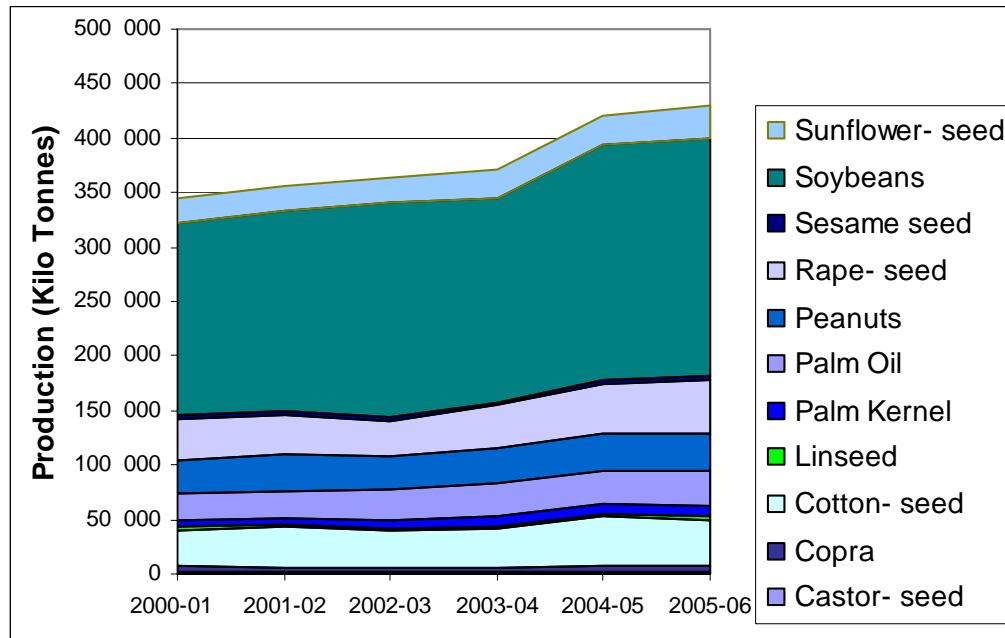
Adapted from da Costa and Silva Lora 2005

3.3 Trade of Biodiesel and its Feedstock

The international market of biodiesel is still in its first stage, thus no reliable trade statistics for biodiesel are available yet. Biodiesel has recently been reclassified by the World Customs Organization under the HS code 3824 90, an industrial code which includes a large spectrum of chemical products and preparations of the chemical or allied industries (including those consisting of mixtures of natural products) not elsewhere specified or included (Zarrilli 2006). For this reason, it is difficult to identify trade flows, trends and opportunities specific to biodiesel. However, biodiesel feedstock trade has experienced significant growth in the past years which may be partly attributed to the rising demand for biodiesel (Steenblik 2006).

Modelling the development of biofuel markets is a demanding task because of the complex interdependencies of external variables such as crude oil price, environmental policies and technological improvements (Thoenes 2006a). A number of countries in Europe, especially Austria, France, Germany and Italy, as well as the United States and recently Japan have embarked on a clean fuel program and biodiesel is one of the fuels of interest. According to Steenblik (2006), the increasing demand for biofuels is mainly driven by the need for diversification in transport fuels, concerns about transport-related pollution, and policies in OECD countries to actively promote the use of biofuels. One additional driver is energy security and the interest in developing alternative fuels that can lessen the dependency on “unstable fossil fuels” (Basiron and Yuen 2005). As an outcome, the global appetite for biofuels has resulted in an increasing demand, production and consumption of vegetable oils (see Figure 3-8).

Figure 3-8 World Production of Selected Vegetable Oils ('000 Tonnes)



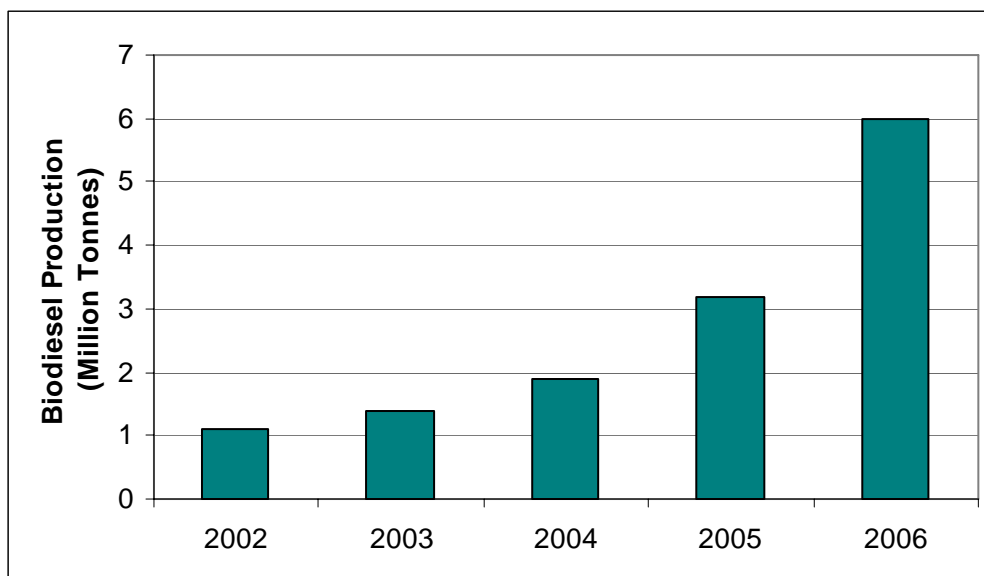
Adapted from Oil World 2006, US Department of Agriculture 2007, MPOB 2006

At the moment, it may be assumed that effects of biodiesel trade in the short to medium term would not be high. For one, in the medium term, demand for biodiesel is likely to be driven by government policy, especially tax policies and laws regulating the minimum shares of liquid biofuels in total transport requirements (UNCTAD 2006). Over the longer term, the potential for replacement of petroleum diesel by biodiesel is vast – of course acknowledging that is

constrained by the intrinsic limitations related to its feedstock production such as suitable land availability (Steenblik 2006). Current world vegetable oil production is around 100 million tonnes annually, while the demand for diesel is expected to rise to over 1 500 million tonnes by 2020. According to Basiron (2007), the production of world oils and fats is projected to increase to 154.3 million tonnes in 2010 and further to 194.4 million tonnes in 2020. While the overall growth in production for the period 2000-2020 is estimated at 2.7%, the specific growth in palm oil production is estimated at 4.1% (is expected to surpass that of soyabean oil production which is estimated at 2.4%). On the export front, total oils and fats export is projected at 53.3 million tonnes in 2010 and is further expected to increase to 70.5 million tonnes in 2020. Palm oil export in particular is estimated to increase by 4.4 % over the 2000-2020 period, surpassing the world total oils and fats and soybean oil export which is estimated at between 3.4% and 3.3% respectively. Oil World (MPOB 2006) claims that the total predicted global biodiesel capacity will reach 20 million tonnes by the end of 2007 and 13 million tonnes of vegetable oil will be used in 2006/07 to make biodiesel, an increase from about 9 million tonnes in 2005/2006.

The main world biodiesel producers today are in the EU (UNCTAD 2006). Rapeseed oil is the primary feedstock. Similar to other biodiesel feedstocks, rapeseed oil is also used for animal feed, for human consumption (when it is low in erucic acid, also known as canola), for cosmetics and for food industry. Between 2000 and 2004, world crude rapeseed oil exports have increased by 25% while the EU exports have fallen from 36% of world exports in 2000 to 9% of world exports in 2004. According to UNCTAD (2006), the increase of biodiesel production in Europe from 715 000 tonnes in 2000 to 1.9 million tonnes in 2004 while rapeseed oil production remained constant, could partly explain the decrease of rapeseed oil exports over that period. This increase in biodiesel production has been spurred by mandatory alternative fuel use legislation and a liquid fuel market dominated by diesel fuel (66% of demand). In 2005 the EU produced 3.18 million tonnes of biodiesel, registering around 65% increase over 2004 (Basiron 2006). Today, Europe’s biodiesel production capacity is spread across different European countries (IEA 2004, WI 2006). Statistics from the European Biodiesel Board show EU25 produces currently 6.1 million tonnes (see Figure 3-9). About 120 plants are mainly located in Germany, Italy, Austria, France and Sweden (Basiron 2006).

Figure 3-9 Biodiesel Production in the EU25



Source: European Biodiesel Board 2007

Moreover, vegetable oil use for industrial purposes in the EU is estimated at 8.03 million tonnes for 2007 (see Table 3-2, USDA 2006). USDA (Basiron 2006) forecasts that palm oil imports may rise to 4.9 million tonnes and soy bean oil to 1.1 million tonne. FEDIOL, Europe's vegetable oil federation, recently suggested that Asian palm oil could supply up to 20% of the EU's biodiesel requirements by 2010. The implications of an increase in vegetable oil – such as palm oil and soybean oil – demand for biodiesel production may result in a shift of vegetable oil stock to biodiesel and an increase in vegetable oil commodity prices.

Table 3-2 EU Industrial Consumption of Vegetable Oils ('000 tonnes) (2007 Forecast)

	2002/03	2003/2004	2004/05	2005/06	2006/07	Change %
Palm Oil	500	671	1035	1365	1720	244
rapeseed Oil	1247	1783	2598	3600	4430	255.3
Soybean Oil	280	335	400	1175	1375	391.1
Sunflower Oil	83	82	95	95	100	20.5
Others	387	405	409	420	405	4.7
Total	2497	3276	4537	6655	8030	221.6

Source: USDA 2007

As it is possible to verify from previous statements, palm oil plays a main role in the world oil and biodiesel production and trade. While it is hard to assess which percentage of palm oil is used as food and which percentage is used as energy feedstock one important reason being the dynamic change in this balance), it is possible to see that for instance the EU demand for palm oil for industrial purposes has increased almost 2.5 times over 5 years (see Table 3-2 above) (Zarrilli 2006).

Last but not least, it is important to mention that currently oil processing into biodiesel takes place in countries different from those which produce the feedstock (Zarrilli 2006). For instance, palm oil which is imported to European countries to be processed into biodiesel keeps the value-added in the production of biofuels out of reach for developing countries (UNCTAD 2006). UNCTAD (2006) argues that potential reasons for this include tariff and non-tariff barriers, access to technology, problems of competition, inadequate infrastructure and transport limitations. Moreover, it is in the best interest of producers in European countries to value-add, since it is in line with their national strategies.

3.4 The Biodiesel Sustainability Debate

The European Parliament's Industry Committee called in December for an EU-wide ban on biofuels use derived from palm oil due to concerns over the 'upstream' impacts in producer developing countries (ITRE 2006). Following a revision of the 2003 EU Biofuels Directive and a public consultation conducted by the Energy Research Center for the Netherlands (ECN 2006), it was revealed that the main obstacle for biofuels development in the EU lays in the uncertainties related to the sustainability of the feedstock production in developing producer countries. The European Commission's Biomass Action Plan (CEC 2005) specifically calls for establishing a requirement by which "through a system of certificates, only biofuels whose cultivation complies with minimum sustainability standards will count towards the targets" (Steenblik 2006). It adds that the system of certificates would need to be applied in a non-discriminatory way to domestically produced biofuels and imported ones. Going even further, it has been argued that a certification system should be applied on full-chain

performance of biofuels rather than on feedstock production only (ECN 2006). As a result of the revision, the European Parliament endorsed the Report on Biofuels with a call to subject biofuels to a certification scheme.

In response to concerns related to sustainability of feedstock production, initiatives such as the Roundtable for Sustainable Palm Oil Production (RSPO) have started a few years ago in order to promote the growth and use of sustainable palm oil through co-operation within the supply chain and open dialogue with its stakeholders. This initiative has already issued principles and criteria for sustainable palm oil production in 2005 and now is starting the stage of implementation and validation. Although certification schemes are gaining weight now, some argue that the expansion of palm oil monocultures and the model as a whole – even with these improvements – continues to be unsustainable (WRM 2006). For instance, the representative for Unilever, executive board member of the RSPO, commented during the public consultation of the Biofuels Directive that sustainability certification for biofuel feedstock addresses micro-production circumstances only. He argues that the real sustainability issue of current biofuel use is that it leads to a macro-expansion of feedstock production. Therefore, Unilever claims that a sustainability assessment should take into account at least the previous land use and the traditional end-use of the crops produced.

Last but not least, certification may add cost to production for smallholder farmers. According to UNCTAD (2006), past examples of certification schemes that were elaborated in developed countries can lead to additional non-tariff barriers to trade and affect especially small-scale producers.

4 Context-Specific Situation: The Malaysian Outlook

This section gives a brief overview of the development strategies in Malaysia during the past two decades with special focus put on the achievement of the above discussed MDGs (in particular poverty reduction MDG 1, and environmental sustainability MDG 7), rural development strategies and development objectives. It portrays then the role that palm oil industry plays in the country's economy and describes the national strategies concerning biodiesel development in Malaysia. This section concludes by describing the land development strategies and palm oil plantations expansion over time in the State of Sarawak, East Malaysia, which have been largely justified on the basis of addressing poverty among the native communities in the region.

4.1 The 2020 Vision of Malaysia

In 1991 the Government of Malaysia declared that it was the objective of the nation to become a developed nation in its own mould by 2020. The '2020 Vision' is to develop Malaysia in an industrialized and a fully developed nation by sustaining growth at 7% per annum and initiating structural changes in the economy as well as within the manufacturing sectors (EPU 2006). During the past two decades, Malaysia made significant progress towards achieving its '2020 Vision' to become a developed country. Since the launching of the New Economic Policy (NEP) in 1971, the nation underwent rapid economic growth and attained significant improvements in its socio-economy, especially in poverty alleviation and the restructuring of society. The National Development Policy (NDP) took these achievements further in the 1990s by focusing on balanced and equitable development. The success of these policies is evident in the prosperity Malaysia has achieved by reaching wide-ranging economic objectives and social transformation, accompanied with rising quality of life. These strong strategies enabled the economy to grow at 7% per annum during the 1990s, thereby achieving the target of the Second Outline Perspective Plan (OPP2 1991-2000) under '2020 Vision'. In order to recover from the recession during the Asian financial crisis, Malaysia established the National Economic Action Council (NEAC) in January 1998 and the comprehensive National Economic Recovery Plan (NERP). The successful instituting of a series of policies resulted in the recover of its economic growth and the fall of poverty incidence by half by the end of OPP2. Malaysia's current GDP per capita is one of the highest in South East Asia at circa EUR 3 850 in 2005, with a level of poverty of only 4.5% (EPU 2006).

The Third Outline Perspective Plan (OPP3, 2001-2010) marks the second phase of the nation's journey to realize '2020 Vision' and focuses on building a "resilient and competitive nation" (EPU 2006). During this period, efforts will be made to raise the quality of development and generate high sustainable growth. National unity remains one of the most important goals of development and the diversities of Malaysians - ethnic, lingual, cultural and religious - are taken into account in forging a dynamic society. In short, the OPP3 will build upon the efforts initiated under the country's past development plans and strengthen the basis of transforming Malaysia into a fully developed nation as envisaged under Vision 2020 (EPU 2006).

Last but not least, despite its economic growth, Malaysia still faces inter- and intra-ethnic socio-economic disparities, rural-urban performance gaps and disparities between more developed states such as Kuala Lumpur and other industrialized and tourism-oriented regions on one side, and less developed states in more remote parts of the country, in particular Sabah and Sarawak, on the other side (EPU 2006). For instance, despite poverty incidence has fallen in Malaysia to only 4.5 % in 2005, the poverty incidence is much higher for native people

living in less developed states. The poverty incidence in the State of Sabah was 23% in 2004 and that of the State of Sarawak was 7.5%. Sabah has also the highest income inequality between rich and poor among the 14 States in Malaysia (Eng 2006). One of the most common explanations in government policies is that this is due to low productivity related to unproductive use of land where poverty is embedded in structural defects among traditional subsistence farmers reluctant to participate in development projects and agricultural industrialization (Banerjee and Bojsen 2003).

4.1.1 Development Strategies: The Ninth Plan

The Malaysian economy registered credible growth during its Eighth Plan period (2001-2005) despite uncertainties in the global environment arising from the September 11 incident in 2001, wars in Afghanistan and Iraq and crude oil price upsurge in 2004-2005. During the Eighth Plan period, GDP in real terms grew at an average rate of 4.5% per annum supported by domestic demand and exports. Per capita GDP increased by 5.7% per annum to EUR 3 845 in 2005 (EPU 2006).

The Malaysian economy managed to sustain growth during the Eighth Plan period due to stronger macroeconomic fundamentals and increased resilience following the lessons learnt from the Asian financial crisis. The steady economic growth enabled the achievement of several socio-economic objectives (EPU 2006):

- overall poverty declined from 8.5% in 1999 to 4.5% in 2005
- hardcore poverty declined from 1.9% in 1999 to 1.2% in 2004
- mean household income increased 5.6% per annum on average
- inter-ethnic income disparities narrowed
- provision of housing, medical services and basic amenities improved significantly

However, rural-urban income disparity and regional disparity continued to widen.

The nation is currently embarking upon a new phase of development towards realizing its aspiration of becoming a developed nation by 2020. This next phase will be guided by the 'National Mission', a policy and implementation framework aimed at obtaining greater performance and impact from the country's collective developmental initiatives. The Ninth Malaysia Plan (2006-2010) represents the first five-year blueprint of the National Mission, outlining the policies and key programs aimed at fulfilling the National Mission's thrusts and objectives for the 2006-2010 period. The following are key highlights and programs of the Ninth Plan that are directly related to rural development, poverty eradication (MDG1) and environmental sustainability (MDG7).

Agriculture

During the Ninth Plan period, the agriculture sector will be revitalized to emerge as the third pillar of economic growth. The New Agriculture Program will be undertaken, which will include greater orientation towards more modern and commercial scale production; the production of high value added primary and agro-based products; wider application of information and communications technology (ICT) and biotechnology for wealth creation; use of better marketing approaches emphasizing product standards and farm accreditation; and the introduction of a higher level of professionalism. Established sub-sectors such as palm oil and rubber will be encouraged to increase diversification into high value-added downstream products. Under the Ninth Plan, a national target aimed at an increase of palm oil production to 19.6 million tonnes by 2010 has been set. Currently Malaysia cultivated area covers 23% of the total country's area which is about 32.8 million ha. Around 40% of the cultivated area is covered by palm oil plantations (MPOB 2006). If the increase in palm oil production of

around 4.5 million tonnes is reached by expanding plantations, this would mean that by 2010 approximately additional 1 200 000 ha would be converted into palm oil plantation¹⁵, equivalent to an additional 4% of the country area becoming cultivated.

Eradicating Poverty

The Ninth Plan is targeting to reduce the incidence of overall poverty to 2.8% and to completely eliminate the incidence of hardcore poverty by 2010. To reach these objectives, programs targeted at specific impoverished groups will be pursued including pockets of urban and rural poor and native minorities in Sabah and Sarawak.

Reducing Regional Disparity

To reduce disparities between rural and urban areas as well as between less developed and more developed regions, the Government will increase the allocation for rural development and for comprehensive development of the less developed states. Greater emphasis will be given to the development of the northern and eastern corridors as well as the States of Sabah and Sarawak.

Promoting Environmental Protection and Sustainable Resource Management

Environmental stewardship will continue to be promoted by the Government to ensure an optimal balance between development needs and the environment. Greater focus will be placed on preventive measures to mitigate negative environmental effects at source, reduce illegal acts against the environment as well as intensify conservation efforts to sustainably manage natural resources. Air and water quality will be monitored closely and measures will be undertaken to minimize pollution. This includes having stricter regulations and emission standards, improving the public sewerage system and promoting the use of cleaner energy. Moreover, land resource utilization will be optimized by applying the spatial development approach. Efforts will be intensified to protect and optimize the utilization of biodiversity.

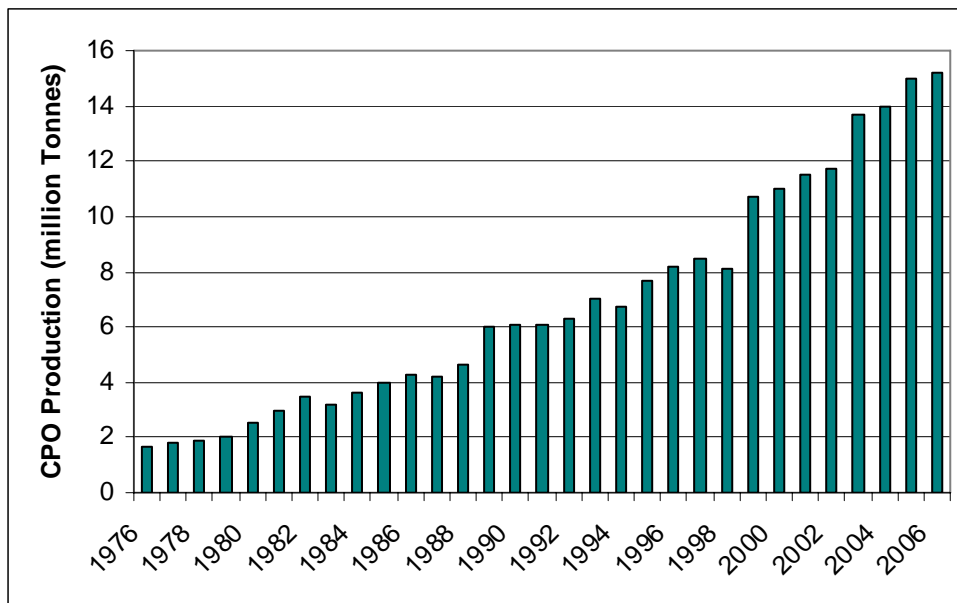
4.1.2 The Role of Palm Oil Industry in Malaysia

Palm oil industry plays an important role in Malaysia's economy. In terms of resource potential, palm oil plantations have grown from less than 1 million hectares in the 1970s to 4.05 million hectares in 2005 (Abdul 2006). Currently, palm oil cultivation constitutes 9% of the 32.8 million hectares of the total land of Malaysia (MPOB 2006). From this planted area Malaysia produced about 15 million tonnes of palm oil in 2005-06 (see Figure 4-1).

Malaysia's palm oil production was initially concentrated in Peninsular Malaysia, however, when the establishment of new plantations slowed down in the late 1980s, Sabah, one of the two States of Borneo, became the new dynamic palm oil frontier (Basiron 2007). The development continued to Sarawak, the other State of Borneo in mid 1990s. Today palm oil is the most important cash crop in both Borneo States.

¹⁵ Calculated based on current yield of 3.8 t/ha (MPOB 2006)

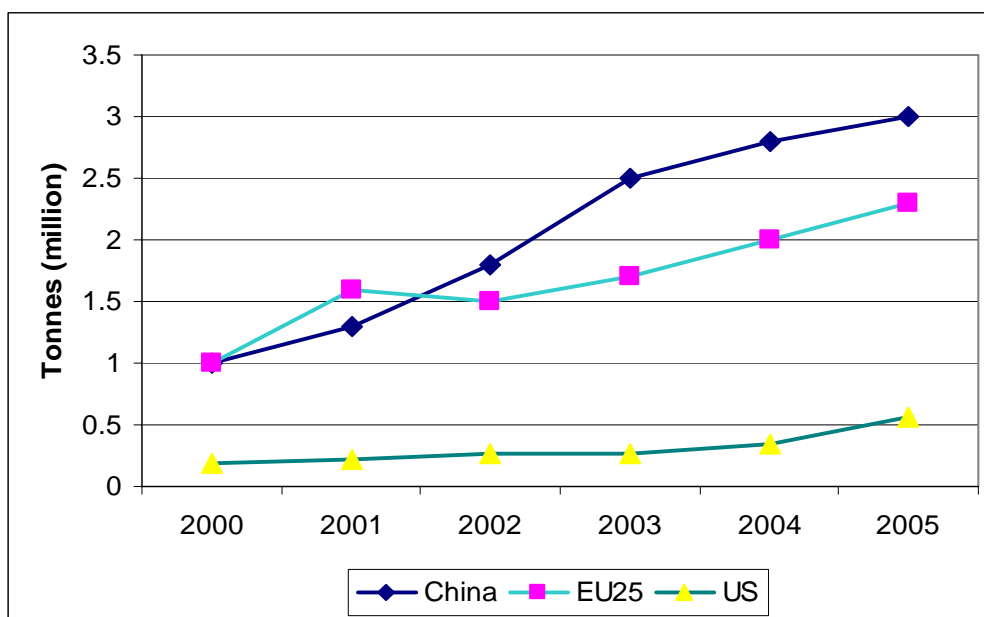
Figure 4-1 Malaysia CPO Production



Adapted from MPOB Database 2006

The increase of palm oil production can be considered a result of an increase in global demand. Especially in recent years, the demand of CPO produced in Malaysia has increased significantly in EU countries, and also the U.S. (see Figure 4-2). The drivers, as above mentioned, are especially tax policies and laws regulating liquid biofuels targets in transport requirements in these countries (MPOB 2006). Moreover, countries such as China and India have also increased their demand for edible palm oil due to population growth and insufficient domestic production. China is nowadays Malaysia’s largest export market (see Figure 4-2).

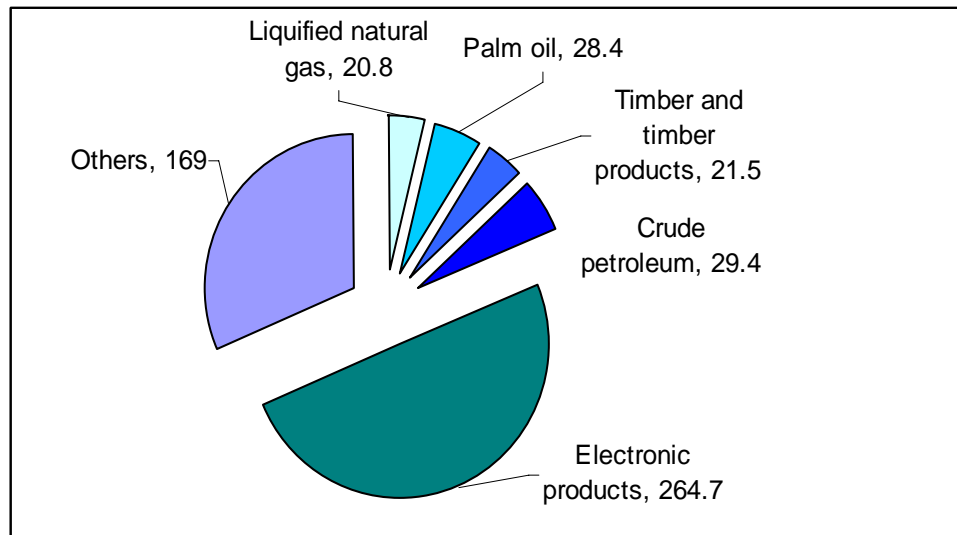
Figure 4-2 Malaysia’s CPO Exports to EU25, US and China



Source: MPOB 2006

Furthermore, Figure 4-3 below shows that palm oil industry is the third largest contributor to external trade for Malaysia after electronic products and crude petroleum. In 2005 it contributed with RM 28.4 billion (EUR 6.2 billion) to the export earnings of the country.

Figure 4-3 Malaysia External Trade (Billion RM)



Source: Department of Statistics Malaysia 2006

In regards to palm biodiesel, Malaysia has been carrying out research on this alternative fuel since 1982. This research has been intensified by the recent increasing demand for biofuels, especially from EU countries (MPOB 2005a). During 2006, the Malaysian and Indonesian Governments announced that they would each allocate 6 million tonnes of CPO as raw material for biodiesel. Although no time-frame was indicated, it has been estimated that in Malaysia 600 000 tonnes of biodiesel will be produced by the end of 2007 and 1.2 million tonnes by mid 2008 (Basiron 2007).

4.1.3 Palm Oil Related CDM Projects in Malaysia

As previously mentioned, until nowadays there is no project under the Clean Development Mechanism (CDM) related to biofuels (biodiesel and bioethanol), although liquid biofuel projects are eligible for CDM status, since are considered “CO₂ neutral”. The picture for biodiesel may change in the near future when the baseline methodology for palm methyl ester (PME) is completed and accepted by the UNFCCC.

However, in the meanwhile the palm oil industry has a large potential role to play implementing projects under the CDM which methodology has been already developed and approved by the UNFCCC, especially in the area of biomass for energy generation, since palm oil plants produce large quantities of solid and liquid waste that can be used to generate electricity and/or heat. These projects have the potential to reduce emissions in three ways: first, by displacing fuel oil which is currently used to generate steam; second and third, by displacing electricity from the national grid or diesel power generators by generating electricity (Chin et al. 2006).

To date, Malaysia has embarked on seven CDM projects of that type; these projects are summarized in Appendix 6. The use of renewable energy sources in a efficient way is in line

with the country's development policy of renewable energy as a fifth fuel (see following section 4.2.1) as stipulated in the objectives of the Third Perspective Plan Outline (OPP3) (Chin et al. 2006). All of them are small-scale projects except the project carried out by Lafarge Malaysia. The Seguntor Bioenergy and Kina Biopower are similar in utilizing biomass from palm oil mills to generate electricity and supplying to the grid. The projects at Lumut PGEO Edible Oils and Sandakan Edible Oils are all biomass steam and power plants in refineries, which also utilize empty fruit bunches (EFB) from the surrounding palm oil mills. The projects at Sahabat Complex will also use EFB but the steam and power are utilized within a bigger integrated manufacturing complex including supplying electricity for residential use. The Lafarge Malaysia project is a direct displacement of a significant amount of coal with palm kernel shell for heat generation only. Appendix 6 illustrates the methodologies used by these projects and how these fulfil the global approach to climate change by emissions reduction (Chin et al. 2006).

In short, out of the seven above presented projects six utilize EFB for either generation of electricity only or co-generation of electricity and steam. According to MPOB (2006) all these projects fulfil the conditions to reduce GHG emissions and meet the essential sustainability and additionality criteria as well as the development strategies adopted by Malaysia. Environmental sustainability is fulfilled by intensifying the development of renewable energy for the country; social sustainability is achieved by creating highly qualified employment and providing training to develop the necessary skills to operate the new plants; and economic sustainability is reached by reducing the foreign oil imports and thus the foreign exchange by introducing sustainable indigenous source of energy (Chin et al. 2006). Moreover, the GHG emissions of the project activities are additional and would not have occurred without the proposed projects, thus confirming the additionality of these.

4.2 Biodiesel Development Strategy in Malaysia

4.2.1 The Five-Fuel Diversification Policy

In parallel with Malaysia's rapid economic development, final energy consumption grew at a fast rate of 5.6% between 2000 and 2005 to reach 38.9 Mtoe in 2005 (APEC 2006). A substantial portion of the energy consumed was from oil (63%) which was mainly utilized in the transport and industrial sectors. Natural gas consumption also increased in a rapid manner to fuel electricity demand. The share of natural gas in total installed electricity generation capacity remains high at 70% in 2005, but has fallen slightly from 77% in 2000 (APEC 2006). According to the APEC Energy Outlook (2006), despite the Government's efforts to increase the share of coal in the electricity generation mix, the share of coal only reached 22% in 2005.

Malaysia's primary energy demand is projected to grow at 3.5% per year to 147 Mtoe in 2030 (APEC 2006); mainly due to the increase in demand for coal, oil and gas; with coal demand accounting for the highest growth rate at 9.7% per year through 2030. Indigenous oil reserves are projected to be depleted within the outlook period, thus shifting the economy to a net energy importer. Net import dependency will reach 32% in 2030 from a net export position of 57% in 2002 (APEC 2006).

Taking into account this growing energy consumption and the country's domestic energy supply constraints, Malaysia has set a strategy focusing on developing diversification of energy sources as the economy's main energy policy goals. The "Five-Fuel Strategy" recognizes renewable energy resources as the economy's fifth fuel after oil, coal, natural gas and hydro (Mohamed and Lee 2005). Through the Five-Fuel Diversification Policy introduced in 2001,

the Government of Malaysia advanced the development of renewable energy (RE) targeting a 5% contribution of RE to the electricity mix by 2005 and formulating the “National Biofuel Policy” (How 2005).

4.2.2 The National Biofuel Policy

The “National Biofuel Policy” was announced in August 2005 and issued in March 2006. This initiative is in line with the nation’s Five-Fuel Diversification Policy and sets the platform for attaining the following objectives: supplement the depleting supply of fossil fuels; mobilize local resources for biofuels; exploit local technology for biofuels; boost a new demand for palm oil; stabilize the crude palm oil price and protect the agro-based industry; and contribute to environmental conservation by reducing CO₂ emissions (National Biofuel Policy 2006, Maeda 2006). The National Biofuel Policy envisions that biodiesel from palm oil will be one of the key energy sources for Malaysia. The policy is underpinned by five strategic thrusts:

Table 4-1 National Biofuel Policy’s Five Thrusts

THRUST 1: Biofuel for Transport

Diesel for land and sea transport will be a blend of 5% processed palm oil and 95% petroleum diesel. This B5 diesel will be made available throughout the country. As this sector is the main user of diesel which is highly subsidized, it will be given priority in this policy.

THRUST 2: Biofuel for Industry

B5 diesel will supply the industrial sector including for firing boilers in manufacturing, construction machinery and generators.

THRUST 3: Biofuel Technologies

Research, development and commercialisation of biofuel technologies will be conducted and adequately funded by both the Government and the private sectors including ventures capitalists to enable increased use of biofuels.

THRUST 4: Biofuel for Export

Malaysia will have an edge to supply the growing global demand for biofuel. The establishment of plants for producing biofuel for export will be encouraged and facilitated.

THRUST 5: Biofuel for Cleaner Environment

The use of biofuel will reduce the use of fossil fuels, minimise the emission of greenhouse gases.

Adapted from the Malaysian National Biofuel Policy 2006

The introduction of biodiesel for the transport sector is one of the positive steps that the government has undertaken to achieve sustainable energy development through diversification of fuel sources. The transportation sector of Malaysia is heavily reliant on the road transport sub-sector. The transportation sector in Malaysia records the highest energy consumption, equivalent to 40% of the total energy consumption in the country (PTM 2006). Moreover, passenger vehicle ownership has been largely promoted as Malaysia considers the auto manufacturing industry as an important driver for economic development. As a result, Malaysia has a relatively high level of passenger vehicle ownership of about 180 per 1 000 population (2002) and energy demand in road transport is projected to grow at an annual rate of 3.5 percent (ACEP 2006). As it is possible to see, the potential demand for biofuel in this sector is large and its use has the potential to ameliorate the increase in negative impacts caused by the high fossil fuels consumption in this sector. However, this sector is heavily subsidized and it is still unclear how biodiesel will compete against the low diesel prices in Malaysia. This will be resolved by the end of May 2007, when strategies under the National Biofuel Policy will be further developed by the Malaysian Government.

Finally, to promote biodiesel in Malaysia, there are several incentives that may be applicable to biodiesel manufacturers. Biodiesel is included in the list of products/activities that are encouraged under the Promotion Investments Act 1986. Biodiesel projects are therefore eligible to be considered for Pioneer Status with 100% tax exemption for a 10-year period or Investment Tax Allowance of 60% on capital expenditure for improving energy conservation (Maeda 2006). If the projects fulfill specific criteria, they may also be considered for other incentives for Strategic or High Technology projects and Incentives for Commercialization of Research and Development findings of the public sector in resource based industries (PTM 2006).

4.3 Land Development and Native Communities in the State of Sarawak

The State of Sarawak is located north-western Borneo Island, East Malaysia (see Figure 4-4). This State became part of Malaysia in 1963, after being governed by the British Colony under the command of James Brooke, known as the 'White Rajah'. Sarawak was governed by the British from 1839 to 1963, with an exception period from 1941 to 1945 during the Japanese occupation. This section starts with a brief overview of the land tenure in Sarawak. It then traces the State land development strategies over time planned on the basis of addressing poverty among the native communities in the State. Land development policies in Sarawak changed from agrarian resettlement schemes in the 1960s to in situ land development programmes in the 1970s, and finally to the joint venture concept of native customary right land development in 1990s. This section ends up with a short description of native communities in Sarawak.

Figure 4-4 Map of Malaysia



Source: Central Intelligence Agency 1998

4.3.1 Land Tenure

Land tenure is a key factor to understand land-use changes. The land tenure in the State of Sarawak can be referred to the land classification made in 1958, when the colonial British Government issued a Land Code that divided land in five categories: reserve land, mixed zone land, native area land, interior area land and native customary land (see Table 4-2). Native customary land is not held under title, but it is subject to native rights (Land Code Ch.81 part II, 5). Therefore the land is often referred to as Native Customary Right land (NCR-land).

Table 4-2 Land Tenure Categories in Sarawak

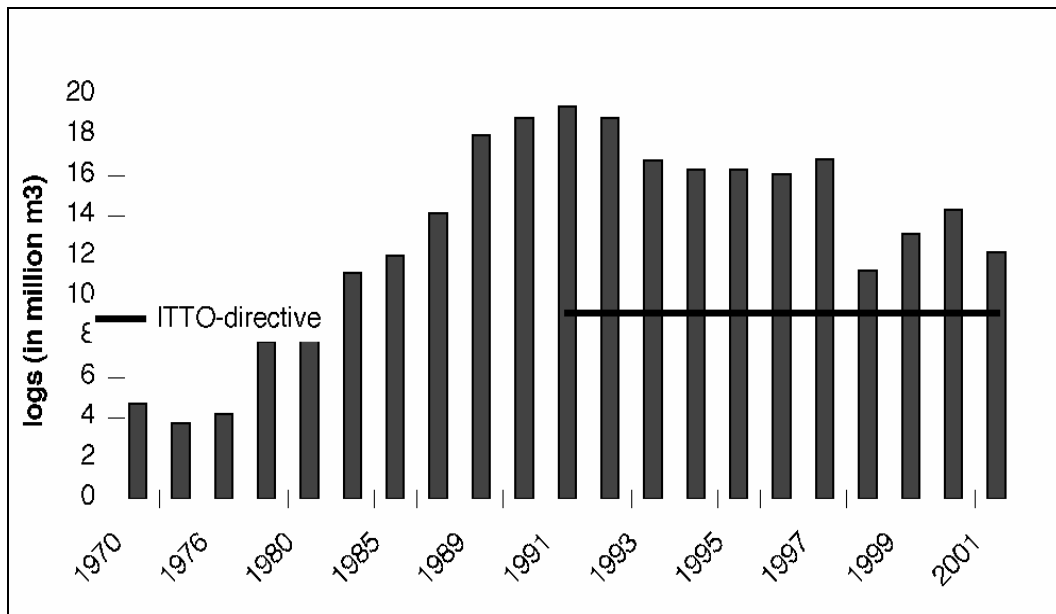
Category	Title
Reserve land	The land is held by the State
Mixed zone land	No restrictions on who can acquire title to the land
Native land area	Only legally defined Dayaks ¹⁶ can acquire title to the land
Interior area land	No restrictions on who can acquire title to the land
Native customary land	Not held under title but subjected to native customary rights

Adapted from Cramb and Dixon 1988

Native land area is characterized by shifting cultivation and small scale agriculture and is mostly found in the coastal zone. Native Customary Right land (NCR-land) is also characterized by shifting cultivation but is mostly located along the rivers. According to Foo (1986, cited by Ngidang 2002), some 22% of the total land of Sarawak is classified under NCR-land although Zainie (1994) refutes this figure arguing that only 13% of the total Sarawak land is NCR-land. Based on Zainie's estimate, the 'Dayaks' – hereafter referred to as 'natives' – of Sarawak own some 1.5 million hectares of NCR-land (Ngidang 2002). Mixed zone land is traditionally located near the urban centres and is used for multiple purposes (Svan Hansen 2005). Interior land areas are occupying interior areas as its name suggests and are traditionally characterized by being forested, with free access for natives to practice traditional activities (hunting, fishing, and gathering). Reserve land is mainly occupied by Permanent Forest Estates (PFEs), which are divided into three sub-categories: forest reserve, protected forest and communal forest. Forest reserves are in most of the cases productive forest and its entry is restricted to a licensing scheme. Farming, hunting and gathering are banned to local population in these forests. In the protected forest areas the locals are allowed to hunt, fish and collect non-timber products. Communal forests are located near or within the NCR-land with free access to local population. All forests can be logged with exception of totally protected forest such as national parks. Logging licenses are generally provided for a 5-10 period (Svan Hansen 2005).

¹⁶ Natives, indigeneous people

Figure 4-5 Log Production in Sarawak (1970 – 2001)



Sources: Malaysian Timber Council MTC, Sarawak Timber Association STA, Sarawak Tribune 2002

In the 1980s, the State Government of Sarawak started issuing timber cutting licenses in certain PFEs as above mentioned. During the past two decades forests in Sarawak have been logged – mainly for export – at high annual extraction volumes (Wong 2002). Sarawak became the main tropical log supplier in the Southeast Asian region since the late 1980s (Tachibana 1995). To control the logging activity and introduce a sustainable logging system, the International Tropical Timber Organisation's (ITTO) recommended from 1990 onwards a quota of 9.2 million cubic metres of annual extraction (see Figure 4-5 above). Despite repeated promises to comply with 1990 ITTO recommendations, the official records of logging in Sarawak remained between 13 million cubic metres and 19 million cubic metres of annual production (Wong 2002). In order to value add the extracted log, Sarawak has taken measures to promote the development of wood processing industries in the State, especially the plywood industry (Tachibana 1995). The first wave of land-use conversion in Sarawak that started with logging activities in the 1980s is being continued by large-scale palm oil plantations that started to expand in the 1990s and are still in expansion process.

4.3.2 Land Development Strategies and Palm Oil Expansion

Agrarian Resettlement Schemes

In 1960 the Government of Sarawak started applying land resettlement schemes in Sarawak for landless agricultural workers and fishermen. This program was mainly designed to provide a plantation-based economy into natives' subsistence-based economy. Between 1964 and 1974 a total of about 5550 ha of rubber plantations were established in the region by the Sarawak Finance Corporation and the Department of Agriculture (Ngidang 2002). This scheme was handled later to the Sarawak Land Development Board (SLDB). The main objective at that time was to acquire NCR-land from the native population and redistribute it among different ethnic groups (Iban, Chinese, Malays, Melanau and Indian). The second objective was to move

native (mainly Iban¹⁷) shifting cultivators from low yield subsistence crops such as hill rice, and low-income agriculture into a plantation-based agriculture system with the intention to raise their living standards (Ngidang 2002).

The cost of developing an individual farm under this new scheme was RM 4 000 to RM 8 000 per household (EUR 870 – 1 740) and it was considered a loan. The payment of the loan was made by deducing a percentage of the rubber production that was sold to a SLDB processing plant. According to Ngidang (2002), minimal land compensation was given to land donors under this scheme. He argues that in fact most of the settlers have not paid their loans yet and therefore have not been given a land title yet.

The rubber-based resettlement schemes were a failure due to the rubber market prices fall in the late 1960s and the establishment of an informal market where rubber producers started to sell their rubber production to middlemen instead to SLDB as a way of evading loan repayments. Moreover, unlike the situation in their previous settlements, they did not have access and control over land resources under the new scheme. Relocating native communities to new environments forced them to adopt mono-cropping farm schemes and prevented them from diversifying their agro-economic activities. In the absence of land for growing food crops to meet subsistence requirements people had to buy food using the incomes gained from the cash crops. When market prices for agricultural commodities such as rubber fell, many settlers had nothing to fall back on to mitigate the negative effect. In 1972 the State Government decided to abandon this scheme and decided to form the Sarawak Land Consolidation and Rehabilitation Authority (SALCRA) in 1976 (Ngidang 2002).

In Situ Land Development

Contrary to the resettlement schemes run by SLDB, SALCRA's in situ development strategy was designed to provide development in the native communities without relocating them to an entirely new and different environment. To date, out of 41 890 ha developed under SALCRA, 40 650 ha are palm oil, 1 053 ha are rubber and 188 ha are cultivated with tea (Ngidang 2002). About 54% of the total planted area is in Iban communities areas. This scheme did not stop communities from practising self-subsistence agriculture, and in addition it encouraged farmers to diversify their agro-economic activities in order to generate additional profits and to raise their living standard.

In order to participate in this scheme, natives had to surrender their unregistered parcels of NCR-land to the State Government and agree with SALCRA to grant the agency the right to develop them into large-scale palm oil plantations for the duration of 25 years (one crop cycle). Parcels of NCR-land are surveyed for each landowner, so SALCRA can distribute profits proportionally to the landowners years later (Ngidang 2002). Under this scheme, land rights are guaranteed by the Government, whereby after 25 years they will be given back the land with a document of title in perpetuity (Ndigang 2002). The way this scheme works is similar to contract farming, where production, processing and marketing is vertically integrated to the central management of SALCRA. The development costs of the scheme are handled as a loan to be repaid by the landowners by deduction of the sales of fresh fruit bunches to the processing factory (Ngidang 2002).

Land development under SALCRA, although it improved landowners' life standard by providing economic benefits, basic services and infrastructure such as schools and rural health centres, was not profitable (Cooke 2002). As a consequence, SALCRA stop expanding at the

¹⁷ Largest (Dayak) native group in the State of Sarawak.

end of the 1980s and was privatized (Cooke 2002). It is not until recent years that it started to distribute dividends from the profits of fruit bunches to the participating landowners. Moreover, a further shortcoming of this scheme is the low wage offered to those interested in working in the oil palm plantation which is no longer able to attract younger generations to work in the scheme (Ngidang 2002). The lack of overall success in the past schemes made the State Government reluctant to further develop land development schemes on its own. As a result, the State Government is now engaged in transferring the responsibility for plantation development to the private sector in joint venture agreements with native communities under a new land development strategy known as the 'New Concept' (Cooke 2002).

Contemporary Land Development Strategy: The New Concept

This new model of land development in Sarawak was launched in 1995 after a land development seminar in October 1994 and almost 10 years after the Land Consolidation Development Authority in Sarawak (LCDA) first proposed this concept (Ngidang 2002). The main pillar of this new strategy is the transfer of individual land rights to a corporate body for it to develop the NCR land on a commercial and large scale basis in accordance with the "New Concept" (Ministry of Land Development 2006). The rationale behind this new concept is the belief of the State Government that the best way to revolutionise the rural economy and help natives to lift their socio-economic status is through the development of the "idle and underutilized NCR land into large scale oil palm plantations" (Ministry of Land Development 2006, Handbook New Concept of NCR Land Development 1997).

The vision of the land development under the "New Concept" is to achieve by the year 2010 the Government objective of having 1 million of hectares fully developed into oil palm plantations. To do so, the State government plans to create at least 60 000 hectares of NCR 'Land bank' from NCR-land annually as from 2005 onwards (Ministry of Land Development 2006). The concrete objectives of the NCR-land development programme are to raise the standard of living of the rural people and contribute towards poverty eradication, reduce rural-urban migration and result in a balanced development between the rural and the urban areas (Ministry of Land Development 2006).

The New Concept is based on a joint venture agreement between the private sector, NCR-landowners, and government agencies whereby the native communities provide the land and labour, the private sector provides the capital and expertise and the government agencies act as trustees or play the role of managing agents for the joint venture (JV) project (Ngidang 2002).

As is mentioned above, one of the most important requisites for the JV is the development of a 'land bank' from NCR-land. The minimum size of a land bank viable for a palm oil commercial plantation is 5 000 ha (Ministry of Land Development 2006, Handbook New Concept of NCR Land Development 1997). Therefore, fragmented parcels of NCR-land are consolidated to one land bank that is surrendered to either the LCDA or the SLDB, both Government Agencies. In order to establish the land bank a perimeter survey is first carried out by the Land and Survey Department followed by a picket survey to identify individual parcels within the land bank (Handbook New Concept of NCR Land Development 1997). The land bank is gazetted under Development Area, classified as 'Native Area Land' and is issued a single master title which is used to lease the land to a joint venture company for a period of 60 years (two crop cycles). Under the JV, landowners are required to give the power of attorney ('trust deed'¹⁸) to the Government Agency (LCDA or SLDB) as a trustee of their

¹⁸ Document which will be executed between the NCR landowners and the Trustee pertaining to the development of the said land and for the protection of the interests of the NCR landowners in the said development.

NCR-land area given to the scheme. The JV agreement is then made between the trustee and the private investor (Ngidang 2002, Ministry of Land Development 2006, Handbook New Concept of NCR Land Development 1997). After the 60 years, the land owners are required to notify the land office of their decision of whether they want to continue with the JV or to have their land alienated. Any native that wants their land back “may apply to the Superintendent for the issue of a grant over his/her land or any part thereof. The Superintendent may then, subject to the direction of the Director, issue such grant to the native upon such terms and conditions as he deems fit to impose” (Land Code Ch.81 part II, 18a). In short, the expiration of the 60-year lease does not automatically provide for the land bank to be reverted to the original landowners.

Under this JV agreement 60% of the equity in the joint venture belongs to the private sector, 10% is owned by the government agency and 30% belongs to the participant natives (NCR-landowners). The landowners acquire 30% using their NCR-land as a substitute for cash (Ministry of Land Development 2006). They are issued share certificates in proportion to the area of their land committed to the oil palm plantation (Ngidang 2002). Although they are not required to come up with cash to acquire shares, the landowners are required to invest 60% of the lease value of their land (RM 1250/ha) to acquire the 30% share in the JV. From the remaining 40% of the lease, 10% is given in form of cash up-front, whereas the rest 30% of the lease value is directly invested in government-approved unit trust fund (Ngidang 2002).

To date, the “New Concept”, also known as “Konsep Baru”, has been introduced as a pioneer project in areas assigned for commercial agricultural production in Sarawak (including NCR-land areas) (Svan Hansen 2005). Land surveys were carried out in 1994 by the Land and Survey Department and developments of new plantations started in these areas from 1996 onwards (Cooke 2002).

Conflicting Land Uses: Land Development and Food Production

Although the objectives for the agricultural sector in Sarawak are similar to those of land development in the sense that both aim to transform the sector into a modern and competitive one and look forward to providing a better living standard to rural people, they differ in one important point: land use. While the mission of the agricultural sector strategies is concerned with ensuring food security in the State – aiming at reaching 90% of self-sufficiency in rice production by 2010 - and promoting sustainable agriculture (Department of Agriculture 2006), the mission of the land development strategies is concerned with developing large-scale palm oil plantations as the best way to improve the rural economy and NCR-land productivity (Ministry of Land development 2006). It is important to highlight here that in the State of Sarawak paddy rice is mainly produced under shifting cultivation by native communities. This puts both strategies in conflict, since both target the development of NCR-land as the mean to reach their objectives.

4.3.3 Traditional Practices and Native Communities in Sarawak

The 1.7 million population of Sarawak is composed of 27 different ethnic groups, of which the major ones are the Malay, Iban, Bidayuh, Melanau, Orang Ulu and the Chinese. The Malay and Melanau (Malays) constitute the so called Muslim-natives, whereas the other groups are classified as non-Muslim natives. The Iban and Bidayuh together with other native groups are referred to as the “Dayaks” (Banerjee and Bojsen 2003). In this study “Dayaks” are referred to as “natives”.

The main socio-economic activity of natives in Sarawak is characterized by shifting cultivation. The shifting cultivation practised by the Iban, the largest native group in Sarawak, is based on the production of paddy rice. The Iban live in longhouses, traditionally located along the river, which generally serves as infrastructure. Each family has its own household (called bilek) in the longhouse and although many productive activities are carried out in groups, each bilek has its own production field (Svan Hansen 2005). The longhouse has the right to a certain area that is generally marked by certain rivers.

In 1958, as mentioned above, the Colonial British Government promulgated a Land Code for Sarawak, which overruled the traditional land tenure system. According to this Land Code, the natives such as the Iban only have the right to land cultivated before 1958. This land is referred to as NCR-land. Within an NCR-land it is possible to find several longhouses. Each NCR-land is commonly held under customary rights by this group of longhouses which are generally direct descendents of the man who first cut down the primary forest to start agriculture in that area. It is important to mention here that Iban native communities reject the concept of private land ownership. Instead of that they recognize stewardship of the land across generations¹⁹. In this line, land is inherited by family members over generations (Svan Hansen 2005).

The way shifting cultivation works is first with a patch of forest being cleared, the trees are left to dry and later burned as part of the land preparation. On average, the size of paddy plot is not much larger than one ha per bilek²⁰ (Gerrits 1995). Usually the biomass is burned in August and the ashes provide a nutrient rich bed in which the rice is planted a few days after the burn (Svan Hansen 2005). Generally, weeding takes place from November to January and harvest from January to March. After harvesting the rice is brought to the longhouse where it is further processed. After two years of production the field is left fallow. The production period will depend on the soil conditions and the abundance of unwanted weeds (Gerrits 1994). The fallow periods may vary between 4 to 5 years to 40 years, depending on the location of the area, soil conditions, pressure on land, etc. As a result, shifting cultivations appear to be a mix of forests in various succession stages (Svan Hansen 2005). Compared to natural forests the flora and fauna are less diverse, however still species rich (Christensen 2003). Assessing the land-use system managed at household (family) level and longhouse level, Gerrits (1994) argues that it appears to be sustainable and that shifting cultivation makes a major contribution to the sustainability of the system.

Traditionally, shifting cultivators are subsistence farmers. The daily paddy rice is supplemented by vegetables grown on the field, wild vegetables gathered in the forest, chicken and pigs kept behind the longhouse, fish from the river and animals hunted in the forest. Traditional subsistence socio-economic activities of natives are highly dependent on the local natural resources and environmental conditions. This interdependency between socio-economic well-being and environmental sustainability is key for the sustainability of local livelihoods and is the basis for native communities to secure and fulfil their subsistence needs (Gerrits 1994).

¹⁹ Ramba, H. U. Iban native. (2007, March 23). Personal Interview.

²⁰ Bujang, M. (2007, March) Borneo Resources Institute Malaysia (BRIMAS) Personal interview.

Box 2. The Meaning of Land for Native Communities

“According to ‘adat’²¹ land is a livelihood, it governs the whole spectrum of human behaviour pertaining to subsistence farming, fishing, hunting and gathering or harvesting forest products, and the environment as a whole. Land also defines the rules and regulations which regulate activities and maintain order in human-environment relations and social interactions involving the protection, utilisation and management of mutual resources and the common good”

- Ngidang 2002 -

Although these traditional practices among natives continue playing a main role in their socio-economic well-being, the introduction of above mentioned land development strategies and off-farm opportunities resulted in the native communities becoming more integrated into the market economy (Svan Hansen 2005a). Due to easier access to markets and general modernisation, especially since 1980s, natives’ subsistence practices have been influenced and in some cases life-style patterns have changed, most of the times resulting in migration to the urban areas (Cooke 2002). External pressure for land practice, modernisation and development represent a challenge in the future sustainability natives’ livelihoods.

²¹ ‘Adat’ is the term used for native customary law. Adat are the rules developed by natives and put in practice within natives NCR-land. Originally these rules were passed through oral tradition, nowadays adat has been codified.

5 Stakeholder Analysis: Understanding the National Perspective

This section portrays the national perceptions on biodiesel development in Malaysia by analysing the views of different key stakeholders on key issues, main drivers, benefits and national strategies related to the development of biodiesel at global level and in particular at national level.

5.1 Future Biodiesel Development in Malaysia

As a general opinion from key stakeholders global biodiesel production will significantly increase in the coming years and Malaysia will become a dominant global player. According to the Malaysian Palm Oil Board (MPOB 2005a) the country initiated research on biodiesel two decades ago, in 1982, with the construction of a palm biodiesel pilot plant of 10 000 t/y capacity. From then on, biodiesel has been “systematically and exhaustively” evaluated in Malaysia as diesel fuel substitute (MPOB 2005a). This includes laboratory evaluation, stationary engine testing and field trials on a large number of vehicles including taxis, trucks, passenger cars and buses (MPOB 2005a). Nevertheless, it was not until 2002-03 when EU countries demand for biofuels significantly increased, that the fast development of biodiesel really jump-started. “This rise in biofuel demand can be considered the kick start for a more rapid biodiesel development”, states Cheah²². According to him, the latest developments in biodiesel is the testing of Envo Diesel (a commercial name for blending 5% (B5) processed palm oil with 95% diesel) in government transport and the production of palm biodiesel (palm methyl ester) with a low pour point (-21°C to 0 °C) suitable for different climatic conditions in other countries (PTM 2006).

In 2005, MPOB supported the palm biodiesel industry calling for bids from companies to set up three biodiesel plants. The successful bidders were Golden Hope, Carotino and Firma Bulkens. Although these three plants started originally as research projects, they will be under commercial operation by the end of 2007²³. Each of the plants has a capacity of 60 000 t/y with a processing cost of EUR 400 - 500 per tonne and capital expenditure of EUR 9.3 million (PTM 2006, Chin 2007²⁴). One has already entered under commission in July 2006, the second one will enter under commission by the end of March 2007 and the third one by the end of September 2007.

At the time of writing this paper, Malaysia has issued a total of 97 licenses for the development of biodiesel plants in the country. Of these, only five have started to set up a biodiesel plant already. Considering these five plants the total installed capacity in Malaysia by the end of this year has been estimated to be of 0.5 million tonnes²⁵. If all licenses issued would go into production a total of 8 million tonnes of biodiesel would be produced in Malaysia. However, this does not seem to be the future scenario, despite the agreement between Malaysia and Indonesia to produce each 6 million tonnes of biodiesel in the nearly coming years. According to the Executive Director of the Malaysian Palm Oil Council

²² Cheah, K. (2007, March 13). Malaysian Palm Oil Board (MPOB). Personal interview.

²³ Cheah, K. (2007, March 13). Malaysian Palm oil Board (MPOB). Personal interview.

²⁴ Chin, B. (2007 March 30). Borneo Pacific (Holdings) Company. Personal interview.

²⁵ Cheah, K. (2007, March 13). Malaysian Palm Oil Board. Personal interview.

(MPOC) Dr. Basiron²⁶, by the end of 2008 the biodiesel produced in Malaysia will be around 1.5 million tonnes. In the medium-term, the Third Industrial Master Plan (IMP3) targets RM 78.8 billion (EUR 17.1 billion) gained in export value by 2020 from palm oil products (Abdul 2006), almost three times higher than the current export earnings from palm oil (RM 28.4 billion equivalent to EUR 6.2 billion).

5.2 Naming Main Drivers

As mentioned previously, Malaysia started research on biodiesel two decades ago. The drivers for biodiesel development in the country vary over time, although price stabilization for palm oil market prices has maintained as the main driver, states Velumail²⁷. During the 1980s the development of biodiesel in Malaysia started with the objective to create a mechanism to stabilize palm oil market prices and diminish the risk of prices falling below production costs as seen during the period of excess supply in 2001²⁸. Some years ago this development accelerated as biodiesel was identified and promoted as source of renewable energy with great potential to reduce greenhouse gases and thus contribute to mitigate climate change. Nowadays, biodiesel is seen as an alternative fuel that allows diversification of energy sources and contributes to lower the reliance on fossil fuels and to ensure energy security²⁹.

In short, although on the one hand the development of biodiesel in Malaysia is still mainly driven by the need of a leverage mechanism for palm oil price stabilization in that according to Basiron³⁰ “crude palm oil diverted to biodiesel has the power to push prices higher” and that “the resulting market dynamics between edible palm oil and palm oil for fuel set the market price of palm oil higher than petroleum market prices”, on the other hand price stabilization is not the only driver for biodiesel development in Malaysia.

A growing population – whereby the share of Malaysia’s urban population will reach 78% in 2030 from 63% in 2002 (APEC 2006) –, combined with a high per capita GDP growth over the next 2 decades (see Figure 5-1), will result in a change of life-style which will cause a shift in energy consumption based mostly on fossil fuel energy sources, rather than traditional biomass sources (APEC 2006). According to the APEC (2006), there will be a substantial growth in energy demand for the transport, commercial and residential sectors. Abraham from UNDP Malaysia points out that biodiesel can play an important role in climate change mitigation, “especially if it is used domestically in the transport sector as planned under the National Biofuel Policy, since large percentage of the energy consumption in the country is in this sector”. In 2005, the transportation sector in Malaysia recorded the highest energy consumption, equivalent to 40% of the total energy utilization (PTM 2006). Moreover, energy demand in road transport is projected to grow at an annual rate of 3.5%. By fuel type, the trend of growth will show significant differences, with gasoline growing at 2.9% per year, diesel at 4.2% per year, and natural gas at 9.2% per year (APEC 2006).

²⁶ Basiron, Y. (2007, March 16). Executive Director of Malaysian Palm Oil Council (MPOC). Personal interview.

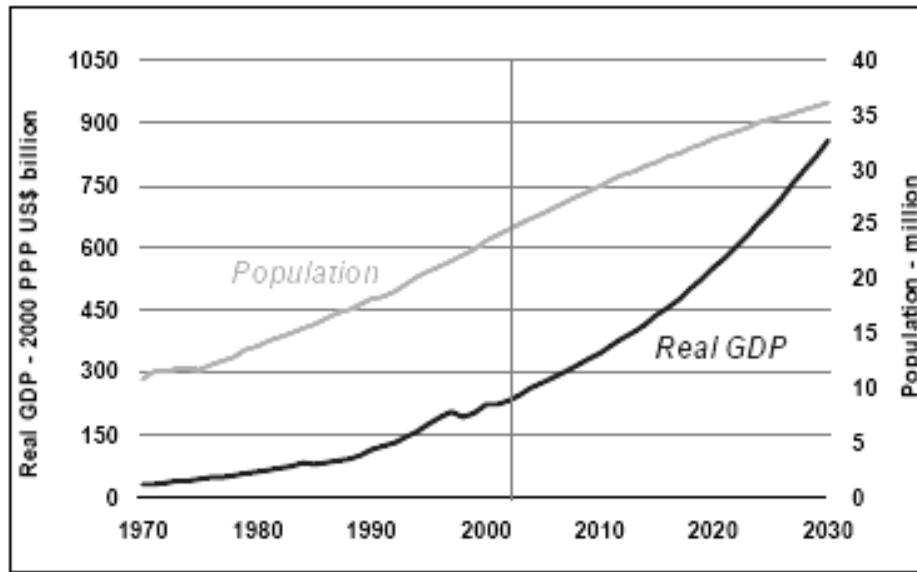
²⁷ Velumail, R. (2001, March 8). Regional United Nations Development Program (UNDP) Office in Bangkok. Regional Energy Program for Poverty Reduction. Personal interview.

²⁸ Cheah, K. (2007, March 13). Malaysian Palm Oil Board (MPOB). Personal interview.

²⁹ Velumail, R. (2001, March 8). Regional United Nations Development Program (UNDP) Office in Bangkok. Energy and Poverty Program. Personal interview.

³⁰ Basiron, Y. (2007, March 16). Executive Director of Malaysia Palm Oil Council (MPOC). Personal interview.

Figure 5-1 GDP in Real Terms and Population Growth in Malaysia (1970 – 2030)



Source: Global Insights 2005

Apart from being used in the transportation sector, Malaysian Government is also considering expanding utilization of biodiesel among the industrial consumers (PTM 2006). This is an interesting alternative for Malaysia, especially considering that 1) energy demand in Malaysia is increasing very rapidly – almost 20% between 1999 to 2002 and at a rate of 5.6% between 2000 and 2005 – and is further expected to increase (Mohamed and Lee 2005), 2) a large portion of this energy comes from fossil fuels (oil, gas and coal) that are highly subsidized in the country (APEC 2006) and 3) despite government efforts to preserve declining energy reserves, Malaysia will become a net energy importer in the next 28 years. Net import dependency will increase from minus 57% (net energy export position) in 2002 to 32% in 2030 (APEC 2006). Particularly in the case of oil, import dependency is expected to reach 32% in 2030 from a net exporting position of 54% in 2002, due to the strong growth of demand in the transport and industrial sectors (APEC 2006). Hence, the development of biodiesel and its domestic use have the potential to reduce the dependence on subsidies and to lower the reliance on “unstable” – in terms of market prices and stocks – fossil energy sources offering a “more stable” alternative source of energy and thus increasing energy security for the country³¹. This rationale is in line with the Five Fuel Diversification strategy of the country (see section 4.2.1).

Last but not least, it is important to mention that currently the development of biodiesel is dictated by the global market demand³². Although Malaysia has currently not introduced any economic instrument supporting directly biodiesel production – Tax Allowances under the Promotion Investments Act 1986 support Pioneer Projects, not directly biodiesel production – and there is no national policy that targets mandatory levels of biodiesel consumption yet, the demand for biodiesel in countries which have to meet national biofuel consumption targets represent an attractive economic incentive for palm oil producers to invest in the

³¹ Chan, R. (2007, April 5). Borneo Pacific (Holdings) Company. Personal interview.

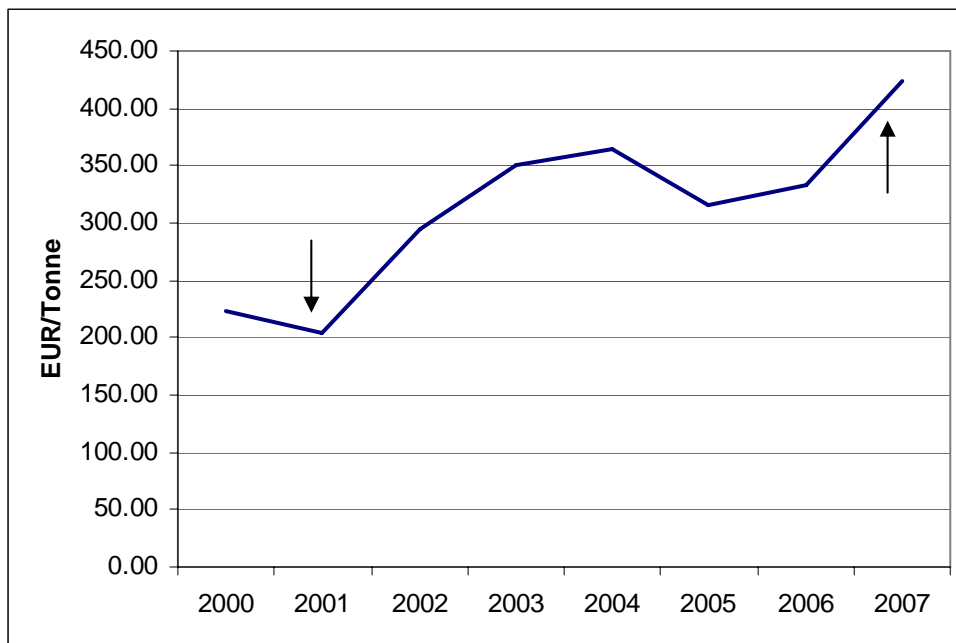
³² Singh, G. (2007 March 15). Director of Center for Environment, Technology and Development Malaysia (CETDEM). Personal interview.

biodiesel industry³³. This could be considered, however, a slippery slope since those that have already invested and started a biodiesel project see export (mainly to EU) as the only current attractive opportunity for biodiesel³⁴.

5.3 Identifying Key Issues for Biodiesel Development in Malaysia

When the rapid demand for biodiesel started to accelerate its development in Malaysia, the price of palm oil used to be 280 EUR/tonne (2002), nowadays it is 420 EUR/tonne (2007) (see Figure 5-2 below). This is important to consider since palm oil price stabilization is one of the main objectives for promoting biodiesel in Malaysia. However, at the same time the increase in palm oil commodity prices has a negative impact in the development of biodiesel, since feedstock makes up to 85 to 90% of biodiesel production costs (Gomes 2007). Due to the increase in palm oil commodity prices many companies that demonstrated an initial interest to produce biodiesel in Malaysia – for instance, those that applied for a license – are giving a second thought to their projects and waiting to see further development of national policies (such the Biofuel National Policy) and global market forecasts before starting any investment.

Figure 5-2 Annual Average Commodity Prices of Palm Oil (1980-2006 and 1st quarter 2007)



Adapted from MPOB Statistics Database 2007

Moreover, although the global demand for biodiesel – in particular from the EU – is an attractive economic incentive as previously mentioned, the market price fluctuations of fossil fuel and edible oils portray also an uncertain market scenario for many biodiesel project developers that prefer to “wait and see” before investing in this industry³⁵. The recent decrease in fossil fuel market prices represents a threat to biodiesel price competitiveness.

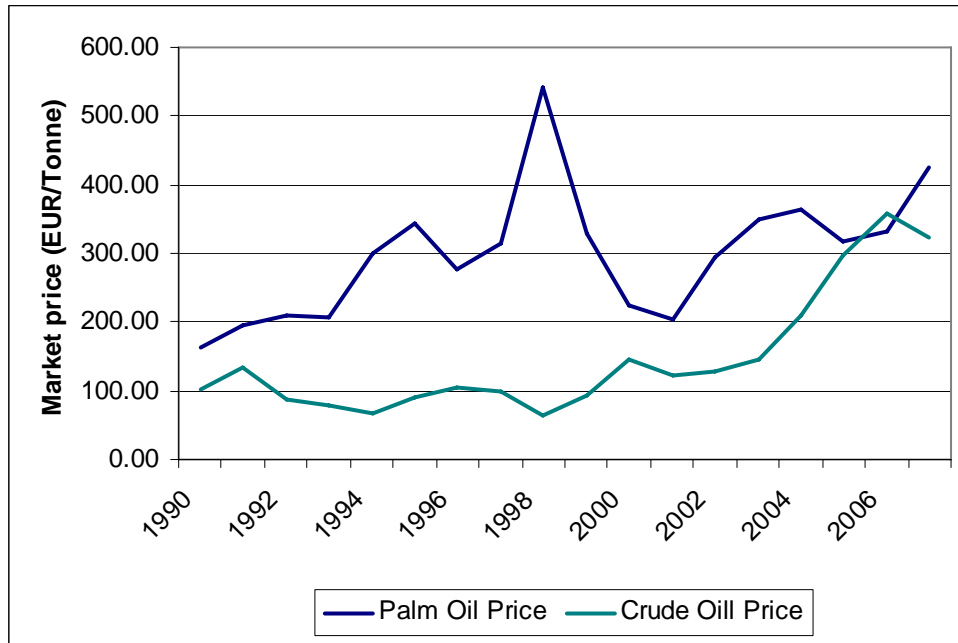
³³ Cheah, K. (2007, March 13). Malaysian Palm Oil Board (MPOB). Personal interview.

³⁴ Chin, B. (2007 March 30). Borneo Pacific (Holdings) Company. Personal interview.

³⁵ Koh, F. (2007, March 13). Pusat Tenaga Malaysia (Malaysia Energy Centre). Personal interview.

Comparing the last market fluctuations it is possible to see that crude oil spot prices fall below palm oil commodity prices (see Figure 5-3).

Figure 5-3 Annual Market Prices of Palm Oil and Spot Crude Oil Prices (1990-2006 and 1st quarter 2007)

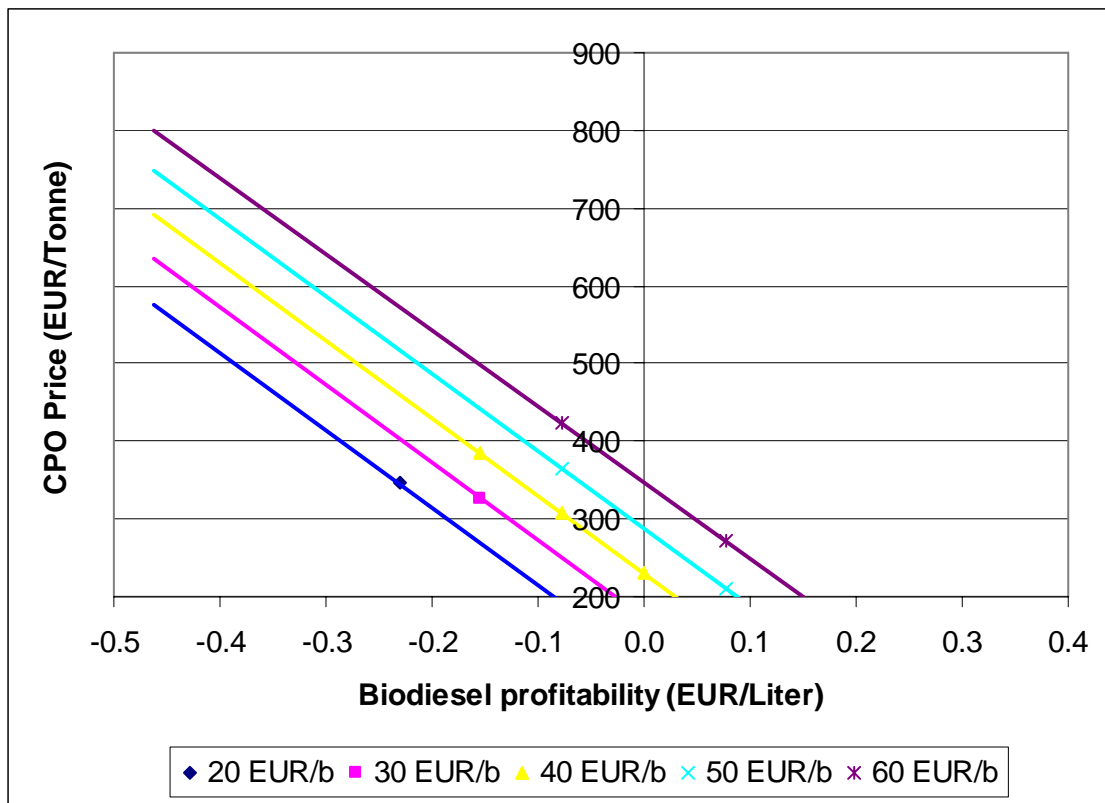


Adapted from Official Statistics from the U.S. Government 2007 (Energy Information Administration), MPOB Database 2007, Energy Intelligence 2006

According to Soon³⁶, “oil market price is a key issue for the future development of biodiesel. If oil prices continue falling, biodiesel will not be economic viable. If fossil fuel prices increase, biodiesel prices will also be affected since biodiesel production depends on the fossil fuel market prices”. Currently the market price for oil is around 45 EUR/barrel (320 EUR/tonne) and that of palm oil is around 60 EUR/barrel (420 EUR/tonne). Suki (2006) claims that biodiesel will require crude oil to be priced in the region of 54 EUR/barrel (395 EUR/tonne) to be competitive (see Figure 5-4 below).

³⁶ Soon, H. (2007, March 17). Environmental Consultancy Eco-Ideal. Personal interview.

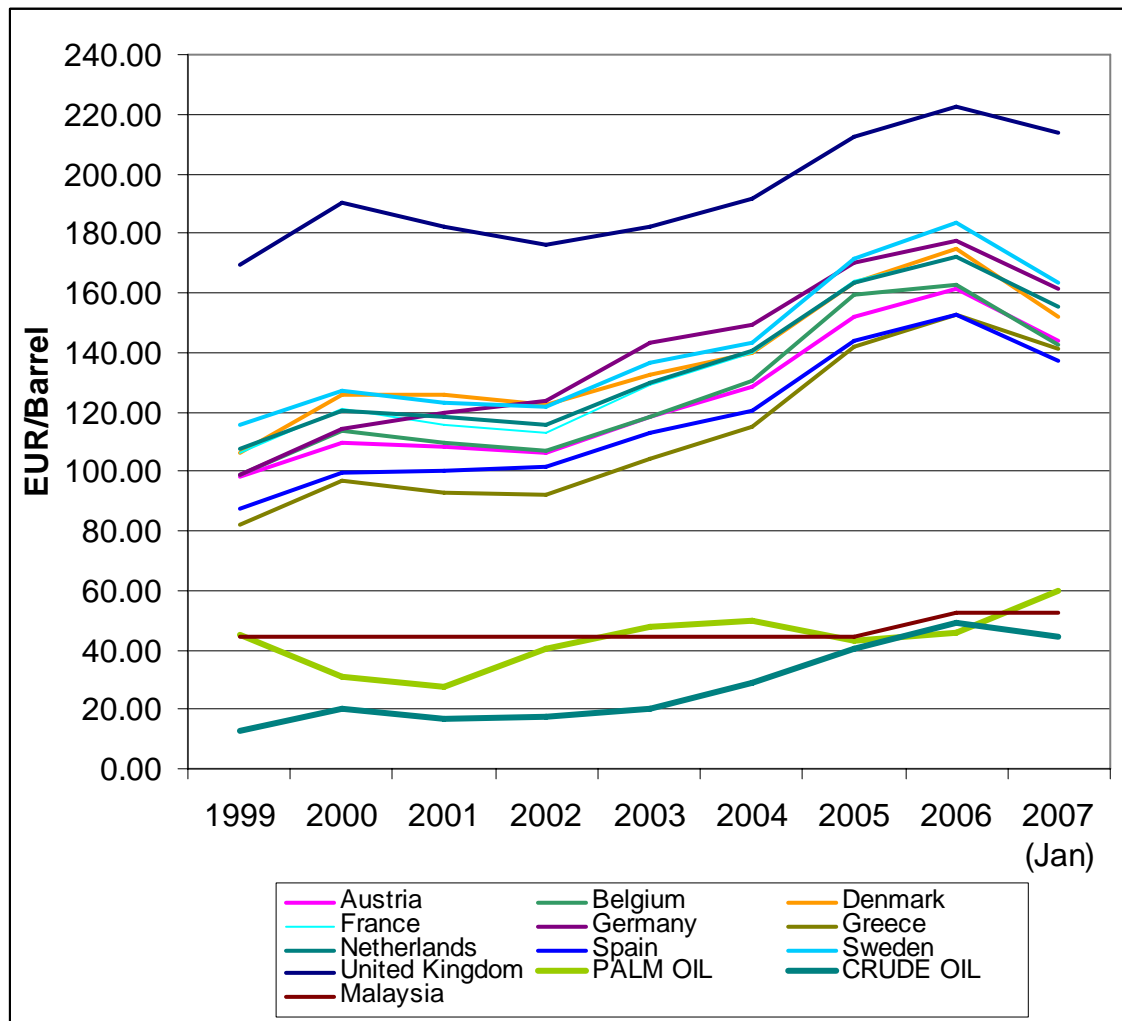
Figure 5-4 Biodiesel Profitability (EUR per Litre)



Adapted from Suki 2006

Nevertheless, taxes and duties on diesel oil and subsidies to biodiesel in countries such as EU countries can influence biodiesel price competitiveness and economic viability. Although palm oil commodity prices have increased in the past years (Figure 5-2), and current oil market prices development and oil subsidies represent a threat to its price competitiveness – see for instance in Malaysia (Figure 5-5) – palm oil and palm biodiesel can be still considered an economic viable option for EU countries. In addition to high diesel oil prices due to taxes levied (UK Department of Trade and Industry 2007, see Figure 5.5 below) – in particular in the UK – EU countries have economic incentives supporting biofuels economic viability (i.e. subsidies in Germany, France, and the UK) due to their interest in meeting mandatory biofuel targets and in ensuring energy security. Hence, EU countries are an attractive export market opportunity for the palm oil industry in Malaysia.

Figure 5-5 Diesel Retail Prices in EU Countries Including Tax and Duty, Diesel Retail Price in Malaysia, Palm Oil and Crude Oil Market Prices (1999 – 2007)



Adapted from UK Department of Trade and Industry 2007, MPOB 2006, Official Statistics from the U.S. Government

In addition, Singh³⁷ claims that the fluctuations in CPO prices are also influenced by fluctuations in vegetable oil prices. He argues that demand for edible oil is increasing, especially in countries with rapid population growth. For instance, in both China and India around 60% of the oilseed consumption will be covered by import to satisfy the internal demand and overcome relatively weak domestic oilseed production (Thoenes 2006a). China combined oilseed imports are estimated to exceed 50 million tonnes by 2015 or most than the double the current volume while India has seen its import rise strongly during the last decade because consumption grew about three times as fast as production (Thoenes 2006a). Moreover, India has lessened its import tariff on palm oil, which makes the import of this vegetable oil even more attractive³⁸. According to Webber³⁹, 1 of 5 million tonnes of palm oil

³⁷ Singh, G. (2007 March 15). Director of Center for Environment, Technology and Development Malaysia (CETDEM). Personal interview.

³⁸ Singh, G. (2007 March 15). Director of Center for Environment, Technology and Development Malaysia (CETDEM). Personal interview.

³⁹ Webber, D. World Wildlife Foundation Malaysia (WWF). Personal interview.

imported by India comes from Malaysia. The increasing demand for edible oil (among which palm oil has a significant share, see section 3.2.1 and 3.3) will have an effect on the price development of biodiesel, since it influences its feedstock (palm oil) market prices. According to the Primer Minister of Malaysia, the commodity price of palm oil will be around 435 EUR/ton by the end of 2007. If palm oil market prices and demand continue raising it may be in the interest of Malaysia and its palm oil industry to export refined palm oil. If on the contrary, palm oil prices decrease, it may be of benefit to Malaysia to value-add and export biodiesel or to create additional demand by implementing a mandatory target for domestic biodiesel consumption.

Furthermore, another key issue in the development of biodiesel in Malaysia is the potential shift from edible oil stocks to oil for biodiesel. Although Basiron⁴⁰ states that the demand for biodiesel can affect the food supply market, Cheah⁴¹ claims that there will not be a significant shift of stock from edible oil to biodiesel in Malaysia, since the demand for edible oil is high and increasing as above stated. It is possible to challenge this statement if recalling Malaysia's committed to set aside almost 40% of its crude palm oil production for biodiesel. This again, has consequences in the market prices of palm oil which affect food prices that utilize this edible oil reaching consumers in developing countries such as India, Malaysia and China⁴². In order for Malaysia to supply the increasing demand for edible palm oil without a shift of stock to biodiesel, palm oil production will need to expand. This argument is shared by other key stakeholders' opinion who forecast an increase in palm oil production in the country. It is also a general opinion that the increase in palm oil production will not likely come from an expansion in palm plantations area, especially since land availability in Malaysia is limited, but from an increase in productivity. The only States in Malaysia that will increase their production through expansion of plantation areas are the States of Sarawak and Sabah, both in the island of Borneo, East Malaysia⁴³. Nonetheless, it is important to mention that although palm oil plantations' expansion within the country seems limited, several Malaysian companies are establishing plantations outside the country borders, especially in Indonesia (Kalimantan), as well as Cameroon and some Latin American countries⁴⁴.

From a global perspective, a high growth in palm oil production is expected as many other developing countries such as Indonesia, Kenya, Cameroon, Colombia, Venezuela, Brazil are entering the biodiesel field along with Malaysia. Indonesia especially is planning to become the world number one palm oil producer by next year. Cheah⁴⁵ claims that at the rate plantations are expanding in this country it might reach its goal by the end of this year 2007. According to Basiron⁴⁶, the increasing global competition will affect Malaysia (at least in the short term), and the market dynamics will stay similar due to the growing demand. In order to compete in the market, Malaysia is strongly focusing on quality and sustainability issues related to its biodiesel production. "It is crucial to consider sustainability issues due to the interests of the

⁴⁰ Basiron, Y. (2007, March 16). Executive Director of Malaysia Palm Oil Council (MPOC). Personal interview.

⁴¹ Cheah, K. (2007, March 13). Malaysian Palm Oil Board (MPOB). Personal interview.

⁴² Singh, G. (2007 March 15). Director of Center for Environment, technology and Development Malaysia (CETDEM). Personal interview.

⁴³ Webber, D., Cheah, K., Singh, G., Efransjah. (2007, March). Personal interview.

⁴⁴ Abraham, M. (2007, March 12). Global Environment Facility (GEF) Small Grant Project, United Nations Development Program Malaysia (UNDP). Personal interview.

⁴⁵ Cheah, K. (2007, March 13). Malaysian Palm oil Board (MPOB). Personal interview.

⁴⁶ Basiron, Y. (2007, March 16). Executive Director of Malaysia Palm Oil Council (MPOC). Personal interview.

buyers” mentions Cheah⁴⁷. Adding to this comment, Basiron⁴⁸ points out that sustainability is a factor that can affect palm oil prices and thus the future development of biodiesel.

In regards to sustainability, Singh and Basiron⁴⁹ mention that the pressure put on Malaysian palm oil industry regarding this issue is not completely fair. According to them, imposing a certification system to palm biodiesel is a non-tariff barrier and goes against WTO rules. Singh⁵⁰ claims that this argument gains especial importance when considering that other producer countries such as EU countries do not certify its biofuel (including feedstock) domestic production and instead of that subsidize it, creating market distortions. Moreover, Basiron⁵¹ claims that even if palm biodiesel is banned by EU countries due to up-stream potential negative impacts, the market for palm biodiesel is still large and attractive. For instance, Korea is targeting 5% of renewable energy consumption by 2011 including biodiesel for transport under the portfolio, China has set a nationwide target for annual biodiesel consumption of 2 million tonnes by 2010 and 12 million tonnes by 2020, India is targeting 20% of biodiesel consumption by 2012 and Japan has targeted transport biofuels equivalent to 500 000 kiloliters of oil by 2010 of which 90% is expected to be imported (Keun and Jung 2006, Kureel 2006, WI 2006, Mohan et al. 2006). Furthermore, he argues that Malaysia has the potential to create more demand for palm biodiesel by subsidizing it for domestic consumption using the corporate tax fund (30%) paid by palm oil companies exporting palm oil products. Finally, he and Gomes⁵² point out that in terms of economic sustainability palm oil is one of the most sustainable vegetable oils worldwide, especially if one considers its high yield in comparison with other oil crops (see section 2.3).

Not everybody agrees with the above arguments, Webber⁵³ claims that only companies that have a strong commitment to comply with sustainability considerations such as the Roundtable for Sustainable Palm Oil (RSPO) criteria will be able to stay competitive in the upcoming biodiesel market. “The RSPO criteria were developed due to the huge demand for sustainable palm oil from the buyers”, he states. Efransjah⁵⁴, is of the same mind and states that RSPO criteria contribute to better practices that improve sustainability in the oil palm sector. Sharing the same view, Soon⁵⁵ claims that the introduction of a certification system could be useful for the development of biodiesel. However, he points out that it is still not clear how the certification system is going to be implemented. Singh⁵⁶ adds that the tracking system would represent one of the main challenges, since “it is not evident to identify the right polluters along the chain” in that palm oil produced unsustainably can easily be mixed with sustainably produced palm oil along the biodiesel production chain which in addition involves

⁴⁷ Cheah, K. (2007, March 13). Malaysian Palm Oil Board (MPOB). Personal interview.

⁴⁸ Basiron, Y. (2007, March 16). Executive Director of Malaysia Palm Oil Council (MPOC). Personal interview.

⁴⁹ Basiron, Y. Singh, G. (2007 March). Executive Director of Malaysia Palm Oil Council (MPOC). Personal interview.

⁵⁰ Singh, G. (2007 March 15). Director of Center for Environment, Technology and Development Malaysia (CETDEM). Personal interview.

⁵¹ Basiron, Y. (2007, March 16). Executive Director of Malaysia Palm Oil Council (MPOC). Personal interview.

⁵² Gomes, L. (2007, April 2). Palm Oil Industrial Cluster (POIC). Personal interview.

⁵³ Webber, D. (2007, March 14). World Wildlife Foundation Malaysia (WWF). Personal interview.

⁵⁴ Efransjah (2007, March 16). United Nations Development Program (UNDP), Peat Swamp Forest Project. Personal interview.

⁵⁵ Soon, H. (2007, March 17). Environmental Consultancy Eco-Ideal. Personal interview.

⁵⁶ Singh, G. (2007 March 15). Director of Center for Environment, Technology and Development Malaysia (CETDEM). Personal interview.

several actors. According to Gomes⁵⁷, an additional challenge related to the introduction of the RSPO criteria is that the burden (implementation costs) falls uniquely on the palm oil producers and no premium for sustainable produced palm oil has been ensured (not even formally discussed) yet. This is contested by Webber⁵⁸ who points out that some companies have already committed themselves to introduce these criteria and signed long-term contracts that presumably take into account the additional costs involved with the criteria implementation. In addition, Webber points out that the only stakeholders that have not really been involved in the process of developing sustainability criteria (RSPO criteria) are smallholders, and if a certification scheme is to be implemented in the sector, “there is a risk that they will face serious difficulties to catch up the wagon”. At the time of writing the national interpretation of RSPO criteria is taking place followed by the establishment of indicators that will allow a proper implementation of the criteria by palm oil companies.

In regards to environmental issues, although 60% of Malaysia’s territory is currently under forest cover⁵⁹ and the intention of the country is to conserve this biological heritage as part of the strategy underlined in the 1998 National Biodiversity Policy (UNDP 2006), there is a great possibility of palm oil plantations expanding in the States of Sarawak and Sabah as above mentioned. This expansion would result in forest cutting and cause biodiversity loss. Although Sabah has still some legal land for expansion, large land developments have already taken place in this State due to its rich fertile volcanic soils⁶⁰. According to Webber⁶¹, the situation in the State of Sarawak is different: “there is available land in native customary right land that could be used for expansion and if this land can not be used for palm oil plantations, there is a probability that expansion takes place in peat swamp forest, which would result in a serious impact on the environment”. 70% of Malaysian remaining peat swamp forest is located in the State of Sarawak. The tropical peat swamp forest of Malaysia and the flora and fauna that inhabit these forests have global as well as national significance. According to Efransjah⁶², in a past study carried out by the Danish International Development Agency (DANIDA) it was found that the tree residual damage, threat to biodiversity and soil degradation were much less in the case of logging in the natural peat swamp forest as compared to land clearing for commercial plantations such as palm oil which causes ecosystem fragmentation, draining of peat swamps and peat oxidation.

Additional environmental issues related to palm oil plantation and biodiesel development mentioned by the stakeholders were water pollution, soil erosion, landscape disturbance, use of agrochemicals, lack of waste management and waste of energy. In regards to the latter, Menon⁶³ from MPOB argues that palm oil industry has the potential to play an important role in the production of renewable energy from fluid and solid waste (biomass). He calculated that a total of 245 MW from palm oil biomass waste and 270 MW from biogas coming from palm oil effluents could be potentially generated by the 422 palm oil mills in Malaysia (Menon 2005). The total potential power generation (4.5%) covers almost the targeted 5% contribution of RE to the electricity mix of the country by 2005. This target was introduced

⁵⁷ Gomes, L. (2007, April 2). Palm Oil Industrial Cluster (POIC). Personal interview.

⁵⁸ Webber, D. (2007, March 14). World Wildlife Foundation Malaysia (WWF). Personal interview.

⁵⁹ More than 50% of it is gazetted as forest reserve managed under the Forestry Department

⁶⁰ Webber, D. (2007, March 14). World Wildlife Foundation Malaysia (WWF). Personal interview.

⁶¹ Webber, D. (2007, March 14). World Wildlife Foundation Malaysia (WWF). Personal interview.

⁶² Efransjah (2007, March 16). United Nations Development Program (UNDP), Peat Swamp Forest Project Personal interview.

⁶³ Menon, R. (2007, March 14). Malaysia Palm Oil Board (MPOB). Personal interview.

under the national Five-Fuel Diversification Policy in 2001 and has not been achieved as yet. Although the potential is large, the mechanism of implementation and financial strategies are still in process of development. Nevertheless, it seems that companies are moving slowly towards this direction.

Last but not least, in regards to social issues, Webber⁶⁴ states that the establishment of palm oil plantations in Malaysia has contributed to positive changes in the rural area such as infrastructure development and basic services provision. However, Abraham⁶⁵ points out that once these changes occur, life-style of local communities are frequently affected. According to him, one of the main social issues regarding palm oil plantations expansion is related to land rights and the loss of native customary right land. “Many native people do not have land property titles in Malaysia and as consequence they have no negotiation power when plantations infringe their land”. Although compensation schemes have been developed in the country, these are not always favourable for local communities in the long term, since they lose all backup support that served to ensure their sustainability. A further social issue is related to workers immigrants. Abraham⁶⁶ claims that many palm oil companies contract workers from Indonesia or Philippines because of lower salaries and cost savings. Webber⁶⁷ adds that immigrants are working in the plantations, mainly because locals consider the work not stable (work is paid on a daily basis and is seasonal) and not well paid (salaries are around 7 to 12 RM/day). According to Bujang⁶⁸, a descent salary in Malaysia should be around 30 RM/day. The rise of immigrants in local communities has also caused social problems such as violations of the social norms in these communities and has increased the pressure on the environment and natural resources⁶⁹. Immigration into such societies can be very disruptive and nothing has been done yet to control it; on the contrary, companies are promoting employment opportunities for immigrants and thus encouraging immigrant overload in the rural areas – in particular in East Malaysia⁷⁰.

5.4 Perspectives on the National Biodiesel Strategy and the Benefits for the Country

Under the New Economic Plan Malaysia has experienced a rapid economic growth that has pursued an aggressive poverty reduction program and pushed for integration in the nation. In 30 years the economic wellbeing has increased nationwide. In light of the National Mission and the national effort to ensure Malaysian aspiration of becoming a developed nation by 2020, the Ninth Plan (2006-2010) was developed (see section 4.1 and 4.1.1). The Ninth Plan re-examines the policies and strategies that were put in place in previous National Plans, proposes changes in the development approaches, and introduces new policy initiatives. One of these new policies is the Five-Fuel Diversification Policy (2001) that encourages the use of renewable sources of energy in the energy sector of the country. The National Biofuel Policy issued in 2006 was developed in line with the Five-Fuel Diversification Policy and spells out a

⁶⁴ Webber, D. (2007, March 14). World Wildlife Foundation Malaysia (WWF). Personal interview.

⁶⁵ Abraham, M. (2007, March 12). Global Environment Facility (GEF) Small Grant Project, United Nations Development Program Malaysia (UNDP). Personal interview.

⁶⁶ Abraham, M. (2007, March 12). GEF Small Grant Project, UNDP Malaysia . Personal interview.

⁶⁷ Webber, D. (2007, March 14) World Wildlife Foundation Malaysia (WWF). Personal interview.

⁶⁸ Bujang, M. (2007, April 14). Borneo Resource Institute (BRIMAS). Personal interview.

⁶⁹ Abraham, M., Webber, D., Soon, H. (2007, March) Personal interview.

⁷⁰ Bujang, M., Mujah, N. (2007, April). Personal interview.

framework with concrete initiatives to promote biodiesel within the country (see section 4.2.1 and 4.2.2).

Although Malaysia has not introduced any economic instruments to support directly the production and development of biodiesel, the National Biofuel Policy promotes biodiesel as an environmentally friendly, sustainable and viable source of energy to reduce the dependency on depleting fossil fuels and encourages its use nationwide (National Biofuel Policy 2006). The policy is underpinned by five strategic thrusts which main objective is to support the introduction of B5 (blend of 5% biodiesel and 95% diesel) for domestic use and to commit to further technological and commercial research for the development of biodiesel (National Biofuel Policy 2006). Although the National Biofuel Policy has a strong focus on domestic biodiesel consumption, current biodiesel production in Malaysia is mainly for export. The reason for this is that diesel price is lower than biodiesel price in Malaysia, since diesel is highly subsidized in the country⁷¹. For instance, the subsidized retail price for one litre of petroleum diesel in Peninsular Malaysia is currently set and assumed to remain constant at EUR 0.35 (RM 1.6) (EPU 2005), while the total production costs for one litre of biodiesel are about EUR 0.38-0.44 (RM 1.8-2.0) (information provided by Malaysian Oil Company). However, according to Cheah⁷², this can change in the near future, with the governmental decisions that will take place in line with the National Biofuel Policy in May 2007.

Nevertheless, as a result of the increasing biodiesel demand in the global market and the establishment of the National Biofuel Policy, Malaysia has planned to increase its national palm oil and biodiesel production. The plan under the Ninth Malaysian Plan (2006) is to increase crude palm oil production to 19.6 million tonnes by 2010, while the current production is at 15.2 million tonnes. As above mentioned, due to limitations in legal land availability and forest conservation interests, Malaysia is not considering expanding its palm oil plantations, except in the States of Sarawak and Sabah. Instead, the country is focusing on increasing its palm oil productivity⁷³. In order to raise production, Malaysia plans to increase yield through breeding and better management activities. Currently the average yield in the country is 3.8 mt/ha, however, according to Cheah and Basiron⁷⁴, the country has the potential to increase yield to 6 mt/ha. Some plantations are already undertaking cutting and replanting with new and more efficient breeding as well as introducing best management practices (i.e. improved harvesting practices) that allow significant enhancement in productivity. In addition, as an alternative way of increasing palm oil production, Malaysia is offering technical support in palm oil plantation and biodiesel development in other developing countries and establishing companies and joint ventures in countries such as Indonesia, Cameroon and Venezuela.

In addition, large governmental-supported industrial projects are under development in Malaysia in which biodiesel industry seems to play an important role. Such is the example of POIC Sabah Sdn Bhd, a wholly governmental owned company in the State of Sabah which has a 15-year master plan that envisages the development of 2 000 ha of industrial land for the palm oil industrial cluster. The first phase of 300 ha in Lahad Datu will be ready for

⁷¹ Soon, H. (2007, March 17). Environmental Consultancy Eco-Ideal. Personal interview.

⁷² Cheah, K. (2007, March 13). Malaysian palm oil Board (MPOB). Personal interview.

⁷³ Cheah, K. (2007, March 13). Malaysian palm oil Board (MPOB). Personal interview.

⁷⁴ Cheah, K., Basiron, Y. (2007, March). Personal interview.

operations by the end of 2007 and according to Gomes⁷⁵ it will accommodate 10 biodiesel plants, all of which will produce biodiesel for export.

Finally, although there is a potential for emissions reduction credits obtained through biodiesel projects under the Clean Development Mechanism, the Malaysian Energy Centre (PTM) comments that there is no biodiesel project in Malaysia accepted under the CDM scheme at the moment. Koh⁷⁶ states that a total of four biodiesel projects have submitted a proposal following Malaysian DNA criteria for CDM projects. However, most of them planned to export their biodiesel production, which made them not eligible. The fourth project is still under revision by the technical team, however, due to methodological uncertainties⁷⁷ and the National Biofuel Policy⁷⁸ which affects the additionality condition (see section 2.3) the revision process has been delayed.

Last but not least, there is a general agreement among the stakeholders that the main benefits for Malaysia from biodiesel production are economic incomes for the nation, price stabilization for palm oil and additional revenues for the palm oil industry. In addition to these economic benefits further mentioned benefits related to the potential of biodiesel are: contribution to climate change mitigation measures, improvement of the export/import balance of fossil fuels in Malaysia, mitigation of the effects of petroleum prices escalation, foreign exchange savings, clean fuel local consumption increase, stimulation of more efficient utilization of raw materials, reduction of transportation costs, contribution to pollution prevention, infrastructure and basic services development and generation of employment in rural areas.

5.5 Summary Analysis of the National Perspective

The national perspective on biodiesel development in Malaysia goes very much in hand with global determinant factors and market dynamics. The increase in biodiesel world demand and the main role that Malaysia can potentially play producing palm biodiesel is incontestable among the interviewed stakeholders. However, although the scenario seems attractive, it is still unclear how this development is going to take place and at which pace. The main reasons given for this are market uncertainties related to price development of fossil fuels, edible oil demand, palm oil commodity price fluctuations and future international and national strategies that might be crucial for the future development of biodiesel worldwide and in particular in Malaysia. Possible the best example for this is the issue of 97 licenses for biodiesel plants in the country, of which only 5 have being currently set into motion, the rest waiting to see future developments before taking any further steps. Nevertheless, this does not seem to have significantly reduced the national interests in biodiesel and the future increase in the country palm oil production in the coming years.

The main drivers and benefits identified by the stakeholders are very similar to global interests for the development of biofuels. As for many other countries that target biofuels as part of their national strategies, climate change mitigation and contribution to energy security by diversifying the energy portfolio and introducing an alternative energy source to fossil fuels

⁷⁵ Gomes, L. (2007, April 2). Palm Oil Industry Cluster (POIC). Personal interview.

⁷⁶ Koh, F. (2007, March 13). Pusat Tenaga Malaysia (Malaysia Energy Centre). Personal interview.

⁷⁷ Methodology for palm-based biodiesel projects is still under validation by the UNFCCC.

⁷⁸ Additionality of a project cannot be proved if the project is developed as a consequence of a country regulation, policy, mandate, etc (in the case of Malaysia the National Biofuel Policy).

play a key role in the promotion of biodiesel in Malaysia. However, the original reason for biodiesel development in the country seems still to be the fundamental driver for its further expansion and this is palm oil market price stabilization. This is crucially related to the main benefits for the country from biodiesel development which can be summed up in additional national revenues since palm oil industry is the third largest contributor to export earnings for Malaysia.

Moreover, although the National Biofuels Policy promotes biodiesel for domestic consumption, the current international (EU demand) and national (petroleum diesel subsidies) market situation portrays only an attractive scenario if biodiesel is exported. Nevertheless, it is worth underlining that Malaysia would benefit greatly if biodiesel would be consumed internally, in particular in the transport sector, since this accounts for about 40% of its total fossil fuel-based energy consumption. Further decisions in line with the National Biofuel Policy will be taken in May 2007. This can set an attractive platform for further developments in the country since it would open a new market of around 300 000 tonnes of biodiesel per year if the target is kept at 5% as planned under the national strategy⁷⁹.

Among the main key issues for biodiesel development in Malaysia, commodity prices for biodiesel feedstock and fossil fuel market price fluctuations were first signalled. Crude palm oil spot price increase due to palm oil demand rise has not only a negative effect on the profit margin of the biodiesel industry but also on the food industry that makes use of it. As a consequence, biodiesel projects development might slow down and edible oil and food production costs might go up. A price increase in food products and edible oil may burden consumers, especially in developing countries such as India, China and Malaysia. Furthermore, the current market price development of fossil fuels threatens the price competitiveness of biodiesel, especially in those countries that do not have any specific economic incentive to support its development. Summing up, it can be said that if palm oil market prices and demand continue raising it is in the interest of Malaysia and its palm oil industry to export palm oil. If on the contrary, palm oil prices decrease (and oil market prices increase), it is of benefit to Malaysia to value-add and export biodiesel and/or to create additional demand by implementing a mandatory target for domestic biodiesel consumption.

In regards to potential economic incentives, although it seems there is an interest from biodiesel project developers to apply for emissions reduction credits under the Clean Development Mechanism, technical constrains in regards to the baseline methodology, the fulfilment of additionality in the presence of a National Biodiesel Policy and the strong focus on export has made difficult the process for their approval. Nevertheless, the success of palm oil related projects in being approved under the CDM scheme, in particular in the area of energy generation from both solid and liquid waste, has set the pace for more to follow on that track. The potential in this area is large in Malaysia, since many of the palm oil companies do not make efficient use of their waste.

Sustainability has also been mentioned as a key issue for the development of biodiesel. Although the first reaction among stakeholders (including local NGOs) was defensive, protecting palm oil from misperceptions and negative criticism, they recognize the mistakes committed in the past and the risks related with further palm oil expansion and production. Moreover, although some think the introduction of a certification system is not completely

⁷⁹ Petroleum diesel makes up 5813.14 thousand tonnes or roughly 42% of the total annual fuel consumption for road transportation (estimates for 2006, based on EIA Statistics 2004, using growth rate of 4.2% according to APEC 2006).

fair if it is not implemented globally for all types of biofuels feedstock (otherwise it is a non-tariff barrier), others consider the implementation of criteria such as the RSPO a good alternative for a more sustainable palm oil production. Although this issue is generally recognized and further work is currently being done on the RSPO criteria by setting specific indicators, the implementation of such certification system is still unclear and many highlights rightly the traceability of oil as a future challenge. Last but not least, the uncertain introduction of a premium for sustainable palm oil and/or biodiesel draws a not so attractive scenario for producers that have to carry the burden for its implementation without getting any market reward for it. This has been contested in the consultation process, but the general picture is still quite unclear.

In regards to sustainability the most frequent issues mentioned during the consultation were related to environmental disturbance. Although clearance of new land for palm oil plantation seems not to be comprised under the country current strategy, with exception of the States of Sarawak and Sabah, the most remarked sustainability concerns related to palm oil production were forest and biodiversity loss. Water pollution, soil erosion, fertilizers use and waste generation were also pointed out, but less frequently. Social issues were highlighted to lesser extend and then again social benefits brought by palm oil development in rural areas were emphasized. The relation between environmental disturbances on the sustainability of local livelihoods was not indicated; however, the loss of native customary land by native communities was remarked.

In general, the national approach to sustainability seems to be positive, first in terms of economic sustainability due to the high productivity of palm oil compared to other oil crops, second in terms of environmental performance because of the high environmental performance of palm biodiesel compared to fossil fuel and its high energy balance ratio and third, because it seems that the almost 30 years of palm oil production in Malaysia has allowed the industry to gain experience and improve and promote sustainable production practices to cope with future challenges. This statement has now to be proven at the ground level, there where plantations are already established and have the potential to improve, and there where new plantations are in development process in the East of the country (Sarawak and Sabah) and outside the country where Malaysian companies are currently expanding.

6 Ground Realities: Walking Through a Sea of Palms

This section starts with a brief description of each case study and then it continues by giving the main findings obtained from the participatory assessment in each case. It then provides a comparative analysis and a discussion of the main issues identified during the communities' assessment.

6.1 Understanding the Thinking Behind Current State Land Development Policies

The rationale for land development under the "New Concept" previously introduced in this paper (see section 4.3.2) is based on the Government's conviction that the best way to bring progress to the rural economy and help natives to improve their "socio-economic status and their vulnerability to poverty" is through the development of the "idle and underutilized NCR-land into large scale oil palm plantations" (Ministry of Land Development, Handbook New Concept of NCR Land Development). According to the Ministry of Land, "while NCR landowners are rich in land they have continued to remain poor. They have been engaged in traditional and subsistence agricultural activities which have not been able to bring them about much progress, independency and stable income".

There is an estimated 1.5 million hectares of NCR-land available for development in Sarawak (Zainie 1994). According to the Ministry of Land of the State of Sarawak, this vast area of NCR-land "which is mostly kept idled, under-utilized and unproductive should be transformed into an economic asset through large-scale plantation development". To see the NCR-land as "idle" and "not of much use unless something productive is done to exploit the natural wealth and convert the land into tangible assets" is a common perception among the State Government, which sees plantation agriculture as the most productive way towards progress (Cooke 2002). Moreover, progress is seen as inevitable and not to be prevented: "landowners who take harsh action to prevent the government's move to develop their land through the private sector will only mar their own progress" (Chief Minister Taib, New Reality Magazine 2000) and "landowners who are not prepared to change will be left behind; those who are left behind will lose, and those who continue to lose will remain poor forever" (Ministry of Land Development 2006).

In line with this thinking, the State Government claims that a radical mental revolution is required to affect paradigm shift in the attitudes and perceptions of native landowners towards developing their NCR-land and thus ensuring their economic growth and progress. A paradigm shift that in short can be summarized in a shift from owner of land to owner of wealth, from traditional subsistence farming to modern an commercial farming, and from 'land security' to profit oriented management (Ministry of Land Development 2006).

6.1.1 Main Objectives and Benefits for Native Landowners

The vision under the "New Concept" is to achieve 1 million of hectares fully developed into palm oil plantations by the year 2010. According to the Ministry of Land Development (2006), until 2005 there were 31 NCR-land development projects set at various stages of implementation distributed throughout the State, an equivalent of a combined gross area of approximately 248 337 ha. In order to achieve its target the Ministry is planning to identify another 65 new NCR-land areas to develop under the concept of 'land bank' (see 4.3.2) throughout the State. The idea is to create at least 60 000 hectares of NCR 'land bank'

annually. It is expected therefore that an increasing area of NCR-land will become available for development into palm oil plantations within the next several months.

According to the Ministry of Land Development, the concrete objectives of the NCR-land development program are the following:

- raise the standard of living of the rural people
- contribute towards poverty eradication
- create employment opportunities in the rural areas
- ensure sustainable source of income
- reduce rural-urban migration
- balance development between the rural and the urban areas

It is expected that the development of NCR-land will generate substantial benefits and economic growth to landowners. To begin with, NCR-landowners will share 30% of the equity in the joint venture (JV), part of which they will pay with the lease value of their land⁸⁰ (Handbook New Concept of NCR Land Development 1997). In consideration for the use of the NCR-land, the Joint Venture Company (JVC) will pay a lease of RM 1 200 per hectare (EUR 260/ha)⁸¹. From this lease 60% will be used to acquire the 30% share, 10% will be paid up-front in cash and the rest 30% will be invested in a government-approved unit trust fund (Handbook New Concept of NCR Land Development 1997). The number of shares each of the NCR-landowner is entitled to is proportional to the size of the land owned by each individual. To sum up, the benefits for native landowners whose land is developed under the 'New Concept' are the following:

- their NCR-land will be developed into modern plantations with provisions of adequate infrastructure facilities such as roads, buildings, factories, schools, etc. that will increase the value of the land
- 30 % share of profit of the JV
- cash up-front payment (10 % of the total value of the said land, which is equivalent to RM 120/ha or EUR 26/ha)
- job opportunities
- income in the form of bonus and dividends

Box 3. New Concept ... New Challenges

"The increased pressure on land resources raises some questions regarding the future development in the area (State of Sarawak). As most NCR-land is regarded as being suitable for large-scale commercial agriculture, such as palm oil plantation, it is the object of increased attention. There is a need to study the impact of these new arrangements on the natural and human resources in the area".

- Svan Hansen 2005 -

⁸⁰ The private sector and trustee will pay cash for their shares while the landowners' equity in the JV will be paid using 60% of the lease value of their land.

⁸¹ There is no crop compensation under the New Concept land development scheme.

6.1.2 Selecting Sustainability Criteria for Assessment

It is mentioned in the methodology section of this paper (section 1.4) that a compilation of sustainability criteria developed by different organizations to assess project contribution to sustainable development was completed to be used in the communities' assessment of this study. Criteria were selected from the compilation list based on their close relation to rural and land development objectives and environmental sustainability (see section 1.3 and 6.1.1). This selection intends to focus on the effects of palm oil plantation on local socio-economic and environmental sustainability considering the current rural and land development strategies in the State. The selected criteria are illustrated in the following Table 6-1.

Table 6-1 Selected Criteria for Community Assessment

Objective: Create employment in the rural areas and ensure sustainable source of income	
CRITERIA	INDICATOR
Employment and income generation	Percentage of community employed in the palm oil plantation
	Gender share
	Additional incomes (at least legal minimum standards)
Objective: Raise the standard of living and contribute towards poverty eradication	
CRITERIA	INDICATOR
Work quality and wealth distribution	Wealth distribution
	Income expenditures
	Quality of work (labor conditions, employment positions)
	Occupational health and safety measures
	Availability of facilities provided by the company
Access to services (potable water, electricity, transport, sanitation, ICT)	Type of services available due to the plantation development
	Quality and coverage of services

Access to infrastructure (roads, markets, centers)	Infrastructure provided due to the plantation development
Access to traditional productive factors (land, water, forest resources)	Type of productive factors available/lost
Traditional production practices	Products and production system
	Production for self-consumption
	Production for commercial purposes
Involvement and Communication (Stakeholder participation)	Involvement in decision making
	Transparency (proper communication channels, information flow from the company to other stakeholders)
	Compliance with applicable laws and regulations (i.e. Land Code)
Capacity development	Type and number of capacity trainings given by the company
Environmental Sustainability	
CRITERIA	INDICATOR
Air quality	Odor, noise
Water quality	Quality of water resources
	Availability of water resources

Land resources	Soil conditions
	Land-use change (agriculture to plantation/ forest to plantation)
Forest resources	Quality of forest resources
	Availability of forest resources

In short, it can be said that the selected criteria intend to assess 1) what are the palm oil development effects on the necessary local environmental conditions and native communities' ability to practice the traditional socio-economic activities necessary to fulfil their subsistence needs (sustainable livelihoods) and 2) how do palm oil plantations development contribute to rural development objectives. Both points will be assessed in terms of access to traditional productive factors and food security, state of natural resources and socio-economic benefits brought by palm oil plantation developments. Last but not least, criteria are assessed on a qualitative basis and some are valued based on a qualitative scale (see section 1.4).

6.2 Case Studies Description

Three case studies are described in this section. The first case study is located in Bintulu Division, while the second and third case studies are located in Miri Division. All the communities assessed are Iban. Although they have similar characteristics and traditional socio-economic practices in the three cases are the same, their perceptions and relations towards palm oil plantations development differ.

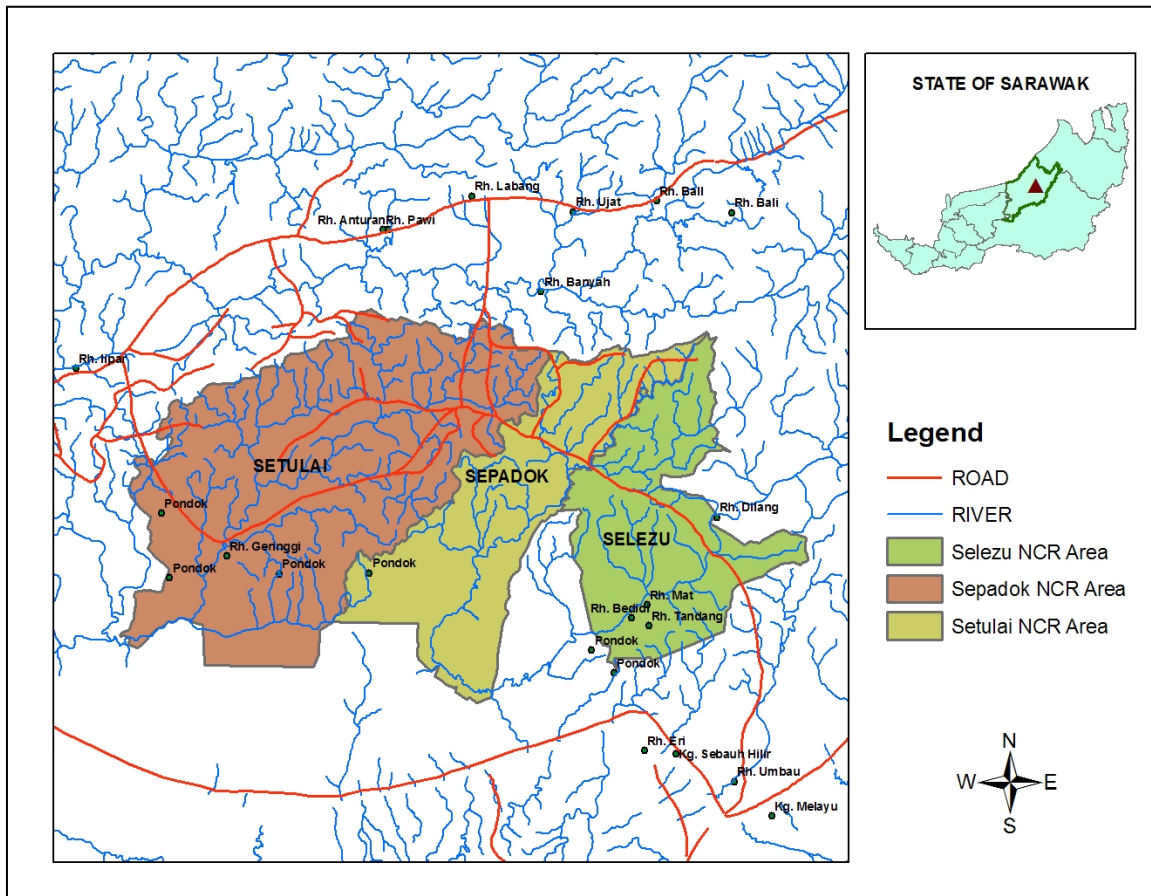
6.2.1 Longhouse Communities Selezu, Setulai and Sepadok

The longhouse communities of Selezu, Setulai and Sepadok are located 40 km away from Bintulu in the Bintulu Division, State of Sarawak. The NCR-land that belongs to each one of these three longhouse communities has been demarcated with their communal means, knowledge and skills and is illustrated in Figure 6-1. In terms of area, the Selezu longhouse community occupies around 2 055 ha, Setulai 2 308 ha and Sepadok is the largest with 4 842 ha.

A total of 196 Iban families of 15 longhouses live in this area. As normally is the case, the Iban longhouse settlements are located in riverside areas which give the name to the longhouse community. In other words, these communities carry these names because they are located along Sungai⁸² Selezu, Sungai Setulai and Sungai Sepadok. The reason for being settled along rivers is because these are used as transportation routes. In recent years many longhouses have moved and settled along the road, since this provides better access to facilities.

⁸² Sungai means river in Iban

Figure 6-1 Map of Selezu, Setulai and Sepadok NCR-Land



Adapted from Borneo Resources Institute Malaysia (BRIMAS) 2007

On average, 20 families or households live in a longhouse and each household has around 5 members. According to descriptions of representatives of these communities, life style in particular among young generations has changed over time due to modernization and education. An increasing number of young people are moving to the towns to find jobs there, especially if they have received proper education. Those who are still attached to their traditions stay in the longhouses and practice traditional farming activities. Normally 1 or sometimes 2 of the children in a family come back to inherit the land that belongs to the household and take care of the family. Although this was in most of the cases responsibility of the eldest, the current situation has changed this tradition and now the heritage is given to the child that shows the most care and attachment to the family and community traditions.

In relation to basic services, although some of the longhouses in the communities of Selezu, Setulai and Sepadok have access to electricity from the grid since they are near the road, some still depend on diesel power generators. Each household has a generator which consumes approximately 2 gallons (around 8 litres) of diesel per night with a cost of RM 10 (EUR 2.2) per gallon. Moreover, currently the communities have access to drinking water from the pipeline supply system provided by the Government. Among other main facilities provided by the State Government there is a school (13 km from the communities) and a small clinic. In addition, the State Government subsidizes these native communities' agriculture by providing them fertilizers and seeds that they use for their production.

The traditional activities are based on: subsistence agriculture production such as paddy rice and vegetables (both for self-consumption); cash crop production such as rubber and pepper (both for commercial purposes)⁸³; livestock small-scale production such as pigs and chickens; forest resources gathering such as medicinal plants, fruits and wild vegetables; hunting and fishing. The agricultural work is shared by both women and men almost in the same proportion. For instance, during the paddy rice production men are in charge of the clearing and burning and also of digging the wholes that women use for planting the rice seeds. Women maintain the field and the harvest is done by both men and women. Cash crop planting and harvest is also done by both, but vegetable production only by women. Fishing and hunting is left only to men, while cooking and craft work is done by women. The composition of the household is the primary determinant of the labor force. Although each *bilek* (household) has its own production plot to work, certain activities are done in community or in *pengiris* group. *Pengiris* is a reciprocal labor exchange system used to facilitate the timely completion of the above described activities (Gerrits 1994). It also has social connotation, since it allows members of the community to work in a group, maintaining community-level interactions and solidarity (Gerrits 1994). Paddy rice is produced using shifting cultivation (see section 4.3.3), which means that each *bilek* has more than one production plot in order to rotate production. Paddy rice is harvested once a year, from January to March, and is the basis of Iban communities' nutritional diet.

Land Development Strategies for Palm Oil Plantation

The development of palm oil plantations in this region was carried out by the State Ministry of Land Development through the Land Custody Development Agency (LCDA) and the Land and Survey Department. In 1996 provisional leases on land were issued by these entities to private palm oil companies⁸⁴. Among the lots of land issued two cover substantial parts (6 %) of the NCR-land that by customary right belong to the longhouse communities of Selezu, Setulai and Sepadok. This situation is not uncommon in the State of Sarawak, since many native communities do not possess a title of their NCR-land and thus the State can make use of it by classifying it as State Land and leasing it as Development Area⁸⁵. The reason for not possessing a title is because under the Land Code NCR-land is not held under title but legally subjected to native customary rights.

Moreover, although the Land Code recognises NCR-land, this land is not secured for the native communities. The Land Code recognises six methods for the creation of NCR-land⁸⁶ and only accepts the claims made prior 1958 (Land Code). Not knowing about this, many native communities failed in claiming recognition for their NCR-land before 1958, others even expanded their land after 1958 without knowing about the restrictions. Nevertheless, many have the necessary evidence to prove their settlement before 1958 and those who claimed their NCR-land during the colony time possess documents recognizing their NCR-land given by the British Government⁸⁷. All the same, with land development projects expanding, native communities are more urged in having their NCR-land recognized. However, the process is long and not always successful. According to Svan Hansen (2005) some communities that

⁸³ Many of these cash crops were provided by the State.

⁸⁴ How, S.C. (2007, March 27). Lawyer. Personal interview.

⁸⁵ Mujah, N. Sarawak Dayak Iban Association (SADIA). Personal Interview.

⁸⁶ (a) the feeling of virgin jungle and the occupation of land thereby cleared, (b) the planting of land with fruit trees, (c) the occupation of cultivation land, (d) the use of land for a burial ground or shrine, (e) the use of land for rights of way, (f) any other lawful method.

⁸⁷ How, S.C. (2007, March 27). Lawyer. Personal interview.

applied last decade to the State Government are still waiting and some have not even received any response. In sum, although the Land Code recognizes natives' right to land, the system provides insufficient security for holders of customary land in that NCR-land is held by license from the State and can in principle be extinguished by the State (Gerrits 2004).

In 1999, oil palm companies started clearing the leased lots within the NCR-land despite the objections and protests of the native communities that organized a blockade to stop operations back then⁸⁸. After trying different alternatives to stop the process, the longhouse communities decided to appeal to court in 2001. In 2007, 8 years later, the case is finally in court. This case is one of the 210 cases registered during the past decade in court in the State of Sarawak concerning natives trying to defend their rights from palm oil plantations infringements⁸⁹. Of this total number, 10 are currently in trial.

Box 4. Palm Oil Plantations Infringing NCR-Land

“The bulldozers took everything suddenly; we were surprised because nobody asked us. They damaged the soil and we lost all our fruit tress, our rubber plantation and our forest. They offered us compensation back then, RM 5 per tree, but we did not accept. Not only was that not enough, but we wanted our land back as our source of livelihood and that of the generations to come”

- Baluka, Iban native from Selezu -

6.2.2 Kampong Ulu Teru and Kampong Sungai Bong

Kampong Ulu Teru, longhouse Kalong and Kampong Sungai Bong, longhouse Rayong are located 250 km away from the city of Miri in the Miri Division, State of Sarawak. Figure 6-2 illustrates their location on the map. In terms of area, Ulu Teru NCR-land occupies 7 902 ha and Sungai Bong NCR-land 12 268 ha.

According to the Headman of longhouse Kalong, a total of 102 families live in Ulu Teru NCR-land, while Sungai Bong NCR-land belongs to a total of 9 longhouses of approximately 20 families, longhouse Rayong being the largest with 32 families (about 192 families in total). As their names indicate, these two longhouse communities are located along the Sungai Bong and the Sungai Teru.

⁸⁸ How, S.C., Iban natives (2007, March, 27). Personal interview.

⁸⁹ How, S.C. (2007, March 27). Lawyer. Personal interview.

Table 6-2 Local Market Prices for Traditional Agriculture Products

Product	Market price
Rubber	4 RM/kg (intermediary agent)
	5 RM/kg (market in town)
Vegetables	1 RM/band
Pepper	6 RM/kg (black)
	8 RM/kg (white)

According to the communities, the production of rubber and pepper and its commercialization in the market or through intermediaries provides them enough incomes to fulfill cash requirements under their traditional life-style. However, commodity prices for these products fluctuate and their incomes are vulnerable to these market fluctuations, falling when commodity price crises.

Land Development Strategies for Palm Oil Plantation

In 1988 the Land and Survey Department issued provisional leases of land to the Land Custody Development Agency (LCDA) from which 4 lots were located within Sungai Bong NCR-land. Although the native communities have right to this land under the Land Code, it was classified as State Land by the Government, since it is not held under title. In 1995, LCDA transferred the provisional leases to a palm oil company which started clearance operations the same year. Despite the natives' protests and blockades back then, one of the lots (equivalent to around 450 ha) was completely cleared. In 1998 natives decided to appeal to court in order to defend their native customary rights (NCRs). As a result, two months ago (February 2007) the Land and Survey Department decided to revoke the provisional leases for the 3 remaining lots and give compensation for the losses and damage. Compensation value is now under negotiation in the trial⁹⁰.

At the same time, in 1996 the New Concept pioneer project was launched and the area were Sungai Bong NCR-land and Ulu Teru NCR-land are located was declared Development Area under this New Concept pioneer project. In 2005, after consultation with the native communities of that area and the agreement of 10 Kampongs interested in participating in the JV scheme (see 4.3.2), the implementation of the palm oil plantation started. A total area of 5 800 ha of combined NCR-land ('land bank') will be developed into palm oil plantation by the JV Company under this scheme⁹¹. To date, a palm oil nursery has already being established, large portions of the total area have already being cleared and the planting process has already started.

⁹⁰ Information provided by Laing, H.N. (2007, April 9). Personal interview.

⁹¹ Kalong. (2007, April 10). Personal interview.

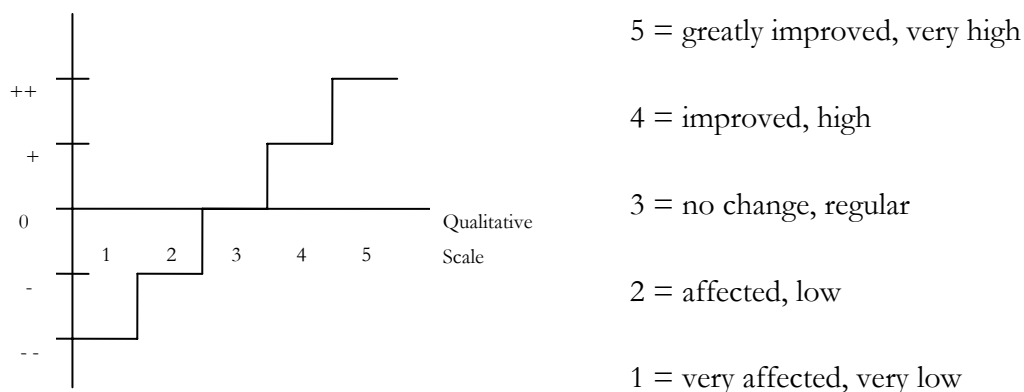
The majority of longhouses in Ulu Teru NCR-land agreed to become part of JV scheme under the New Concept and set aside land to be developed into palm oil plantation. On the contrary, almost no longhouses in Sungai Bong NCR-land agreed with the land development strategy under the New Concept and therefore decided not to participate in the scheme.

6.3 Main Findings

The fieldwork carried out with representatives of the longhouse communities of Selezu, Setulai and Sepadok and representatives of Ulu Teru and Sungai Bong differed in that for the first case study the interviews and debates took place in the capital city of Sarawak, Kuching and not in the communities, while for the second and the third case studies the assessment was carried out in the longhouse communities. A total of 7 women and 10 men representatives of the communities of Selezu, Setulai and Sepadok participated in the focus group debate; in addition, interviews with key respondents and participatory rural assessment (PRA) tools such as ‘resource matrix’ and ‘village resource map’ were used with these communities. In Ulu Teru, a total of 4 men and 4 women participated in the focus group debate while in Sungai Bong a total of 19 men and 9 women took part in it. In these both case studies, interviews, participatory observation and PRA tools such as ‘resource matrix’ and ‘transects’ were implemented. The interviews, the ‘village resource map’ and the ‘transect’ tools served to corroborate information and gain more in depth understanding of the issues. The main points of the focus group debates were summarized and are presented in a perception matrix in Appendix 7 of this paper.

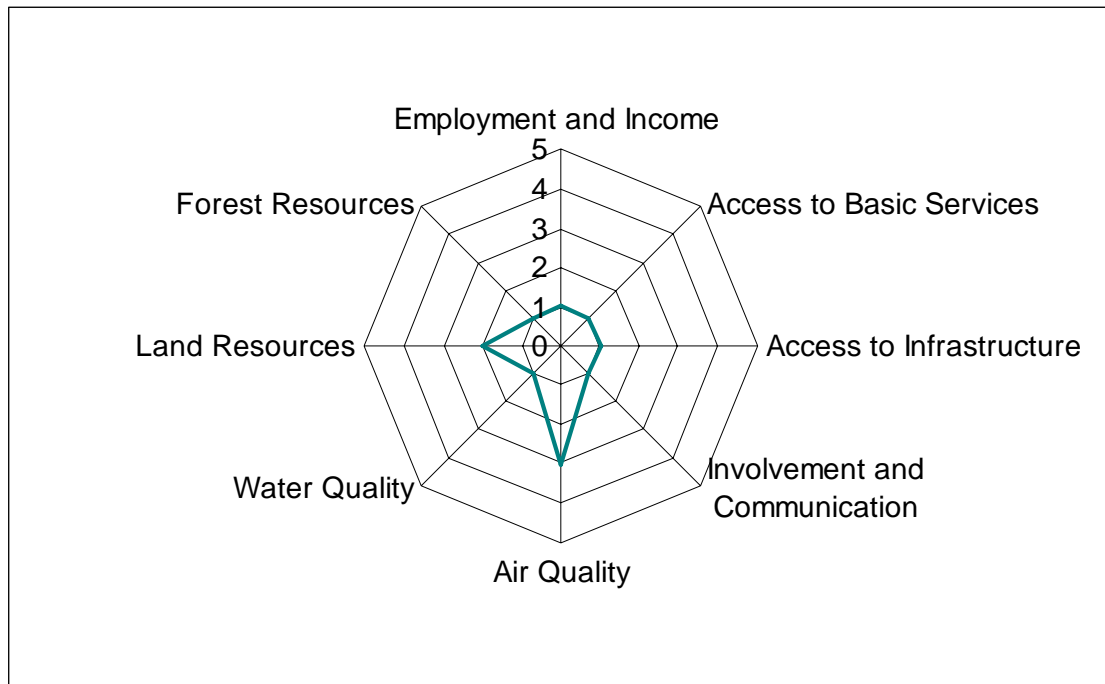
6.3.1 Communities Perceptions and Qualitative Valuation

During the focus group discussions the participants were asked to put their answers in a qualitative scale for some of the criteria. The qualitative scale is based on the MATA-CDM methodology⁹², it has 5 qualitative values and is not based on scientific results. The qualitative valuations carried out by the communities correspond to specific criteria and are in relation to the palm oil plantation development. The results obtained for each longhouse community are presented hereafter.



⁹² Developed by Sutter (2003) at the Swiss Federal Institute of Technology (ETH).

Figure 6-3 Perception Radar for Longhouse Communities Selezu, Setulai and Sepadok



Effect on employment and incomes generation is very low: The communities of Selezu, Setulai and Sepadok considered the employment in the palm oil plantation not attractive because “the salary is low” (RM 8-15/day) and “it is unstable” (it is based on a daily-contract and is seasonal). They mentioned that workers in the plantation are mainly Indonesians because locals are not interested in accepting these conditions. As a result, people from these communities do not benefit from additional cash incomes from the development of the palm oil plantation in the area. In relation to their general expenditures, community members listed education, water and diesel for the power generator.

Access to basic services and access to infrastructure is very low: Moreover, no new service or infrastructure was developed in the area due to the establishment of the plantation, on the contrary, community representatives state that their water supply system (originally a gravity-based system) was seriously damaged by the expansion of the palm oil plantation into the upper water catchment are of their NCR-land. As a consequence, they are unable to use the potable water coming from their water catchment and therefore they were given access to pipeline supply water by the State Government. Basic services and infrastructure were developed in the area by the State Government (not due to the palm oil plantation development), and although the coverage is still insufficient (i.e. not all longhouses are covered with electricity from grid), communities have access to basic services as water, electricity, access to road, a clinic and a school.

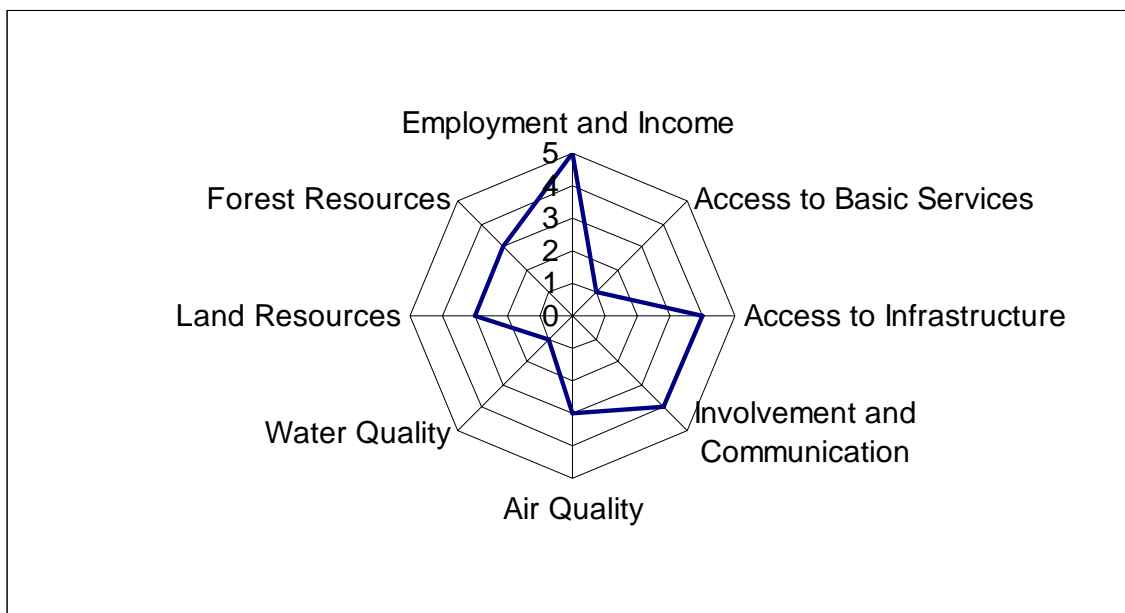
Involvement and communication is very low: In regards to the consultation process carried out before/during the palm oil plantation expansion, community members claim that only “pro-government” members were consulted and sometimes only the Headman. As a result, decisions are taken without general consensus and without many of them knowing the intention of the company or the Government Agencies (GA). Moreover, when the palm oil company started clearing new area for planting in the NCR-land, community members tried to

find support from different governmental bodies to deal with the issue. Additionally, they tried to negotiate with the company a JV scheme or otherwise a compensation for the land. All the same, the company refused the proposal on the basis that they were expanding in State Land leased by the State Government and therefore they had no obligation towards the communities. As communities did not get any support, they decided to appeal to court as the only means to exercise their rights and get recognition for their NCR-land under the Land Code.

Forest resources and water quality are very affected, land resources are affected, air quality did not change: As a result of the palm oil plantation expansion into their NCR-land, community members state to have lost forest, rubber and fruit trees which were covering the area that was cleared by the palm oil company. However, the most serious loss was the access to their water sources, since the clearing was carried out in the water catchment that provided them potable water. “The forest cover that served to protect the water sources was clear-cut and the infrastructure used for the gravity-based water supply system was destroyed”. As a result, communities have less forest where to hunt and gather wild vegetables and fruits, less area planted with rubber and less fisheries available in the river due to water quality degradation. According to them, amount and variety of fish catch has significantly reduced during the past 10 years (from 2-3 kg per day 10 years ago to an average of 1 kg of fish a day nowadays). In regards to air quality, community members that live in longhouses near the road argue that in dry season the air becomes very “dusty” due to the transit of trucks working in the plantation. Furthermore, community members consider land to be affected due to erosion and use of fertilizers in the plantation. In regards to water quality, they argue that water has significantly changed over time and now it looks “moody and oily”. They also claim that “water is itchy” when they bath in the river.

Having looked at the first case study perceptions, the remaining two case studies perceptions are now presented: longhouse Kalong, which is participating in the New Concept scheme and longhouse Rayong, which decided not to participate.

Figure 6-4 Perception Radar for Longhouse Kalong, Kampong Ulu Teru



Effect on employment and incomes generation is very high: As a result of participating in the New Concept scheme, families of longhouse Kalong in Kampong Ulu Teru received the first payment for their land (RM 120/ha equivalent to EUR 26/ha) and those who work for the plantation are paid RM 12 per 8-hours day (EUR 2.6). Community members working in the plantation see in that an additional benefit: not to have to spend money in neither transport nor food as compared to working in town. Moreover, according to them, working in the plantation ensures a more stable income as opposed to traditional agriculture where prices depend on market fluctuations. After 5 years and on top of the first payment, every landowner will receive an additional RM 360/ha (78 EUR/ha) from the government unit trust fund (only once). From then on, landowners will be paid RM 360/ha each month, equivalent to one ton of fresh fruit per ha (EUR 78/ha). The total cash incomes generated by a landowner will be according to the area of land given to the scheme. Finally, cash incomes are distributed within the household to be used for the family expenditures. According to community members, the general expenditures are food, education and diesel for electricity generation. Besides the expenditures, they claim the additional cash incomes from the plantation scheme allow a monthly RM 100 (EUR 22) saving.

In relation to the work quality, plantation workers claim the work is “not too hard”. Among the facilities the plantation offers are transportation for all the workers and housing for those that do not come from the communities (mainly Indonesians). According to the Headman, more than 50% of the longhouse community people are working in the plantation. From these, 7 out of 10 are women. This is mainly due to the fact that currently the main work is to be done in the nursery. Men are generally sent to logging and clearing. Finally, those who work in the plantation receive training once a year. The trainings are carried out by the company and intend to train the workers in different production activities within the plantation.

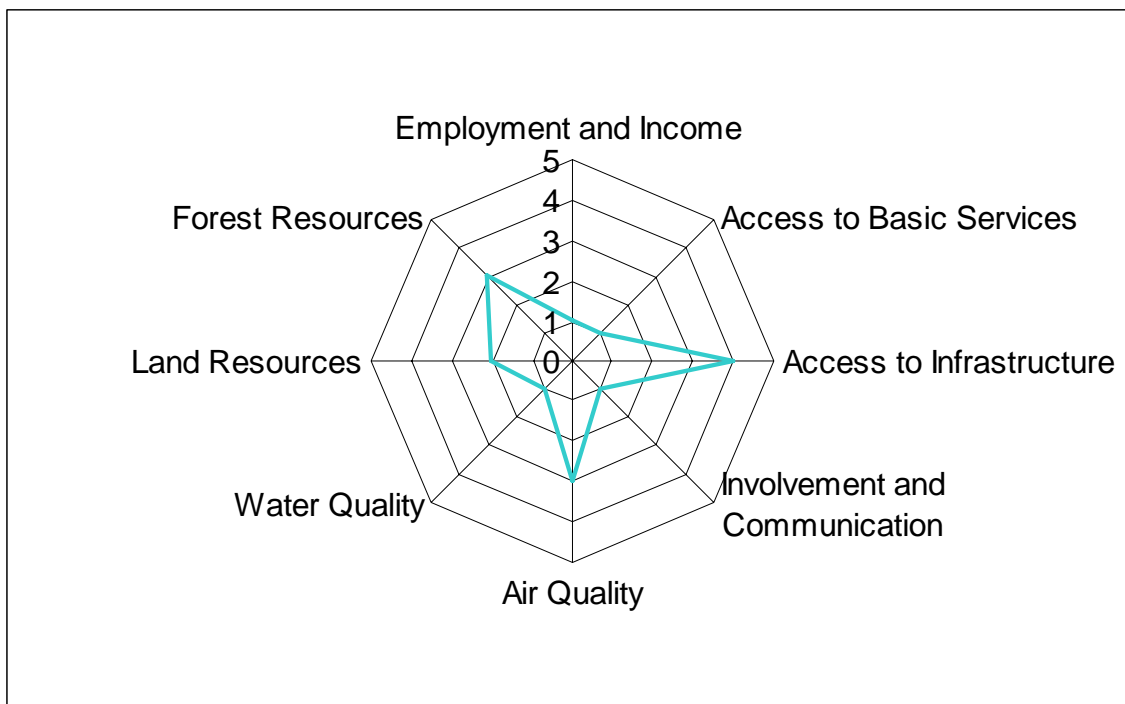
Access to basic services is very low and access to infrastructure is high: In regards to basic services, the community hopes the Government complies with the promise of providing them with new basic services - access to underwater pipe supply and electricity from grid - as part of the project development under the New Concept. As part of the palm oil development project, a road was built in Ulu Teru NCR-land in 2002. Prior to the road the river served as access route to the communities and longboats were used for transportation. The road has facilitated things for the community bringing them easier access to the hospital, the school and the town (market). Moreover, the Headman states that Governmental Agencies can access the communities much more easily now. Finally, the communities hope that the Government will comply with the promise of building up a school, a health center, a police station, a canteen and housing for the community as part of the condition for participating in the scheme. It is important to point out here that several community members of longhouse Kalong indicated they trust on the Government and that it will keep its promise.

Involvement and communication is high: In order to introduce the scheme in the region, the Headmen of different communities were consulted first by the Governmental Agency. Thereafter all the communities of the area were invited to meet in Ulu Teru, where representatives of the Government explained about the New Concept scheme. According to community members, the main reason to participate in this scheme is the possibility of more cash income generation. In relation to the ‘land bank’ establishment process a community member explained that “the Land and Survey Department conducted a field survey to establish the perimeter of the proposed development area and once established, individual land was picket surveyed together with the community members. The following step was the trust deed signature, which each of the participant families had to sign. With the trust deed,

landowners gave their rights to land to the trustee (Governmental Agency)”. Communities do not get any regular information of the company’s future plans or current activities and when there is an issue that they would like to talk with the company, it is generally done through the Government Agency (Land and Survey Department or LCDA). According to community members, the agreement has been respected until now, people have been paid the first RM 120/ha, their NCR-land is recognized by the Government and the company operations on the land have started since 2004; however, they argue that things have been moving too slow (10 years have passed since the project was launched). Last but not least, community members assume that they can recover their land in 60 years if they decide to do so. They also point out that they have in their hands enough evidence to prove they have been settled on that land since 1925.

Water quality is very affected, land resources, air quality and forest resources did not change. Although longhouse Kalong has given 60% of its NCR-land to be developed into palm oil plantation it still has land for paddy rice (30%) and rubber (10%) production. The land given was covered by forest, rubber, fruit trees and paddy rice. According to some community members that work in the plantation, the soil in the area that has been cleared is not affected since the bulldozers only clear superficially and the roots are not damaged. “The soil is still alive”. However, in regards to the river water, community members claim as a general perception that it is now polluted and this has affected fisheries. Some remark that water is used by the palm oil plantation to irrigate and fertilizers and erosion has affected the water quality. As a consequence, “the river now is moody and dirty”. On the other hand, however, some community members argue that “the community does not care about the fish nor the river now, what the community wants is to benefit from development and improve their situation towards progress”. Last but not least, the community has still access to forest resources since they use the communal forest located besides their NCR-land. Although this forest area belongs to the State is of free access to locals for them to practice traditional gathering and hunting.

Figure 6-5 Perception Radar for Longhouse Rayong, Kampung Sungai Bong



Effect on employment and incomes generation is very low: Despite being in the development area for the New Concept pioneer project, longhouse Rayong decided not to participate in the scheme and no one from the community works in the plantation. The main reason for this is that they consider the salary too low (12 RM/day, 26 EUR/day). They argue that if they would work in the plantation they would have to use their salary to buy food, while if they work in the traditional farming activities they can produce the food they need to eat. Moreover, community members claim that being part of the New Concept scheme and worker in the plantation does not leave either enough land or time to work on the family production needed for the well-being of the household. As a result, the community decided neither to take part of the scheme nor to work in the plantation. In consequence, the community does not get any cash incomes or economic benefits from the plantation development. In regards to the normal expenditures community members listed the school, diesel and clothes.

Access to basic services is very low and access to infrastructure is high: In relation to basic services, the community is indifferent to the possibility that new services will be brought by the Government/company, since they claim to have already the necessary to fulfill their needs: “rainwater tanks which are working good and diesel power generators to generate the electricity they need during the evenings”. However, they recognize the benefits brought by the road constructed by the company in 2004 in Sungai Bong NCR-land. The road gives them easier access to the market and the hospital. Prior to the road, the only way of reaching these sites was the river.

Involvement and communication is very low: In 1996 a Government representative from LCDA came to talk to the community about the New Concept scheme. After that meeting the community decided in a consensus decision not to participate in the scheme. Among other things because they found that the payment terms and the modus operandi were unclear. Although more meetings were held after that by the Government Agencies with other communities, Longhouse Rayong was not visited again, neither was it invited to the community assembly in Ulu Teru. In addition to the unclear operation terms, a further reason for the community not to participate in the scheme is the fear that they will lose their NCR-land after the 60 years period of being utilized for the palm oil plantation. They claim that after 60 years the land may be seriously damaged and not productive any more. They use as an example the land under palm oil plantation in the way to the city of Miri by alleging that “the soil there is not suitable for paddy rice production anymore”. Moreover, community members state that they did not believe in the promises made to them back then. The Headman recalls what he was told: “if your palm oil succeeds you can get big amount of money and cars and housing will be given for every family”, he argues that this type of promises made him only suspicious about the scheme and only increased the mistrust they gained from previous experiences (see section 6.2.2., that case is currently in court).

In 2004 the JV Company working under the New Concept started operations and entered the Sungai Bong NCR-land, although this was not part of the ‘land bank’. After protests of the communities in the area the company discontinued operations and promised not to disturb their NCR-land again. At that same time, the company received the community’s consent to construct the road through their NCR-land for which the company agreed to pay compensation for the damage (according to adat equivalent to RM 1500 or EUR 326)⁹³. Despite the promise, in March 2007, LCDA started clearing operations (logging and road

⁹³ No compensation has been given to date.

opening) activities in Sungai Bong NCR-land. Some community members claim that although the NCR-land has been recognized by the State Government at the court case (see section 6.2.2), their rights seem to continue under threat.

Water quality is very affected, land resources are affected, forest and air quality did not change. Referring to the palm oil plantation expansion into their NCR-land in 1995, members of the community claim to have lost access to that area of land (450 ha), the paddy rice production in that area, the rubber tress and the forest resources that were planted there. They also argue that land under plantation has been affected due to erosion and fertilizers use and it is not suitable to produce paddy rice anymore. Moreover they point out that water has significantly changed over these past years. They describe the river water as “moody and itchy” and they argue that less amount and variety of fishes can be catch now compared to a decade ago. As an example they mention that they used to catch 1-5 kg of fish per day before whereas now they can only catch around 0.5 kg. Last but not least, community members of longhouse Rayong claim that Sungai Bong NCR-land comprises a large area of land suitable to produce paddy rice and covered with forest and rubber trees where to hunt, all of which they would like to conserve for future generations.

6.3.2 Resource Matrix

In order to gain a better understanding of the thinking and resource value of the communities, they were asked to list the resources they consider are fundamental to fulfill their well-being needs. Afterwards, they were asked to value those distributing 100 points between the resources according to their level of importance. Following the valuation, resources were ranked in hierarchal categories to allow comparison. The results obtained are the following.

Table 6-3 Resource Matrix Results

Resources	Selezu, Setulai and Sepadok	Longhouse Kalong, Ulu Teru	Longhouse Rayong, Sungai Bong
Land	1		2
Water	3	1	1
Paddy Rice	2		
Forest Resources	3		3
Road		2	3
Electricity		3	
Fire			4
House			4

The communities of Selezu, Setulai and Sepadok gave the highest value to land. The argument used by community members is: “without land we do not have anything”. Paddy rice is also important for them occupying the second rank. According to community members paddy rice is the basis for their nutrition needs and thus is of fundamental importance for the community well-being. Land and paddy rice are followed by water and forest resources, both ranking the same.

Longhouse Kalong in Kampong Ulu Teru ranked water as the resource of major importance to fulfill the community’s well-being needs. This resource is followed by electricity and the road, both of which are not natural resources but basic services and infrastructure which they consider of fundamental importance for the well-being and development of the community. The road gives them access to the school for the children, the hospital in case of an emergency and the market in town where they can buy food and sell their products. Electricity is currently used for cooking in some cases, for lighting and for house electronic devices.

Longhouse Rayong in Kampong Sungai Bong is the community that listed more number of resources. Almost all of the resources in their list are natural resources, water be considered the most important. Following water from close is land ranked as the second most important resource for the community well-being. According to their comments, community members related land with the production of paddy rice for self-consumption as the basic product to fulfill their subsistence needs. Moving down in the ranking is it possible to find forest resources, such as food from hunting and gathering and material for crafts and construction. At the same level of importance is the road, which gives the community access to the market and to the hospital. Finally they consider their longhouse and fire important as well, since these contribute to their basic protection and cooking needs.

6.4 Comparative Analysis

The following comparative analysis is based on the results obtained from the assessment of the three case studies, which are summarized in the perception matrix, the criteria qualitative valuation, the ‘resource matrix’ results and comments that will be used to complement the analysis. The comparative analysis focuses on three main topics: the socio-economic benefits obtained from the palm oil plantation development and the different perceptions on well-being needs and development; the change in traditional farming practices and access to traditional productive factors and natural resources; and the differences between communication, involvement and participation.

6.4.1 Socio-Economic Benefits and Change towards Progress

Based on the ‘resource matrix’ results it is possible to argue that the attachment to land, natural resources and thus traditional practices as well as to ‘new services’⁹⁴ differs among the different communities. While the longhouse communities of Selezu, Setulai and Sepadok (first case study), as well as longhouse Rayong (third case study), value high their land, paddy rice and forest resources, all of which are intrinsically linked to their traditional practices,

⁹⁴ Basic services and infrastructure provided by the Government or due to the palm oil plantation development in the area, as part of the State rural development strategy.

longhouse Kalong values high the road and electricity, which are linked to ‘new services’ and less to their traditional practices. For both the first and the third case study, land is considered to be essential for the fulfilment of their subsistence and well-being needs, since it is the source of all the rest: water, paddy rice (basic diet) and forest resources. On the contrary, for longhouse Kalong land and forest resources are not even mentioned in the list; instead of that, infrastructure and basic services are considered more important for the well-being and development expectations of the community. In all the three cases water is ranked high. Water in this case is referring to potable water (rainwater or pipeline water) and not river water, on which perceptions among communities vary again. While the first and third case studies care about the river pollution and how this affects the communities and their livelihood, the second does not consider this an issue for the well-being of the community people, in particular after the development of ‘new services’ in the community. Last but not least, the road plays an important role for the second and third cases, in both cases because it opens an easier access to the market, education and health centre.

The different valuation of resources between the three case studies is most likely explained by different perspectives on the future and development and how much communities are accustomed to ‘new services’. On the one hand, longhouse Kalong wants to benefit from development and change towards progress. They think “the situation will be better for them” by taking this path⁹⁵. They do not care about the pollution of the river, which they use currently as transportation route to their fields and to fish. Nor does a reduction in their production worry them (in the case of vegetables for instance), since the cash incomes they will generate from the development of their land will allow them purchasing power for that which they need. Moreover, they expect the scheme will bring them ‘new services’ and infrastructure (promised by the Government), which they expect will contribute to their progress. As a result of their expectations for the future and in relation to access to ‘new services’, they value these high.

On the other hand, longhouse Rayong would like to keep its land and the forest as they are for the well-being of future generations. They do care about the quality of the water in the river, which they use to bath, to wash, to fish and as transportation route. They value the forest resources they have within their NCR-land, since they depend on them to obtain food and materials to build and craft their daily items, and they value their land, which they consider the source of everything and most important the “source of the food each household needs for its well-being”⁹⁶. As a result, they do not expect ‘new services’ from the Government (such as electricity from grid or pipeline water supply), since they consider they already have all they need. Consequently, they value traditional practices and productive factors high and not new services or infrastructure. Nevertheless, the fact that they value the road, may suggest that they would possibly value ‘new services’ higher once realizing the benefits of having access to those.

Finally, the longhouse communities of Selezu, Setulai and Sepadok represent a different case in that they value high their traditional practices and productive factors despite having access to ‘new services’ (for instance, road, electricity from grid and pipeline water supply) for more than a decade. This suggests that they may be already accustomed to these basic services and thus they value them lower. It also suggests that even having access to new services, native communities stay attached to their traditional practices because they consider these essential for the subsistence needs and well-being of the community.

⁹⁵ Kalong ak Gol. Headman of longhouse Kalong.

⁹⁶ Farmer in longhouse Rayong.

In short, the different valuation of resources is a matter of how the communities envision their future and what they consider could be the best for their people in the long-term. For instance, longhouse Kalong wants progress, even if that means degradation of the state of natural resources within its NCR-land; longhouse Rayong wants to ensure their livelihood for the present and for future generations, keeping their traditional activities and conserving the resources and the access to them within their NCR-land. The different valuation is also linked to the expectations communities may have in relation to 'new services', the access they have to these and how accustomed they are to these. Longhouse Kalong, for instance, is waiting for the 'new services' promised by the Government under the New Concept, and expects the provision of these services will contribute to the progress of the community; on the other hand, longhouse communities of Selezu, Setulai and Sepadok, who have access to these services for more than a decade, do not value them so high, and instead they recognize the value of their natural resources and traditional productive factors.

In relation to socio-economic benefits from the palm oil plantation development besides or within NCR-land, the second case listed a number of positive contributions to the community, starting from additional cash incomes and employment continuing to basic services and infrastructure such as housing, a health centre and even a police station. Many of these benefits are promises of the State Government as part of the New Concept. On the contrary, the first case mentioned only negative effects, the principal being the destruction of its potable water resources and the damage of their water catchment, as well as the loss of their land and the forest and rubber. Likewise, the third case claimed loss of land and forest resources; however, they recognized the road as a benefit brought by the palm oil plantation development for the community.

The difference in benefits that communities gain from the palm oil plantation development lies in great part in their level of involvement in the project and the level of communication with the Government.

In the case of Selezu, Setulai and Sepadok, for example, the company expanding in their NCR-land is a private entity which considers itself in compliance with the Law and making use of its rights as owner of provisional leases of State Land provided by the State Government (see 6.2.1). Based on this argument, communities were not consulted previous the palm oil plantation expansion, and their rights to their NCR-land were/are ignored. According to community members, although during the palm oil plantation expansion into their NCR-land and due to the protests of the communities, some Headmen were approached (presumably to negotiate compensation), the community was not involved in any decision making nor involved in any type of accommodation/resolution. As a result, communities of Selezu, Setulai and Sepadok do not get any benefit from the project, only losses. The losses were significant enough for the Government to accede in providing them access to water from the pipeline supply system, since their original water supply system was damaged by the plantation development. Furthermore, communities lost access to land, forest resources and rubber plantations which according to them have not been compensated yet.

The problem in this case lies on the negligence of Governmental Agencies in recognizing NCRs, in particular NCR-land⁹⁷. This negligence finds its basis on land regulations which give the State the right over all 'unoccupied and waste land' which it can then lease to individuals and companies. Cooke (2002) argues that 'unoccupied and waste lands' cover all land regarded as 'idle' and 'uncultivated' including land left to fallow or rotation for shifting

⁹⁷ How, S.C. (2007, April 27) Personal interview.

cultivation, or deliberately left uncultivated for ecological reasons (water catchment protection), or subsistence use (for hunting, building material, craft material supply and so on). In addition to this and as previously mentioned in this paper, NCR-land is recognized under the Land Code but is not held under title, and the Land Code defines State Land as “all land for which no document of title has been issued” (Cooke 2002). In short, although the Land Code gives the means to recognize natives’ right to land, the system is flexible enough not to secure the customary land to their holders if it is in the interest of the State to develop that land. As a result, NCR-land is currently disputed, in particular among political spheres that see land development strategies as means to progress and also as a way to gain political power and control on rural communities (Cooke 2002).

Similar to the first case study, longhouse Rayong’s first experience with palm oil development was more negative than positive. In 1995, without any consultation, a private palm oil company expanded operations into their NCR-land. Again, the land was declared State Land and consequently Development Area by the State Government which was given to a private company under provisional lease. The expansion of palm oil plantation into their NCR-land caused the loss of land and forest resources and did not bring any benefit to the community. In regards to this infringement, the communities of Sungai Bong are currently resolving a case in court. In 1996 the community was approached by a government representative and explained about the New Concept. Longhouse Kalong decided not to participate in the scheme, among other things because of the mistrust on the Government, the fear of not recovering their land after 60 years and the lack of clarity regarding the modus operandi and payment terms of the scheme. The mistrust on the Government may be partially explained by the first experience described above and the fear of not recovering their land after the 60 years of the project might be as well attributed to this mistrust. However, it is important to clarify here that according to the Land Code Ch.81 part II, 18A ‘land bank’ is not recovered automatically reverted to the original landowner after the 60 years. “The Superintendent may, subject to the direction of the Director, issue such grant to the native upon such terms and conditions as he deems fit to impose” (Land Code Ch.81 part II, 18a). As such, although the arguments justifying longhouse Rayong’s decision not to participate are mainly based on mistrust and previous negative experiences, the lack of security given by the Land Code in regards to land recovery after the project completion, adds rational value to their decision.

As a result of not participating in the scheme, however, the community does not get any economic benefit from the palm oil plantation development with the exemption of the road, which has been constructed in their NCR-land under their consent. The road has caused a positive impact on the community, which counts now with an easier route of access to the hospital, the school and the market.

At odds with longhouse Rayong, longhouse Kalong is one of the longhouses in Kampong Ulu Teru that decided to participate in the New Concept scheme. After putting aside land that will be developed into palm oil plantation and conferring their customary right to land to the Government (Trustee), people of longhouse Kalong are waiting to see the benefits. Currently, they are enjoying the economic benefits from working in the plantation (RM 12 a day) and the initial payment for renting their land (RM 120 per ha) which has already been paid by the company, as well as the socio-economic benefits from improved access provided by the road. In addition, they are expecting more benefits to come promised by the Government under the conditions of participating in the scheme. These benefits are related to the development of above mentioned new basic services and infrastructure that are supposed to contribute to the community development. Last but not least, although the expectations of longhouse Kalong are high, nobody in the community really knows when all these promises will reach the

community (10 years have passed since the pioneer project was launched)⁹⁸. The comment of an old woman from longhouse Kalong reflects very well these feelings: “I hope to be able to enjoy from the benefits of giving my land before I leave”.

6.4.2 Traditional Production under Shifting Cultivation and Access to Traditional Productive Factors

One of the main similarities among the three case studies is their decision to continue with their traditional practices. The main reason given is because it contributes to fulfil subsistence needs primordially by securing their food and the well-being of the *bilek* (household). The main difference is that in the case of longhouse Kalong, members of the community claim that with the cash incomes generated from working in the plantation now they do not need to worry so much on producing their food since they can afford to buy it in the market. This is particularly the case with the vegetable production. Nevertheless, in the three cases, paddy rice production for self-consumption seems to be an activity that will remain despite future changes. Having said so, some consequences due to land-use changes are to be observed in shifting cultivation and other traditional practices. A more in depth analysis on this issue is developed in section 6.5.1 below.

6.4.3 Communication, Involvement and Expectations

One of the main differences between the three case studies, already partially mentioned above, is their different level of involvement in the palm oil plantation development. As above described (section 6.4.1), one of the main issues regarding native communities' lack of involvement whereas they are practically excluded from any decision-making process is the declaration of their NCR-land as State Land which is then declared Development Area and leased to private companies for land development. By doing so, native customary rights to their land are ignored and as a consequence there is any possibility for them to get involved or benefit from the palm oil plantation development (see 6.4.1). This section will look into other issues related to communication, involvement and native communities' participation.

Looking into approaches the Government took to consult native communities in the three case studies it is possible to argue that the consultation process carried out by the Government uses social hierarchies to communicate its objectives and involve the communities and offers paternalism⁹⁹ in return for acceptance. To begin with, it is mentioned by members of Selezu, Setulai and Sepadok that only their Headman was approached by the Government, but not the entire community. In line with this, some members of Kalong recognized that their Headman was firstly approached by the Government and then the rest of the community was explained about the New Concept in a big assembly. This way of approaching first the Headman denotes a use of social hierarchies whereby the Government advances its objectives by consulting and 'gaining' first the approval of communities' headmen and leaders, who will later convince and involve the rest of the community. According to Cooke (2002), Headmen are offered in return state allowances and in certain cases political power.

⁹⁸ The new Concept pioneer project was launched in 1996.

⁹⁹ The policy or practice on the part of people impositions of authority of restricting the freedom and responsibilities of those subordinate to them in the subordinates supposed best interest (Oxford Dictionary).

Moreover, according to a study conducted by Cooke in communities being developed under the New Concept northern Sarawak, paternalism is another common mean used by the Government to convince longhouse communities and local leaders and Headmen to support governmental strategies. Under this approach, people from the community are encouraged to look to the State for their welfare and in turn loyalty is expected (Cooke 2002). Indirectly there is the idea that in order to benefit from the various available State funds, the people in the community has to stay in good terms (“friendly”) with the Government and support its development strategies, otherwise they may be labelled as ‘anti-development’ or ‘anti-Government’ and will be cut any potential provision from the Government (Banerjee and Bojsen 2003, Cooke 2002). This might explain the consultation process in longhouse Rayong, where after deciding not to participate in the New Concept scheme after the Government representative visited them, the community was included neither in any following consultation process nor in the assembly of several communities in Ulu Teru where the New Concept was presented. This exclusion possibly suggests the longhouse is not considered “friendly” or supportive of the Government development objectives and therefore is left out any decision making process and/or benefit from the land development project.

Moreover, a good example of paternalism use by the Government is the list of promises and expectations such as new services and infrastructure that members of longhouse Kalong mentioned the Government will provide them as part of the conditions to participate in the New Concept scheme. According to Banerjee and Bojsen (2003), this is a way of communities to justify their practices through invoking the assurances and promises from the Government about facilities and development.

In addition to showing the approaches used by the Government to consult and involve communities in development projects, the arguments presented above serve to show the political interest involved with land development strategies in the State of Sarawak. According to Cooke (2002), Mujah (2007) and Bujang (2007)¹⁰⁰, oil palm development under the New Concept is a useful strategy to gain control on NCR-land and rural communities. NCR-land has become the attention of the State Government and the private sector since the major part of the most suitable land resources became scarce in the State in the mid 1990s (Ngidang 2001). The pressure on land availability and economically developed NCR-land has increased land disputes in Sarawak and has been driver for the development of JV schemes such as the New Concept. Under such scheme, land will be developed in line with the objectives of the State and the Government will gain political power and control on the participating communities, since these will look to it for their welfare. This recalls the argument set by Vandergeest and Peluso (1995) that State exercises power in actions that “include or exclude people within particular geographic boundaries” and that “control what people do and their access to natural resources within those boundaries”.

According to a survey carried out by Ngidang (2002) in Ulu Teru, although the level of participation is very high, over half of the participants (53%) does not understand the concept at all, 30% understand the concept a little and less than one fifth (17%) claim to have understood it. Then why did they agree? The concept of paternalism, the fear of being labelled ‘anti-Government’ and the use of social hierarchies above explained might be keys to answer this question. Moreover, these approaches used by the Government to involve communities in the pioneer project under the New Concept reflect this project was not initiated by the communities but by a top-down Government approach. As such, the room for open dialogue and democratic consensus was reduced. According to Ngidang’s study, the decision to

¹⁰⁰ Mujah, N. and Bujang, M. (2007, April). Personal interview.

participate was taken without a community wide consensus and by-passing an open discussion among all the community members by using the social hierarchies and paternalism approaches above described. Although this seems at odds with communities' indication of a big assembly in Ulu Teru, it might suggest that the decision to participate in the New Concept scheme was taken by local leaders previous to the meeting in Ulu Teru. If so, then the assembly in Ulu Teru might have served more to formalize procedures with an official presentation of the New Concept than to provide floor for open dialogue. This idea goes in line with a comment made by a group of women in longhouse Kalong "we did what the Headman thinks is going to be good for us. We have to follow what the Headman says and stay together".

This process of agreement whereby community members decide to participate through a process of co-optation ("choose together") follows a psychology of consensus. According to Ndigang (2002) a psychology of community consensus assumes that when decisions have been made (in this case by the Headman and some local leaders), all are bound by agreement and the community members have the obligation to participate, primarily in order to maintain solidarity and harmony in the longhouses and for fear of being branded "anti-development".

In addition, it is important to mention here that communities such as longhouse Kalong that were pursued to participate in the New Concept are expecting the Government to reciprocate. According to the study carried out by Ngidang (2002), "what communities see is an act of faith or trust", by which they expect the Government to amending the trust deed in order to be fair to them and to provide them with structural, economic and organisational facilities - i.e. the facilities cited by longhouse Kalong - as a reward for complying with top-down policy decisions.

Last but not least, it is remarked in the introductory part of this section that officials' claims on natives' vulnerability are based on perceptions about their land-use system for leaving land "idle" and "unproductive". According to Government Officials, "natives can avoid this vulnerability to poverty by making their land more marketable and one sure way of doing so and improving productivity is through palm oil plantation agriculture". Again, plantations mean progress, and longhouses are supposed to support this top-down government development strategy and be 'pro-development' or otherwise they will be left behind. All the same, a government survey carried out by Cooke (2002), suggests that there were reservations among native communities about the usefulness and security of "making their land more marketable" and exchanging land for shares. This was expressed in concerns about "temptation to sell the shares for their market value, and about the state of market itself which will affect how companies perform". Moreover, and even more important, native communities raised questions about the willingness of palm oil companies to make their practices accountable and transparent, since they have poor or no idea about the company's accountability or strategic plans for the future and these conditions do not give them trust on the JV Companies. Despite the companies are producing in their land and despite owing 30% of the equity shares, native communities have no access to any decision-making process. All these greatly suggest that other parties are taking larger shares of the revenues of the JV and communities are taking larger part on the negative externalities, and becoming even more vulnerable in the face of new uncertainties.

6.5 Discussing the Main Issues

This section provides a further analysis on the main issues identified through the community assessment and the comparative analysis. Studies of different authors are used in this section to support and discuss arguments.

6.5.1 Plantation Schemes: Supporting Socio-Economic and Environmental Sustainability?

In order to analyze the effect of palm oil plantation schemes on sustainable livelihoods it is important to step back and recall what is meant in by sustainable livelihoods. As mentioned at the beginning of this paper, it relies on the interdependency of natural resources quality (environmental sustainability) and socio-economic well-being (socio-economic sustainability), since natives traditional subsistence practices highly depend on the local environmental conditions. Thus, sustainable livelihoods is defined in this paper as the existence of the state of natural resources necessary to support the ability of a community – and that of future generations – to practice the traditional socio-economic activities necessary to fulfil their subsistence needs. On this basis, it is also possible to argue that the sustainability of livelihoods is inherent to native communities' risk minimization strategies to secure their basic needs.

In addition to this, it is important to bring to mind the rationale behind the promotion of plantation schemes which is based on the Government's conviction that the best way to bring progress to the rural economy and help natives to "improve their socio-economic status" and "vulnerability to poverty" is by making their "idle and underutilized NCR-land more marketable and productive" through its "development into large scale oil palm plantations" (Ministry of Land Development 2006, Cooke 2002). And moreover, as this strategy is about bringing progress, longhouses are supposed to support it and conform to governmental objectives being 'pro-development' or otherwise they will be left behind and will be cut from any potential provision from the Government (Banerjee and Bojsen 2003). Finally, it is worth recalling the objectives of this strategy, which according to the Ministry of Land Development are concerned with raising the standard of living of the rural people and contributing towards poverty eradication (MDG1), creating employment opportunities in the rural areas, ensuring sustainable source of income, reducing rural-urban migration and balancing development between the rural and the urban areas.

Looking into the direct socio-economic effects of introducing a JV scheme based on large-scale palm oil plantation agriculture such as the New Concept it can be first argued that the employment opportunity in the plantation and the incomes generated from palm oil production have the potential to bring additional incomes for participating native communities. These additional incomes can contribute to the household cash income requirements and lessen the vulnerability related to the reliance on traditional cash crop production (such as rubber and pepper) subjected to market fluctuations.

To begin with, it is important to understand that the lack of cash income from paddy rice, gathered fruit and vegetables, as well as livestock production reflects the primary contribution of it to the household's subsistence needs (self-consumption). Incomes are mainly obtained from the cultivation of cash crops, for instance, rubber and pepper and the sale of forest products. Additional cash income can come from off-farm activities such as wage labor, remittances, rental businesses, etc. According to Gerrits (2004), the annual average household income of a native community in 1991 was around RM 5 408 (EUR 1 176) of which 53.7% came from agriculture and natural resource-based activities and 46.3% from off-farm income. For a household dependent 75% on agricultural traditional activities the annual average income was calculated at RM 3 515 (EUR 763). In addition, Gerrits argues that the aggregated labor profiles show considerable variability in the monthly labor contribution to agriculture; this is due to two main factors: the seasonal nature of this type of activity and the need to work in temporary wage labor if declining market prices for cash crops. Moreover, comparing a household that depends mainly on traditional practices to another that has several sources of income, he adds that alternative sources of income (economic diversification) have taken the

pressure off the farming practices to meet the household's subsistence and cash requirements. These results go in hand with the perception of community members in longhouse Kalong, whose decision to participate in the scheme is mainly based on economic interests. Based on incomes estimates given by community Kalong, a rough estimate for the average annual additional cash income generated by the scheme would be composed by RM 3600 from working in the plantation and RM 12 960 (starting after 5 years) from the palm oil production¹⁰¹. Adding both it is possible to see that the total annual cash incomes generated by the palm oil development scheme are 2.3 times higher compared to average household incomes estimated by Gerrits (1994) for households depending 50% on traditional farming practices. This goes in line with comments of community members in longhouse Kalong who claim that cash incomes coming from wage labor and in the future from palm oil production will not only give them the purchasing power to buy the food they need (instead of producing it) and cover household cash requirements (such as school payment), but also to allow savings. *As a result, it is possible to argue that additional incomes from full-time wage labor in palm oil plantations and incomes from palm oil production under schemes such as the New Concept can lessen the pressure of relying only on traditional agricultural practices vulnerable to market prices fall of agricultural commodities and can create sufficient additional incomes to meet the households' cash requirements and to allow savings.*

Secondly, it can be argued that the introduction of a scheme such as the New Concept can bring additional socio-economic benefits by providing new infrastructure and basic services that have the potential to play an important role in the progress of the participant communities. According to comments of community members of longhouse Kalong, a series of structural and service facilities were promised by the Government as part of the conditions to accept participating in the scheme. First, the provision of new basic services and infrastructure has the potential to play a significant role in reducing indoor pollution (cooking is made in several houses burning biomass), and improving sanitation. Moreover, it can set the necessary conditions to improve productive activities, such as agricultural processing or other potential rural enterprises (Nordström 2005). In addition, the provision of basic services is fundamental to provide proper rural community services, for instance proper attention in health centers (Nordström 2005). Finally, the provision of new infrastructure and basic services will enhance communities' ability to access productive factors such as markets. For instance, the road, which is to date the only infrastructure provided by the company, not only brings social benefits to the communities by giving them access to the school and the health center, but it also contributes to their economy, since it provides them access to the market in town, where products can be sold at better prices than through intermediary agents¹⁰². *As a result, if new basic services and infrastructure are provided under the New Concept scheme these could play a significant role in improving the living conditions of the participating communities and contributing to their socio-economic development.*

To sum up above discussed arguments it is possible to say that the establishment of palm oil plantations under the New Concept scheme has the potential to meet the objective of the Government of raising the standard of living of the native communities and contributing towards poverty eradication (MDG1) by 1) contributing with additional incomes to the participating landowners and 2) by providing new basic services and infrastructure to these communities. If one of these conditions fails to be fulfilled, the potential contribution towards progress in the native participating communities will be undermined and maybe overtaken by the involved risks of participating in this scheme.

¹⁰¹ Assuming the participant landowner works 300 days a year in the plantation with a RM 12 per day salary, and assuming that the landholder has put aside 3 ha in the scheme – average calculated from longhouse Kalong participants –, with an income of RM 360/ha/month. Returns from palm oil production will start in 5 years.

¹⁰² Rubber farmer. (2007, 9 April) Longhouse Kalong.

What are these risks? As stated above, the introduction of palm oil plantations under the New Concept has the potential to bring socio-economic benefits to the native communities participating in it. However, there are related risks that can be particularly counter-productive for the participatory communities' well-being that should be considered.

Although shifting cultivation of paddy rice does not contribute to cash income generation, it plays a fundamental role in the fulfillment of subsistence needs of the household and therefore it can be considered, together with other traditional resource-based activities, a risk minimization strategy for the communities (Svan Hansen 2005a). The introduction of wage labor in the palm oil plantation and the use of native communities' NCR-land to develop such plantations may jeopardize the fulfillment of communities' subsistence needs and affect the sustainability of local livelihoods.

First, although it has been stated that wage labor can create additional incomes, it can also create additional costs. To begin with, if traditional farming products are quantified based on current prices given by farmers of longhouses Kalong and Rayong (see Table 6-2) and secondary data from previous research studies (Mertz et al. 2003, Gerrits 1994), the potential monetary equivalent per man-day including products for self-consumption looks as follows.

Table 6-4 Monetary Equivalent per man-day of Traditional Farming Products Based on 2007 Prices

Product	Labor Productivity	Price	Income
	(kg/day/man)	(RM/kg)	RM/day
Paddy (after milling)	6.6	2.5	16.5
Rubber	15	4	60
Pepper (dried)	12	6	72

Despite its importance, the monetary equivalent per man-day for gathered forest resources and produced vegetables was more difficult to determine and therefore they are not included in this table. Nevertheless, they play an essential role in the subsistence needs of the communities. From Table 6-4 above it is possible to state that the monetary equivalent per man-day for traditional agricultural practices during the farming season – even for paddy rice which is not produced for commercialization purposes – can compete with the full-time wage provided by the palm oil company which ranks from RM 7 to 15 (RM 12 in this specific case) per day. For instance, rubber production provides 5 times higher income and pepper 6 times higher income per day compared to the income generated in one day-work in the plantation, this without mentioning that one day of work in the rubber is equivalent to 4 hours while one day of work in the plantation is 8 hours. This demonstrates that the salary at the palm oil plantation is low, as some of the community members in longhouses Rayong and Selezu claim. The main difference between both incomes is that incomes from cash crops production depend on market fluctuations - which make these activities more vulnerable -, while full-time wages do not depend on market fluctuations. Even so, both activities are seasonal and thus it can be said that both compete with each other in terms of time and labor input. As a consequence, some farmers that work in the palm oil plantation see the need to hire another member of the community to do the farming activities that the household can not complete due to time constraints¹⁰³. Other farmers decide to reduce production and use the additional incomes generated by working in the palm oil plantation to buy the necessary food for the household¹⁰⁴. *Summing up, it can be argued that the cash incomes from wage labor are low when compared to*

¹⁰³ Farmer in longhouse Kalong. (2007, March). Personal interview.

¹⁰⁴ Comments of Longhouse Kalong members during the focus group meetings.

monetary equivalent per-man day of traditional farming products; however, wage labor incomes are more stable since these do not depend on market fluctuations. On the other hand, wage labor reduces time availability for traditional subsistence practices which in some cases is compensated by hiring labor to complete the farming activities and in other cases by purchasing the missing food products to fulfill the subsistence needs of the household. Both of these result in additional costs for the farmer working in the palm oil plantation.

On top of generating additional costs, low wage labor opportunities in palm oil plantations attract poor immigrants, mainly Indonesians, to the region. As previously mentioned immigrants accept low wage conditions easier than locals and therefore are generally contracted by palm oil companies to cut costs. Indonesians find low wage labor in palm oil plantations in East Malaysia a good income opportunity compared to Indonesia¹⁰⁵, and as a result many “cross the border” to settle and work in plantations that offer them housing and basic facilities. Consequently, the employment opportunities in the rural area are reduced for locals and salaries in plantations have maintained low. Although in Ulu Teru area the number of Indonesians working under the New Concept is still low, more will come once a larger portion of the area is developed into a palm oil plantation¹⁰⁶. As it is happening in other regions of East Malaysia, this can have social implications in that immigrants do not always respect social norms of native communities and bring with them ‘inappropriate’ habits that erode the local culture¹⁰⁷. Moreover, the settlement of poor immigrants causes additional pressure on natural resources and on the environment. *In short, if local employment opportunities under schemes such as the New Concept are to be maintained for locals, and the scheme is to fulfill the State Government’s objectives of providing them economic benefits and improving their living standards, incomes from wage labor could be much higher – in particular if they are shareholders of the JV – and work requirements would need to include regulations to preserve the local culture and prevent social erosion due to immigrant overload.*

In addition to shifting time and labor from traditional activities to low wage labor, the implementation of a palm oil plantation scheme causes land-use changes within the NCR-land which affect the communities’ traditional practices and productive factors and might jeopardize the sustainability of livelihoods. Firstly, to understand these changes it is necessary to know the land-use distribution in the NCR-land after the palm oil plantation development. As indicated by community members from longhouse Kalong and longhouse Rayong, the average plot for paddy rice production per family is around 1.2 to 1.6 ha. Moreover, according to farmers in longhouse Kalong, families participating in the New Concept scheme are still working their paddy plots and producing the necessary rice to fulfill the household subsistence needs. Based on these statements and using an average plot of 1.4 ha, the percentage of the NCR-land covered by paddy rice (reducing the area given to the palm oil plantation) is 3% for the communities of Selezu, Setulai and Sepadok, 5% for Ulu Teru communities (2% if the entire NCR-land is considered without taking 60% given to the palm oil plantation), and 2% for Sungai Bong communities (see Table 6-5 below).

¹⁰⁵ Indonesians working in East Malaysia come mainly from Kalimantan, in the Island of Borneo.

¹⁰⁶ Indonesian workers in the palm oil plantation. (2007, March). Personal interview.

¹⁰⁷ Abraham, M., Webber, D., Soon, H. (2007, March) Personal interview.

Table 6-5 Land Cover under Paddy Rice Production

	Ulu Teru (102 hh)		Sungai Bong (192 hh)		Selezu, Setulai, Sepadok (196 hh)	
	(%)	ha	(%)	ha	(%)	ha
Total NCR-land		7 902 ha		12 268 ha		9 205 ha
NCR-land (-) Palm Oil	- 60	3 160 ha	- 4	11 818 ha	- 6	8 683 ha
Paddy Rice Production	5	158 ha	2	240 ha	3	275 ha

Furthermore, based on land-use descriptions of the Headmen of both longhouses Kalong (Ulu Teru) and Rayong (Sungai Bong) (see section 6.4.2), it is possible to estimate the following land-use distribution for these both cases (Table 6-6). It is important to note here that what is considered under rubber is also old secondary forest, and what is considered for paddy rice is not entirely under production, but also under forest in different succession stages according to the fallow period¹⁰⁸. Moreover, it is important to bear in mind that the following table refers to the areas within the NCR-land boundaries that belong uniquely to the assessed longhouses and it does not include communal NCR-land (i.e. preserved forest areas, graveyards, etc.).

Table 6-6 Land Distribution of Ulu Teru and Sungai Bong NCR-Land

Type of Land-Use	NCR land-use distribution	
	Long Kalong (%)	Long Rayong (%)
Palm oil plantation	60	4
Shifting cultivation (includes secondary forest growth)	30	50
Rubber, pepper, orchards and mixed forest	10	46

¹⁰⁸ Vegetables and pepper are also cultivated in the land area reserved for paddy rice production.

It is possible to state from Table 6-6 above that as a result of the area given to the palm oil plantation development, longhouse Kalong in Ulu Teru NCR-land has a smaller area for shifting cultivation (including secondary growth) than longhouse Rayong in Sungai Bong NCR-land. A smaller area for shifting cultivation combined with a larger percentage of area covered under paddy rice production in Ulu Teru (Table 6-5), may suggest an intensification of paddy rice production in that paddy rice will be produced with shorter fallow periods compared to Sungai Bong. Moreover, comments of community farmers that state the average fallow period lays between 4 and 10 years for longhouse Rayong and around 4 years for longhouse Kalong, support above suggestion on a probable reduction of fallow length as a consequence of a reduction in land for shifting cultivation.

Table 6-7 Land-Use Change in Longhouse Ranggong Comparing Situation in 2001 to the Situation 30 Years Ago (Survey of 38 Households)

Change Parameter	Longer/larger	Same	Shorter/less
Hill rice fallow	0	1	36
Size of hill paddy rice	0	4	32
Time spend on hill paddy rice	0	3	34
Time spend on wage labor	30	4	1

Source: Svan Hansen 2005a

The results above obtained go in hand with results obtained in 2005 by Svan Hansen when she assessed land-use changes in longhouse Ranggong caused by the introduction of the New Concept scheme¹⁰⁹. First, she found out that due to the establishment of the scheme the area under shifting cultivation diminished drastically and as a consequence some households now use the areas close to the longhouse more intensively. Moreover, based on survey results she found out that the great majority of households (36 out of 38) in longhouse Ranggong reduced their fallow period after giving their land to develop into palm oil plantations under the New Concept (see Table 6-7 above). This results support the above discussed argument on a reduction of fallow length. However, Svan Hansesn (2005a) also found out that households decreased their hill paddy area considerably and thus their paddy production. These results differ from the case studies in this paper in that interviews to farmers in longhouse Kalong revealed that each family wants to continue producing the necessary paddy to provide “the basic needs and well-being of the *bilek*”. A probable reason that allows them fulfilling its paddy production needs despite being working in the plantation might be related to their possibility to hire other farmers to do the work.

¹⁰⁹ The study region is located between Miri and Bintulu District, in the Niah Catchment.

Summing up, the expansion of palm oil plantations into NCR-land can result in 1) a reduction in land available for shifting cultivation, 2) a more intensive use of land with shorter fallow periods if families continue producing the necessary paddy rice to fulfill household subsistence needs, and/or 3) a reduction of paddy rice production. All these consequences affect the sustainability of livelihoods.

Although these changes could be considered productive under the Government’s understanding of productivity (land will not any more be left ‘idle and under-utilized’ but on the contrary will be used more intensively), they may in the long term have consequences on soil quality/fertility and paddy rice productivity (yield), resulting in a possible increase of fertilizers use. According to a study carried out by Mertz et al. in 2003 they found out that the amount of fertilizers and weeding (manual or using herbicides) used in a paddy rice plot has significant negative correlation with the length of fallow, meaning that the shorter the fallow period the larger the amount of fertilizer and herbicide (or weeding work intensity) used by the household (see Table 6-8). This is confirmed by comments of some farmers in longhouse Rayong which state that “the moment you know you have to rotate your land and leave it fallow is when the soil is tired, your production is not so good anymore and you have too many weeds coming up in your plot. The fallow will recover your land to produce again”. In other words, if the fallow period is shortened, the land has no time to “recover” and thus more fertilizers and herbicides will need to be used to maintain productivity. Mertz et al. (2003) also found out a clear negative relationship between off-farm income per household and fallow length (see Table 6-8). This can be most likely explained by the above discussed argument that wage labor (higher off-farm income) reduces time for labor in traditional farming practices and increases intensity of land use. *As a result, households that do not leave their land to fallow or reduce the fallow period because of more intensive farming need to use more fertilizers and herbicides to maintain productivity and spend more time in hand weeding.*

Table 6-8 Fallow Length Related to Farming Practices in Shifting Cultivation in two Iban Communities

Fallow before farming	Herbicide per ha	Fertilizer per ha	Yield kg per ha	Off-farm Income RM
NF	5.9	17.7	899	9450
YSF < 10 years	5.2	9.0	1147	7949
OSF > 10 years	3.2	5.2	1107	5093

NF = no fallow; YSF = young secondary forest; OSF = old secondary forest

Source: Mertz et al. 2003

In addition, a study carried out by Saarnak in 2003 shows a close positive relationship between fallow length and nutrient content in ash after the burning takes place to prepare the terrain for planting paddy rice. He found out by collecting ashes (containing nutrients) on fields with different fallow periods that a reduction of the fallow length results in a reduction of the nutrient content in the ashes and that the optimum length of fallow is around 12 years. *This corroborates above arguments by demonstrating that if households reduce their fallow periods or do not leave their plot to fallow at all, missing nutrients will have to be complemented by adding fertilizers.*

Combining above arguments, it can be argued that although wage labor in palm oil plantations – which is shown to be low if compared to monetary equivalent per-man day of traditional farming products – provide a stable income because it does not depend on market fluctuations, it reduces time availability for traditional subsistence practices which in some cases is compensated with additional costs (by hiring labor or buying the missing food products). Moreover, as a result of the introduction of wage labor and the reduction of NCR-land available for shifting cultivation, the land is used more intensively and traditional production is reduced. As a response to the intensification in farming activities more fertilizers and herbicides are used by the communities with possible negative impacts on the soil and water resources quality in the long-term. Moreover, as a consequence of a reduction in production, the subsistence needs of the household are not always fulfilled and families are less self-sufficient. All these has negative effects on the state of natural resources, on the communities' ability to fulfill their subsistence needs and thus on the sustainability of their livelihoods.

Moreover, the introduction of palm oil plantations into NCR-land has demonstrated (see section 6.3.1) to have also a large effect on communities' access to natural resources (such as loss of forest and water resources) as well as a negative impact on its quality (i.e. soil conditions). According to Svan Hansen (2005a), soil conditions in a palm oil plantation after two crop rotations (60 years) change drastically. This goes in line with community farmers' arguments that after palm oil plantations are introduced land is not suitable for paddy rice production anymore. The complexity involved with estimating monetary value to forest and water resources used to fulfill communities' subsistence needs is the reason why these issues have not been developed further under this section of the analysis. However, based on the assessment of the case studies in this paper it is possible to argue that 1) these resources play an essential role for the communities' subsistence needs as providers of wild meat, fish, fruits and vegetables for self-consumption, material for construction and crafts, space where to wash and bath and for their ecological services; and 2) the loss of access to these resources and the impact on their quality can be considered an additional negative effect on the sustainability of their livelihoods because it undermines the communities ability to fulfill their subsistence needs. The effect of palm oil plantation development on the quality of natural resources and local livelihoods is further developed in section 6.5.3.

Furthermore, it was stated above that the reliance on only traditional farming activities for cash income has high vulnerability to cash crises due to market prices fall of agriculture commodities. This argument has been confirmed by other authors that argue that rural communities economy in Sarawak based on cash crops such as rubber and pepper have been largely affected by market prices fluctuation (Gerrits 1994, Svan Hansen 2005a). For this reason economic diversification on the one hand and access to traditional productive and natural resources on the other hand are so important to fulfill cash requirements and subsistence needs. On this basis it can be argued that the reliance on one economic activity such as palm oil production – which also depends on market fluctuations - as the alternative to diversify economy and bring additional cash income to rural communities can in fact increase the vulnerability of native communities participating in the scheme. This is aggravated by other factors upon which participating communities now depend such as less access to productive and natural resources, high dependence on Government promises/provisions and lack of transparency in that participant landowners do not have any access to information or any decision power in relation to the operations of the company.

Last but not least, the analysis above presented has focused on assessing the benefits and risks involved with the development of NCR-land into palm oil plantations under the New Concept scheme. However, it is important to emphasize here that the expansion of palm oil plantations into NCR-land without the consent of native communities and without their involvement or participation, do not necessarily bring to the communities the potential socio-economic benefits above described, on the contrary, it might escalate the risks. This argument is based on the comparative analysis of the three case studies (see section 6.4) assessed in this paper and might be a reflect of the current 210 court cases dealing with land conflicts between native communities and palm oil companies in the State of Sarawak.

Box 5. Eroding Sustainability

“Economic resilience and social sustainability is gradually eroded and the former and survival of ‘traditional’ Iban communities seems to be threatened by the State’s insisting efforts to officially distribute material wealth”.

- Svan Hansen 2005 -

6.5.2 Palm Oil Expansion a Threat to Food Security?

As previously discussed, the introduction of palm oil plantations into NCR-land has changed traditional farming practices and access to traditional productive factors and natural resources. This in turn impacts the communities’ ability to produce and gather enough food based on their traditional practices to be self-sufficient and fulfil their subsistence needs.

In the first instance, this is a consequence of a reduction in the time spent in traditional farming due to wage labour and cash income increase. Mertz et al. (2003) and Svan Hansen (2005a) found in their studies on native communities in Sarawak a clear negative relationship between time spent on wage labour and/or increase in cash income and time spent in traditional farming (see previous section). As a result, farmers who work in the palm oil plantation do not have enough time to complete the work in their farming plots and 1) hire other farmers for this purpose or 2) reduce their production by reducing the size of their plots. Svan Hansen’s study (2005) shows for instance that from 70% Iban communities in the Niah Catchment that were self-sufficient in paddy rice in 1985, only 30% were self-sufficient in 2001. According to her, the main reason for this is the introduction of palm oil plantations in the area and the shift of labor time spent in traditional farming activities to wage labor.

In the second instance, the reduction of land availability for shifting cultivation within the NCR-land has caused an intensification of the farming practices and a decrease in fallow length. A study carried out by Mertz et al. (2003) shows that there is significant correlation between decrease in fallow length, decrease in yield and increase in the use of fertilizers and herbicides (see previous section). Thus as a result of intensification in farming practices, the use of agrochemicals requirements to maintain productivity will increase.

In the third instance, the conversion of land into palm oil plantations has not only reduced the available land for shifting cultivation, but also the land covered by secondary forest (which is in fact difficult to differentiate from each other). As a result, communities have less access to forest resources for self-consumption and for commercial purposes.

In the fourth instance, the impact on natural resources quality within the NCR-land, such as the river water pollution or the soil erosion (see next section), has also negative consequences on the communities’ livelihoods. According to community members, soil degradation is caused by the soil erosion at the moment of clearing and by the use of agrochemicals for the palm oil production. Soil might also be affected in the long-term due to an intensification of the traditional farming practices as above discussed. The quality of river water is affected due to erosion and use of fertilizers in the palm oil plantation, as well as to water catchment forests and riparian forests clearance necessary. The negative impacts on water quality and the implications for native communities will be explained in more detail in next section.

As a result of 1) plot size and production decrease due to less land availability and labour time for traditional farming, 2) pressure on land (and soil quality) due to intensified farming practices, 3) less access to natural resources and 4) the degradation of natural resources quality, communities' ability to produce and gather food based on their traditional practices is threaten. Consequently, it can be argued that the development of palm oil plantations into NCR-land jeopardizes the communities' ability to be self-sufficient and that, at community level, the expansion of palm oil plantations has a negative effect on food security based on traditional subsistence practices.

Nevertheless, if the cash incomes generated by working in the palm oil plantation and producing palm oil are sufficient to afford purchasing the food in the market or hiring farmers to complete the work needed to fulfil the household subsistence needs it can be argued that the economic benefits brought to the communities by the palm oil development under the New Concept scheme can provide the necessary cash incomes to afford paying for food security. Even more if in addition to the economic benefits, the palm oil development scheme brings the infrastructure and services necessary to facilitate access to the market and other productive factors.

Even so, it is important to emphasize that cash income from palm oil production is vulnerable to market fluctuations, and incomes from labour wages in the plantation are low and based on a daily-contract (see previous section). On this basis, it can be contested that households' ability to secure food is more vulnerable if they depend on these incomes to fulfil their food needs compared to households that have the ability to secure their food based on traditional subsistence practices (farming and gathering). Because traditional farming practices can fulfil household food needs without depending on external cash income (self-sufficient), they can be considered a risk minimization strategy for food security.

At a State level, the land development policies seem to be contradictory and cause possible land-use conflict in the future if proper measures are not implemented.

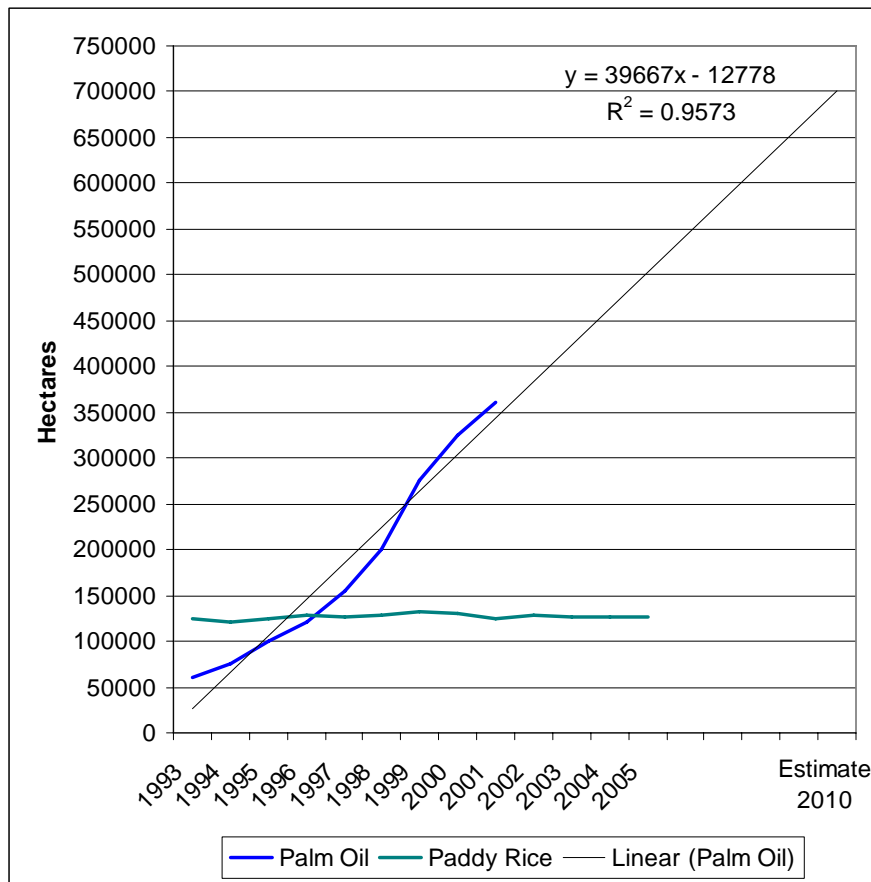
While the Ministry of Land Development promotes the development of 1 million ha into large-scale palm oil plantations by 2010 and targets to create at least 60 000 hectares of NCR 'land bank' annually (Ministry of Land Development 2006), the Ministry of Agriculture targets 90% of self-sufficiency in rice production at State level by 2010¹¹⁰. While the objectives of the Land Development Ministry are to raise the standard of living of the rural people and contribute towards poverty eradication by creating employment opportunities in the rural areas and ensuring a source of income, the objectives of the Ministry of Agriculture are centered in ensuring food security for the State, improving balance of trade for food, increasing competitiveness and promoting sustainable agriculture. It is important to highlight here that in the State of Sarawak paddy rice is mainly produced by native communities.

Looking at both above described agendas for the rural area in Sarawak, it can be argued that NCR-land is the objective for different land development strategies and means to fulfill different State targets by 2010.

According to production trends of palm oil and paddy rice in the State of Sarawak since 1993, it is possible to see on the one hand a significant increase in palm oil production and on the other hand a relatively constant production of paddy rice (see Figure 6-6 below). Moreover, based on a forecast simulated based on these historical trends (R^2 value = 0.96), it is possible to argue that palm oil development at the current rate of growth has the potential to cover the 1 million ha targeted by the Ministry of Land Development by 2010 (Figure 6-6).

¹¹⁰ Ministry of Agriculture Staff (2007, March 19). Personal interview.

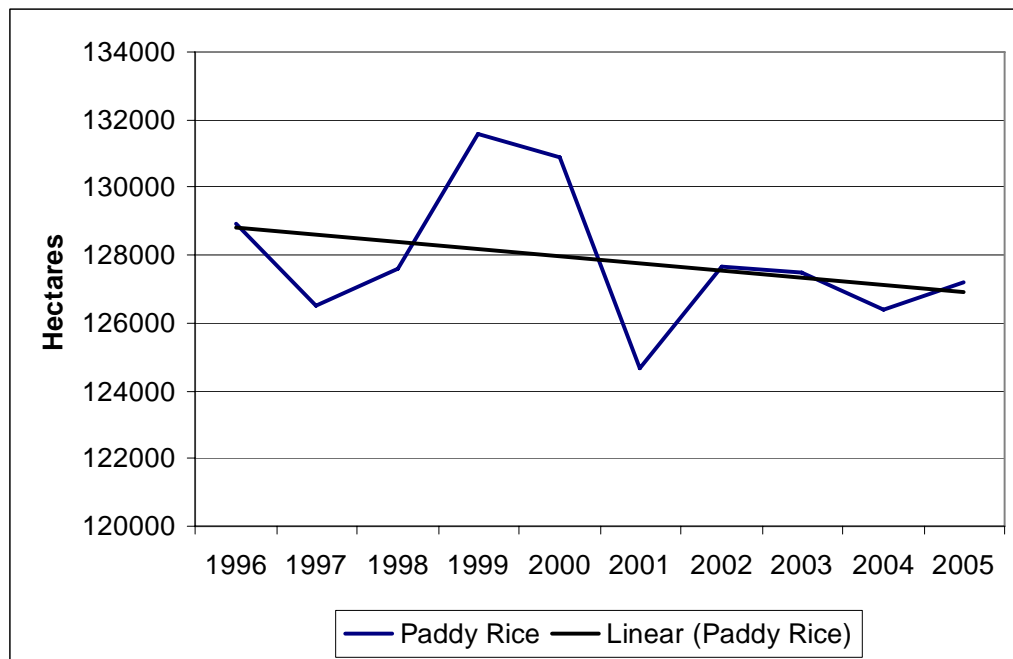
Figure 6-6 Palm Oil and Paddy Production Trends in the State of Sarawak (1993 – 2005) and Palm Oil Production Forecast Estimated for 2010



Adapted from Svan Hansen 2005 and Ministry of Agriculture Statistics 2007

On the contrary, paddy rice production might not likely reach the level necessary to fulfill 90% self-sufficiency by 2010 at its current growth rate. Based on information provided by the Ministry of Agriculture of Sarawak it is possible to see that the production trend for paddy rice is slowly declining (Figure 6-7). This can be most likely explained by the arguments above discussed, whereby production of paddy rice under shifting cultivation in native communities is decreasing due to factors such as the development of large-scale palm oil plantations into their NCR-land and the reduction of time spent in traditional farming practices due to wage labour and /or increase in cash incomes.

Figure 6-7 Paddy Rice Production Trends in the State of Sarawak (1996 – 2005)

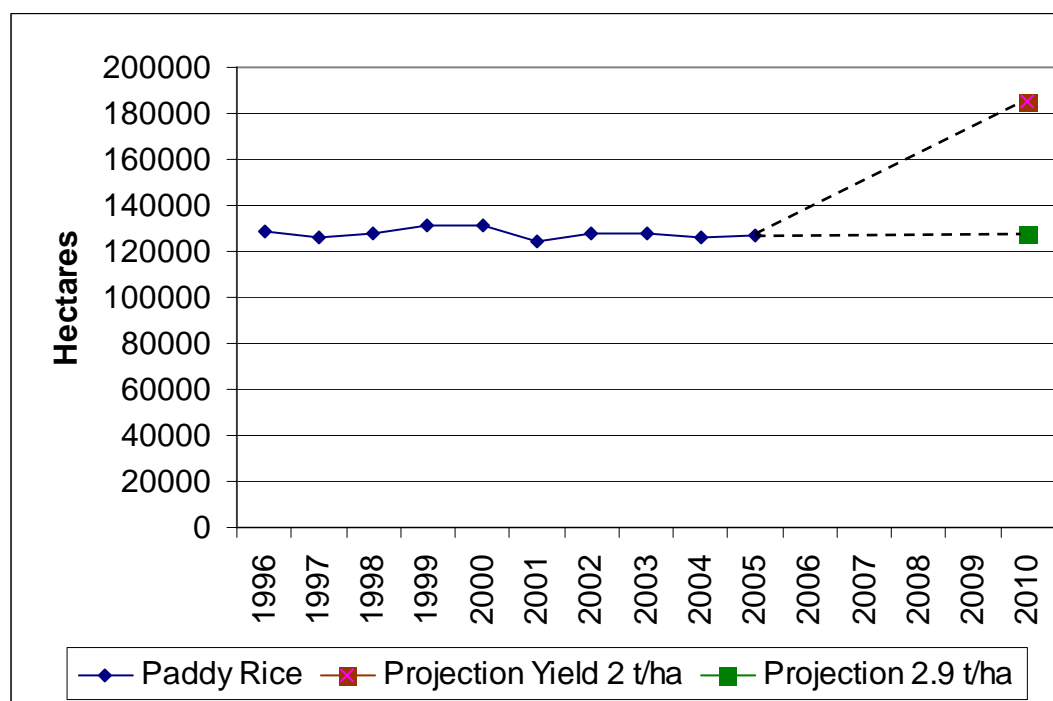


Adapted from Ministry of Agriculture of Sarawak Statistics 2007

In addition, it was discussed above that intensification of farming practices and decrease of fallow length may cause a decrease in paddy rice yield (Mertz et al. 2003). As a consequence, the production of paddy rice might continue declining over time. Figure 6-8 below illustrates the estimated projection of paddy rice production necessary to fulfill 90% self-sufficiency objectives by 2010¹¹¹ based on two different yields. The first projection is based on the current average yield in the State of Sarawak equivalent to 2 t/ha, while the second projection is based on a higher yield of 2.9 t/ha. Both yields could be considered low if compared to the average yield in Peninsular Malaysia, which lies around 4.5 t/ha. The selection of 2.9 t/ha is based on an interview with a staff member of the Ministry of Agriculture of Sarawak who claims this is the targeted yield for paddy rice the State intends to reach. From the estimated projections it can be established that in order to reach 90% self-sufficiency by 2010 based on current yield, the paddy rice plantations in the State should expand significantly from around 127 000 ha (2005) to 185 000 ha in 2010. On the other hand, if yield is improved to 2.9 t/ha the State would be able to reach 90% self-sufficiency by 2010 without a significant increase in its paddy plantation area (see Figure 6-8).

¹¹¹ It is estimated considering a demand increase based on Sarawak population growth rate of 2.3% and current production and import data provided by the Ministry of Agriculture of Sarawak. It is important to consider that the data provided by the Ministry are subjected to estimations due to the difficulties of field data collection. This reflects the difficulties of the Ministry to reach all paddy producers in the State. Paddy producers are mainly farmers in native communities, which in some cases are located in remote areas.

Figure 6-8 Paddy Rice Production Projections for 2010 based on two Different Yields, State of Sarawak



Adapted from Ministry of Agriculture of Sarawak Statistics 2007

The results show that the State intentions to improve yield recognize that paddy rice self-sufficiency targets will not be reached under current yield and production trends. Even less, if considering that palm oil plantations will continue expanding and as a consequence land availability for paddy rice production under shifting cultivation will continue shrinking (with the implications above discussed). According to interview comments, the Ministry of Agriculture plans to improve yield by promoting the following incentives: giving subsidies for more fertilizer¹¹²; improving irrigation using gravity-based systems; increasing subsidies for rice price from RM 0.6 – 0.65/kg to RM 0.8/kg; granting RM 650 to those farmers that reach a yield of 10 t/ha. These incentives will be provided with Federal Government funding. The intention of the State to increase yield and improve competitiveness in the agriculture sector by increasing the use of fertilizers proves the future trends towards more intensified traditional farming practices. In the long-term, however, this might deteriorate the quality of natural resources (i.e. soil quality) needed by native communities to fulfill their traditional practices.

To sum up, the current pressures on land for paddy rice production under shifting cultivation, the current production trends and low yield and the objectives of palm oil expansion in the State jeopardize the State's objectives on food security based on reaching 90% self-sufficiency in rice by 2010. However, an increase in yield to 2.9 t/ha supported by State incentives may improve the scenario to achieve this target. Finally, the intention of the State to increase yield and improve competitiveness in the agriculture sector supports the arguments above discussed on intensification of traditional farming practices. An increase in the use of fertilizers and intensification in the agricultural practices might in the long-term deteriorate the natural resources quality conditions needed by native communities to fulfill their traditional practices.

¹¹² Fertilizers needs to improve yield are: 13 bags of 50 kg each of combined fertilizer per ha and 5 bags of 50 kg each of urea per ha

Box 6. Biofuels and Food

"The production of biofuels must not endanger food needs and should contribute to the prosperity of local communities."

- Recommendation in Dutch Report prepared for the Environment Ministry of the Netherlands with stringent criteria for the use of biomass materials in the jurisdiction. (Reuters, 2007, April 30)

6.5.3 Source of Life or Source of Problems? Forest and Water Quality Degradation

According to the quality assessment previously discussed in this paper, palm oil plantations development has a negative effect on forest resources and river water quality. The main reasons given are erosion processes, clearing of forests and the use of fertilizers. The consequences are several and are mainly related to 1) a decrease in natural resources conditions necessary for native communities to fulfill their subsistence needs¹¹³, 2) loss of biodiversity and gene banks, 3) contribution to global warming and 4) loss of essential ecological services. In regards to the latter, the forest role in regulating water flow regimes and quality is seriously affected when forests are cleared to establish palm oil plantations. As a consequence, river water quality becomes more vulnerable to the effects of palm oil production practices and palm oil mills effluents.

The forests in northwest and north Borneo (Malaysian Borneo) have some of the highest levels of biodiversity in the world. They provide habitat for viable populations of more than 60 animals listed as globally threatened including the Orangutan, Proboscis Monkey, Sumatran Rhinoceros, Asian Elephant, Tiger, Civet Otter, Storm's Stork and Wrinkled Hornbill and as many as 5 000 tree species (UNDP 2006). Forests in Borneo are commonly inhabited by endemic species that give these forests even more significance not only because the unique species, but also as a gene bank with resources for medicinal and other important human uses. In addition to their biodiversity richness, forests are providers of basic subsistence needs for native communities in Borneo. According to the land tenure categories in Sarawak (see section 4.3.1), although Permanent Forest Estates in Sarawak are in most of the cases productive forest and its entry is restricted to a licensing scheme, protected forest areas and communal forests located near or within NCR-land are forests where locals are allowed to hunt, fish and gather non-timber products. This shows the State recognizes native communities' use of forest resources for their subsistence needs. Nevertheless, during the past two decades palm oil plantations in Sarawak have been expanding at the expense of forest and NCR-land, following logging activities which started almost 30 years ago (Banerjee and Bojsen 2003, Svan Hansen 2005, see section 4.3.1). According to a study carried out by Svan Hansen in the Niah Catchment, results of change detection analysis from 1979-1990 and 1990-2001 indicate an overall trend of successive waves of land cover changes, where forest areas have been logged and afterwards gradually replaced by palm oil plantations which currently cover more than 50% of the entire catchment. As a result, palm oil plantations cause a shift in vegetation from a species rich dipterocarp lowland rain forest or swamp peat forest to contain only three species (Svan Hansen 2005). Moreover, according to Svan Hansen (2005a) the transformation of forest into a palm oil plantation starts an almost irreversible process, whereby after two

¹¹³ Due to loss of access to wild meat, fish, fruits and vegetables for self-consumption, material for construction and crafts, water to wash, bath and irrigate.

crop rotations (60 years) seed banks are destroyed and soil conditions are changed in such a way that forest ability to naturally regenerate is jeopardized. *In short, clearing and fragmentation of tropical forest, loss of natural terrestrial habitats and loss of access to forest resources for native communities has been caused during the past decades by land development practices such as logging and large-scale palm oil plantations. This results in biodiversity loss and puts at risk medicinal and other important human uses of forest resources. Last but not least, it is worth mentioning that the current expansion rate of palm oil plantations (2.5% based on time period 1993-2001), the development objectives of the State Government to reach 1 million ha of palm oil plantation and the competition for land development is a continuous threat to the frontier forests in the State of Sarawak.*

Moreover, forests in general and in swamp forests in particular contribute to the storage of atmospheric carbon. This function has gained recognition in recent years due to its importance to the implication of increased CO₂ levels contributing to global warming. It has been estimated that 5 800 tonnes of carbon per ha can be stored in a 10-meter deep peat swamp and 300-500 tonnes per ha can be stored in other types of tropical forests (UNDP 2006). Moreover, besides acting as stores of carbon, peat swamps actively accumulate carbon in the form of peat. When swamp forests are drained to facilitate land conversion peat dries and oxidizes releasing large quantities of CO₂ back into the atmosphere, thus contributing to global warming. Moreover, once peat dries it becomes also more vulnerable to fire which causes irreversible loss of the peat swamp diverse vegetation (UNDP 2006). Although palm oil plantations in Sarawak are not expanding currently into swamp forests¹¹⁴, swamp forests are surrounded by palm oil plantations at different stages of growth and the activities in the plantations such as the use of agrochemicals pose a growing threat to these ecosystems (UNDP 2006). Moreover, CO₂ is released to the atmosphere when other type of tropical forest – in Sarawak generally mixed dipterocarp forests – is cleared for palm oil plantations development. Clearance is mostly carried out using ‘zero burning’¹¹⁵ practices in Malaysia, however, the use of fire for clearing is allowed in certain circumstances (ECD 2000) and is common in neighboring countries such as Indonesia. The CO₂ emissions from peat swamp forest fires in Indonesia have been categorized as the world's third largest emitter of emissions linked to climate change (Biofuelwatch and EI 2006). In the past years, from May to October, southwest monsoon winds blow sulphur dioxide, nitrogen dioxide and particulate matter-laced smoke known as ‘haze’ coming from Indonesia to Malaysia (Reuters 2007). Sarawak has been affected in particular from haze coming from Kalimantan, causing not only impacts on health but also on agriculture production¹¹⁶. *In sum, forest clearing driven by land conversion to establish palm oil plantations has a negative effect on global warming, since CO₂ is released back to the atmosphere. This can be particularly negative for the environment if peat swamp forests are cleared due to their capacity to store large quantities of carbon. Although currently palm oil plantations in Sarawak are not expanding into swamp forests, the pressure for land and the effects of plantations activities are a threat to these ecosystems. Moreover, although in Malaysia forest clearing with fire is relatively controlled and “zero burning” practices are promoted, the expansion of palm oil plantations using fire is happening in large extent in neighboring countries such as Indonesia¹¹⁷.*

¹¹⁴ Efransjah (2007, March 16). United Nations Development Program (UNDP), Peat Swamp Forest Project. Personal interview.

¹¹⁵ Zero-burning technique is a method of land clearing whereby the remaining tree stands are felled and chipped into smaller pieces and left *in-situ* to decompose naturally or used as mulch for young palms (ECD 2000).

¹¹⁶ Ngan, R. (2007, March 11). Borneo Resource Institute Malaysia. Personal interview.

¹¹⁷ The Association of South East Asian Nations approved the ASEAN Agreement on Transboundary Haze Pollution in 2002, however Indonesia's parliament has to ratify yet. Indonesia is the only country among the 10 member-Association of Southeast Asian Nations that has not ratified the ASEAN Agreement. However, in a meeting held past month March

In addition to providing valuable forest products, forests play a significant role in regulating hydrological cycles. These indirect services are difficult to value but without these there would be substantial replacement costs (UNDP 2006). Forests in general and peat swamp forests in particular, help mitigate flood, maintain base flows in rivers, infiltrate runoff, retain/remove sediments and nutrients and contribute to groundwater recharge and discharge (UNDP 2006). Regarding water catchments, the forest function related to water conservation in these areas can be classified as for production of subsurface flow or recharge, for evaporation as pump, for natural dam, and for water quality formation (Noguchi et al. 2005). On this basis, it can be argued that land cover and land use changes in the form of deforestation and conversion of forest into plantations and other large-scale agricultural purposes affect the ecological services of forests, its buffer capacity and its role in regulating water flow regimes. For instance, when forests in riparian or water catchment areas are cleared, there is an increase level of soil erosion and surface runoff due to reduced infiltration and retention rate, this results in an increase concentration of nutrients and sediments in the river water reducing riverbanks capacity which may result in flooding in particular during storms and monsoons events (ECD 2000, Lai 1998, Douglas et al. 1993).

The effect of palm oil plantations on soil erosion and consequently on water quality varies through the cultivation cycle. In the establishment phase forest is cleared and as a consequence high levels of soil loss occur. According to the Environmental Conservation Department of Sabah (ECD 2000), soil loss is estimated to be 50 times higher during palm oil plantation development compared to the existing baseline conditions. With completion of field planting and establishment of cover crops¹¹⁸, soil loss is estimated to be twice as much as the one under existing baseline conditions. Soil exposure due to forest cover loss and soil erosion caused by the clearing and development operations have an effect on river water as above mentioned resulting in high levels of sedimentation affecting its quality (ECD 2000, Svan Hansen 2005). Community members in longhouse Kalong and longhouse Rayong recognize this by describing the river water as “moody”. The rivers with “moody” water crossing through Ulu Teru and Sungai Bong NCR-lands might be most likely explained by the fact that plantation development and forest clearing in that area has recently started in 2004 and is still ongoing. As above described, this stage of the palm oil plantation development has the highest levels of soil loss, and therefore causes the largest levels of sedimentation in the river, especially since there is no forest or any vegetation cover left to act as buffer against these effects.

The largest effects on river water quality continue until the cover crops are fully developed (Svan Hansen 2005). In addition to the eroded sediments, transport of nutrients from the applied fertilizers into the rivers intensifies the impact on river water quality. This is possible related to the community members’ description of “itchy” water. The reason why water is polluted by fertilizers from palm oil plantations is because 1) plantations use the river water for irrigation – as it is the case in the JV Company in Ulu Teru - or 2) irrigation water is discharged in the river. Table 6-9 below resumes the results obtained by Svan Hansen in 2001-02 on water quality parameters for two sub-catchments of the Niah Catchment: one is covered 70% with palm oil plantation and the other is covered 55% with forest. The parameters are compared to class IIB standards which are the water quality standards that all rivers in

2007 in Brunei by the Member Ministers of ASEAN, Indonesia presented a detailed Action Plan allocating some EUR 50 million to prevent haze (Asian American Press 2007).

¹¹⁸ Large exposed areas are generally re-vegetated with fast growing cover crop species such as *Centrosema pubescens*, *Calapogonium caeruleum*, *Calapogonium muconoides*, *Pueraria phaseoloides* and *Pueraria javanica*. Ground cover not only protects against soil erosion but if leguminous plants are used they may also enrich the soil through their nitrogen fixing abilities.

Sarawak should meet according to the Department of Environment (DoE) of Sarawak. It is important to consider here that palm oil plantations are non-point source pollutants, thus other activities such as logging and shifting cultivation may also have an effect on the results.

Table 6-9 Water Quality Parameters for Two Different Sub-Catchments in Sarawak¹¹⁹

Parameters		Unit	Station	Mean	Class IIB	% above/below Class IIB
Basic						
PH	pH	pH	1	6.4	6-9	25.0
			2	6.6		14.3
DO	Dissolved Oxygen	mg/l	1	4.6	5-7	62.5
			2	4.5		57.1
TSS	Total Suspended Solids	mg/l	1	30.0	50	14.3
			2	17.0		0.0
Organic Pollution						
BOD	Biological Oxygen Demand	mg/l	1	0.4	3	0.0
			2	0.5		0.0
COD	Chemical Oxygen Demand	mg/l	1	20.4	25	14.3
			2	25.9		33.3
Nutrient and Eutrophication						
NH3N	Amoniacal Nitrogen	mg/l	1	0.11	0.3	0.0
			2	0.09		0.0
NO3-N	Nitrate Nitrogen		1	0.45		
			2	0.31		
Ptotal	Total Phosphorus	mg/l	1	0.17	0.2	28.6
			2	0.09		0.0

Note: The mean is based on N = 6-8. Station 1 = Palm Oil Plantation; 2 = Forest

Source: Svan Hansen 2005

From the table above presented it is possible to state that although pH values are occasionally below standards of Class IIB (-25% and -14.3%), they are still within a range where human or aquatic life is not affected (Svan Hansen 2005). Moreover, it is possible to see that palm oil plantation presents higher turbidity values than the forest sub-catchment, since 14.3% of the TSS from palm oil is above the standards of IIB Class. This confirms the high level of sedimentation in the water. Svan Hansen (2005) adds that turbidity values may be higher but they resulted to be low in the study due to sampling methods. Furthermore, low DO values indicate poor water quality. Since oxygen is required for respiration, exposure to low dissolved oxygen levels (<5 - 6 mg/l) may not directly kill an organism, but will increase its susceptibility to other environmental stresses (Oram 2006). Exposure to < 30% saturation (<2 mg/l oxygen) for one to four days may kill most of the biota in an aquatic system (Oram 2006), fish and other aquatic animal species require a minimum DO of 2 mg/l to live (Svan Hansen 2005). In addition to its use in respiration, oxygen is needed to aid in decomposition. Decomposition of large quantity of organic matter (high BOD) can severely deplete the oxygen in water and make it uninhabitable for many species (EPA 2006). An overload of nutrients from runoff from various land uses adds to the problem, since nutrients cause an overgrowth of phytoplankton in water (see below), which later die and decompose (EPA

¹¹⁹ Samples were taken in 2001 - 2002. Water was sampled directly from the river bank in the surface water.

Percentage above/below IIB standards are obtained considering Min. and Max. values for each parameter.

2006). As a result, Svan Hansen (2005) argues that DO values can be ascribed to “erosion, high contents of organic matter that is decomposing and stagnating water”.

Continuing on, COD values for both palm oil plantation and forest are high. According to Svan Hansen (2005) this is possibly explained by anthropogenic chemical pollutants such as fuel from motors, diesel engines and oil and grease. This might possible explain community members’ comments that described water as “oily”¹²⁰. In regards to nutrient and eutrophication parameters, it is possible to see that the nitrate and amoniacal nitrogen as well as Ptotal values are higher compared to those of the forest sub-catchment and Ptotal is particularly above IIB Class standards. Both ammonium compounds and urea are generally used in palm oil plantations. These are eventually converted into nitrate in the soil under well-drained condition and nitrate on its turn promotes undesirable growth of aquatic micro flora in rivers (ECD 2000). Ptotal has the same eutrophication effect in surface water as nitrate (ECD 2000). High nutrient values may result in depleting oxygen in water (EPA 2006), reflected in low DO values as is the case in this example. The high values of nutrient and eutrophication parameters in the table are most likely explained by the wash out of nutrients/fertilizers utilized in the palm oil plantation and soil erosion (Svan Hansen 2005, ECD 2000). This confirms the arguments given by community members who argue that erosion and the use of fertilizers in palm oil plantations are the reasons for the river water quality degradation.

In sum, the practices for palm oil plantation development cause forest cover loss and high levels of soil erosion. This causes an increase in surface runoff and an increase concentration of sediment in the river water. The rise of the sedimentation level in the river makes the water look “moody”. The largest effects on river water quality due to erosion continue until the cover crops in the plantation are fully developed. In addition to the eroded sediments, transport of nutrients from the applied fertilizers into the rivers intensifies the impact on river water quality. This can be stated based on results obtained by Svan Hansen (2005) describing water quality in a sub-catchment 70 % covered with palm oil plantations. By looking into water quality parameters such as turbidity, dissolved oxygen, and nutrient and eutrophication parameters it is possible to denote a high percentage not in accordance with IIB Class standards, which implies poor river water quality.

In addition to palm oil plantation activities affecting the river water quality, palm oil mills located in some of the plantations play also a significant role as water polluter agents. Palm oil mills in Malaysia are legally bound to treat their Palm Oil Mill Effluents (POME) before final discharge. Usually a pond system (lagoons) is used to this purpose but it is also normal to find open digester tanks (Yoshihito et al. 2003). The “treated” water is discharged afterwards direct in the river. In this case it is easier to measure the direct pollution palm oil mills cause in river water, since they are point source polluters. Table 6-10 below shows different quality parameters for water sampled immediately downstream of the final discharge of two oil mills. Data obtained by Svan Hansen in 2001 from an oil mill located in the Niah Catchment (Sarawak) are compared to water samples obtained in 2007 from an oil mill located in Lahad Datu (Sabah).

¹²⁰ Community members of longhouse communities Selezu, Setulai and Sepadok.

Table 6-10 Water Quality Parameters for Two Oil Mills, 2001 and 2007

Parameters		Unit	Station	Mean	Class IIB
Basic					
PH	pH	pH	1	6.8	6-9
			2	6.7	
TSS	Total Suspended Solids	mg/l	1	43.0	50
			2	40.0	
Organic Pollution					
BOD	Biological Oxygen Demand	mg/l	1	2.05	3
			2	29	
COD	Chemical Oxygen Demand	mg/l	1	21.93	25
			2	432	
Nutrient and Eutrophication					
NH3N	Amoniacal Nitrogen	mg/l	1	0.41	0.3
			2	64	
Ntotal	Total Nitrogen	mg/l	1	1.72	
			2	69	
Oil	Oil and Grease	mg/l	1	0.66	
			2	nil	

Note: 1 = oil mill in the Niah Catchment (1998 - 2001); 2 = oil mill in Lahad Datu (2007)

Source: Svan Hansen 2005, Golden Elate Palm Oil Mill 2007

The basic parameters show that pH levels and TSS have similar values as found in the above described palm oil plantation sub-catchment, with TSS values around 22% above IIB Class standards¹²¹ (Svan Hansen 2005). This means again high levels of sedimentation in the water. Nevertheless, values of both of the organic parameters, BOD and COD, differ from the palm oil plantation sub-catchment values in that they are much higher and as a consequence above Class IIB standards. In particular this is the case for the palm oil mill in Lahad Datu. The Biochemical Oxygen Demand (BOD) serves as a quantitative measure of the level of organic oxygen demanding wastes in water indicating the organic pollution load of the water. BOD directly affects the amount of dissolved oxygen (DO) in water (EPA 2006). The greater BOD the more rapidly oxygen is depleted and this means less oxygen is available to aquatic organisms. As a result, the consequences of high BOD values in the river water affected by the palm oil mills effluent are the same as those for low DO values: aquatic organisms become stressed, and become more susceptible to other environmental stresses (EPA 2006, Oram 2006, Svan Hansen 2005). An overload of nutrients from wastewater treatment plants adds to this problem (EPA 2006). Furthermore COD high values might be attributed to chemical pollutants from diesel engines and oil and grease (i.e. palm oil) from the wastewater coming out from the oil mill process. Although the recommended value for oil and grease in raw water is 0.1 mg/l according to the Department of Environment, the values recorded in the river are not critical for secondary use and aquatic life according to Svan Hansen (2005). The COD and oil levels from Table 6-10 might possibly explain the description of community

¹²¹ Percentage above/below IIB standards in the study carried out by Svan Hansen (2005) are obtained considering Min. and Max. values for each parameter.

members that claimed the river water is “oily and itchy”¹²². Finally, in regards to nutrient and eutrophication parameters, both ammonium compounds and total nitrogen are above the IIB Class standards. This is due to high nutrient content in the wastewater coming from the oil mill process. Indeed, previous studies have shown that application of POME *per se* and/or *treated* POME as an alternative to inorganic fertilizers provides a cost-effective approach in waste utilization and savings in fertilizer costs in palm oil plantations (Singh et al. 1999, Nordin et al. 2004).

In short, the negative effects that palm oil plantations cause on the river water quality are intensified by the discharged treated POME in the river. This can be argued by looking at water quality parameters of the river water sampled down stream the final discharges of two oil mills. The sampled water presents high turbidity values, high organic pollution and high nutrient and eutrophication levels. This, together with the palm oil plantation activities, explains most likely the community descriptions on the river water referring to it as “moody, oily and itchy”¹²³.

Moreover, low levels of dissolved oxygen (DO) – due to high levels of erosion and high contents of organic matter decomposing (Svan Hansen 2005) – might explain as well communities’ claims on the reduction of fisheries in the river. This is possible to argue because DO levels in both case examples – palm oil plantation and oil mills – reach critical values that stress aquatic organisms and increase their susceptibility to other environmental stresses (EPA 2006, Oram 2006, Svan Hansen 2005). As a general perception among the three case studies, the quantity of fishes in the river has dropped significantly and the amount and variety of fishes caught today is by far less than 10 years ago. According to Bujang¹²⁴, “5-10 years ago in half an hour it was possible to fish a full bucket of different species of fish using a net; nowadays using the same technique half a day is needed to fill out half a bucket with only 2 species”. He argues that “variety of fishes has reduced, because only fishes that like moody water are able to survive. ‘Seemah’, which is the preferred species among the Iban communities and has a good price in the market, is not possible to find in moody water anymore”. Although more research is needed on the effects of palm oil plantations on river water fisheries to establish significant correlations, it is possible to imply based on the quality parameters above discussed that the decrease of water quality due to palm oil plantation development has an effect on fisheries availability. Moreover, it is important to bear in mind that native communities do not only depend on fisheries in the river as part of their subsistence needs, but also depend on the river water to bath and wash. As a consequence, the negative effects of palm oil development in river water quality jeopardize the communities’ ability to fulfill their daily needs. Last but not least, it is worthy to highlight here that native communities also pollute the river water with sewage and fertilizers they use for their farming activities (see Svan Hansen 2005) and that an intensification of their traditional farming system will only add to this effect.

Negative impacts on river water quality above described are partly to be mitigated by specific measures suggested by the Environment and Conservation Department of Sarawak. For instance, the ‘Environmental Impact Assessment Guidelines for Palm Oil Plantations’ suggest considering riparian reserves of 20 m width at both banks of rivers within the plantation area as key mitigation measure. In addition to riparian forests, the EIA Guidelines suggest to establish buffer zones for sensitive areas by identifying areas of high erosion risk. High erosion risk areas are established according to an ‘erosion hazard assessment’ – which looks at elevation and slope, rainfall distribution, drainage, vegetation cover and soil conditions – and serve as a basis for planning soil conservation work in the plantation (ECD 2000). As a result,

¹²² “Oily and itchy” description given by community members of longhouse communities Selezu, Setulai and Sepadok, “itchy” description given by community members of longhouse Rayong.

¹²³ “Moody, oily and itchy” description given by community members of longhouse communities Selezu, Setulai and Sepadok; “moody and itchy” description given by community members of longhouse Rayong, “moody and dirty” description given by community members of longhouse Kalong.

¹²⁴ Bujang, M. (2007, April 14). Borneo Resources Institute Malaysia. Personal interview.

sites located on very steep areas and thus having high soil erosion risk (>100 t/ha/y) should be excluded from the palm oil plantation development (ECD 2000). Moreover, buffer zones should be established between the plantation area and sensitive areas such as ecologically sensitive areas – areas with high erosion risk, flood plains, mangrove, swamp/forest – and areas already set aside as part of the State environment conservation strategy e.g. national parks, protected forests, water catchments for potable water supply, etc.

In short, buffer zones, sensitive areas and riparian reserves within the plantation area enable exclusion of high erosion risk areas from being developed, serve as natural filters for surface runoff from the plantation areas and protect the river banks from erosion (ECD 2000). Moreover, they are also conservation areas that can also serve as biological corridors and sanctuary for mobile fauna¹²⁵.

Last but not least, the EIA Guidelines suggest a demarcation of the water catchments and sub-catchments within the palm oil plantation area. According to the ECD (2000), the demarcation of the hydrological boundary is important to determine the potential hydrological impact of the plantation and on this basis facilitate control on flooding and water pollution within the catchment and sub-catchments. Additionally, the Guidelines suggest that the area within the main catchment affected by the proposed plantation development should be defined. By doing so, it is possible to assess if the effects of change in soil cover, particularly removal of vegetation cover during site clearing, will result in significant hydrological change to that catchment (ECD 2000).

Even though these measures are required by Law for the palm oil development project to be accepted, these are often not implemented (Svan Hansen 2005). A clear example of plantations expanding without the necessary mitigation measures is possible to see in the case of Selezu, Setulai and Sepadok. In this case the water catchment and infrastructure for potable water supply was damaged by the palm oil plantation development into their NCR-land. As a result, communities were not able to use that water anymore. It is clear that no demarcation of the water catchments or sub-catchments was carried out in this case nor were assessed the effects of cover change on the hydrology of the catchment. Moreover, photography of palm oil plantations in Sabah and Sarawak, as well as field observation support the argument that mitigation measures are not always implemented. For instance, it is possible to observe that riparian reserves at both sides of the river are not always set-aside within palm oil plantation areas, thus contributing to a larger impact on the river water quality. According to Webber¹²⁶, this is not uncommon in East Malaysia. He argues – based on a study carried out by the WWF in 2006 in Sabah¹²⁷ – that out of 31 palm oil plantations identified in the study area, only 11 were certain about being subjected to EIA requirements and only 1 had submitted an EIA.

To sum up, although these mitigation measures allow identifying areas that might be potentially at risk by the plantation activities and propose ways to mitigate negative impacts, palm oil plantations do not always implement them and thus they cause larger impacts that they could otherwise have avoided. These impacts have not only high implications on the local environment conditions and natural resources quality but also on native communities that depend on these to fulfill their subsistence needs based on traditional socio-economic practices, thus jeopardizing the sustainability of their livelihoods.

¹²⁵ Webber, D. (2007, March 30). World Wildlife Foundation. Personal interview.

¹²⁶ Webber, D. (2007, March 30). World Wildlife Foundation. Personal interview.

¹²⁷ The area assessed under the WWF study is the Kinabatangan area. 1 km on both sides of the river stretching from Kampong Abail to Deramakot Forest reserve was evaluated. Total study area 38 829 ha.

7 Conclusions and Recommendations

7.1 Summary of Main Findings

This section shortly presents the main findings of the study, starting by the main points obtained by the stakeholder analysis at national level and concluding by presenting the main issues found at ground level.

7.1.1 The National Perspective

The development of biodiesel worldwide is being shaped by market dynamics and national strategies. The price development for fossil fuels, demand for edible oil, palm oil commodity price fluctuations, international and national strategies targeting biofuels are all playing a role in the future development of biodiesel at global level, and in particular in Malaysia as one of the major global palm oil producers.

Crude palm oil market price increase resulting from the global palm oil demand rise affects not only the profit margin of the biodiesel industry – since palm oil accounts for some 90% of biodiesel production costs – but also the food industry that also constitutes an important and competing market. As a result, biodiesel projects development in Malaysia might slow down and edible oil and food production costs might go up. Price increase in food products and edible oil will burden consumers, especially in developing countries that are the main palm oil for food importers such as India and China. In the same line, demand for vegetable oil, in particular in these countries, is increasing due to population growth and to overcome relatively weak domestic oilseed production, causing in turn international demand to rise – a factor that also results in an increase in palm oil commodity prices. As such, the competition between palm oil for food versus palm oil for fuel has also important cards to play in the global trade of palm oil. Malaysia has committed to set aside almost 40% of its crude palm oil production for biodiesel (6 million tonnes of CPO), again with consequences on importer countries of edible palm oil. To balance this, Malaysia is aiming to increase palm oil production in the country and abroad. Last but not least, the current market prices development of fossil fuels with oil prices reaching 45 EUR/barrel threatens the price competitiveness of biodiesel, especially in those countries that do not have any specific economic incentive to support its economic viability and/or development.

Likewise to other countries that target biofuels as part of their national strategies, climate change mitigation and contribution to their energy security by diversifying the energy portfolio and introducing an alternative energy source that will lessen the dependency on fossil fuels are main drivers in the promotion of biodiesel in Malaysia (both go in line with the Five-Fuel Diversification Policy of the country). Nevertheless, the main reason for biodiesel development in Malaysia is palm oil market price stabilization by reducing market volatility and surpluses. The increases in commodity prices brings in turn one of the main benefits for the country – in short this can be summed up as additional national revenues since the palm oil industry is the third largest contributor to export earnings for Malaysia.

Although the National Biofuel Policy in Malaysia promotes biodiesel for domestic consumption, the current international (EU) demand and national petroleum diesel subsidies resulting in low diesel prices present only an attractive scenario for biodiesel if it is exported. If palm oil demand continues rising and palm oil commodity prices continue increasing, it is of benefit to Malaysia to export it to those countries that offer the most and are bound by mandatory national regulations to reach biofuels consumption targets (EU, Korea, China,

India, Japan). On the contrary, if palm oil prices decrease it is in the interest of Malaysia and the palm oil industry to value-add and export biodiesel and to create additional demand by implementing a mandatory target for domestic biodiesel consumption.

With this in mind, it is worth recalling that Malaysia would benefit greatly if biodiesel would be consumed internally, in particular in the transport sector, since this accounts for about 40% of its total fossil fuel-based energy consumption and is one of the sectors with highest annual growth rate at 3.5 percent¹²⁸. If a mandatory biodiesel consumption target enters into force under the National Biofuel Policy after the decisions taken in May 2007, an attractive platform for further biodiesel development in the country would open, since this national strategy would create a new market of around 300 000 tonnes of biodiesel per year if the target is kept at 5% as initially planned¹²⁹. And this without taking into account that the power and industrial sectors also have a great potential role to play, especially if considering that Malaysia will become a net energy importer in the next 3 decades.

In regards to economic incentives, although biodiesel project developers are interested in emissions reduction credits under the Clean Development Mechanism, technical constraints in regards to the baseline methodology, the fulfillment of the 'additionality' condition in the presence of a National Biodiesel Policy and the strong focus on export have made difficult the process for their approval. Even so, the success of palm oil related projects under the CDM scheme, in particular in the area of energy/electricity generation from solid (EFB) and liquid waste (POME), has set the pace for more to follow on that track. This has a great potential for the country, since it adds to its targeted 5% contribution of renewable energy to the electricity mix under the Five-Fuel Diversification Policy.

Sustainability is a key issue for the development of biodiesel in Malaysia, and a very sensitive issue as well. On the one hand, it creates defensive reactions, whereby arguments in favor of palm oil are used to demonstrate its positive attributes compared to other oil crops and prove that international criticism is not always well founded or fair. For instance, certification of palm oil has been categorized as unfair and as non-tariff barrier if other biofuel feedstocks are not also bounded to follow a similar system. On the other hand, sustainability is considered key to maintain the demand of biodiesel and ensure its market (in particular in the EU) and it is seen more as a matter of time, whereby more companies have to commit to already started work on sustainability criteria – such as the Roundtable for Sustainable Palm Oil Production (RSPO) criteria.

¹²⁸ Diesel in particular is growing at 4.2 % per year (APEC 2006).

¹²⁹ Petroleum diesel makes up 5813.14 thousand tonnes or roughly 42% of the total annual fuel consumption for road transportation (estimates for 2006, based on EIA Statistics 2004, using growth rate of 4.2% according to APEC 2006).

The benefits of a certification system accrue to Malaysia if certification leads to better sustainability performance. Although the burden would fall on palm oil companies probably reducing profits, the externality costs that are currently borne by native communities and the local environment – and thus the Malaysian economic development and achievement of MDG 1 and MDG 7 – will presumably be reduced.

Benefits of biodiesel for Malaysia: price stabilization for palm oil, additional revenues for the industry and the Nation, climate change mitigation if not planted in peat swamp forests, improvement in export/import balance of fossil fuels, mitigation of the effects of petroleum prices escalation, savings in foreign exchange, clean fuel local consumption, more efficient utilization of raw materials, infrastructure development and access to basic services and employment in rural areas.

The implementation of criteria such as the RSPO seems to be well taken and seen as a good alternative for a more sustainable palm oil production. However, there are still a number of doubts about the implementation of a certification system. One of the most important challenges is related to traceability and how the “right polluter will be traced along the production chain”. Another issue is the uncertainty related to premium prices if palm oil is sustainably produced. To date, this is a topic that has been very poorly discussed in forums, maybe because it is not in line with current country policies. Nevertheless, the uncertainty in relation to a possible premium is in part the reason why producers decide not to carry the economic burden of implementing sustainability criteria as yet.

Moreover, when referring to sustainability most of the time the attention is put on environmental disturbance: forest and biodiversity loss, water pollution, soil erosion, fertilizers use and waste generation. Social issues are noted, but to a lesser extent and focus on emphasizing the concurrent benefits brought by palm oil plantations development. Environmental impacts and their effect on local livelihoods for the original landowners in plantation areas are not highlighted.

In general, the national approach to sustainability seems to be positive, first in terms of economic sustainability due to the high productivity of palm oil compared to other oil crops, second in terms of performance because of the high environmental performance and energy balance ratio of palm biodiesel and third, because it seems that the almost 30 years of palm oil production in Malaysia has allowed the industry to gain experience and improve and promote sustainable practices to cope with future challenges. This has now to be proven at the ground level by improving the sustainability performance of already established plantations and that of plantations that are expanding in East Malaysia (Borneo) and outside Malaysia in countries such as Indonesia, Cameroon and Venezuela.

7.1.2 Ground Realities

The contribution to rural socio-economic development from palm oil plantations development differs according to the development interests of the State, the level of involvement and participation of the communities, their attachment to traditional practices and the natural resources upon and within their land and the vision of the future they have. However, one thing is certain, and is that palm oil plantations, regardless of the communities' involvement and potential socio-economic benefits, have an impact on the quality of natural

resources and the ability of native communities to continue or to further develop their traditional socio-economic practices to fulfill their subsistence needs. As such, it jeopardizes the sustainability of their livelihoods.

Native communities' resources valuation and attachment to traditional practices highly depend on the perspectives they have on the future and development. Although traditional practices maintain their importance as providers of the basic needs and the well-being of the household (bilek), communities that are interested in progress and economic development put less attention on the conditions of natural resources and the access to them, based on the rationale that an increase in cash incomes will enable them to acquire the necessary purchasing power to fulfil the household cash requirements and subsistence needs.

Moreover, communities benefit differently from palm oil plantations development according to the approach taken under the land development strategy by the State, their level of involvement and communication with Governmental Agencies. To carry out land development projects, the Government tag on different approaches. The least favourable for native communities is when the State declares their NCR-land a Development Area which is then leased to private companies for land development – such as palm oil plantations – without any community consultation process or commonly reached resolution. As a result, native communities' rights to their land and customary rights in general are ignored and as a consequence communities are practically excluded from any decision-making process and any possibility for them to get involved or benefit from the palm oil plantation development.

The large number of disputes on NCR-land reflected in the 210 court cases dealing with native communities claiming their rights to land against palm oil companies in the state of Sarawak are a sign that above described approach does not benefit the local communities, on the contrary they have to bear with the externalities. It also demonstrates that although rights to land are recognized under the Land Code, they are not fully respected. The source of the problem lies in that although the Land Code provides means for NCR-land to be recognized, the system provides insufficient security for holders of customary land in that NCR-land is held by license from the State (not held under title) and therefore it can be in principle extinguished by the State if it is in the interest of the State to develop that land. The only means native communities have found to make value their rights and protest against infringement of their NCRs are blockades, without successful results. They hope bringing their cases to court will cause enough pressure at State level to make their customary rights recognized and respected.

On the other hand, if it is in the State's interest to involve native communities in the land development strategy, then the State Government approaches the communities to gain their participation. For instance, in order to involve communities in the New Concept scheme, studies have shown¹³⁰ that the State Government uses social hierarchies to communicate its objectives and uses paternalism in return for acceptance. By convincing first the Headman and the local leaders the State Government can in principle gain the entire community based on a psychology of consensus. Under this concept all community members are bound by agreement and have the obligation to participate when decisions have been made (in this case by the Headman and some local leaders) in order to maintain solidarity and harmony in the longhouse communities.

¹³⁰ See Ngidang (2002), and Cooke (2002)

A good example of paternalism use by the State Government is the list of promises and expectations such as new services and infrastructure that members of longhouse Kalong mentioned the State Government will provide them as part of the condition for participating in the New Concept scheme...

Moreover, communities' welfare will be taken care by the State Government and will be benefited with provisions if in turn they stay in good terms with the State Government and support its development strategies. Otherwise they may be labelled as 'anti-development' or 'anti-government' and will be cut any potential provision from the State Government.

The fear of being branded "anti-development" has moved many communities to participate in such schemes, and in reward for complying with top-down policy decisions they expect the State Government to look for their well-being.

Wide consensus and open discussion among all the community members is bypassed using the social hierarchies and paternalism approaches above described.

"What communities see in accepting Government development strategies is an act of faith or trust".

– Ngidang 2002 –

Nevertheless, by involving communities in land development strategies such as the New Concept scheme these have access to benefits from the palm oil plantation development. In socio-economic terms, communities involved and participating in palm oil plantation development schemes¹³¹ can benefit from additional cash incomes from working in the plantation and from the palm oil production profits gained from giving land to the scheme. In addition to the cash incomes, communities can benefit from new services and infrastructure provided by the Government.

To begin with, wage labour from working in the plantation, although is low¹³², it can bring additional cash incomes that contribute to lessen the pressure of households that rely only on traditional agricultural practices vulnerable to market prices fall of agricultural commodities (i.e. rubber and pepper). Moreover, incomes obtained from palm oil production (after 5 years of started the project) are significantly above (2.3 times higher) the average household income¹³³. As a result, participating communities have the potential to generate enough purchasing power to buy the food they need (instead of producing it), cover household cash requirements (such as school payment), and also accumulate savings, which could be considered a potential future productive factor.

In addition, the provision of new basic services and infrastructure has the potential to play a significant role in reducing indoor pollution, improving sanitation, setting the necessary conditions to improve and/or generate productive activities and provide proper rural community services and access to further productive factors such as markets (i.e. the road in case studies 2 and 3). Consequently, the development of palm oil development schemes such as the New Concept have the potential to meet the objectives of the Government of raising

¹³¹ Communities that gave NRC-land to be developed into palm oil plantations.

¹³² RM 12 per day is low if compared to monetary equivalent man-day for traditional farming products. According to Bujang, the minimum salary is RM 30 a day.

¹³³ Assuming incomes are based 50% on traditional farming and the other 50% on off-farm income (Gerrits 1994).

the standard of living of the rural people, generating low wage employment in the rural areas, moving communities towards progress and contributing towards poverty eradication (MDG1).

...HOWEVER, although the introduction of palm oil plantations under the New Concept scheme has the potential to bring socio-economic benefits to the native communities participating in it, there are related risks that can be particularly counter-productive for the sustainability of their livelihoods and the local environment that should be considered.

First, although working in the plantation generates cash incomes that contribute to lessen the vulnerability of households relying only on traditional farming activities, it reduces time availability for traditional subsistence practices and/or decreases the total traditional farming production. As a consequence, the household's subsistence needs are not fulfilled, their subsistence risk minimization strategy is weakened and households become less self-sufficient. To compensate, the household has to inquire into additional costs by hiring labor to do the traditional farming or by purchasing the missing food to fulfill their subsistence needs.

Moreover, the low wage opportunities in palm oil plantation attract poor immigrants, mainly Indonesians, to settle in the region. As a result, employment opportunities for locals are reduced, salaries are maintained low and social conflicts are more likely to develop in that immigrants do not always respect social norms of native communities and bring 'inappropriate' habits that erode the local culture.

Furthermore, as a result of the introduction of wage labor and the reduction of NCR-land used for shifting cultivation, the traditional land-use system and land management practices change. For instance, fallow length is reduced and land for traditional farming is used more intensively. As a consequence of the intensification in farming activities, more fertilizers and herbicides are used by the communities with possible negative impacts on the soil and water resources quality in the long-term.

Last but not least, the New Concept scheme is promoted in order to help natives to improve their "socio-economic status and their vulnerability to poverty". Following that line of thoughts, it is recognized that economic diversification on the one hand and access to traditional productive and natural resources on the other hand are important for native communities to lessen this vulnerability in that these allow the fulfillment of cash requirements and subsistence needs. The concentrate reliance on an economic activity such as palm oil production – which similarly to cash crops depends on market fluctuations - as the alternative to diversify economy and bring additional cash income to rural communities, in addition to less access to productive and natural resources, and high dependence on the State Government for the welfare of the community only increases the uncertainties for native communities participating in the scheme. On top of that the lack of transparency in the process in that landowners do not have any participation in the decision making related to the operations of the company (neither access to regular information nor financial reports), and the lack of understanding about the modus operandi of the scheme (in particular in relation to land recover after the 60 years of the project), adds to these uncertainties.

As a result, although a scheme such as the New Concept has the potential to improve "the socio-economic" status of native communities participating in it, the uncertainties related to it and the negative effects on the sustainability of their livelihoods increases the communities' vulnerability and threatens their risk minimization strategies to be self-sufficient to fulfil the basic needs for their well-being.

7.1.3 Food Security

AT COMMUNITY LEVEL, the development of palm oil plantations affects native communities' ability to produce and gather food based on their traditional practices. Different factors can be pointed out as the drivers for this: 1) production decrease due to less land availability and labour time for traditional farming, 2) pressure on land due to intensified farming practices, 3) less access to natural resources and 4) the degradation of the natural resources quality near and within the NCR-land. The combination of these factors affects the ability of native communities to produce (and gather) food for self-consumption and thus it has a negative effect on their food security based on traditional subsistence practices.

This should be less of a problem if it is considered that the economic development enhanced by palm oil plantations development under the New Concept provides the economic means for native communities to purchase their food and the infrastructure and services necessary to facilitate access to the market and other productive factors. Even so, it is important to bear in mind that this increases communities' dependency on external factors to secure their subsistence needs. As such, it makes food security more vulnerable diminishing the ability of communities to be self-sufficient and debilitating its risk minimization strategy – based on traditional subsistence practices – for food security

AT THE STATE LEVEL, the current pressures on land for paddy rice production under shifting cultivation, the current declining production trends and low yield and the objectives of palm oil expansion in the State jeopardize the State Government's objectives regarding food security by reaching 90% self-sufficiency in rice by 2010. Maintaining the same land under production it has been estimated that an increase in yield to 2.9 t/ha¹³⁴ would be necessary to achieve this target. The State Government has the intention to reach this yield and has established to this end a series of economic incentives to promote higher productivity among the paddy rice farmers, which are generally native communities. This is in line with the interest of the State Government to improve competitiveness in the agriculture sector and supports above arguments discussing intensification of traditional farming practices.

7.1.4 Environmental Degradation

TROPICAL FOREST clearing and fragmentation, the loss of natural terrestrial habitats and loss of access to forest resources for native communities has been caused during the past decades by land development practices such as large-scale palm oil plantations. This results in biodiversity loss and puts at risk essential human uses of forest resources (i.e. medicinal, nutritional, protection uses). The current expansion rate of palm oil plantations in the State (2.5%¹³⁵), the land development objectives of the State Government to develop 1 million ha into palm oil plantations and the competition for land development is a continuous threat to the frontier forests in the State of Sarawak.

¹³⁴ Current yield is 2 t/ha

¹³⁵ Calculated using time period: 1993 – 2001. Data source: Svan Hansen 2005

Moreover, forest clearing driven by land conversion to establish palm oil plantations has a negative effect on global warming, since CO₂ is released back to the atmosphere. In Malaysia forest clearing with fire is not recommended, and therefore generally clearing is done using 'zero burning'¹³⁶ practices. However, fire is still used in certain occasions and is very common in neighboring countries such as Indonesia. Releases of CO₂ in the atmosphere can be particularly negative for the environment if peat swamp forests are cleared due to their capacity to store large quantities of carbon. Although currently palm oil plantations in the State of Sarawak are not expanding into swamp forests, the pressure for land and the effects of plantations activities represent a current a threat for these ecosystems.

Transboundary pollution:

... The 'yellow dust' invasion

The CO₂ emissions from peat swamp forest fires in Indonesia have been categorized as the world's third largest emitter of emissions linked to climate change. Satellites have shown that 75% of the fire hotspots in Indonesia are on palm oil plantation land. The 'haze' coming from Indonesia has caused respiratory problems in the past years to population in Singapore and Malaysia. Despite the ASEAN Agreement on Transboundary Haze Pollution, regional efforts to stop countries from polluting their neighbors have been hindered by storms of accusations and counter-accusations over responsibility. For instance, Indonesians were accusing Malaysian companies to be the ones setting fire to clear land in Indonesia. This might change in the future since ASEAN countries have committed past month to support Indonesia in the implementation of its Action Plan to combat land and forest fires.

(Asian American Press, Reuters and Climate Ark 2007)

RIVER WATER is also affected by palm oil plantations development, especially during clearing operations and the first stage of the cultivation cycle. In addition, treated wastewater discharges from the oil mills intensify this degradation process and increase the stress on aquatic biota.

Clearing practices for palm oil plantation development cause forest cover loss and high levels of soil erosion (estimated at 50 times higher than baseline conditions). This causes an increase in surface runoff and consequently an increase concentration of sediment in the river water. In addition to the eroded sediments, transport of nutrients from the applied fertilizers into the rivers intensifies the impact on river water quality. Effects are reflected in particular in quality parameters such as turbidity, dissolved oxygen, and nutrient and eutrophication parameters which present a high percentage not in accordance with IIB Class Standards¹³⁷. This is corroborated by a study¹³⁸ carried out in a sub-catchment 70% covered with palm oil plantation which demonstrates poor river water quality.

Moreover, the negative effects that palm oil plantations cause on the river water quality are intensified by treated palm oil mill effluents (POME) discharged into the river. Water quality parameters of the river water sampled down stream the final discharges of two oil mills¹³⁹

¹³⁶ Zero-burning is a method of land clearing whereby the remaining tree stands are felled and chipped into smaller pieces and left *in-situ* to decompose naturally (ECD 2000).

¹³⁷ IIB Class Standards are the are the water quality standards that all rivers in Sarawak should meet according to the Department of Environment (DoE) of Sarawak

¹³⁸ See Svan Hansen (2005). Study carried out in the Niah Catchment, State of Sarawak.

¹³⁹ See Svan Hansen (2005).

show high turbidity values, high organic pollution and high nutrient and eutrophication levels. This, together with the impacts caused by operations in palm oil plantations, may explain community descriptions on the river water referring to it as “moody, oily and itchy”.

Although palm oil plantations are required to implement mitigation measures, they do not always do so. Looking into the case of Selezzy, Setulai and Sepadok longhouse communities:

The forest clearance and plantation expansion in the water catchment located in the upper area of their NCR-land resulted in the community losing its potable water supply. This is a clear example of an impact that could have been avoided if preventive measures – in this case a water-catchment demarcation and assessment on hydrology changes – had been implemented

As a result of the poor water quality and low levels of dissolved oxygen (DO) aquatic biota is affected and their susceptibility to other environmental stresses is increased. This possibly explains the reduction of fisheries that native communities argue to be one of the main consequences of the changes in the river water quality. Communities claim that there is not only a reduction of fishes in the river over the past 10 years but also a reduction in species diversity. Although it is possible to imply there is a relationship between the changes of river water quality and fisheries availability, further research on the effects of palm oil plantations and oil mill effluents on river water fisheries is needed in order to establish significant correlation

To finish, the degradation of river water quality affects also native communities, since it has a negative impact on their ability to fulfill their daily needs such as fish, wash and bath. Equal important is to highlight here that native communities also pollute the river water with sewage and the fertilizers they use for their farming activities and that an intensification of their traditional farming system will only add to this effect.

In sum, the introduction of palm oil plantations into NCR-land has demonstrated to have a large effect on communities’ access to natural resources (i.e. forest, soil and water resources) as well as a negative impact on their quality. Since these resources play an essential role for the communities’ subsistence needs as providers food for self-consumption, material for construction and crafts, means to wash and bath and for their ecological services, the loss of access to these resources and the impact on their quality have a negative effect on the sustainability of their livelihoods.

7.2 Final Remarks: Tying up National Talks and Ground Realities...

At the national level, the production expansion of palm oil driven by a demand increase resulting from growing interests on biofuels – in this particular case biodiesel –, national strategies to lessen the dependency on unstable fossil fuels and to diversify energy portfolio, international and national agendas to comply with Kyoto Protocol targets, as well as a growing demand for edible palm oil from countries with rapid population growth, contributes to the economic growth of Malaysia. Moreover, palm oil price stabilization resulting from increasing biodiesel demand and the increase in commodity palm oil prices adds to this effect in that it generates additional national revenues for the country as the palm oil industry is the third largest contributor to export earnings for Malaysia. In addition, the production of biodiesel feedstock in Malaysia creates socio-economic development opportunities in the rural area and the domestic consumption of biodiesel has the potential to improve export/import balance of fossil fuels, mitigate the effects of petroleum prices escalation and contribute to the country’s

energy diversification policy, as well as mitigate climate change and promote the local consumption of clean fuel.

At the ground level, the implementation of palm oil plantation schemes under the New Concept indeed causes a paradigm shift as the one promoted by the Ministry of Land Development in the State of Sarawak. By participating in this scheme, native communities are in the process to convert “from landowners to owners of wealth, from traditional subsistence farming to modern and commercial farming and profit oriented management”. Although this mind-shift goes in line with the development objectives of the State, it also implies the need to give away ‘security’ in particular in terms of land and food. It seems that the cost for native communities of becoming more modern and integrated to the market economy is linked to an increase in vulnerability whereby their risk minimization strategies are weakened and livelihoods sustainability undermined.

Nevertheless, palm oil development schemes under the New Concept scheme have the potential to bring socio-economic benefits to the native communities participating in it. This land development strategy is therefore better in terms of rural development and poverty reduction (MDG 1) than expansion into NCR-land by declaring it State Land and leasing it as Development Area to private palm oil companies without conducting a proper consultation process and without wide consensus of the affected communities on a commonly agreed resolution. Under such approach, native communities have to take on the negative externalities of land development and bear with the negative impacts to their livelihood without gaining any benefits from it.

Despite the fact that at international and national level biodiesel is considered an attractive opportunity and a driver for further palm oil expansion, at local level its development seems not to be so familiar – or as attractive¹⁴⁰. Nevertheless if one of its roles is to serve as leverage mechanism to stabilize palm oil prices, it could be argued that it is also in the interest of the participant landowner communities to support its development. If biodiesel is banned and/or trade barriers and protectionism mechanisms such as tariffs, subsidies and regulations for biofuels proliferate causing market distortions and affecting palm oil and/or palm biodiesel global demand, the repercussions will reach ‘producer’ native communities that now depend on palm oil production prices to fulfill their needs.

On the other hand, however, the introduction of a certification system or sustainability/environmental requirements that lead to better sustainability performance would be in the benefit of Malaysia. Although the burden would be put on palm oil and biodiesel producer companies probably reducing profits, the externality costs that are currently borne by native communities and the local environment – and thus Malaysian sustainable development if considering MDG 1 and MDG 7 – could conceivably be reduced.

To conclude, it is worth mentioning that palm oil plantations have the potential to meet rural development objectives and the sustainable achievement of MDG1 and MDG 7 if there is commitment towards the wellbeing of native communities, attractive wage labour opportunities (likely to require significantly higher wages than currently offered), work requirements that include regulations to preserve the local culture and prevent social erosion caused by immigration overload, recognition and respect of native communities customary rights, high level of stakeholder participation, and transparency in the consultation and decision making process. It seems hopeful, or even likely that palm oil plantation schemes

¹⁴⁰ Local native communities, local NGOs.

following such principles can raise standard of living of native communities and contribute towards poverty eradication in the rural areas (MDG1). Last but not least, there is a large opportunity gap in mitigating and/or preventing negative impacts on the local environment (MDG 7) that needs to be exploited further. Environmental responsibility and sustainable production practices should be a learned lesson from a long experience producing palm oil. Malaysia, as a country in its way to become a developed country in the next decade, could serve as example for other countries following the same path and thus take a position where its national development strategies account for ground realities.

7.3 Recommendations

Based on the assessment of case studies and secondary information, this section describes 3 different initial proposals that may be able to enhance the positive contributions of palm oil plantations and palm biodiesel development to the sustainable achievement of MDG1 and MDG7 and livelihoods sustainability and minimize the negative aspects of this development. The mechanisms are proposed as ideas an initial outlines for decision- and policy-makers as well as academic researchers to be considered for further research. In essence, these aim to:

- improve the consultation process with native communities in the State of Sarawak and develop mapping skills among native communities to complement the decision making process
- make use of the Clean Development Mechanism as an economic support to implement specific RSPO sustainability criteria
- develop an economic incentive to make biodiesel competitive for domestic consumption

In addition, specific recommendations that will not be further developed in this section, but upon which further consideration is suggested are:

- As section 6.5.3 describes, although mitigation measures are required for palm oil companies to be approved by Law, many do not implement them. Therefore, reinforcing the institutional capacity to enforce implementation of mitigation measures by palm oil companies following EIA requirements could be a way to reduce companies' negligence regarding these requirements and reduce impacts on the environment that could be prevented.
- As stated in section 5.3, inclusion of smallholders' participation in the development of the RSPO criteria has been very poor. As a result, if sustainability criteria are implemented as a mandatory requirement, smallholders would have difficulties to 'catch the wagon'. To lessen these difficulties, a supportive mechanism that can provide smallholders the initial resources to implement these sustainability criteria in case a certification system is introduced should be developed and implemented with anticipation.
- In line with the previous point, if sustainability criteria are to be implemented (at national level or by importing countries) it would be suitable to validate these by local stakeholders (including affected communities and smallholders) so that these reflect not only international and national stakeholders' interests but also local realities and needs. The main findings of this study serve to give a better understanding of the effects of palm oil and palm biodiesel development at the national and the ground level in producer developing countries such as Malaysia. Therefore it could be used as a basis to develop criteria/parameters/indicators to consider in sustainability certification schemes or sustainability requirements.

- As discussed in section 6.4.3, the lack of transparency in JV schemes such as the one proposed under the New Concept increases native communities vulnerability participating in such. Creation of an information/communication channel whereby the native communities involved in the New Concept scheme are provided with regular information from the palm oil company on their future plans as well as financial annual statements – third party audited to avoid mistrust, see section 6.4.3 and 6.3.1 – and semester meetings between representatives of the shareholders in the JV, would increase the level of transparency and participation in decision making and lessen this vulnerability.

Lack of transparency, lack of participation in decision making processes and low salaries opportunities serve as indication that other parties in the JV are taking a larger share of revenues while native communities are taking the largest share of negative externalities.

Although the previous recommendations are worth to develop further, time constraints and personal interests limited the focus on the following group of initial proposals. The following proposals and ideas are introduced here to be considered as initial outlines/basis for further research.

7.3.1 Community Consultation: A Transparent Process to Act in Recognition of Native Customary Rights

Despite the fact that consultation with native communities is included under the Detailed Environmental Impact Assessment (DEIA) that every project should carry out in the State of Sarawak, one of the weaknesses identified through the assessment of the case studies is the lack of or the inappropriate consultation process carried out with native communities when development projects - such as large-scale palm oil plantations – take place within their NCR-land affecting their native customary rights (NCRs). Communities allege a poor consultation process and/or lack of wide consensus – if consultation has been carried out at all (see section 6.3.1 and 6.4.1). As a result, land conflicts and court disputes between native communities and development projects have proliferated in the State.

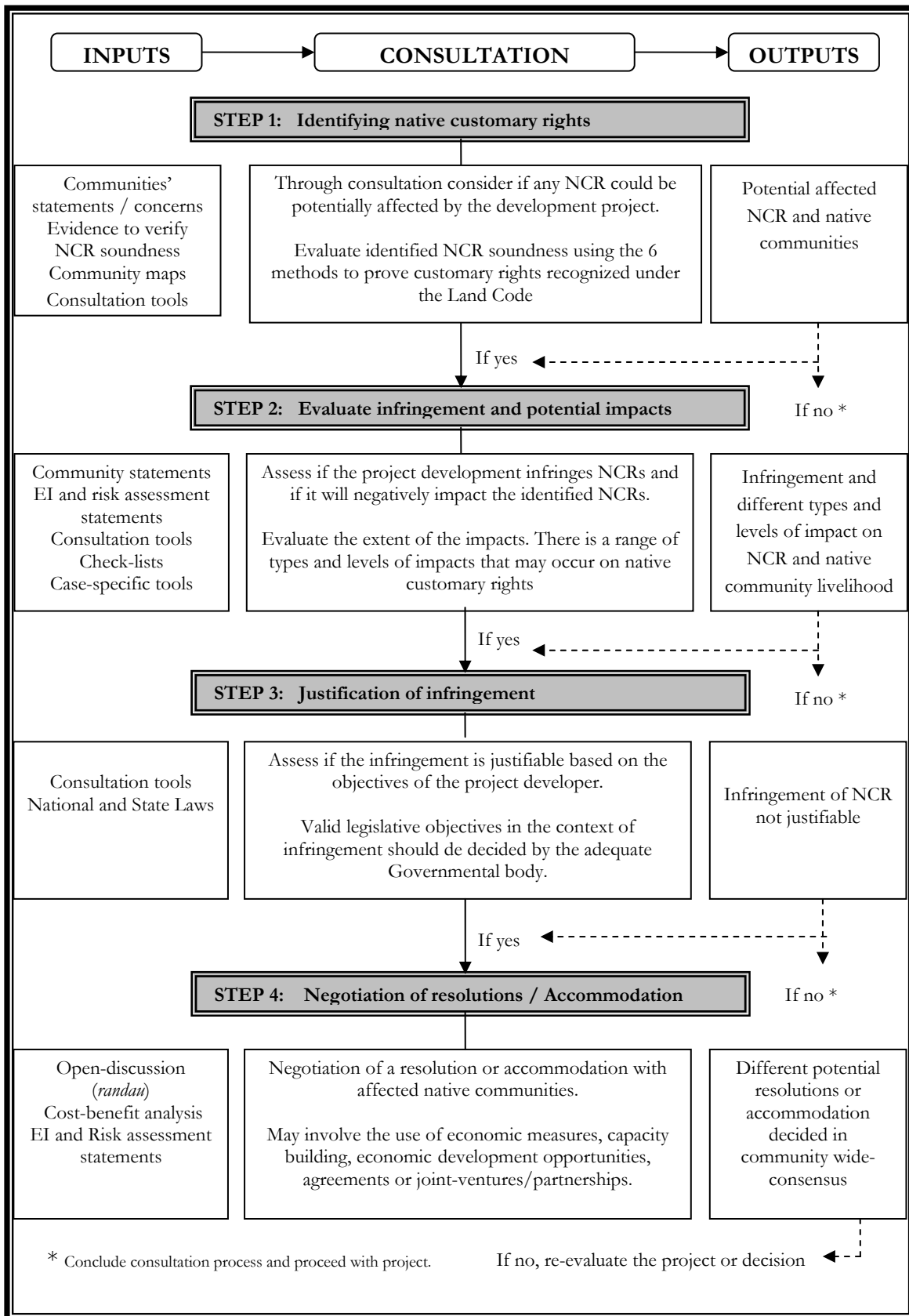
On the basis of previous research and community statements it is possible to argue that the problem starts at the moment of recognizing if the development project is or not affecting native customary rights (i.e. taking place within NCR-land). For this reason, it is suggested that the consultation process should start by the identification of potential affected native communities and NCRs.

Other issues that add to this problem are the approaches taken by the State Government to involve communities and make them supportive of top-down development decisions (see section 6.4.3). These approaches, based on ‘social hierarchies, paternalism and anti-development fear’ do not follow principles of good governance, such as transparency, open-dialogue and consultation. The consultation process therefore should provide a platform on which decision making processes can be done in a participatory and transparent way until a common resolution/accommodation is achieved. Here it can perhaps be useful to look at other jurisdictions that have worked with such issues. As one example, in 2002 the Province

of British Columbia in Canada released its “Provincial Policy for Consultation with First Nations”. Under this policy the “Province has an obligation to consider aboriginal interests (rights) in decision-making processes that could lead to impacts on those interests (rights). This obligation, which is fulfilled in most instances through consultation, is enforced by the Courts to ensure that Provincial decision-makers consider aboriginal interests appropriately into Provincial land and resource use decision-making.” Furthermore, “where a sound claim of aboriginal rights is made out, consultation efforts must attempt to address and/or accommodate a First Nation's (native's) concerns relating to the impact of proposed activities on the identified aboriginal interests (rights)”. Although there are other jurisdictions such as Australia, Sweden, Denmark, Norway, Finland that have also developed frameworks to recognize and deal with native rights, the proposal will focus on the one above described policy due to its international exposure and recognition and its applicability to the situation in the State of Sarawak.

Based on the “Provincial Policy for Consultation with First Nations” approach, the following consultation framework outline is proposed as an initial proposal (further research on it should be done) to be implemented by decision-makers and project developers for consultation with native communities in the State of Sarawak. Its use and implementation is recommended not only for private and public entities as a complementary activity under the DEIA and prior to the development of a project, but also for native communities that should be prepared to know about it, so they can make use of it if they recognize their rights have been infringed. In addition to this consultation framework, some consultation principles are suggested as the platform on which the consultation process could be developed (see Appendix 8). The proposed outline follows the 4-step consultation process described in the “Provincial Policy for Consultation with First Nations”, however it is adapted to the specific-context situation of the State of Sarawak. The proposed consultation framework is as follows.

Figure 7-1 Proposed Community Consultation Framework Outline for the State of Sarawak



Last but not least, the entire consultation process has to be properly documented to maintain high level of transparency and the consultation process has to be carried out from both sides, meaning that the level of participation of communities has to be as high as the interest of land developers and decision-makers to gain deep understanding of the situation. In this way, the consultation is not only a process whereby information is delivered, but where communication is successful through participation in the decision making process. Finally, the quality of the consultation should be also considered in that the land developer has to engage in sufficient consultation and attempt to address native rights or reach accommodations / resolutions where sound case for these rights has been found out.

7.3.2 Land Demarcation and Community Mapping

As a complementary tool to the consultation process and the DEIA and as essential input for any decision making process in regards to development projects with NCR infringement, it is necessary to count on community maps. As NCR-land is commonly owned it is necessary to involve the native community that has customary rights on this land in order to use their traditional common knowledge to produce them. Although currently governmental organizations and non-governmental organizations are putting resources into producing these maps, the need for NCR-land boundaries establishment is large and the demand for the service is far above the human resources and capacity able to fulfill it. On this basis, it is recommended to focus support to train community members about IT and GIS tools management in order to build up the necessary skills within the communities to carry out the field work and be able to generate maps of their NCR-land based on their traditional knowledge. Although such maps have to be legalized to be officially used, the existence of initial maps and the understanding of GIS tools and mapping will allow native communities to be more prepared to defend their NCRs in case of infringement. Consequently, native communities will be able to come to better resolutions with the project developer through the consultation process. Moreover, community maps and community mapping will set the conditions and provide the communities the basic skills to develop map plans for socio-economic projects and natural resources management. Besides, communities would be able to demark their water catchments and other ecologically sensitive areas within their NCR-land that can be used by project developers – in case the development is taking place within or near the NCR-land – to consider as buffer zones that could be potentially set-aside, conserved or protected in the project development.

7.3.3 Using the CDM to Implement RSPO Sustainability Criteria

Among the different criteria defined under the 7 RSPO principles released in 2005, some criteria are easier or more economically attractive to implement than others. For instance, there are some criteria that set the condition for companies to make better use of their waste, maximize energy efficiency as well as increase the use renewable energy and reduce greenhouse gas emissions (see Table 7-1) – these clearly are targeted at the ‘internal efficiency’ of operations and as such, benefits accrue directly to the company. The implementation of these criteria is economically attractive in that palm oil companies have a great potential to utilize their solid waste and wastewater to generate energy, in particular by making use of Empty Fruit Bunches (EFB)¹⁴¹ and Palm Oil Mill Effluent (POME) to generate electricity (for self consumption or for selling to the grid). Although the process is slow, the success of palm

¹⁴¹ Fiber and shell is commonly used to generate energy for the oil mill

oil companies that have invested in such projects and are gaining revenues from CERs for being approved under the CDM has called the attention of the industry that is looking now at this opportunity more seriously (see section 4.1.3 for approved projects examples and section 6.5).

Table 7-1 RSPO Criteria Related to Waste Management and Energy Utilization

RSPO Criteria Related to Waste and Energy
<p>Criterion 5.3 Waste is reduced, recycled, re-used and disposed of in an environmentally and socially responsible manner.</p>
<p>Criterion 5.4 Efficiency of energy use and use of renewable energy is maximized.</p>
<p>Criterion 5.6 Plans to reduce pollution and emissions, including greenhouse gases, are developed, implemented and monitored.</p>

Source: RSPO Principles and Criteria 2005

Following this line of thought, the following paragraphs present a suggested mechanism that could be implemented by integrated palm oil companies¹⁴² expanding into biodiesel that are interested into implementing sustainability criteria to assure its biodiesel market abroad. It is based on the proposal that the CDM could serve as a means to create the economic support for these companies to implement sustainability criteria. This suggested mechanism is only an initial proposal based on rough estimates and is presented here with the intention to recommend it for further research.

In light of the recent concerns of importer countries (EU) on sustainability issues regarding biodiesel feedstock production, the implementation of sustainability criteria may have an important role to play in the future biodiesel development and trade (see section 5). If no premium is accorded, producing companies will have to burden the costs of implementing such criteria if their intention is to export to markets where such criteria may become a requirement. In order to find a solution that might lessen that burden the proposed mechanism hereafter tries to link the implementation of specific RSPO criteria with economic benefits that the companies could gain from doing so.

First, it was showed in Table 7-1 above that specific RSPO criteria support the efficient use of waste and renewable energy generation and that by implementing these criteria companies have the potential to become energy self-sufficient and gain revenues from CER under the CDM. Based on information provided by the Malaysian Palm Oil Board¹⁴³, it has been estimated that the waste produced by a palm oil mill with 45 FFB t/ha working at full capacity has the potential to generate a total installed capacity of 3.5 MW. The total capacity generated is calculated adding the electricity generated from biomass with a condensing turbine (2 MW) and from biogas using gas-engine generators (1.5 MW). The total installed capacity generated of 3.5 MW is above the capacity required for a biodiesel plant of 100 000 t/y capacity and the

¹⁴² Companies that own both palm oil plantations and oil mill.

¹⁴³ Information provided by Menon, R. (2007). Malaysian Palm Oil Board.

power plant together, equivalent to 2.5 MW¹⁴⁴ (Appendix 9). As a result, the company would have implemented 3 RSPO criteria, would be self-efficient in terms of electricity supply to run the biodiesel and power plant and would as well be able to supply electricity to the grid or directly to local communities¹⁴⁵.

Based on both projects' estimates, and using secondary information (Yeoh 2004, Bovee 2003) and approved baseline methodologies under the CDM¹⁴⁶, initial calculations on annual emissions reduction (ER) give estimates in the range of 75 000 to 150 000 tonnes of CO₂-eq. This is equivalent – assuming EUR 7/t of CO₂e¹⁴⁷ – to annual incomes from CERs ranging between EUR 525 000 to 1 050 000. These initial calculations cover both projects ERs considering the use of biomass/biogas to generate electricity and the avoided methane emissions¹⁴⁸. Initial calculations are estimates, mainly based on default values given by the approved baseline methodologies under the CDM. The estimates are given in range because they vary depending on project emissions such as transportation, inefficient combustion, etc. However, the estimates are useful to serve as basis to know the potential economic support that a company implementing these projects and criteria could generate.

Second, knowing the potential economic revenues that a company can generate from CERs it is suggested under this initial proposal that a percentage of these revenues could be allocated to fulfill the implementation of further sustainability criteria that could result in significant socio-economic and environmental benefits at local level. This is based on the rationale that palm oil companies could use this proposal (the implementation of further sustainability criteria using a percentage of the revenues gained from CERs) to take concrete actions to improve the local environmental and socio-economic conditions and in this way fulfill the “contribution to sustainable development” requirement in order to be approved under the CDM. What percentage should be allocated to this purpose and which criteria should be implemented first? Based on the community assessments in this study and the secondary information supporting the main findings of these assessments (see section 6), the following RSPO criteria are suggested to be implemented with the economic support gained from the CERs under the CDM (Table 7-2).

¹⁴⁴ Information on capacity requirement provided by palm oil company in Lahad Datu (2007).

¹⁴⁵ On the one hand, the connection costs to supply electricity to the grid are high and would have to be covered by the company¹⁴⁵. However, the company would make incomes from selling renewable energy to the grid and contributing to the National 5% targeted renewable energy in the electricity supply mix. On the other hand, in order to supply electricity to surrounding local communities a step-down transformer from 415V to 240V and electricity supply lines will be required. The costs would also be borne by the company, and the economic revenues would probably be negotiated with the communities.

¹⁴⁶ ACM0006 “Consolidated methodology for grid-connected electricity generation from biomass residues”, “Tool to determine methane emissions avoided from dumping waste at a solid waste disposal site”, AM0013 “Avoided methane emissions from organic wastewater treatment”, and AM0022 “Avoided Wastewater and on-site Energy Use Emissions in the Industrial sector”.

¹⁴⁷ Current CER price offered by Eco Securities Group – Consultancy that evaluates these type of projects for CDM in Malaysia.

¹⁴⁸ It is assumed in both cases that in absence of the project electricity would be generated with an on-site fossil fuel based generator with capacity more than 200 KW (default value of 0.8 t CO₂e/MWh)

Table 7-2 RSPO Criteria Related to Environmental Impact Minimization

Requirement by Law (following EIA)	Criteria under RSPO
<p>Demarcation of high erosion risk areas to use as a basis for planning soil conservation work</p> <p>Hydrological demarcation of water-catchments and sub-catchments</p> <p>Demarcation of buffer zones:</p> <ul style="list-style-type: none"> — Ecologically sensitive areas — Buffer zones around protected areas (i.e. national parks) — Riparian reserves (20 m width at both banks of rivers) <p>Assessment of potential hydrological impact and erosion hazard</p>	<p>Criterion 4.3 Practices minimize and control erosion and degradation of soils.</p> <p>Criterion 4.4 Practices maintain the quality and availability of surface and ground water.</p> <p>Criterion 5.2 The status of rare, threatened or endangered species and high conservation value habitats, if any, that exist in the plantation or that could be affected by plantation or mill management, shall be identified and their conservation taken into account in management plans and operations.</p> <p>Criterion 7.2 Soil surveys and topographic information are used for site planning in the establishment of new plantings, and the results are incorporated into plans and operations.</p> <p>Criterion 7.3 New plantings do not replaced primary forest or any area containing one or more High Conservation Values.</p> <p>Criterion 7.4 Extensive planting on steep terrain, and/or on marginal and fragile soils, is avoided.</p>

One of the conclusions of this study (see section 7.1.4) is that the impacts on the local environment caused by palm oil plantations jeopardize the native communities’ ability to practice the traditional socio-economic activities necessary to fulfill their subsistence needs (socio-economic sustainability), thus posing a threat to their livelihoods’ sustainability. On this basis it can be argued that implementing criteria related to good environmental practices, conservation and mitigation activities companies could lessen the negative impacts or threat on livelihood’s sustainability. Table 7-2 has selected some criteria under the RSPO that are related to mitigation measures that could reduce the impacts of palm oil plantations on the local environment. Table 7-2 also shows how these criteria are related to required mitigation measures following EIA that palm oil plantations should implement to be approved under Law, but that in practices are not implemented – most likely due to economic reasons (see below) – resulting in negative consequences to the environment and native communities (see sections 6.5 and 7.1.4).

Most of the criteria above presented are related to set-aside land for conservation due to erosion control and ecological reasons. As a rule of thumb, the land that should be set-aside for conservation and mitigation reasons in a plantation is equivalent to about 5% of the

plantation area¹⁴⁹. However, 5% of a plantation area set-aside can be also interpreted as production losses. This is probably the reason why some plantations do not comply and neglect these requirements or choose not to implement these criteria. The proposed mechanism suggests using a percentage of the incomes obtained from CERs to balance the company losses for setting-aside land identified as ecologically sensitive, HCFV¹⁵⁰, buffer zones around these areas and riparian reserves, and adds to this the recommendation that these areas should be not only conserved but also of free access for native communities to practice their traditional activities, such as hunting, gathering and fishing. Table 7-3 below shows estimates of the yearly losses (opportunity cost) and savings of setting aside land – assuming it is still not under plantation – and relates this to the incomes generated under the CDM¹⁵¹.

Table 7-3 Opportunity Costs and Savings for Setting Aside 5% of a 10 000 ha Palm Oil Plantation (500 ha) and the Economic Support Allocated from CERs Revenues to This Purpose (EUR)

Project investment	Yearly CER incomes*	Investment savings	Yearly opportunity costs**	Yearly savings	Yearly losses	% CER incomes
Biomass project: 3.5 m	First year:	Firs year: 230 000			First year: 486 087	First year: 46%
Biogas project: 1 m						
Total: 4.5 m	1 050 000		826 087	110 000	716 087	68%

* Not including transaction costs

**Based on 3.8 t/ha yield and palm oil price of 2000 RM/t

Based on the estimates above provided, and if land is set aside using yearly 68% of the revenues obtained under the CDM, around 13 - 14 years would be needed to recover the capital investment necessary to start both the biomass and biogas projects – considering only CERs revenues and assuming internal funding covered the total investment. Moreover, Table 7-3 above does not account for savings that the company would make by displacing electricity generated on fossil fuels and incomes for selling electricity to the grid or to local communities. It is important to highlight that these are only initial estimates and further research on this analysis would be required to see if ideas such as these stand up to deeper scrutiny.

¹⁴⁹ If all sensitive areas would be strictly considered, it would account for 10% of the plantation area. In case 5% is already set aside as a requirement following EIA guidelines, this initial proposal would target the additional 5% to be set aside in order to ensure the company is considering all the potential impacts.

¹⁵⁰ The HCVF concept was initially developed by the Forest Stewardship Council (FSC) for use in forest management certification and first published in 1999. Forests where environmental and social values are considered to be of outstanding significance or critical importance can be defined as a High Conservation Value Forest (HCVF) (Jennings et al. 2003).

¹⁵¹ Information on production costs obtained from Nordin et al. (2004).

To conclude, although these are rough estimates they serve to provide an example of an idea or an initial basis on which to work further in order to find economic support mechanisms for the implementation of sustainable practices among palm oil companies. This proposal intends to show that by implementing specific RSPO criteria, companies can generate economic support (using the CDM) to improve the local environmental conditions by 1) improving waste management, 2) enhancing renewable energy, 3) implementing environmental mitigation measures and 4) setting conditions for natural resources and biodiversity conservation. By reducing their impact on the local environment palm oil companies will lessen the threat on local livelihood's sustainability by 1) not degrading the natural resources quality in such a way that native communities are not able to fulfill their subsistence needs and 2) by giving them access to set-aside areas to carry out traditional subsistence practices.

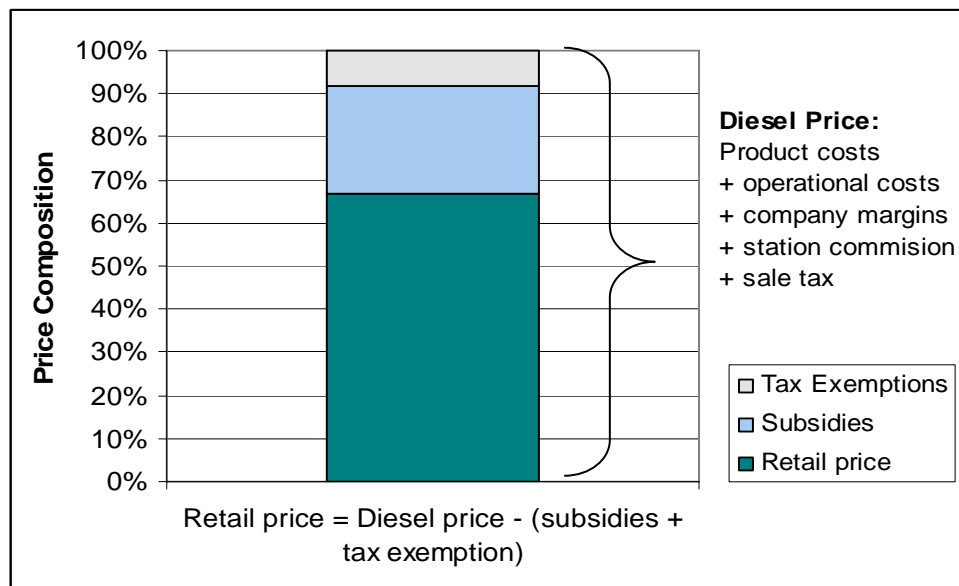
7.3.4 Subsidies: An Economic Incentive to Support Biodiesel Domestic Consumption?

As stated in section 6 of this paper diesel oil is highly subsidized in Malaysia. Due to these subsidies it is not possible for biodiesel to compete at domestic level and thus it is currently exported to countries that have national biofuels targets and/or where palm biodiesel is an economically viable option due to high diesel oil prices.

This initial proposal looks into the possibility of subsidizing biodiesel in Malaysia using the same price mechanism utilized for diesel oil in Peninsular Malaysia in order to promote its national consumption in addition to its current export. By doing so not only thrust 4 but also thrust 1 and 2 of the National Biofuel Policy would be fulfilled (see section 4.2.2). Additionally, this initial proposal intends to assess the opportunity of providing native communities a cheaper fuel option for their electricity generation (see section 6.2). The following are initial estimates and are provided in order to give a basis for further research on this topic.

According to the Economic Planning Unit of the Prime Minister's Department in Malaysia (EPU 2005), the price mechanism for fossil fuels in Malaysia is linked to international market prices. The actual retail price is determined after taking into consideration prevailing international prices, operating costs such as distribution and marketing costs and finally, sales taxes. In Malaysia, however, fuel is sold much cheaper than other countries because the Government provides subsidies and sales tax exemptions. Based on information provided by the EPU (2005), the subsidies for diesel oil in Peninsular Malaysia are set at around 0.59 RM/l and the tax exemptions at about 0.2 RM/l. Considering a retail price of 1.6 RM/l, it is possible to assume that the 'real' price of diesel oil in Peninsular Malaysia is currently 2.39 RM/l. The price composition of diesel oil is illustrated in Figure 7-2.

Figure 7-2 Price Composition for Diesel Oil in Peninsular Malaysia Based on 2007 Retail Prices



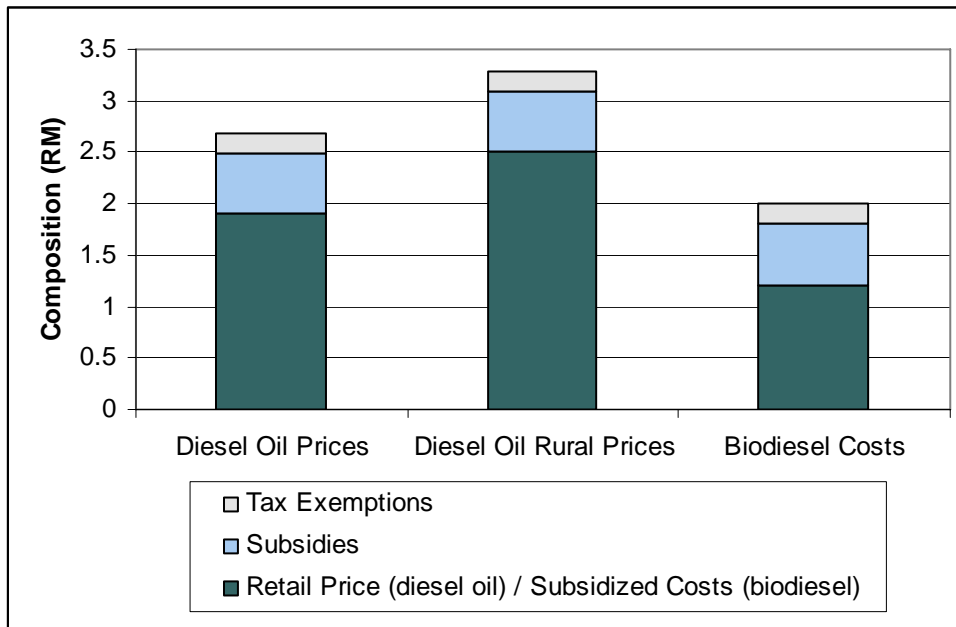
Adapted from Economic Planning Unit of Malaysia 2005

Furthermore, based on information provided by the Palm Oil Industry Cluster (POIC) the current biodiesel costs in Malaysia lay at about RM 2.0/l (EUR 0.38 - 0.44). If these subsidies would be applied to reduce biodiesel costs, the costs to produce one litre of biodiesel would lay at RM 1.41 (EUR 0.3). If tax exemptions are added, then biodiesel costs would reduce to RM 1.21/l (EUR 0.28).

Assuming both subsidies and tax exemptions are applied, then it would be possible to argue that subsidized biodiesel costs (RM 1.21/l) could eventually become economically attractive compared to diesel oil retail prices in Peninsular Malaysia (RM 1.6/l). This without considering all the advantages discussed in this study of introducing an alternative fuel in the transport sector such as emissions reduction, less reliance on fossil fuels, clean fuel local consumption, etc. Moreover, the transport sector is in particular attractive since it is equivalent to 40% of the total energy consumption in Malaysia and has one of the highest growth rates at 3.5% (diesel oil in particular 4.2%). Nonetheless, other opportunities in the power and industry sector should not be left out, especially if one considers that Malaysia will become a net energy importer in the next 28 years (see section 6.2). In short, subsidizing biodiesel with the same price mechanism applied currently to diesel oil in Peninsular Malaysia, would open an opportunity to use it domestically in the transport sector (as well as power and industry sectors), to reduce air emissions that contribute to climate change – contributing to MDG 7 – and to diversify the energy portfolio (Five-Fuel Diversification Policy) of the country – thus contributing to energy security.

The opportunity in Sarawak might be even more attractive, since the retail price for diesel oil in Sarawak is currently 1.9 RM/l. In addition, diesel oil prices in the rural area of Sarawak are at about RM 2.5/l due to transportation costs (see section 6.2). This is the price at which communities buy diesel for their electricity generation with diesel power generators. Assuming the same price mechanism for diesel oil in Peninsular Malaysia is implemented in the State of Sarawak, the price compositions would be as follows.

Figure 7-3 Price Composition for Diesel Oil in the State of Sarawak (2007 Retail Prices and Costs)



Looking at Figure 7-3 it can be argued that by implementing the price mechanism used in Peninsular Malaysia for diesel oil, subsidized biodiesel costs (1.21 RM/l) would be almost two times below diesel oil retail prices in the rural area of the State of Sarawak (RM 2.5/l). If biodiesel would be subsidized and sold in the rural areas where companies are producing biodiesel – thus avoiding transportation costs – local communities would have the opportunity to access a cheaper fuel for their electricity generation. As such, if biodiesel becomes a cheaper fuel opportunity for rural communities to generate electricity, then biodiesel would be contributing to enhance productive factors in the rural area and thus contributing to poverty alleviation (MDG1).

Box 7. Using Biofuels to Help Native Communities Meet MDGs

If biofuels are used to support other activities in addition to transportation, especially at local level, they have the potential to be part of a more integral and accelerated way to promote sustainable development in developing countries and enhance the achievement of MDGs.

Biofuels reduce the risk of over-dependence on fossil fuels that undermine efforts of the poor to meet MDGs.

- Flavin and Hull Aeck 2006 -

The initial proposals and outlines above presented give only initial estimates and suggest ideas to be considered as a basis for further research.

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Abbreviations

ER	Emissions Reduction
EPU	Economic Planning Unit of Malaysia
CER	Certified Emissions Reduction
CDM	Clean Development Mechanism
CPO	Crude Palm Oil
GA	Governmental Agency
GHG	Greenhouse Gas
JV	Joint Venture
LCDA	Land Consolidation Development Authority in Sarawak
MATA-CDM	Multi-Attributive Assessment of CDM
MDGs	Millennium Development Goals
MPOB	Malaysian Palm Oil Board
MPOC	Malaysian Palm Oil Council
NCR	Native Customary Right
RM	Malaysian Ringgit (<i>1EUR=4.6RM, 2007 exchange rate</i>)
RSPO	Roundtable for Sustainable Palm Oil Production
SALCRA	Land Consolidation and Rehabilitation Authority
SLDB	Sarawak Land Development Board
UNCTAD	UN Conference on Trade and Development
WWF	World Wildlife Foundation

Appendix

Appendix 1 Interviewed Organizations

INTERVIEWED ORGANIZATIONS
NATIONAL PERSPECTIVE
Center for Environment, Technology and Development Malaysia (CETDEM) Eco - Ideal Consulting Sdn Bhd Global Environment Facility (GEF) Small Grant Project, (UNDP) Malaysia Malaysian Palm Oil Board (MPOB) Palm Oil Council (MPOC) Palm Oil Industrial Cluster (POIC) Pusat Tenaga Malaysia - Malaysia Energy Centre (PTM) Regional United Nations Development Program (UNDP) Thailand World Wildlife Foundation Malaysia (WWF)
LOCAL PERSPECTIVE
Borneo Pacific (Holdings) Company Borneo Resource Institute (BRIMAS) Longhouse communities: Selezu, Setulai, Sepadok, Sungai Bong and Ulu teru Partners of Community Organisations (PACOS) Sarawak Electricity Supply Corporation (SESCO) Sarawak Dayak Iban Association (SADIA)

Appendix 2 Community Questionnaire Based on Survey Questions

COMMUNITY QUESTIONNAIRE

Name of the longhouse community

Number of families

Headman name

Location

Type of land development strategy

Participant community yes/no *(if community is not participant not all questions are applicable)*

1. Employment and Income Generation

- 1) From 10 people in your community, how many are employed in the company and why?
- 2) How many of those are women?
- 3) What is the salary you get working in the company?
- 4) How much cash incomes are you provided monthly by the company as shareholder?

2. Work Quality and Wealth Distribution

- 5) How are cash incomes distributed among the community members?
- 6) How do you spend the incomes you get from the palm oil company?
- 7) In a scale of 1 to 5 (5 is very high) how is the quality of work in the plantation? Why?
- 8) What facilities did the company provide to the community?

3. Access to Services

- 9) What types of services are available for the community due to the establishment of the palm oil company?
- 10) In a scale of 1 to 5 (5 is very high) how is the quality of these services? Why?
- 11) Is the coverage adequate? How many hh are covered, how many are left out?

4. Access to Infrastructure and Productive Factors

- 12) What infrastructure has been developed due to the palm oil company establishment?
- 13) In a scale of 1 to 5 (5 is very high) how is the quality of these infrastructure? Why?
- 14) What productive factors are important for your community?
- 15) How is the access to these after the establishment of the palm oil plantation?
- 16) In a scale of 1 to 5 (1 is the best) what is the condition of the available productive factors? (related to 8, 9, 10)

5. Traditional Practices and Access to Traditional Productive Factors

- 17) What traditional farming activities do you practice? Why?
- 18) What productive factors are important for your community?
- 19) How is the access to these after the establishment of the palm oil plantation?
- 20) Do you still practice traditional farming after the establishment of the palm oil plantation? What has changed?

6. Involvement and Communication

- 21) How was the process of consultation (carried out for the JV)?
- 22) Why did the community decide to participate?
- 23) What decisions have been taken with your agreement?
- 24) Which representatives from the community participated in the meeting, why and how often?
- 25) What communication channels have been established by the company/Government Agency?
- 26) Do you get regularly information from the company concerning its future plans or financial situation?
- 27) What type of information is shared in the consultation/meeting process?
- 28) Is it enough information? Why yes or not?
- 29) Is the agreement respected by all the stakeholders? Why yes or not?
- 30) Is the land recognized as NCR-land by the company / by the Government?

7. Capacity Development

- 31) Are you provided trainings/capacity building by the company?
- 32) What type and how often?

8. Air Quality

- 33) What have been the affects on air quality around your community due to palm oil company operations?
- 34) In a scale of 1 to 5 (5 is greatly improved, 3 no change, 1 very affected) how did air quality change after palm oil plantation development/establishment? Why?

9. Water Quality

- 35) In a scale of 1 to 5 (5 is greatly improved, 3 no change, 1 very affected) how did river water quality change after palm oil plantation development/establishment? Why?
- 36) Did water resources (fisheries) change after development / establishment of the palm oil plantation? Why?
- 37) In a scale of 1 to 5 (5 is greatly improved, 3 no change, 1 very affected) how are the conditions of your water catchment's area after palm oil plantation development / establishment?

10. Land Quality

- 38) In a scale of 1 to 5 (5 is greatly improved, 3 no change, 1 very affected) how did soil quality change after palm oil plantation development/establishment? Why?
- 39) Regarding you NCR-land distribution: How much of it is covered by forest? How much is covered with paddy? How much with cash crops?
- 40) From your NCR-land, how much is under palm oil plantation now?
- 41) What land-use was replaced by the palm oil plantation?

11. Forest Resources

- 42) What type of forest resources do you use?
- 43) In a scale of 1 to 5 (5 is greatly improved, 3 no change, 1 very affected) how did forest /forest resources quality change after palm oil plantation development/establishment? Why?

Appendix 3 Local Community Assessment Tools

General Specifications

Total duration of the assessment: 3-5 days (each community)

Local community general characteristics: Located not far from a palm oil plantation (community members may plantation workers, smallholders or shareholders in a JV scheme). Communities are dependent or partly dependent on traditional subsistence practices and traditional farming for self-consumption and commercial purposes.

Methodologies to be used: Participatory Rural Assessment (PRA), interviews and focus group debate based on survey questions.

PRA Tools to be used: Village Resource Map, Resource Matrix, Transects (SEAGA 2004).

Objectives of Community Assessment

Main objectives: **1)** To gain an understanding of the effects of palm oil plantation developments on local socio-economic dynamics by looking into changes in the traditional and off-farm socio-economic activities, style of life, land use, wealth distribution, access to services, infrastructure and traditional productive factors, participatory processes, community involvement, benefits and risks. **2)** To gain an understanding about the changes in the local environmental conditions and how this affects local livelihoods sustainability.

TOOL	ACTIVITY	OBJECTIVE
<i>Village resource map</i>	Community members are asked to draw or design their community on paper and using different materials.	Know about the resources available to the community, the infrastructure, the type of services it has, the social organizations within the community and how it is structured on a map.
<i>Resource matrix</i>	Communities are asked to list the resources they consider more important for their well-being needs. Afterwards, they are asked to value those distributing 100 points among the listed resources.	Make a list of the most valuable resources for the community. Rank them according to their value, identify differences between the communities and understand possible drivers.
<i>Transects</i>	A transect is established that crosses the community, farming field and palm oil plantation. Community members are asked to walk	The walk through the community and its surroundings will help to understand the relation between different land uses and ecosystems with the diverse traditional socio-economic activities of the

	along the transect while explaining the activities that are carried out in each land-use area and comment on changes over time in those areas.	community. Along the transect changes related to before-and-after plantation developments will be identified.
<i>Focus group debate</i>	1 or 2 groups of community members (women and men representatives) are asked to answer and debate specific questions that assess different sustainability criteria.	Based on the answers and debates, understanding will be gained on social, economic and environmental issues related to the effects (positive and negative) of palm plantation developments on the community welfare and their livelihoods sustainability. Identification of main benefits and risks, as well as possible solutions.
<i>Interviews</i>	Key representatives of the communities are interviewed.	The interviews will contribute to gain a deeper understanding of the main issues regarding the community and the relation with or the effects of the palm oil plantation development.

Appendix 4 Sustainability Criteria Compilation

CRITERIA	Pro-poor economic growth		
SUB-CRITERIA	ORGANIZATION	INDICATOR	NATURE
Regional economy	MATA-CDM	Contribution to wealth generation as a region	Quantitative
	MATA-CDM	Location in economically disadvantaged area	Qualitative
Employment generation	MATA-CDM GS	Percentage of community employed	Quantitative
		Gender share	Quantitative
	MATA-CDM GS	Incomes	Quantitative Qualitative
		Savings	Quantitative
Sustainable technology transfer	MATA-CDM	Innovation in cleaner technology	Qualitative
	MATA-CDM	Technology and capacity transfer	Qualitative
	MATA-CDM	Financing for R&D	Quantitative Qualitative
Balance of payments	GS CDM-Malaysia RSPO	Long-term economic sustainable project	Quantitative
Technology self-reliance	GS CDM-Malaysia	Subsidies	Quantitative
		External technical support	Qualitative

		Use of domestically produced equipment	Quantitative Qualitative
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CRITERIA	Inclusive social development		
SUB-CRITERIA	ORGANIZATION	INDICATOR	NATURE
Community participation and Involvement	MATA-CDM GS CCB Standards RSPO	Involvement in decision making	qualitative
	RSPO	Transparency (Information flow from the company to other stakeholders)	Qualitative
	RSPO	Compliance with applicable laws and regulations (laws, land tenure rights)	Qualitative
Access to services	MATA-CDM	Types of services available	Quantitative
		Quality of services	Qualitative
	GS	Availability of facilities provided by the company	Quantitative Qualitative
Access to traditional productive factors (water, land, credit, market, infrastructure)		Types of productive factors available	Quantitative
		Condition of productive factors available	Qualitative
		Access to traditional productive factors	Quantitative Qualitative
Income generation and wealth distribution	MATA-CDM	Equal wealth distribution	Quantitative Qualitative

	GS	Employment generation	Quantitative Qualitative
	RSPO	Incomes (at least legal minimum standards, sufficient for basic needs and some discretionary income)	Quantitative
	CCB Standards	Quality of work (labor conditions, employment positions)	Qualitative
	CCB Standards RSPO	Occupational health and safety measures	Qualitative
	GS	Pro-poor turnover share	Quantitative
		Incomes expenditure	Qualitative
		Wealth distribution (Gender, community projects, individual interests)	Quantitative Qualitative
Capacity development	MATA-CDM GS	Organizational capacity	Qualitative
		Capacity trainings from company	Quantitative Qualitative
Cultural landscape	MATA-CDM GS RSPO	Resettlement to better conditions, appropriate compensation	Quantitative Qualitative

CRITERIA	Environmental sustainability		
SUB-CRITERIA	ORGANIZATION	INDICATOR	NATURE
Air quality	MATA-CDM GS CDM-Malaysia	Air pollutants produced	Quantitative
	MATA-CDM GS	Respiratory diseases	Quantitative Qualitative
	MATA-CDM GS	Odor and noise	Qualitative
Water quality	MATA-CDM GS CDM-Malaysia	Distribution of available drinking water	Quantitative
	MATA-CDM	Quality of waste water going into the natural ecosystem	Quantitative Qualitative
	MATA-CDM	Acidification	Quantitative
	MATA-CDM	Eutrophication	Quantitative Qualitative
Land resources	RSPO	Use of best production practices (IPM, soil fertility, minimize erosion, proper use of agrochemicals)	Qualitative
	MATA_CDM GS CDM-Malaysia	Erosion/degradation	Qualitative

		Land-use change (agriculture/forest to plantation)	Quantitative
		Access to land for agriculture	Quantitative Qualitative
Ecosystem services and health	MATA-CDM CDM-Malaysia	Access to forest productive resources	Qualitative
	GS	Value of forest resources	Qualitative Quantitative
	GS RSPO	Conservation and changes in biodiversity	Qualitative
Waste management	RSPO	Reduction of waste	Quantitative Qualitative
	RSPO	Re-use and recycling of waste	Quantitative Qualitative
	RSPO	Management of waste	Quantitative Qualitative

Appendix 5 Fuel Properties of Malaysian Petroleum Diesel, Normal and Low Pour Palm Oil Methyl Ester, and Palm Biodiesel/Diesel B5 Blend

Property	Unit	Petroleum Diesel	Biodiesel/Diesel Blend B5	Palm Oil Methyl Ester	with Low Pour Point	EN14214
Density at 15 C	kg/l	0.83 - 0.84	0.84 - 0.85	0.87	0.87 - 0.89	0.86 - 0.90
Viscosity at 40 C	cSt	3.92 - 3.97	4.14 - 4.54	4.41	5-Apr	3.5 - 5.0
Sulphur content	% mass	0.1	0.17 - 0.18	<0.001	<0.001	0.001 (max.)
Pour point	C	12	9 - 12	15	(- 21) - 0	...
Flash point	C	77	75.0 - 81.0	174	150 - 200	120 (min.)
Cetane Number	...	50.6 - 61.8	54.8 - 61.5	58.3	53.0 - 59.0	51 (min.)
Gross calorific value	MJ/kg	45 - 47	44 - 47	40	39	...

Note: EN14214 European Quality standard for Biodiesel

Source: MPOB 2005a

Appendix 6 Palm Oil Related CDM Projects in Malaysia (2006)

Project	Methodologies used	Amount of emissions reduction
Biomass Energy Plant – Lumut PGEO edible Oil Sdn Bhd	Thermal energy for the user	32 545 t of CO ₂
Replacement of fossil fuel by Palm Kernel Shell Biomass in the production of Portland Cement – Lafarge Malaysia Cement Bhd, Rawang	Emissions reduction through partial substitution of fossil fuels with alternative fuels in cement manufacture	61 947 t of CO ₂
Sahabat Empty Fruit Bunch Biomass Project - Felda Sahabat Lahad Datu	Thermal energy for the user	53 986 t of CO ₂
LDEO Biomass Steam and Power Plant in Malaysia – LDEO Palm Oil Refinery	Thermal energy for the user Avoidance of methane production from biomass decay through controlled combustion	208 871 t of CO ₂
SEO Biomass Steam and Power Plant in Malaysia – SEO Palm Oil Refinery	Thermal energy for the user Avoidance of methane production from biomass decay through controlled combustion	216 831 t of CO ₂
Seguntor Bioenergy 11.5 MW EFB Power Plant	Renewable electricity generation for grid Avoidance of methane production from biomass decay through controlled combustion	230 019 t of CO ₂
Kina Biopower	11.5 MW Power Plant Renewable electricity generation for grid Avoidance of methane production from biomass decay through controlled combustion	230 019 t of CO ₂

Adapted from <http://cdm.unfccc.int>

Appendix 7 Perception Matrix – Community Focus Groups Discussions Main Points

	Selezu, Setulai and Sepadok	Ulu Teru, Longhouse Kalong	Sungai Bong, Longhouse Rayong
Employment and income generation	<p>No one from the communities work in the plantation, they consider the salary too low (8-15 RM/d) and the work unstable (per day basis contract and seasonal).</p> <p>Scale 1</p>	<p>For communities in Ulu Teru there are 3 types of job: in town, in the palm oil plantation and on the agricultural field. When members of the community work in town the expenses in transport and food are high. When they work in the plantation there is no transport expenses and the food comes from the community production. When they work in agriculture, the production is good, but the market is uncertain, prices can suddenly fall and then the profit is very low. In palm oil plantation the profit is assured, there is income security, especially since community members are shareholders of the JV.</p> <p>“When giving land for the plantation each participant member receives 120 RM/ha (26 EUR/ha). The land is cleared, planted and after 5 years they receive 360 RM/ha (78 EUR/ha) that comes from the government unit trust fund (only once). When harvest is ready, each month a ton of fruit per ha will be harvested. One ton of fruit is equivalent to RM 360 (EUR 78)”.</p> <p>More than 50% of the people that live in Ulu Teru</p>	<p>No one from the community works in the plantation, they consider the salary too low (12 RM/d).</p> <p>If they work in the plantation they will have to use their salary to buy food, while if they work in traditional activities they can produce sufficient food to eat. The person that works in the plantation will not have enough land or time for their own production.</p> <p>Scale 1</p>

		<p>work at the plantation. 7 out of 10 workers are women, this is due to the nature of work at the palm oil nursery.</p> <p>The normal salary for an 8-hours day is RM 12 (EUR 2.6). If the work extends to a 10-hours day the salary is RM 16.5 (EUR 3.6). The salary is the same for women and men.</p> <p>Scale 5</p>	
Work quality and wealth distribution	<p>No one from the communities works in the plantation.</p> <p>Expenditures are generally spent in education, water, diesel.</p>	<p>The incomes earned per family stay within the family. With the incomes from the plantation it will be possible to save around 100 RM/month (EUR 22). The rest will be spent in food, education and diesel for electricity generation.</p> <p>The work in the plantation is not so hard, at the moment. Women are working in the nursery and men are logging and clearing the land. The company provides transportation to pick them up to the nursery and take them back to the community.</p>	<p>No one from the communities works in the plantation.</p> <p>The normal expenditures are the school for children, diesel and sometimes clothes.</p>
Access to basic services	<p>The basic services that exist in the communities are not brought by the plantation company</p> <p>The government provided some of the</p>	<p>The community hopes the Government complies with the promise of providing them with new basic services (access to pipeline water, electricity from grid) as part of participating in</p>	<p>They are indifferent to the possibility that the company brings future new services since they already have what they need: “rainwater tanks are working good and</p>

	<p>communities with electricity from the grid and communities have currently access to pipeline water. The communities without access to the grid generate electricity with diesel power generators. Electricity was provided by the government before the establishment of the plantation. In regards to water, originally they used to get drinking and irrigation water by gravity from the water sources located in the upper water catchment of their NCR-land. The communities do not have access to that water anymore because the company cleared the forest protecting the upper water catchment area within their NCR-land and destroyed the infrastructure used to obtain water by gravity from that water sources. As a result, communities applied for water supply to the State Government and in 2001 they were supplied by the State Government with pipeline water. However, they consider pipeline water too expensive and many have opted for rainwater as a cheaper option.</p> <p>Scale 1</p>	<p>the project development.</p> <p>Scale 1</p>	<p>diesel power generators give them the electricity they need during the evenings”.</p> <p>Scale 1</p>
<p>Access to infrastructure</p>	<p>Infrastructure for the communities has not been brought by the company.</p>	<p>The palm oil JV Company built up a road in 2002. The transportation before was done through the river using longboats. The road is</p>	<p>The JV company constructed a road in Bong NCR-land in 2004. It has been beneficial for them, since it gives them</p>

	Scale 1	<p>very important for the community since it is their access to the hospital, the school and the town (market). Moreover, GA can access the communities easier now.</p> <p>The communities hope that the government in JV with the company will comply with the promise of building up a school, a health center, a police station, a canteen and housing as part of the project development.</p> <p>The community members believe in the government and that it will keep its promise.</p> <p>Scale 4</p>	<p>access to the market, school and the hospital.</p> <p>Scale 4</p>
Access to traditional productive factors	<p>Setulai lost 265 ha of land, and Selezu 260 ha. Area has been surveyed by the Land and Survey Department in Sepadok, but no land has been cleared yet by the palm oil company.</p> <p>The area cleared was covered by forest, rubber and fruit trees.</p> <p>They still have access to productive factors, however, less forest to hunt and gather, and less fish in the river due to the affected water quality. They used to catch 2-3 kg of fish a day; now only an average of 1 kg a day.</p>	<p>Although they have given part of their land, they still have access to land for production and forest to hunt and gather. From their total NCR-land, 60% was given to the palm oil plantation, 30% is used for paddy production under shifting cultivation and 10% for production of rubber. The land given to the palm oil plantation was covered by forest, rubber, fruit trees and paddy. Fishes have reduced due to the water quality of the river.</p>	<p>Land has been damaged due to palm oil plantation infringement. Forest and rubber have been logged and paddy was lost.</p> <p>There is still access to land for production and forest for the community and for future generations. The river has changed and there is less fishes to catch. They used to catch 1-5 Kg of fish before, now they only can catch 0.5 kg. Variety of fishes has also reduced, “only the type of fishes that do not care about moody water can be found”.</p>
Traditional	Communities still	The community produces	The community produces

<p>Production Practices</p>	<p>produce paddy rice under shifting cultivation, mainly for self-consumption. One plot is about 3-4 acres (1.2 - 1.6 ha). Hill paddy rice is preferred in taste but it has low productivity compared to wet paddy rice. In addition to paddy rice, they produce rubber and pepper, that they sell in the market. They also produce vegetables and fruits, both to sell in the market and for self-consumption.</p>	<p>paddy rice under shifting cultivation only for self-consumption. Each family has currently around 2 plots to rotate cultivation. They cultivate for 1-2 years and leave a fallow period of 4 years, depending on soil conditions. Fewer families are producing vegetables, since now people can buy them using the incomes from the plantation. Hunting and gathering is still done in the communal forest near their NCR-land. This forest belongs to the State but is of free access to the communities. With the time the traditional skills for hunting are disappearing, but now they have access to market and incomes from the plantation, so they can buy meat and other food. In addition to paddy rice they produce rubber that they sell in the market.</p>	<p>paddy rice under shifting cultivation. Each family has 2 to 3 plots to rotate. If wet paddy rice, the soil is good for 4 to 10 years after that rotation is needed. If hill paddy rice is produced the soil is good for 1 to 2 years.</p> <p>In addition to paddy rice, the community produces rubber and pepper which they sell to the market, produces and gathers vegetables for self-consumption, produces meat from pigs and chicken mostly for self-consumption but sometimes also for commercial purposes, hunts and fishes.</p>
<p>Involvement and communication (stakeholder participation)</p>	<p>The company/GA approached only the Headmen.</p> <p>In general, community members do not have the impression to have any involvement in the decision making process, only members that are “pro-government” are consulted.</p> <p>The consultation process lacks transparency, the clearance operation was</p>	<p>At the beginning, the Headman was consulted and then the community agreed to participate. After that all the communities were invited to meet in Ulu Teru, where representatives of the State Government explained about the New Concept project. The Land and Survey Department carried out a field survey in 1994 to establish the perimeter of the proposed development area. Once the perimeter was mapped, individual land was picket</p>	<p>In 1996 a Government representative from LCDA came to talk to the community about the New Concept scheme. However, after that meeting the community decided not to participate. The payment terms and the modus operandi were unclear to them and the promises given by the Government made them suspicious. The decision not to participate was taken in consultation and in</p>

¹⁵² Sarawak Administrative Office, District Officer, Resident, Land and Survey Department, members of Parliament and the State representative.

	<p>taken without previous consultation and/or consensus with the community</p> <p>No regular information from the company gets to the communities.</p> <p>When the infringement happened the communities tried to stop the clearing operations by meeting different regional governmental bodies¹⁵². However, they did not get any useful support. For this reason communities decided to appeal to court.</p> <p>Communities also tried to talk with the company to see if any participatory scheme with the plantation company was possible or a proper compensation could be negotiated, but the company refused the proposition on the basis that they were expanding in State Land leased by the government and therefore it had no obligation towards the communities.</p> <p>The NCR-land is recognized under the Land Code and the communities have evidence to prove their rights on the land in court. Setulai has a document from the Britain government on their settlement in the area in 1945, Selezu has also a document from the Britain Government</p>	<p>surveyed together with the community. A copy of the elaborated map was given to the Headman (he showed the map during the focus group meeting). Once the map was elaborated, representatives of the Government (GA) returned to the communities in order to make every participant family sign a document (trust deed) where they stated they are giving their rights to land to the trustee and where they agreed with the project terms of payment.</p> <p>The communication channels the community uses when they want to highlight an issue to the company are mainly visits to the Land and Survey Department Head Quarters. The communities do not have direct communication with the company; any issue has to be raised through the GA.</p> <p>Communities do not get regular information about the company's future plans or current activities. Until now the agreement has been respected, people has been paid the first RM 120/ha, however, things have been moving too slow (10 years since the project was initially launched). The company started operations (logging and clearing) in 2004. Communities seem certain that they can recover their land in 60 years if they want so.</p> <p>Their rights to the NCR-</p>	<p>consensus with the entire community.</p> <p>More meetings were held by the Government with other communities, but the government did not come back to Longhouse Rayong. The community was not invited to the big meeting in Ulu Teru.</p> <p>The reasons not to participate are mainly due to the lack of clarity in the how the scheme operates. The community fears that after 60 years they may not recover their land, they fear their land may be seriously damaged and not productive any more. They pointed out the land under palm oil plantation in the way to the city of Miri: "the soil there is not suitable for paddy rice any more".</p> <p>Moreover they did not believe in the promises made to them: "if your palm oil succeeds you can get big amount of money and cars and housing will be given for every family". This increased only the mistrust they had from previous experiences (see section 7.2.2. currently case is in court) and made them suspicious about the new scheme.</p> <p>In 2004 the company started operations in Sungai Bong NCR-land, but after protests of the communities in the area</p>
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	<p>confirming its settlement in the land in 1955, Sepadok has a graveyard that proves they have been established in the area before 1958. As a result, the company and State GA might not be in compliance with the Land Code since they violated the territory considered by law NCR-land.</p> <p>Communities consider the company does not respect their NCR-land.</p> <p>Scale 1</p>	<p>land are recognized by the palm oil company and the Government. Moreover, they have evidence to show they have been settled in that land since 1925.</p> <p>The reason why people decided to participate in the scheme is because they are interested in the incomes of the project.</p> <p>Scale 4</p>	<p>the company stopped operations and promised not to “disturb their land”. The company received the community consent to build up the road through their NCR-land giving them compensation for the damage. According to adat RM 1500 (EUR 326). No compensation has been given to date.</p> <p>In March 2007 LCDA started clearing (logging and road opening) activities in their NCR-land without any previous consultation.</p> <p>Although the NCR-land was recognized by the Government during the court case (see section 7.2.2), they seem not to respect it (LCDA has started operation in their area again).</p> <p>Scale 1</p>
<p>Capacity development</p>	<p>No one in the communities works in the plantation, thus nobody has participated in trainings provided by the company.</p>	<p>The persons employed by the company have to attend trainings once a year to learn about the production operation in the plantation. If they want to become managers they need a university diploma; however, the option is open for them to apply.</p> <p>“Is in the convenience of the company to teach them, otherwise they would not be able to develop their</p>	<p>No one in the community works in the plantation, thus nobody has participated in trainings provided by the company.</p>

		land”.	
Air quality	The air during the dry season is dusty due to the company trucks using the road. However, not big change. Scale 3	No changes. Scale 3	No changes. Scale 3
Water quality	River quality has deteriorated, the water is “moody and oily” and it is “itchy” when one bathes in it. Fishes have reduced in quantity and in variety. Scale 1	The water is polluted and has affected the fishing. The palm oil plantation uses the water from the river to irrigate. Erosion has affected the water quality; the river now is “moody and dirty”. “However, the community does not care about the fish nor the river now, what they want is to benefit from development and improve their situation towards progress”. Moreover, the future project from the Government is to build an underwater pipe system that will provide clean water to the community. Scale 1	The water of the river has changed. Is “moody and itchy”. Less fishes can be found and only those that like moody water. Scale 1
Land resources	The land under plantation is seriously damaged, since the bulldozer cleared everything and eroded the land. Moreover, the company uses fertilizers in the plantation. Scale 2	The soil in the area used for the plantation is still good. The bulldozers only clear superficially and roots are not damaged. There is erosion, but soil can be still used to plant, it is still “alive”. Scale 3	Land quality after a palm oil plantation is affected by fertilizers and erosion. If the erosion level is not too high the land can be still recovered with forest. The land will not be good for paddy. Scale 2

<p>Forest resources</p>	<p>The forest affected by the clearing was used to protect the water catchment, retain soil erosion and filter water. The forest has been totally cleared.</p> <p>Scale 1</p>	<p>The forest where they hunt is not in their NCR-land, it belongs to the State but it is a communal forest, which means it is of free access to locals for traditional activities.</p> <p>Scale 3</p>	<p>The forest has become less, but the community still has access to forest resources within the NCR-land.</p> <p>Scale 3</p>
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Appendix 8 Consultation Process Principles

The following principles are taken from the “Provincial Policy for Consultation with First Nations” released in 2002 in the Province of British Columbia in Canada. It applies to all consultation efforts, and is suggested here as a platform on which basis the consultation process could be taken:

- *Through consultation, the land developer must consider native customary rights prior to making land or resource decisions concerning land activities that are likely to affect those customary rights and attempt to address and/or accommodate concerns that are raised, provided that those concerns relate directly to native customary rights that are sound and to impacts of decisions on those customary rights*
- *Consultation should be carried out as early as possible in the decision-making process*
- *The land developer must ensure the adequacy of any consultation activities it undertakes or that are undertaken on its behalf*
- *Decision-makers should take steps to ensure consultation activities involve representatives from all potentially affected native communities*
- *Consultation processes need to be effective and timely, carried out in good faith, and wherever possible meet applicable legislative timelines*
- *The consultation process should inform decision-makers of the possibility that the decision(s) that they make on proposed activities may result in an infringement of native customary rights. The question of whether infringement appears likely and whether efforts to attempt to address and/or reach workable accommodations of these rights are likely to be adequate to justify any such infringement, should be considered by decision makers*
- *Consultation processes should be clearly defined to the native communities in question*
- *Consultation processes should illustrate how information provided by native communities is or is to be considered in decision making processes and planning*
- *Methods for meaningful consultation should be selected in relation to the nature of the proposed activity, the requests of the native communities in question (where those are reasonable), the soundness of the customary rights that are at issue, and other relevant factors*
- *Information should be provided to native communities in a manageable and understandable format, with adequate time for review*
- *All elements of the consultation process and records of them should be kept to maintain high level of transparency*

Appendix 9 Palm Oil Mill Waste and Energy Equivalence for Power Generation

Mill 45 FFB t/h		Full capacity (18 h / 320 d)	
<u>FUEL AVAILABILITY</u>	<u>UNITS</u>		
FFB production	tonnes	259200	
Total fiber/shell mix at 60:40	tonnes	49248	
Fiber at 12% of FFB	tonnes	31104	
Shell at 7% of FFB	tonnes	18144	
EFB at 23% of FFB	tonnes	59616	
<u>MILLING POWER REQUIREMENT</u>			
BASIS: Fibre&shell at 60/40% ratio needs 7.2 kg/kwh ; Processing requires 18 kwh/ tonne FFB			
Mill power requirement at 18kwh/tonne FFB	kwh	4665600	
Milling hours per year = 18hrs/day x320 days	hours	5760	
Power plant capacity required	MWh	0.81	
Fuel required for this energy	tonnes	33592.32	
Surplus fuel mixture (fibre/Shell)	tonnes	15655.68	
<u>POWER GENERATION - CONDENSING TURBINE</u>			
BASIS: Fibre/shell mixture : 3 kg/kwh, Empty bunch : 9 kg/kwh			
Surplus fibre/shell available	tonnes	15655.68	
Energy from surplus fibre/shell mixture @ 3 kg/kwh	kwh	5218560	
Energy from Empty fruit bunch at 9 kg/kwh	kwh	6624000	
TOTAL ENERGY	kwh	11842560	
<i>Biogas production</i>			
POME production rate at 65% to FFB	c. meter	168480	
Biogas production rate at 28 M3 / M3 POME (M3)	c.meter	4717440	
Biogas at 1.8 kwh / m3 effluent	kwh	8491392	
POWER STATION TOTAL CAPACITY	kwh	20333952	
		(24 hr/ 365 d) (18 hr/ 320 d)	
Total hours in a year = 365 x 24	hours	8760	
Total hours in a year = 18 x 320	hours	5760	
Size of power plant	kw	2321.23	3530.20
POWER STATION IN MW	MWh	2.3	3.5
BIOMASS IN MW	MWh	1.3	2
BIOGAS IN MW	MWh	1.0	1.5

Calculations are based on information provided by Menon, R. (March 2007). Personal interview.