Scaling Up Palm Oil Certification:
Gaps and Options for More Sustainable Production

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Table of Contents

1. Executive Summary

2. Introduction
    2.1. Growing Supply and Demand
    2.2. Impacts on Greenhouse Gases
    2.3. Impacts on Biodiversity
    2.4. Background of RSPO

3. Land Use and More Sustainable Production
    3.1. Improved Field Management and Increasing Productive Yield
    3.2. Plantation Expansion and Degraded Lands

4. Costs and Price Premiums
    4.1. Deforestation and Commodity Prices
    4.2. Economic Values of Alternative Land Use Options
    4.3. Palm Oil and Timber and Carbon Offsets in Indonesia (POTICO)
    4.4. Price Premiums for Certified Oil Palm

5. Certification Options
    5.1. Supply Chain Certification Schemes
    5.2. GreenPalm
    5.3. Malua BioBank and Conservation Certification
    5.4. Tiered Certification

6. Implications and Conclusion

7. Annexes

8. References

1. Executive Summary

Palm oil production is a rapidly growing commodity industry leading to rampant deforestation and land use change due to its lucrative financial returns. Palm oil plantation expansion has significant impacts on ecosystem services, biodiversity loss, and greenhouse gas balances through extensive logging activities and unsustainable land use change. Greater certification and sustainable production is necessary in order to not only lessen environmental impacts but also to ensure longer-term and more sustainable economic growth for producing regions.

This report focuses on some of the fundamental economic aspects driving production processes and analyzes ways to implement more sustainable means of production and improve certification transparency throughout the supply chain. Improving field management and productive yields alongside expansion onto degraded land are two components of the scaling up of sustainable oil palm production. Viable mechanisms and incentives must address the profitability and opportunity costs of sustainable management practices and the cost of certification that oil palm producers face.

The findings here illustrate the current gaps in incentivizing producers to undertake more sustainable processes. GreenPalm, Malua BioBank, tiered certification, payments for ecosystem services (PES) programs, Reducing Emissions from Deforestation and forest Degradation (REDD) activities, and higher price premiums for certified environmental goods are all potential ways to address the costs of certification and ensure more sustainable production. A combination of such innovative approaches with more robust governance and regulatory measures are critical catalysts that can help drive such change. Without sufficiently addressing opportunity costs, business-as-usual approaches will only continue, increasing environmental impacts and limiting the welfare of future generations in these regions.

2. Introduction

The palm oil commodity trade is a rapidly growing industry. Palm oil is consumed increases for a wide variety of uses including food, soaps, detergents, cosmetics, plastics, and perhaps most notably biofuel. Increased production of palm oil and the expansion of palm oil plantations greatly threaten the rich biodiversity habitats in palm oil producing regions, namely

Malaysia and Indonesia where 90 percent of oil palm production occurs.[1] Growing demand for biofuels in the face of climate change will continue to expand the palm oil market, although palm oil production arguably leads to a net gain of greenhouse gases (GHG) due to deforestation and destructive land use practices, depending on the type of land established for plantations (primary forest, degraded, other types of cropland). An effective and efficient certification market for the palm oil sector is essential.

Scaling up palm oil certification encompasses a number of key factors. Both supply and demand of certified palm oil are mutually reinforcing mechanisms that help drive increased production of sustainably produced oil palm. In one sense, ‘scaling up sustainable oil palm production’ is a paradox. However, “sustainability” in this context does not mean agronomic sustainability, but rather implies production that accounts for impacts not only on environmental services and biodiversity but also long-term impacts on intergenerational welfare. Therefore, ‘scaling up sustainable oil palm production’ means increasing supplies of palm oil that accounts for negative externalities. The balance between maximizing the welfare of producing countries’ citizens in the present as well as over the long term is a broader and more complex issue. While the issue of scaling up oil palm production is highly contingent on factors at the local, regional, and national levels, this analysis focuses on the palm oil certification market in aggregate, with certain aspects applying more in certain regional areas than others. Ultimately, this study aims to recognize the disparity between effective sustainable palm oil production and the status quo and potential avenues in implementing robust incentives for more sustainable production and growth.

This report seeks to examine how to scale up sustainable palm oil production, exploring issues and potential options in increasing the supply of sustainable palm oil in order to address growing global demand. A number of questions arise in determining the feasibility of effectively increasing oil palm supply sustainably in terms of impacts on greenhouse gas emissions, biodiversity, etc. Can price premiums for palm oil match costs of certification? Can the expansion of oil palm plantations on degraded lands or existing agricultural land instead of primary forest lead to equally if not greater profits in the long term? These are pivotal questions in addressing how to potentially scale up supply. Section 2 provides some background on recent palm oil developments, its impacts, and the main palm oil certification body, the Roundtable on Sustainable Palm Oil (RSPO). Section 3 examines land use options for more

[1] Thoenes (2006).

sustainable oil palm production by taking into account the importance of improving field management, productive yields, and the potential for establishing plantations on degraded lands. Section 4 focuses on the economic values attributed to various land-use options and pinpoints how to address the opportunity costs dilemma for producers. Section 5 looks into the role of various supply chain certification schemes and the relevant potentials and challenges with each. And lastly, Section 6 concludes by outlining more general aspects of palm oil certification scalability.

2.1. Growing supply and demand

Palm oil's many uses in commercial markets and its high profitability have enabled its rapid expansion in the past decades. Compared to other oil crops and vegetable oils, palm oil production generally has high yields per hectare, low production costs per unit, supportive economic environments and policy settings in the two main producing countries (Indonesia and Malaysia), high trade-to-production ratio, and a high level of market concentration.[2] All of these factors have allowed for rapid advances and modernization of production.

Projections by the Food and Agricultural Organization (FAO), the OECD, and FAPRI claim that global vegetable oil demand, supply, and trade are to rise by approximately 30% from 2006 to 2015.[3] Growing demand for biofuels and palm oil in particular is evident in the EU's doubling of palm oil imports from 2000-2006. Palm oil production is expected to continue to rise due to its price competitiveness and the lucrative nature of oil palm plantations. It is estimated that during 1990–2005, 55–59% of the total extent of oil palm expansion in Malaysia and at least 56% of that in Indonesia occurred at the expense of old-growth or secondary (logged) forests.[4] The 2009 United Nations Environment Program's (UNEP) 2009 report on biofuels claims that "two-thirds of the current expansion of palm oil cultivation in Indonesia is based on the conversion of rainforests, one-third is based on previously cultivated or to-date fallow land."[5] However, growing sustainability concerns about palm oil, particularly in the EU, may pressure industry and policy makers to adopt more widespread RSPO certification and effective

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[2] Thoenes (2006).
[3] *Ibid.*
[4] Koh & Wilcove (2008).
[5] UNEP (2009).

environmental standards. It should be noted however that oil palm may not be as major a driver of deforestation as other activities. Oil palm development only accounts for 4% of worldwide forest loss[6] and about 8% of the forest loss in Indonesia from 1990-2000.[7] Relative to other activities, oil palm development may not be as significant, but its impacts are nevertheless considerable.

2.2. Impacts on Greenhouse Gases (GHG)

The establishment and expansion of oil palm plantations has led to rapidly growing emissions of GHG due to deforestation and forest degradation from unsustainable logging and cultivation of peat land. Deforestation in Indonesia accounts for about 34% of worldwide GHG emissions related to land-use change and forestry (LULUCF) and 94% of GHG emissions in Indonesia, the third largest emitter of GHG after China and USA.[8] GHG emissions can vary greatly depending on the amount of above ground biomass prior to plantation development. The palm oil industry is a net emitter despite positive GHG balances on oil palm plantations on degraded land and grassland.[9]

Fairhurst and McLaughlin (2009) proposed that the RSPO and governments could regulate plantation expansion so that new areas can be developed only where the carbon displaced can be recovered within one planting cycle of 25 years. This requirement would push investors to choose sites with small stocks of standing biomass, encouraging producers to set high yield targets and total biomass production. Despite the need for the RSPO to recognize GHG balances, a recent RSPO conference in 2009 decided not to include GHG emissions standards in its certification criteria for 'sustainable' palm oil.[10] Another option is for the influx of REDD credits through more viable and robust mechanisms. This issue is addressed in Sections 4.2 and 4.3.

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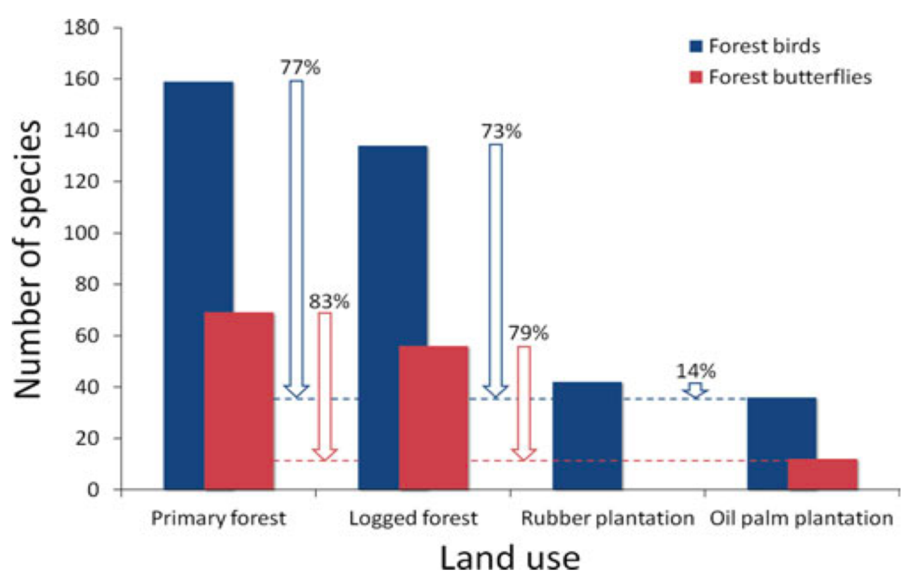
[6] Corley (2006).
[7] Fairhurst and Härdter (2003).
[8] World Resources Institute (2009).
[9] Fairhurst and McLaughlin (2009).
[10] Browne (2009).

2.3. Impacts on Biodiversity

The expansion and establishment of oil palm plantations in forested areas impacts biodiversity through conversion of wildlife habitat. Oil palm plantations support far fewer species than forests, due to land-cover change and habitat fragmentation. Oil palm's ecological impact depends on the extent to which plantation expansion causes deforestation and the ability of plantations to support biodiversity.[11] The destruction of the habitats for such mega fauna as orangutans, elephants, and tigers has led to global criticism of palm oil production.

Oil palm plantations are structurally more homogenous than natural forests due to uniform tree age structure, lower canopy, less undergrowth, more human disturbance, and less stable microclimates.[12] Oil palm plantations are therefore consistently criticized for being a mono-crop in that only a narrow range of species survives in such plantations. Fitzherbert et al. (2008) found that only about 15% of species found in primary forest survived in oil palm plantations and that oil palm plantations hold fewer than half as many vertebrate species compared to primary forests. Figure 1 below illustrates the differences in the total numbers of

Figure 1. Species of Birds and Butterflies Under Various Land Use Options. Koh and Wilcove (2008).



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[11] Fitzherbert, et al. (2008).
[12] *Ibid.*

forest birds and forest butterflies under various land use options in southern Peninsular Malaysia and Borneo. The literature is not clear on how biodiversity in oil palm plantations compares with other agricultural land, but it is much lower relative to primary and managed forests.

As with other crops, these impacts are contingent on crop management practices. Initial land clearance and preparation actions, such as burning, lead to the greatest impacts, killing seeds and sedentary animals and eroding the soil. Further impacts include water pollution from onsite mills. In addition, biodiversity richness within plantations varies depending on ground cover and pest control management implemented by plantation operators.[13] Annex 1 maps the global distribution of oil palm and potential conflicts with biodiversity. Derived from various national and international databases, the map shows the general pattern of how oil palm plantation development poses serious conflicts with biodiversity. The presence of sufficient non-forested land for plantation development can help minimize biodiversity damage, but the profitability of both timber and palm oil incentivizes producers to clear-cut and convert primary forests.[14]

2.4. Background of RSPO

The Roundtable on Sustainable Palm Oil (RSPO) is the foremost body promoting sustainable palm oil. Established in 2004, the RSPO is a not-for-profit association and takes a multi-stakeholder approach in developing and implementing global standards for sustainable palm oil. The RSPO unites stakeholders from seven sectors of the palm oil industry – producers, palm oil processors or traders, consumer goods manufacturers, retailers, banks and investors, environmental or nature conservation NGOs, and social or developmental NGOs. The founding members of the RSPO in 2004 were Aarhus United UK Ltd, The Body Shop (UK), Golden Hope Plantations Bhd (Malaysia), Karlshamns AB (Sweden), Loders Croklaan (Netherlands), Malaysian Palm Oil Association, Migros Genossenschafts Bund (Switzerland), Pacific Rim Palm Oil Ltd (Singapore), Unilever NV (Netherlands) and WWF.

[13] Fairhurst and McLaughlin (2009).
[14] see Koh & Wilcove (2008).

Principles and Criteria for Certification

RSPO's Principles and Criteria for Sustainable Palm Oil Production[15] are listed as the following:

1. Commitment to transparency
2. Compliance with applicable laws and regulations
3. Commitment to long-term economic and financial viability
4. Use of appropriate best practices by growers and millers
5. Environmental responsibility and conservation of natural resources and biodiversity
6. Responsible consideration for employees and for individuals and communities affected by growers and mills
7. Responsible development of new plantings
8. Commitment to continuous improvement in key areas of activity

These criteria come with indicators and guidelines in order to assist RSPO members and applicants to fulfill requirements for RSPO certification. The RSPO criteria are rigid to an extent and encompass many critical points in terms of sustainability, but loopholes and gaps do remain, necessitating improvements and providing important lessons for scaling up certification. The criteria currently do not sufficiently address leakage issues (fringe plantation boundaries and spillover effects) or GHG balances throughout the palm oil supply chain.

Principles 5 and 7 relate most directly to biodiversity conservation and habitat conversion issues. Principle 5 focuses more on aspects of the plantation and mill management processes while Principle 7 focuses on the development of new plantations themselves. Criterion 5.2 does address outer plantation areas, or "wider landscape-level considerations (such as wildlife corridors)." If plantations are found to affect rare, threatened or endangered species or high conservation value habitats, then they must take this into account in their management plans and operations by "ensuring that any legal requirements relating to the protection of the species or habitats are met, avoiding damage to and deterioration of applicable habitats, and controlling any illegal or inappropriate hunting, fishing or collecting activities; and developing responsible measures to resolve human-wildlife conflicts (e.g.,

[15] "RSPO Principles and Criteria for Sustainable Palm Oil Production: Including Indicators and Guidance." 2007. http://www.rspo.org/

incursions by elephants)."[16] These guidelines are a reasonable start in minimizing plantation impacts on habitats and biodiversity.

Documented impact assessments are required under both principles 5 and 7. Criterion 7.1 relies heavily on certified auditors who conduct independent impact assessment. The criteria states that "a comprehensive and participatory independent social and environmental impact assessment is undertaken prior to establishing new plantings or operations, or expanding existing ones, and the results incorporated into planning, management and operations."[17] Thus, the effectiveness of these criteria falls largely on independent auditors, who must take into account the common practice that many timber companies first harvest timber and then begin oil palm plantations on forestland that was once biodiversity valuable.

3. Land Use and More Sustainable Production

Land use and palm oil plantation development is arguably the core issue when it comes to scaling up production of sustainable oil palm. With rapidly growing demand for palm oil, there are a number of ways to effectively meet the growing need for more production, potential economic gains, and environmental sustainability. Increasing yields and productivity, improving field management, and expanding and developing plantations on degraded land are examples of potential ways to engage in more efficient and sustainable palm oil cultivation.

Such practices are the most viable means to address palm oil supply, GHG emissions mitigation, and biodiversity conservation. Improving the performance of palm oil production in line with the RSPO sustainability criteria is possible by establishing plantations on land with minimal levels of biomass and by closing the agronomic gap between potential and present yields, although it should be noted that potential yields calculated by agronomists often exceed economically optimal yields due to the costs of achieving higher yields. Also important is the cost effectiveness of such actions and whether sufficient financial and regulatory mechanisms can be put into place to incentivize them, addressing the producers' opportunity costs of continuing with business-as-usual oil palm development. Various land use options and their economic value potentials are discussed in Section 4.

[16] *Ibid.*
[17] *Ibid.*

This section focuses on specific land use options in addressing how to implement more sustainable oil palm production as opposed to business-as-usual approaches. Fairhurst and McLaughlin's (2009) study serves as the basis for many of the points addressed here. Section 3.1. examines how management and productive yields can be addressed, and Section 3.2. addresses the expansion and use of degraded lands. Soil quality, elevation, and (micro) climate effects are not examined but certainly influence palm oil production and sustainability.

3.1. Improved Field Management and Increasing Productive Yield

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Improvements in field management for increased yields *along with* mechanisms to incentivize expansion onto degraded land are critical for minimizing the amount of forestland needed for oil palm production.[18] Each condition is necessary but certainly not sufficient for addressing how to increase sustainable production. Improving management practices to increase yields alone will only increase returns to oil palm and thereby promote further deforestation. Chomitz (2006) states that soils, climates, markets, and governance stresses affect deforestation across space and time. Both positive feedbacks, such as increasing demand for food and fuel, as well as negative feedbacks, such as deteriorating soil quality, help shape how landholders respond to incentives thereby affecting deforestation rates.[19]

Figure 2 below illustrates how over the past 40 years Indonesian oil palm plantation area and production have seen exponential growth while the relative yields have remained relatively stagnant since the mid 1970s and have indeed decreased in the past twenty years despite improvements in yield potential of commercially available planting materials.[20] Expansion onto poorer quality land with less fertile soils and inadequate and inefficient field management practices are two primary reasons for stagnant relative yields.[21]

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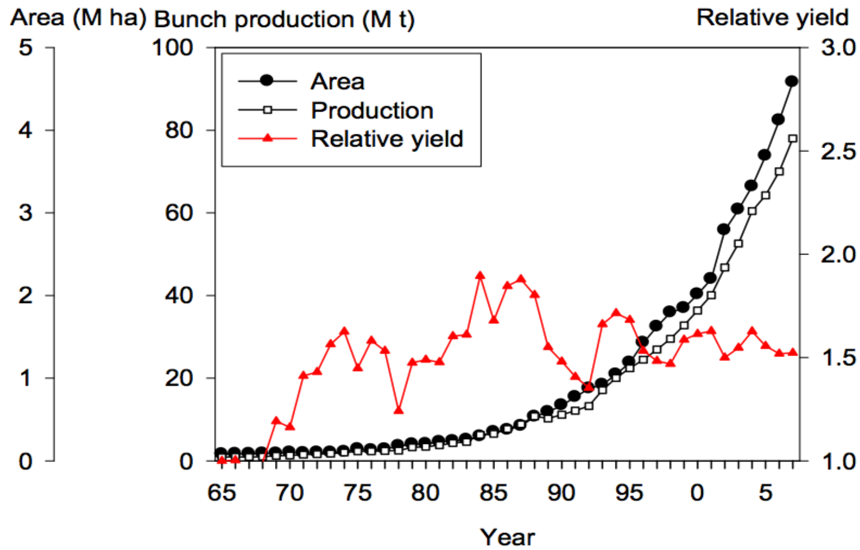
[18] Fairhurst and McLaughlin (2009).

[19] *Ibid.*

[20] Corley and Tinker (2003).

[21] *Ibid;* Fairhurst and McLaughlin (2009).

Figure 2. Area planted, bunch production, and relative yield of oil palm in Indonesia from 1965-2007. Fairhurst and McLaughlin (2009) and FAO (2008).



Fairhurst and McLaughlin (2009) outline ten major components for "best management practices" for greater yields as applied to the Cargill Harapan Sawit Lestari estate in West Kalimantan, Indonesia:

- Complete crop recovery by strict control of harvesting to eliminate crop loss
- Harvests at seven day intervals
- Proper access for harvesting (infield paths, foot bridges, road access)
- Continuous maintenance of correct canopy conditions by removing fronds at harvest and pruning twice a year
- Ground cover management to provide adequate soil cover but provide harvesters and other field workers with unimpeded access
- Adequate in-field drainage and outlets
- Recapitalization of soil phosphorous
- Timely application of standard fertilizer rates
- Application of empty fruit bunch mulch
- Strong commitment of all plantation management staff to maximize yield by eliminating field constraints

Such management practices are "better" only when costs are not fully accounted for. Section 4 examines how financial returns of various land use options vary. The financial analysis in the Fairhurst and McLaughlin (2009) study is based on four different land types, not management practices, and hence does not specifically examine the costs of such stated "best management practices."

Principle 4 in the RSPO's Principles and Criteria for Sustainable Palm Oil Production[22] stipulates guidelines for the use of appropriate best practices for growers and millers. Again, the phrase "best practices" is seemingly meaningless if there is no expectation of higher financial returns from applying them. In terms of sustainability, it is vital for palm oil producers to strive for these best management practices not just for the sake of more responsible environmental management but also for eliminating potential inefficiencies in production processes in order to reap higher revenues and minimize costs in the long run. The large obstacle here is the absence of literature that has investigated how incremental costs and incremental revenues vary between different land use options *and* management practices with regards to oil palm. Section 4 touches upon some of these concerns.

As stated before, increasing yields alone is insufficient in fully addressing how to scale up more sustainable palm oil production. Once maximum yields are reached on existing plantations, producers and companies will still have incentives to expand current plantations. Only when improved management practices are taken into account in addition to mechanisms and signals to incentivize expansion onto degraded or already converted land can increased palm oil production occur more sustainably.

3.2. Plantation Expansion and Degraded Lands

While increasing productive yields helps in enabling more effective output per ha of land, expansion will inevitably continue in order to match escalating demand and take advantage of the lucrative nature of the oil palm market. Expansion onto grasslands and degraded land can address the question of how to expand plantations with minimal environmental impacts. Degraded land can have various meanings, sometimes referring to nutrient depleted soil due to erosion or to changes in vegetative land cover. UNEP defines land degradation as a "long-term loss of ecosystem function and services, caused by disturbances from which the system cannot recover unaided" (UNEP, 2007). Establishing and expanding oil

[22] "RSPO Principles and Criteria for Sustainable Palm Oil Production: Including Indicators and Guidance." 2007. http://www.rspo.org/

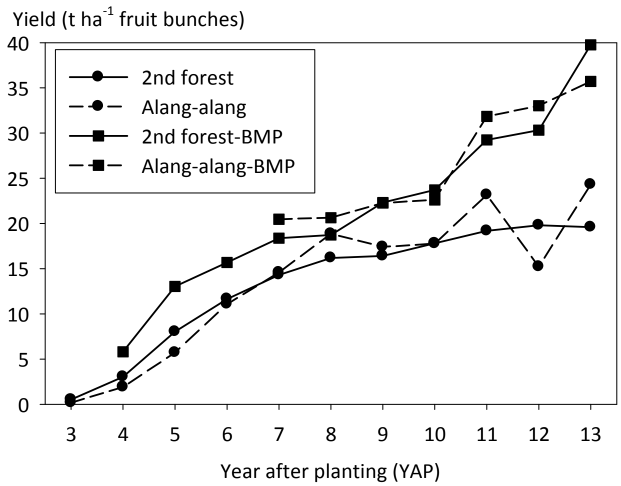
palm plantations on degraded lands yield greater environmental benefits in terms of minimizing carbon stock reduction and impacts on biodiversity.

Management practices have been shown to play a great role in determining yields irrespective of previous land use.[23] Ramdhani and Taufik's (2006) study examined the amount of land suitable for oil palm in Kalimantan using complex models involving 14 criteria which included slope, elevation, humidity, temperature, rainfall, relief, landform, soil, soil origin, land cover/use, conserved, area, key species habitat, water body, and settlements. Using a GIS model, the authors estimated the amount of degraded land suitable for production and the amount of yield that could be achieved on such land. Such assessments and rich data sets illustrate how ground surveys and geospatial mapping are critical elements in determining suitable degraded lands for oil palm development, overlaying maps with soil texture and topography data. Such studies on a larger scale can better inform producers on land areas that can be utilized for more sustainable production while at the same time achieving competitive financial returns.

Fairhurst and McLaughlin (2009) highlight that the experience at Cargill's oil palm estate Harapan Sawit Lestari (HSL) in West Kalimantan, Indonesia "showed that when best field management practices were applied but using standard fertilizer application rates, yields were greater in mature palms (≥3 years after planting) compared with palms under standard estate practice irrespective of previous land use" (Figure 3). These results indicate that oil palm plantation expansion onto degraded lands will not necessarily see decreased yields when best field management practices are employed, contingent on soil, elevation, and climate effects notwithstanding. Again, the authors failed to specifically assess the financial returns associated with specific management practices but rather focused explicitly on oil palm establishment on four land types. Further research and financial analyses must more comprehensively assess the costs of various management practices.

[23] Goh et al. (1994); Goh et al. (2000).

Figure 3. Comparison of yield from palms planted on land cleared from secondary forest and from glassland under standard and best field management practice in Harapan Sawit Lestari (HSL). Fairhurst and McLaughlin (2009).



4. Costs and Price Premiums

The apparent clash between effectively implementing sustainability standards and the lucrative nature of palm oil production under the status quo is the greatest hurdle in scaling up palm oil certification and sustainable production. While higher yields and plantation expansion on degraded lands offer more sustainable means for oil palm production, the question of cost and financial incentives is of arguably greater interest in terms of effectively addressing the potential for production and certification scalability. Without sufficient financial incentives for producers and developing regions, there is little hope for scaling up palm oil certification and production.

A major discussion left out of section 3 is the dilemma between sustainable forest management and private gains from deforestation and agricultural conversion. While the options discussed in that section are indeed avenues to scale up sustainable palm oil production, there must be mechanism(s) and drivers to incentivize such options. Otherwise, they remain just that, options, and not financially attractive investments. Business-as-usual scenarios of deforestation and agricultural conversion would then continue and flourish unchecked.

Profits from deforestation (and sustainable management, for that matter) are attributable to a large number of economic variables, including but not limited to land use systems, conversion and production costs, administrative costs, land values, timber prices, commodity (oil palm) prices, wage rates, and more. While in-depth analysis of all these factors goes beyond the scope of this paper, this study examines what are perhaps some of the most significant factors in determining palm oil profits and possible ways to better incentivize producers toward more sustainable behaviors.

4.1. Deforestation and Commodity Prices

The global land area of oil palm cultivation has more than tripled since 1961 to over 13 million hectares.[24] More than half of the expansion in Indonesia and Malaysia since 1990 has come at the expense of forests, with the distinction between primary, secondary, or plantation forests not being clear.[25] Using data from the Food and Agriculture Organization (FAO) of the United Nations, Koh and Wilcove (2008) determined the relative contributions of cropland and forestland to oil palm plantation development in both Malaysia and Indonesia. The authors assumed that the total decline in area of all commercial crops between 1990 and 2005 was the maximum cropland area converted to oil palm plantations. Secondly, they assumed that the total decline in forest area (primary, secondary, and plantation forests, excluding rubber plantations) was the maximum forest area converted to oil palm plantations. For Malaysia, their analysis indicates that during 1990-2005 between 55% and 59% of oil palm is attributable to forest conversion, with 41 to 45% due to conversion of pre-existing cropland (including rubber plantations). For Indonesia, it indicates that at least 56% of expansion is attributable to conversion of primary, secondary, or plantation forest. The relative shares for different types of forests are difficult to discern. Malaysia reported no loss of primary forests during this period.[26] Assuming this is correct, significant amounts of secondary and/or plantation forests were therefore converted to oil palm plantations. According to UNEP, in Indonesia, two-thirds of current palm oil plantation expansion is based on rainforest conversion while one-third is based on previously cultivated land.[27] The primary shortcomings with FAO's data are that no

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[24] FAO (2008).
[25] Koh and Wilcove (2008).
[26] FAO (2006).
[27] UNEP (2009).

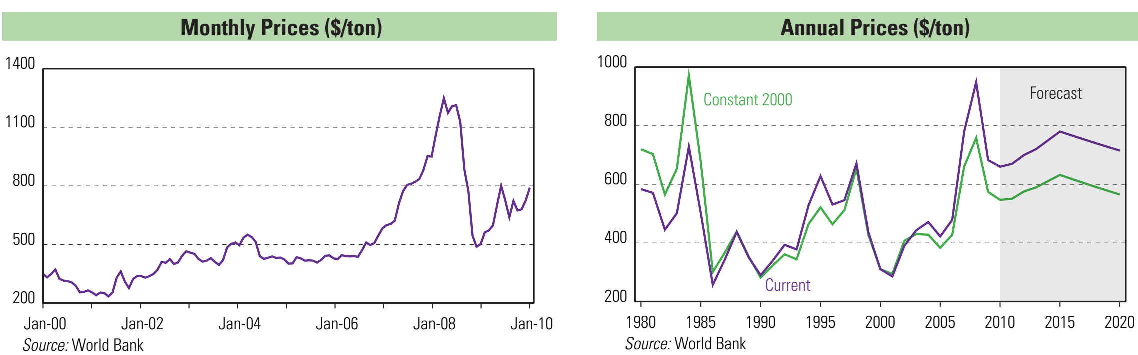
independent remote-sensing surveys validated the data and that the numbers are self-reported by country governments (hence, there is potential for bias).

Chomitz et al. (2006) state that other things being equal, higher prices for crops and lower prices for farm inputs will spur faster deforestation. Deforestation in the context of this report refers to complete removal of natural forest vegetation. In addition to numerous other factors, commodity boom and bust cycles, rural-urban migration, and fixed and overvalued exchange rates are all important co-factors that may play significant roles in affecting deforestation rates.

In order to examine the links between palm oil production and prices, it is important to look at the general trends over the past years along with recent patterns. Palm oil production costs are generally low, especially when compared to other vegetable oil crops. Palm oil has the lowest per unit production costs and thus has been the most price competitive vegetable oil in the global market in most years.[28] In relation to 2000 prices, recent palm oil price trends are similar to those for other vegetable oils and are greatly influenced by global market trends for food and energy commodities. Inflation-adjusted prices doubled over the period 2005-2007 (Figure 4) due in large part to increasing demand for vegetable oil for biodiesel production as well as edible oils in other markets.[29] As the figure shows, however, they collapsed during 2008 and have only partially recovered since.

Figure 4. a) Global monthly price trends for palm oil from Jan 2000 to Jan 2010; b) Global annual price trends from 1980 to 2010 and forecasted to 2020. Data from World Bank (2010).

a) **b)**



[28] Thoenes (2006).

[29] Grieg-Gran (2008); World Bank (2010).

Future research should examine the relationship between oil palm prices and deforestation rates with greater econometric rigor. Chomitz et al. (2006) elucidate the challenges in comparing variations in prices and deforestation rates across different spatial and temporal contexts due to confounding factors and inconsistent measurements.

Rapid increases in oil palm demand will create even greater pressure for plantation development. The Food and Agriculture Research Policy Institute in the U.S. has forecasted palm oil consumption to increase by 46 percent over the next ten years along with projections that nominal palm oil prices will be above US$1000 per ton while real prices will be at about US$1000 under a 2.5% annual inflation rate.[30] Rapid increases in demand and oil palm prices (although, Figure 4 shows flat prices after 2010, not rapid increases), the returns per hectare for oil palm will only increase in coming years, hence placing even greater pressure on deforestation and land conversion. The next section examines the opportunity costs of land uses and the studies that have studied the economic value of various land use options.

4.2. Economic Values of Alternative Land Use Options

In order to determine whether viable incentives can be developed for more sustainable production, it is imperative to start by quantifying the tradeoffs in land use change for various alternatives. A number of studies have done such work, including estimating financial returns for oil palm plantation development. The measure of profitability and economic worth is the estimated net present value (NPV), which is the present discounted value of revenues minus costs of tradable inputs and domestic factors of production over the course of the plantation's existence.[31]

The multitude of assumptions, spatial scales, time horizons, prices, discount rates, and other variables in the literature on economic values of land use options makes direct comparisons across studies difficult. Other factors that further complicate opportunity cost calculations across studies include soil and climate conditions, size of operations, technology, distance from markets and transportation infrastructure, and the cost of labor.[32] All these

[30] FAPRI (2008).
[31] Tomich et al. (2001).
[32] Grieg-Gran (2008).

variables make the extrapolation of research findings on larger scales difficult and potentially suspect.

Grieg-Gran (2008) outlines the risks of common approaches studies have used in estimating returns to land. The risk of estimates that use average production costs and revenues is that they may not capture local variation in yields or scales of operation. By not including costs of production, equating the opportunity cost to the value of production tends to exaggerate the opportunity costs of avoiding deforestation. The use of land prices in many studies is questionable due to lack of clear ownership and land markets (tenure, permits, etc.) in many developing countries. Generally speaking, producers prefer to clear virgin forest to earn income on timber sales instead of developing on cleared land,[33] and the price that oil palm smallholders and estates receive for fresh fruit bunches (or FFB, one of the main forms of oil palm products) affects the returns to forest land conversion to oil palm.[34] Producers also prefer expansion into forestland rather than abandoned agricultural land because recently cleared forests need less fertilizer and profits are generally greater.[35]

The NPV summary table in Annex 2 highlights notable studies that have calculated economic returns from various land use options. Despite the inability to compare prices between studies, an overall trend does emerge when looking at the opportunity costs among the various options within each study. There is minimal financial evidence in support of not converting forests to other land uses. Fairhurst and McLaughlin (2009) focus only on palm oil plantation profits based on land type in their analysis and therefore differ significantly in therir approach compared to the other studies, which examined various types of commodity production and forest management. In the case of Cameroon in the Yaron (2001) study, local communities fare better financially by clearing forest land for small-scale farming. Oil palm is widely regarded as the most profitable option for Sumatra, Indonesia in terms of returns to land (social prices) and returns to labor (private prices). Indonesia's oil palm producers also have the lowest per unit costs compared to other oil palm producing regions.

Annex 3 illustrates some of the information in the NPV table at a more conceptual level. Using Fairhurst and McLaughlin's (2009) estimates for financial returns of various types of plantations on land type as the basis for this graph, one can see a number of simple

[33] Tan (2009).
[34] Grieg-Gran (2008).
[35] Clay (2004) in Worldwatch Institute (2006) chapt. 12 note 31.

relationships between economic value and an environmental characteristic marker. In this case, land elevation is used as a marker for determining how financial returns increase for more intensive land use as elevation decreases.

The literature reveals significant evidence for much greater estimated NPV's for oil palm plantation development in terms of both returns to land values and labor. The evidence here suggests that sustainable forest management generally yields lower returns and employment than commercial agriculture. In terms of oil palm production, the rapid growth in demand and price along with generally low per unit production costs translate to very lucrative financial returns. Chomitz et al. (2007) states that management for non-timber forest products employs 0.3 people per hectare per year with NPV returns of only $5 per hectare while oil palm production employs 108 people a hectare per year and $114 in returns per hectare.

New, innovative, and more robust mechanisms must be implemented in order to innovate markets and attract producers for more sustainable production, addressing their opportunity costs of continuing business-as-usual practices. Unless such mechanisms are implemented and local communities receive increased returns from sustainable resource management, oil palm cultivation and unsustainable land management will continue to be the status quo and the more financially lucrative options for both producers and local communities alike. The RSPO thus serves an important role for such mechanisms to be formulated through its multi-stakeholder framework.

One potential strategy to account for the opportunity costs in avoiding deforestation is through REDD credits. Butler et al. (2009) used a hypothetical plot of 10,000 hectares and based their estimates on observed empirical data for the oil palm estimations and various REDD situations for modeling. Their analysis provides a relatively convincing argument of the long-term net present value (NPV) trajectory of land use for oil palm production contrasted to various options for reducing carbon emissions from deforestation and forest degradation (REDD). By modeling and comparing the profitability of conversion of forest to oil palm versus conservation under REDD, the authors conclude that under their REDD compliance (but not voluntary) scenario projections, net profits could outcompete oil palm returns, but only under their low yield variable price scenario. Figures 5 and 6 below illustrate these points further. Figure 5 models the net operating profit over time for oil palm, a hypothetical REDD compliance scheme, and a REDD voluntary scheme. Figure 6 presents the net present value figures for the different land use options under the same time horizon.

Figure 5. Accumulated net operating profit from 2009-2039. Butler et al. (2009).

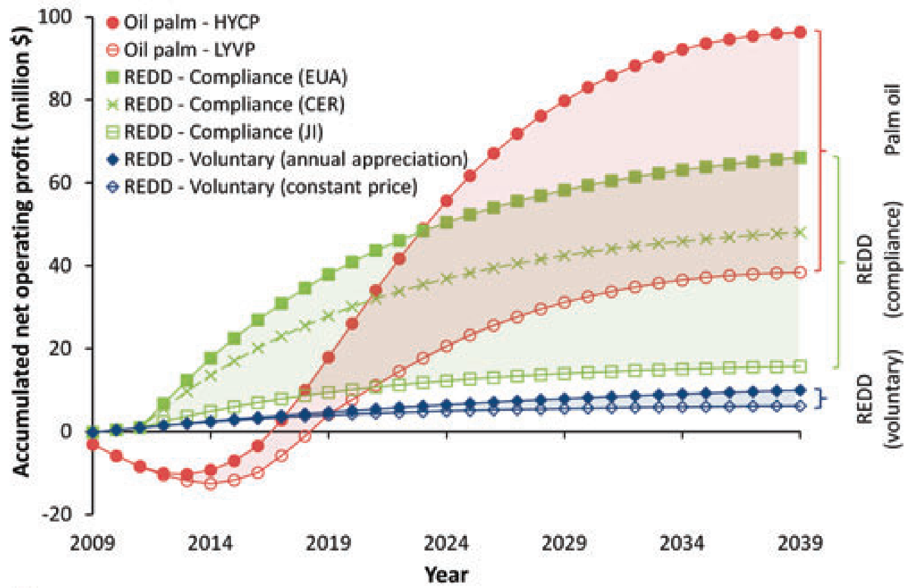
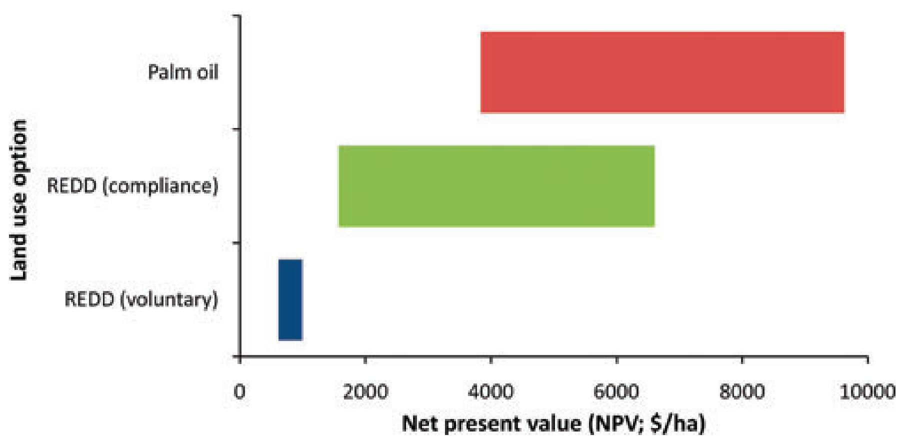


Figure 6. Net present values of three land use options from 2009-2039. Butler et al. (2009).



Although the scenarios in the study are hypothetical in nature, the assumptions are based on a rigorous set of data from Intergovernmental Panel on Climate Change (IPCC) reports, current carbon markets, and Food and Agriculture Organization (FAO) data sets. REDD profitability projections were based on carbon prices of both voluntary and compliance markets, assuming a carbon price of $4.40 per ton CO_2e in 2010 and used the then (2009) current December 2010 futures contact price of $4.65 per ton CO_2e as the carbon price for 2011 to 2039. Default values of forest carbon stocks from the United Nation's Intergovernmental Panel on Climate Change were used as the best practices to estimate forest carbon. I will avoid getting into the specific methodologies the authors used in calculating their projections but simply state that the REDD projections were derived using various price parameters and assumptions from a variety of existing carbon markets including the European Union Allowances (EUA) under the EU Emissions Trading System, Voluntary Carbon Financial Instruments (CFI) from the Chicago Climate Futures Exchange (CCFE), Certified Emissions Reductions (CER) under the Kyoto Protocol's Clean Development Mechanism (CDM), and Joint Implementation (JI) under Article 6 of the Kyoto Protocol. For the oil palm profitability projections, the authors used data from the Indonesian Oil Palm Research Institute along with commodity price data and forecasts from the World Bank. Two scenarios were modeled where one assumes high-yield and constant price (HYCP) and the other assumes low-yield and variable price (LYVP).

REDD is clearly a complex issue with ever-growing analysis being produced. While there is great uncertainty and variability in determining REDD profitability projections, a general picture does emerge. More robust mechanisms must be established and greater participation must occur in order to drive more trading in carbon markets and hence higher carbon prices. Higher carbon prices are a critical component in strengthening REDD's long-term economic prospects and thereby addressing the opportunity costs of oil palm production, and increasing the financial incentives for more sustainable management. Even if REDD mechanisms are applied, the necessary but not necessarily sufficient next step is to ensure that a significant portion of the value of carbon storage and payments goes to local forest owners or users. The issue of distribution is thus critical.

4.3. Palm Oil and Timber and Carbon Offsets in Indonesia (POTICO)

The World Resource Institute's (WRI) Palm Oil and Timber and Carbon Offsets in Indonesia (POTICO) program directly addresses the issue of incentivizing plantation expansion onto degraded and abandoned land and aims to "link sustainable agricultural commodity expansion with Reduced Emissions from Deforestation and forest Degradation (REDD) in Indonesia."[36] POTICO aspires to utilize multiple revenue streams in order to incentivize oil palm companies to establish new plantations on degraded land as well as to sustainably manage forests.

[36] WRI. http://www.wri.org/project/potico

The main opportunity costs for private companies in establishing plantations on degraded lands are derived from decreased future revenues from timber, the risk of ongoing conflicts with local communities, and obtaining new permits for degraded land. Oil palm plantation companies in Indonesia generally capture the profits from timber sales when they expand on rainforest land[37]). By working to direct revenues from certified palm oil and a combination of certified timber and carbon offsets, WRI will direct these multiple revenue streams in order to compensate for the foregone revenue from clear-cutting or selective logging of timber. Partnering with the Tropical Forest Trust (TFT), WRI also seeks to develop sustainable management plans for the forested land previously slated for conversion. Relevant legal and regulatory frameworks, site-specific multi-stakeholder consultation, and cost-benefit analysis will determine feasibility of the suite of options. Under the RSPO sustainability criteria, effective engagement of local stakeholders must be conducted through the process of gaining free, prior and informed consent (FPIC). Furthermore, POTICO aims to generate key tools and resources in enabling such future initiatives and efforts through economic modeling, mapping of degraded land, legal analysis, FPIC process documentation, improved district land use planning, and among others.

A significant difference with the Butler et al. (2009) study is the "all or nothing" approach in comparing different land use options. In other words, Butler et al. (2009) compared land use economic values and profitability in terms of scenarios where land use was completely devoted to REDD concessions versus land use solely devoted for mono-crop oil palm production. Furthermore, Butler et al. assumed under the REDD scenarios that all forest area would be left undisturbed and eligible for carbon credits. No compensation for other ecosystem services (such as erosion control or watershed protection) was included or economic activities such as sustainable harvesting of forest products. POTICO offers a hybrid approach in taking elements from both options in order to address the opportunity costs of producers for more sustainable activities through the combination of revenue streams from certified sustainable oil palm, certified sustainable timber, and carbon offsets.

Unfortunately, published economic forecasts are not available from POTICO, as it is in its infancy. There exist no rigorous profitability assessments under which profits from payments for ecosystem services activities, sustainable timber harvesting, carbon, and sustainable oil palm harvesting are compared to profits from putting land into mono-crop oil palm production in

[37] UNEP (2009).

business as usual approaches. So, although in principle POTICO may potentially generate greater profitability in addition to what potential REDD credits could provide, by incorporating a combination of activities geared towards certified oil palm and timber production, there is as yet no firm evidence that it will.

4.4. Price Premiums for Certified Oil Palm

Due to the typically higher costs attributed to oil palm certification, it is critical to examine price premiums and potential demand for certified products. Certain parallels can be drawn to Forest Stewardship Council (FSC) certified timber and price premiums for other environmental goods. However, the literature on this subject specifically for certified oil palm is more or less non-existent. This section touches upon some innovative studies that have been done.

The most comprehensive study that has investigated price premiums for more sustainable oil palm is Bateman et al.'s (2009) paper on potential premiums for 'tiger-friendly' oil palm. The paper does not explicitly center on certified oil palm but rather focuses on marketing the benefits of the 'critically endangered' Sumatran Tiger through oil palm production. The authors propose that the most viable approach to compensate the costs of tiger-friendly production is to make those who value the conservation of the tiger pay the cost of that conservation as opposed to subsidy based schemes, which they claim have high information and administrative costs.

The authors use a split sample design to study consumer behavior and willingness to pay (WTP). As expected, as the price of a tiger-friendly good increases the probability of it being chosen decreases. In absolute terms, premiums are highest at the upper end of the market for the higher quality, tiger-friendly good over the conventional good. For the highest level of marketing, the authors found that the premium for tiger-friendly margarine was in excess of 50% at the low quality end of the market and just over 35% at the high end of the market.[38] The share of the upper end of the market is unknown, and the literature lacks studies on the estimation of demand for higher quality, certified oil palm goods over conventional oil palm goods. There could be potential for this end of the market to increase, as has been the case

[38] Bateman et al. (2009).

with US organic foods, which have been growing at a rate of 15% per annum.[39] Demand for organic products is likely to be significantly different, however, then demand for tiger-friendly goods and thus greater research must examine what share of the market such higher quality, tiger-friendly goods take up.

Translating this case study to the RSPO carries significant challenges in the sense that unlike a relatively easily measurable good such as FSC-certified timber, oil palm is used in varying quantities in a large host of products. The complexities of the oil palm supply chain play a large role in linking certified oil palm to the end-consumer whereby the higher premium can be met. GreenPalm is such a mechanism that aims to connect buyers of certified oil palm with producers through its web-based marketplace. Discussed in greater detail in section 5.2., GreenPalm is a web-based broker linking manufacturers and buyers of certified oil palm to appraised and certified oil palm producers whereby GreenPalm certificates are purchased and sold based on various WTP and WTA (willingness to accept) values for buyers and producers, respectively. A significant amount of further research must be conducted in order to effectively measure potential premiums for certified oil palm and identifying niche markets. Greater marketing and education campaigns can also lead to greater awareness of the true cost of certain environmental goods and therefore lead to greater premiums.

5. Certification Options

Up to this point, this paper has highlighted various land use options and illustrated mechanisms to incentivize more sustainable production as ways to involve more stakeholders in the RSPO. In addition to the production side of oil palm production, another significant aspect to the oil palm certification trade is the supply chain itself and monitoring certified oil palm from producer to end-product manufacturer and, ultimately, consumer. The RSPO has identified four main supply chain certification schemes, each with varying advantages and disadvantages. Arguably the over arching concern with these supply chain certification schemes is the magnitude of transaction costs, compared to the magnitude of the price premium. The sections below outline these supply chain certification schemes as well as some innovative ways to reinforce greater certification.

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[39] Quaid (2006).

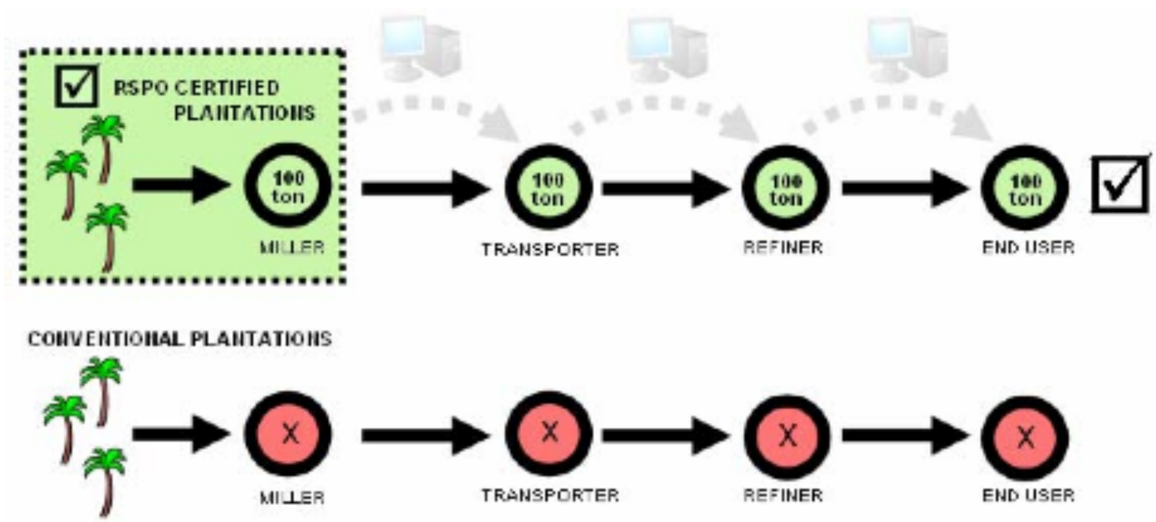
5.1. Supply Chain Certification Schemes

The palm oil production chain is a complex arrangement of various actors and processes with oil palm concentrations varying greatly in assorted products, thereby complicating the transparency and verification of labeled certified oil palm throughout the supply chain (see Annex 3). The RSPO has approved four different supply chain certification systems that preserve a claim to sustainable production: identity preserved, segregation, mass balance, and book and claim. The RSPO's aim by approving such systems is to set up both a credible and practical way for the trade of RSPO certified palm oil.[40]

Identity Preserved

The identity preserved supply chain model ensures that the RSPO certified palm oil that eventually goes to the end user is distinctly identifiable with a specific mill and therefore is continually traceable and isolated from other palm oil throughout the supply chain. The purpose of this model is to assure end users of the specific plantation that their palm oil is derived from. Clearly, the advantages of such a system are that the level of traceability and level of claim are exceptionally high. Implementation and transaction costs on the other hand will be very high due to the need for constant separation of oil palm throughout the entire supply chain.

Figure 7. Identity Preserved Supply Chain.[41]



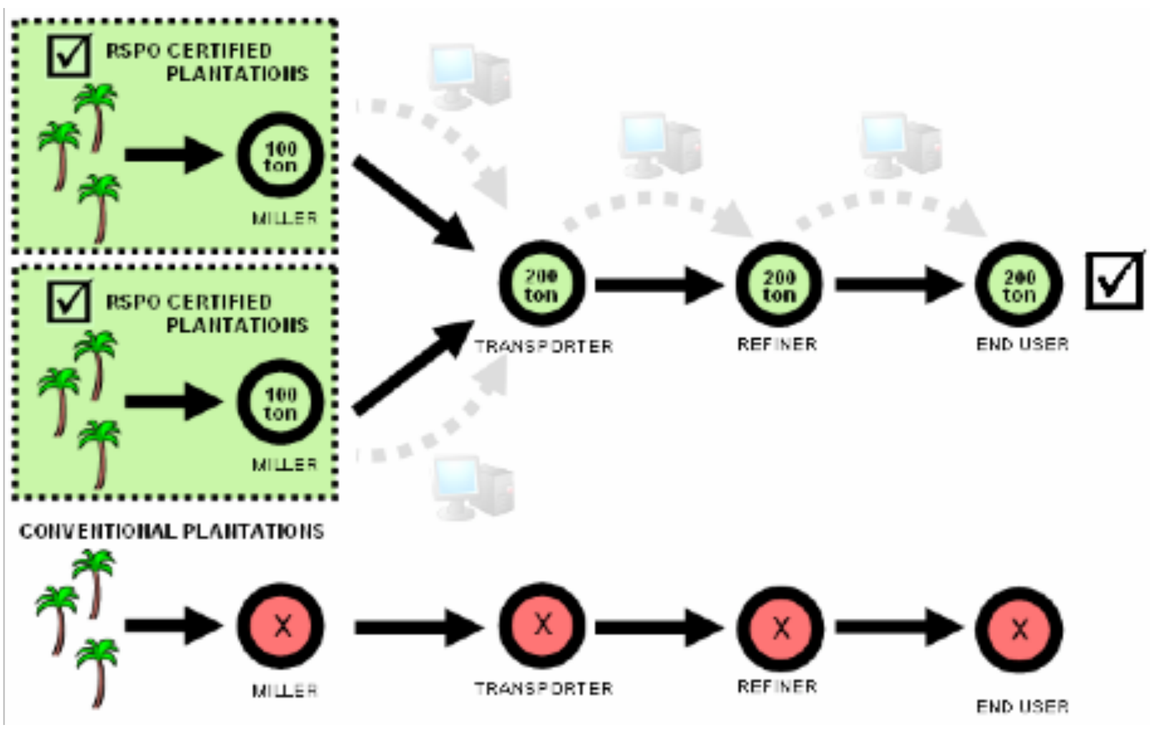
[40] "RSPO Supply Chain Certification Systems." 2008. Roundtable on Sustainable Palm Oil. http://www.rspo.org/

[41] *Ibid.*

Segregation

The segregation model is similar to the identity preserved option except that traceability of the precise source of the certified oil palm is not required. Hence, it allows the mixing of various RSPO certified palm oil from different sources. This model still ensures that certified palm oil is separate from non-certified palm oil throughout every stage of the supply chain. End products that adopt this system are able to claim that the product contains RSPO certified palm oil. The issue with using such a certification scheme is again that the transaction costs are very high due to the required oversight and resources to monitor such a process from the palm oil growers, to the palm oil processors/traders, to the consumer goods manufacturers, and finally to the retailer level.

Figure 8. Segregation Supply Chain.[42]



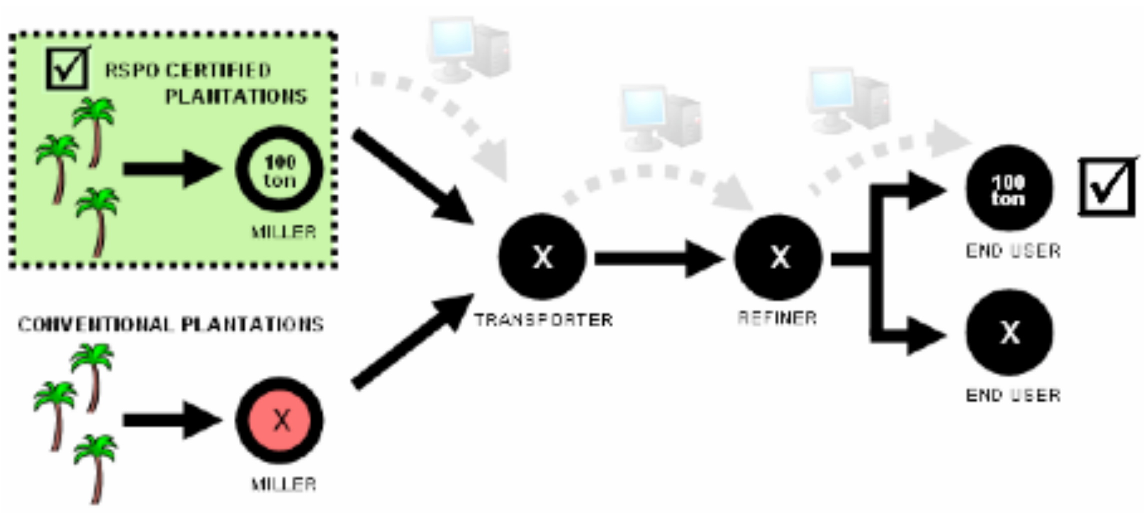
Mass Balance

The mass balance process, or also known as controlled mixing, does not separate certified and non-certified oil palm but rather comingles them throughout the supply chain as overall company quantities are measured. The RSPO has identified that end users who use this

[42] *Ibid.*

model may claim that they "support the production of RSPO Certified Sustainable Palm Oil" as opposed to "contains only RSPO Certified Sustainable Palm Oil" which is the market claim allowed for identity preserved and segregation.[43] While there is no separate storage throughout the supply chain, purchases and sales of RSPO certified palm oil are independently verified and controlled. The direct advantage of such a system is that transaction costs are lower than the previous two models. Mass balance actively engages all supply chain stakeholders to be included in the sustainable palm oil trade in some shape or form, which could help encourage industry to reach a mainstream level of sustainable palm oil trade.

Figure 9. Mass Balance Supply Chain.[44]



Book and Claim

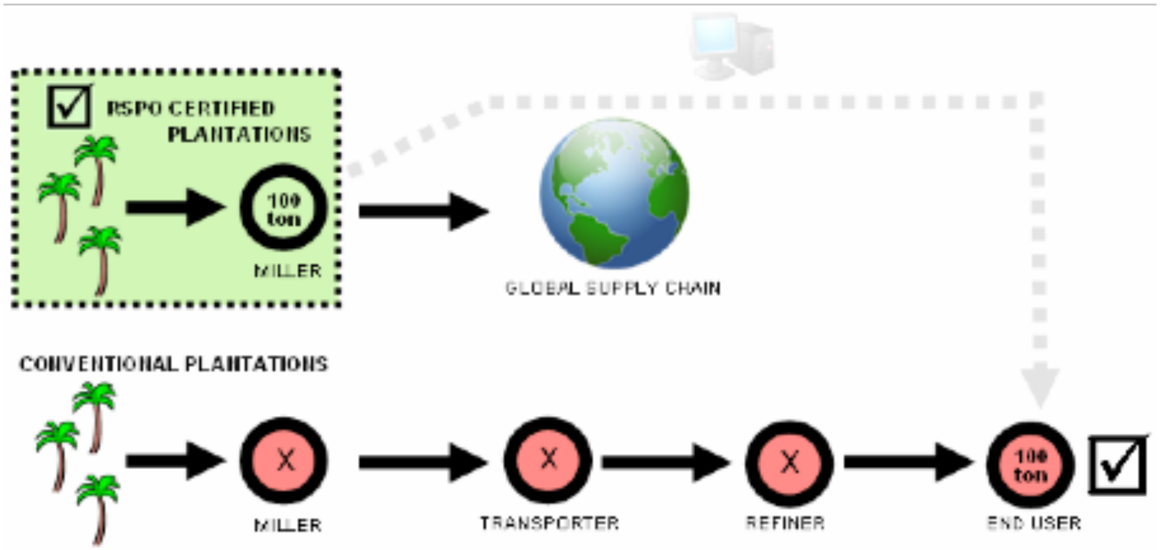
Lastly, the book and claim model is completely separate from the supply chain. It is analogous to a carbon offsets program. Certified palm oil is represented by tradable certificates which are then traded independently from the physical oil and supply chain. RSPO-certified oil producers sell certificates through a broker to buyers and end users who want to support sustainable palm oil production. The end user purchases an equivalent amount of volume credits to the oil they purchase from the physical supply chain. Credits in the certificate trading only comes from RSPO certified mills up to their annual output of certification units, thereby ensuring that all sustainable palm oil is represented by sustainable certificates. Of all the supply

43 *Ibid.*

44 *Ibid.*

chain certification systems, the book and claim model arguably has the lowest transaction costs since it utilizes the existing industry supply chain model, directly connecting RSPO certified sustainable producers to end users of oil palm. The next section discusses the innovative GreenPalm program which aims to offer a financial premium for producers of sustainable oil palm and reducing transaction costs incurred throughout the supply chain.

Figure 10. Book and Claim Supply Chain.[45]



5.2. GreenPalm

GreenPalm, Inc. launched in 2007, is the official book and claim broker for the RSPO. Trading began in September 2008 and as of January 2010 trading has brought the total number of certificates traded to 340,000 (one certificate represents one ton of certified sustainable palm oil), funneling a total sum of more than $3.5 million back to RSPO-certified palm oil producers, net of fees to RSPO and GreenPalm.[46] For reference, world production of palm oil in 2008/09 was 44.262 million metric tons so the number of certified sustainable palm oil is a tiny share of the palm oil trade.[47] Individuals, manufacturers, and retailers can all take part in GreenPalm in order to buy certificates from growers. Currently, there are a total of 109 GreenPalm members,

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[45] *Ibid.*

[46] Norman (2010). http://www.greenpalm.org/blog-press/blog/greenpalm-makes-a-healthy-start-to-the-new-year

[47] World Bank (2010).

9 of which are registered certificate owners and 52 redeemed certificate owners. GreenPalm's innovative approach offers the RSPO and certified oil palm a number of prospective options and also raises many questions, foremost among them the major hurdles in scaling up a book and claim system.

The Process

The participation of oil palm producers in the GreenPalm program is contingent on first being approved by an RSPO-accepted independent auditor and subsequent approval for RSPO certified supplier status. The annual volumes of sustainable palm oil and palm kernels supplied from the producer are recorded and uploaded directly into the RSPO central database.

One of the main issues that arise with GreenPalm's innovative strategy and book and claim in general is how double counting is addressed and avoided. An RSPO-certified palm oil producer has two options with its oil palm supply. The company can sell the RSPO-certified oil palm through the physical supply chain, which requires full segregation and traceability, or alternatively through the conventional market with no label, or a combination of these two options. Most importantly, as a GreenPalm member, the producer registers the cumulative tonnage of RSPO-certified sustainable palm oil with GreenPalm. This volume is then deducted from the RSPO central database and thus cannot be sold through physical supply chains. Double counting is avoided by distinguishing between RSPO labeled oil palm through the physical supply chain with unlabeled oil palm sold in the conventional market, which can then be converted into respective quantities of GreenPalm certificates (see Annex 5).

The producer can then register how many certificates he or she wants to sell on the GreenPalm online trading platform (one GreenPalm certificate = 1 ton of sustainable crude palm oil) and set a price he or she is willing to accept. Buyers of certificates such as retailers or manufacturers bid on how much they are willing to pay for certificates. The appropriate bids and offers are matched and buyers then have 14 days to settle the trade. When redeeming certificates, buyers are then able to claim that they are promoting the production of sustainable palm oil. The producer receives the full value of the traded certificate minus taxes while the buyer pay an extra $1 to the RSPO and $3 in fees to GreenPalm.[48] The literature does not examine how these fees compare to the price premium of the certified and labeled end-product. Future research must assess price premiums for GreenPalm and RSPO-labeled products.

[48] GreenPalm. "How It Works." http://www.greenpalm.org

GreenPalm and the book and claim system in general hold a great deal of potential for reducing transaction costs along the supply chain. This simple approach can be implemented quickly at a potentially large scale and lower cost than the other supply chain certification systems (identity preserved, full segregation, mass balance). As with any supply chain system, there are advantages and disadvantages but a book and claim chain of custody system has significant scaling up viability from the standpoint of reducing transaction costs.

Among the other chain of custody systems, the book and claim model can foreseeably handle larger trade volumes more efficiently and with lower transaction costs. Simply put, increases in demand for sustainability certificates leads to increases in sustainable production since such certificates benefit producers directly.[49] In the other chain of custody systems producers are more dependent on parties they sell their physical oil palm to but in a book and claim scheme they are able to directly receive financial compensation through the book and claim's innovative trading platform. Annex 5 illustrates how GreenPalm's book and claim approach looks on a conceptual level. The system and web-based trading platform is able to completely bypass the typical supply chain between producer and end user, thereby bringing more benefit to oil palm producers.

The biggest drawback to the system is that there is no traceability of the product in the supply chain.[50] Under ideal conditions, the ultimate goal for a supply chain certification system is full segregation and traceability of certified palm oil throughout the supply chain since that allows the most transparent monitoring. Arguably however, GreenPalm enables a high degree of transparency and openness through its live online trading platform. Buyers of certificates earn the right to claim that they support the sustainable production of palm oil and, when redeeming certificates, must match the quantities of palm oil used from the supply chain to the equivalent number of GreenPalm certificates. In a sense, manufacturers can offset their use of palm products by paying an RSPO-certified producer for an equivalent amount of sustainably produced oil palm. By making such claims through marketing and product labels, manufacturers may be able to reap higher premiums on their products for such efforts. Additionality concerns arise as oil palm is still purchased in the normal supply chain but if properly scaled up, GreenPalm gives producers an incentive to conduct more sustainable operations as long as higher certificate prices address the costs of meeting certification standards. Until transaction

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[49] Dehue, et al. (2007).
[50] Hai (2008).

costs decrease, the book and claim and mass balance systems may offer the greatest potential in the short term for scaling up sustainable palm oil certification in regards to the supply chain.

5.3. Malua BioBank and Conservation Certification

One potential option to address the dilemma of increasing supply and demand for both sustainable production of commodities and land use for conservation/restoration is by developing a conservation certificate scheme and/or bank. The wetland mitigation banking industry model in the US is akin to such a system and based on the premise of no net loss; this approach allows development activities to mitigate impacts by buying credits from mitigation bankers.[51] Ultimately, large scale protected areas funded by mitigation banking fees and commodities with attached conservation certificates could lead to greater sustainable crop production, compensating for biodiversity loss and habitat change.

The Malua Wildlife Habitat Conseration Bank (MWHCB) is the first-of-its-kind business model for rainforest conservation, adapting the US mitigation-banking model to conserve tropical rainforests containing globally valuable biodiversity. The bank is located in Sabah, Malaysia on the island of Borneo and will restore and protect 34,000 hectares (80,000 acres) of critical habitat threatened by forest clearance for agriculture and oil palm plantations.[52] Founded as a partnership between the Sabah State Government and the private sector, the land use rights to the government land are held by Yayasan Sabah (the Sabah Foundation) and MWHCB is a wholly owned subsidiary of the US based Eco Products Fund, LP and New Forests, Ltd.. The Sabah government has committed to halt commercial logging in the forest for 50 years and the Malua BioBank Conservation Management Plan works to improve wildlife habitat and promote ecosystem service functions in the protected forests. MWHCB will provide funds for forest conservation during the first six years and in return has the rights to any eco-products such as biodiversity conservation certificates, carbon credits, etc. Part of the revenue from the sale of such eco-products will then be used towards an endowment overseen by the Malua Trust in order to support the ongoing management of the forest into the future.

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[51] Brand (2009).

[52] Malua Wildlife Habitat Conservation Bank. "Malua Forest Reserve. Conservation Management Plan August 2008."

The Malua BioBank will sell Biodiversity Conservation Certificates (BCC's), each representing 100-square meters of rainforest restoration and protection in the 34,000 ha Sabah forest bank. Buyers of such certificates include companies in the energy, food, and cosmetic industries that rely on agribusiness (palm oil) and are becoming increasingly scrutinized for impacts on habitats and biodiversity. Local companies may buy certificates in order to support the Sabah government leadership on environmental and social issues. Lastly, conservation NGO's may buy certificates in order to support the project and innovative conservation initiatives for communities and governments. Revenues from the sale of the certificates will go towards recovering costs and to endow the Malua Trust fund for future management of the Sabah site. Any profits will be shared between the forest management license holder (the Yayasan Sabah foundation to improve the livelihoods of local citizens) and the Malua BioBank investor. Oil palm plantations that buy such certificates can then attach them to their exports of crude palm oil. Brand (2009) claims:

> Each hectare of palm oil plantation produces about 100 tonnes of crude palm oil during its 25 year life. If a biodiversity certificate is attached to teach tonne produced, the hectare of palm oil plantation effectively sponsors the rehabilitation and conservation management of one hectare of the biobank. This makes the palm oil producer the sponsor of biodiversity conservation rather than the cause of its depletion.[53]

Annex 7 illustrates how biodiversity conservation credits could be integrated into the crude palm oil supply chain. As purchases of crude palm oil also translate to purchases of biodiversity conservation certificates, consumer purchases of the end products will lead to expanded conservation. For example, the Malua BioBank can gain a return from selling BCCs at say $10 per 100 square meters of forest rehabilitation and conservation management. One BCC attached per one ton of crude palm oil will only add 1.5% to the current price.[54] Such little money is required to compensate for not turning the 100 square meters into oil palm due to the unique licensing agreement between the Sabah State Government and Malua BioBank, where the Sabah Foundation holds the land use rights to the government land. Developed country importers and eventually consumers would absorb such costs as environmental goods could be targeted to niche markets of consumers willing to pay for premiums of environmental goods in

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[53] Brand (2009).
[54] *Ibid.*

developing regions. Again, analysis of such niche markets as they relate to certified oil palm is largely absent in the literature.

What makes the Malua BioBank case so innovative and interesting is that it is the first commercial biodiversity conservation deal financed by private investors, issuing conservation certificates for tropical rainforest conservation on a commercial basis. Bio-banks could ultimately be built up to sell multiple ecosystem commodities including biodiversity certificates for palm oil, REDD credits to energy firms, and water quality credits to downstream water users.[55] As the global economy grows, eco-commodities could then become highly valuable along with their growing significance for the global economy. Landscapes could begin to be integrated with production and conservation functions on a commercial level through such schemes as Malua BioBank.[56]

The main obstacle for such a mechanism is how to build up the demand for certificates as well as increase the numbers of such banks. More multi-stakeholder work and dialogue must occur between the private sector and local/national governments in order to effectively build up such banks like Malua. In terms of increasing demand, international trade law and agreements will need to be consulted before any type of regulatory scheme could be implemented in Annex I countries, which would stipulate sustainable-certification commodity imports. Biodiversity conservation banks and certificates represent innovative approaches to incentivizing biodiversity conservation. However, the scalability of such approaches is arguably very limited due to the higher returns in alternative land uses, which the Sabah Foundation is evidently willing to ignore. For this reason, the Malua BioBank is a proactive approach but not necessarily very replicable across multiple scales.

5.4. Tiered Certification

The concept of tiered certification is perhaps another potential option for the RSPO in order to include greater producer participation for certified oil palm, create greater transparencies, and thus conceivably scale up more sustainable production. Probably the most recognized success story of tiered certification in the developing world is Indonesia's Program for Pollution Control Evaluation and Rating (PROPER). While analysis is limited on the success of

[55] *Ibid.*
[56] *Ibid.*

this scheme, particularly after the 1998 Asian financial crisis, its applicability to the oil palm certification trade may nonetheless contain lessons for the RSPO and potential scalability.

Launched in 1995, PROPER became the first major environmental public disclosure program in the developing world. The scheme targeted major industrial water polluters and used a five-color scale to grade the environmental performances of various facilities.[57] The fundamental principle underlying a public disclosure strategy, and certainly applicable to certification in general, is to correct for information asymmetry. As Tietenberg (1998) states, after regulation and market based instruments, information disclosure can trigger and intensify interactions among firms, workers, community groups, consumers, financial markets, and regulators. The justification for a tiered system as opposed to a simple binary index is that the former in certain respects can convey more accurate information of the good/plant and can potentially incorporate more players into the market than would have otherwise been left out, especially those on the margins of certification. Furthermore, one potential outcome with a tiered system is that there could be pressure and competition for a "race to the top", particularly for the larger companies, in order to aim for the highest standards and therefore competitive advantage in the sustainable certification oil palm trade. The higher ratings could provide an incentive to go beyond compliance, as marginal abatement costs generally increase in the advanced stages of achieving greater sustainability measures.

The applicability of such a scheme as PROPER to the oil palm certification trade is not entirely clear. While both industrial facilities and oil palm plantations produce negative externalities (toxic material use and water pollution in the case of industrial plants, and greenhouse gas emissions, biodiversity impacts, etc. in the case of oil palm plantations), there are distinctions in applying tiered schemes for industrial facilities and plantations. The complexity of tiered regulatory and certification standards for industrial facilities and plantations depends on the degree to which environmental impacts are considered in those rankings. Standards for industrial facilities may have to take into account a host of production processes within the facility to account for end waste products. An oil palm plantation on the other hand may need to only account for plantation development when considering the greatest habitat and GHG impacts, a conceivably more straightforward aspect to regulate than potentially complex production processes. For example, a black rating could apply to companies that establish plantations in primary forest, a red rating to ones that establish them in high-

[57] Garcia et al. (2007).

conservation value logged forests, up to a gold rating to ones that establish them on degraded or existing agricultural land. In this sense, the colored ratings each indicate plantation establishment on varying degrees of environmental impact and sustainability. In terms of auditing and monitoring however, pollution into waterways is arguably easier to measure and more directly observable in terms of its effects on human health than oil palm plantation impacts on biodiversity, GHG balances, etc.

Another significant difference between PROPER regulation on industrial facilities versus tiered certification for oil palm is the scale difference and complexity of the supply chain. Should the certification solely fall on the plantation or the whole supply chain as well? In terms of oil palm, this includes the mills, refineries, and end-product manufacturers in addition to just the plantation. Imposing regulations and certification of a commodity good throughout the supply chain is certainly much different and more complex than certification standards set just for industrial facilities. The scale is different in that in order to address palm oil certification and sustainability issues, the whole supply chain must be taken into account. The RSPO could continue work to implement and scale up its certification scheme not only for oil palm producers but also various players in the supply chain. Doing so would, however, conceivably increase the costs of certification for stakeholders in the oil palm supply chain.

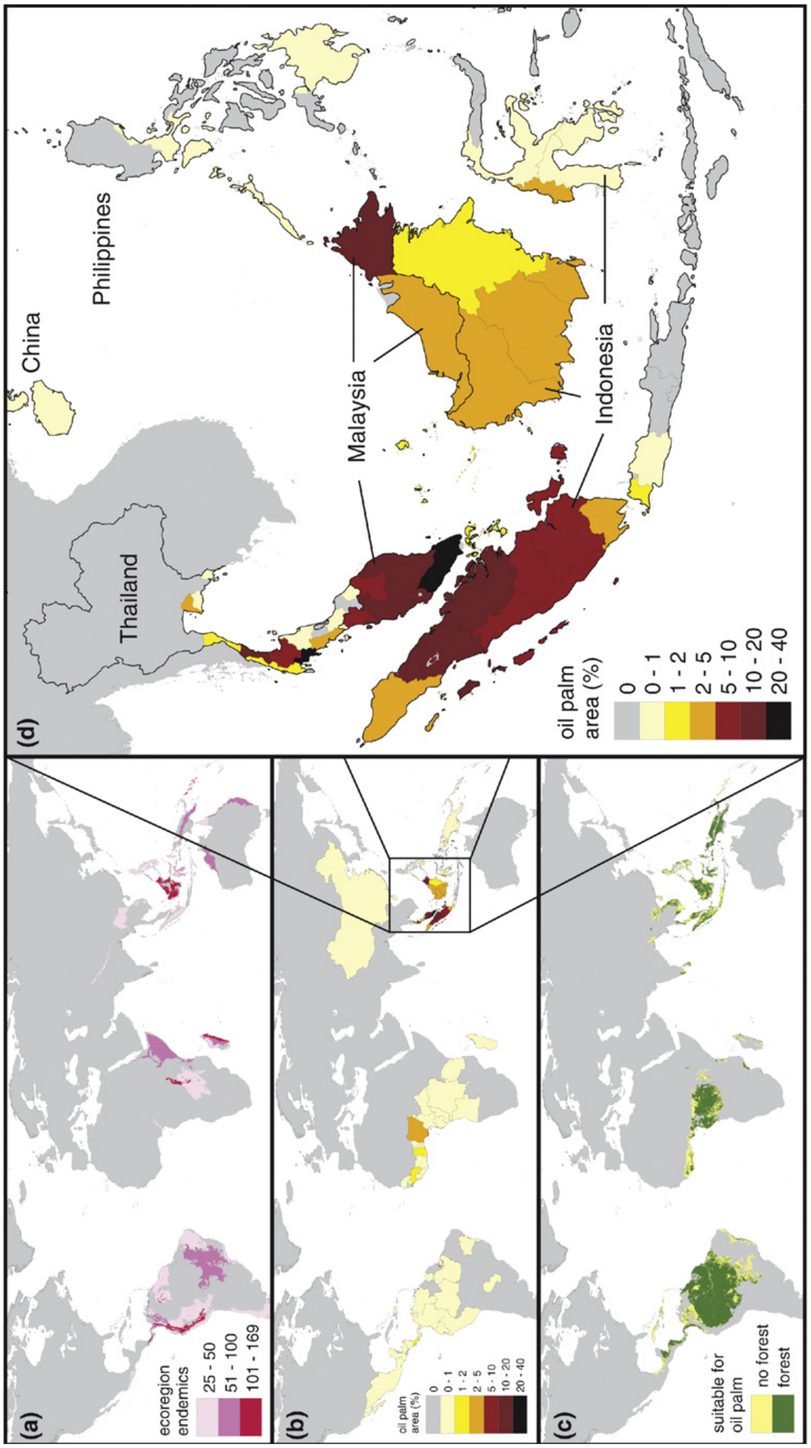
6. Implications and Conclusion

By now it should be clear that the effectiveness of the RSPO and oil palm sustainability is contingent on a plethora of complex factors, instruments, and stakeholders. A whole host of relevant aspects to the thesis of this study were not addressed due to the great complexities of scaling up oil palm certification and sustainable production, well beyond the scope of a single report. Welfare effects, poverty reduction, global mechanisms, government regulations, dialogue and negotiations, tradeoffs between growth and poverty alleviation, regulatory and institutional frameworks, GATT/WTO agreements and laws, amongst a multitude of more aspects all play relevant parts in the oil palm commodity trade and development. If decision-makers fail to properly address these issues and enact more multi-sectoral strategies and policies when focusing on oil palm markets, then increasing certified oil palm and sustainable production alongside increasing the livelihoods and welfare of local communities will not be achieved.

The typical rationale for producer engagement in certified sustainable oil palm production thus far has relied on risk of reputational damage among financial institutions or end-product manufacturers that comes with unsustainable practices. This incentive is alone not sufficient for scaling up sustainable oil palm production and certification. Viable and robust financial and regulatory mechanisms must be implemented across various scales from local levels up to global trade and markets. Unless such policies and mechanisms can be enacted, the lure of the profitable status quo approaches of rapid oil palm development will continue, enabling greater returns for producers. Further research must more thoroughly assess the costs of certification and opportunity costs for producers to engage in more sustainable production practices, financial returns between different land use options and management practices, transaction costs and issues/solutions to scaling up sustainability throughout the oil palm supply chain, price premiums for sustainable certified oil palm products, among a myriad of other topics. There is certainly no panacea for addressing the complexities of increased oil palm certification and sustainable production, but continuous research and push from NGO's and research organizations, greater stewardship and leadership among government officials and industry stakeholders, and more transparent information flow to consumers can help promote more sustainable oil palm production and increase the welfare of producing regions.

7. Annexes

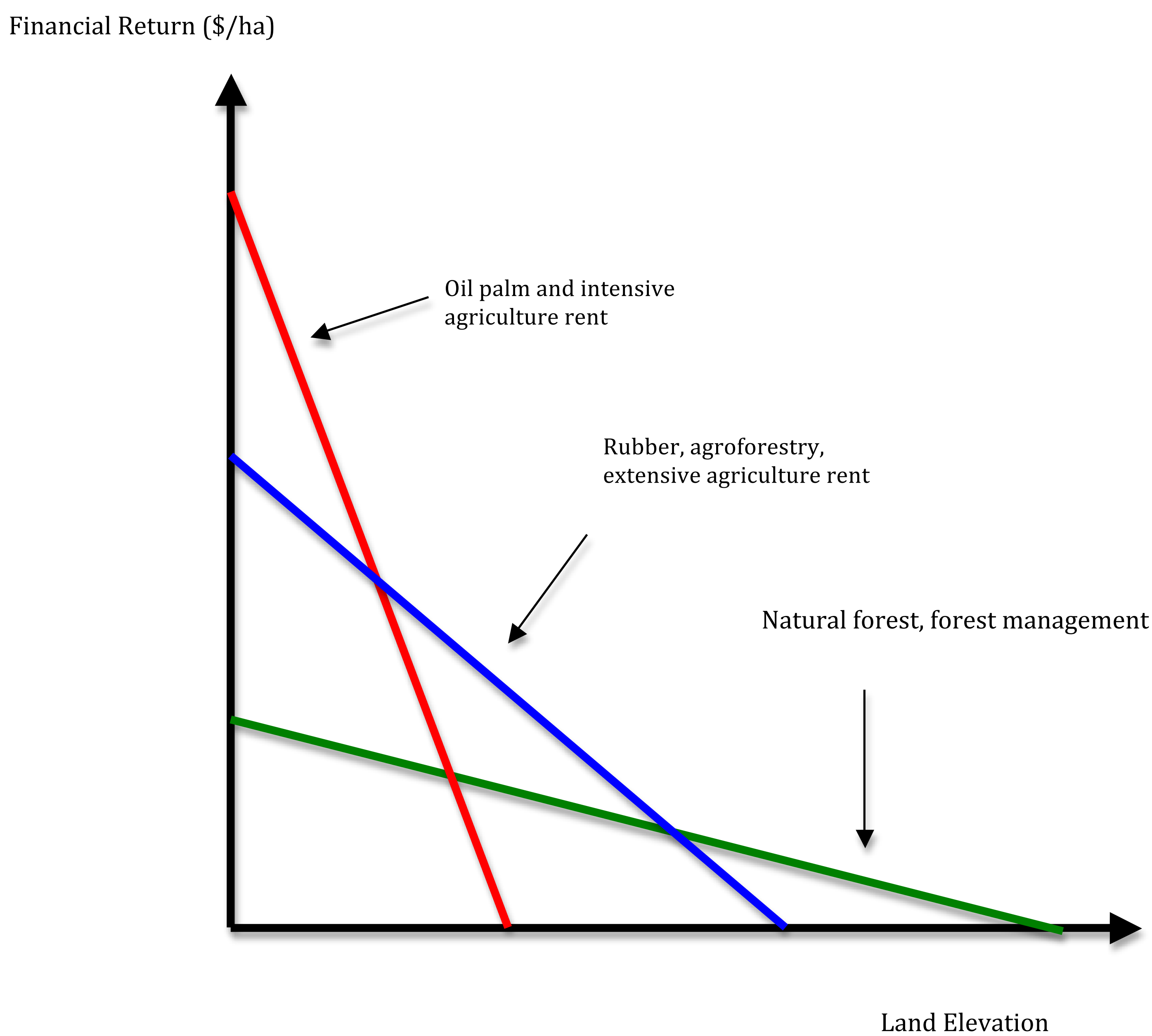
Annex 1: Global Distribution of Oil Palm and Potential Conflicts with Biodiversity. Fitzherbert et al. (2008).



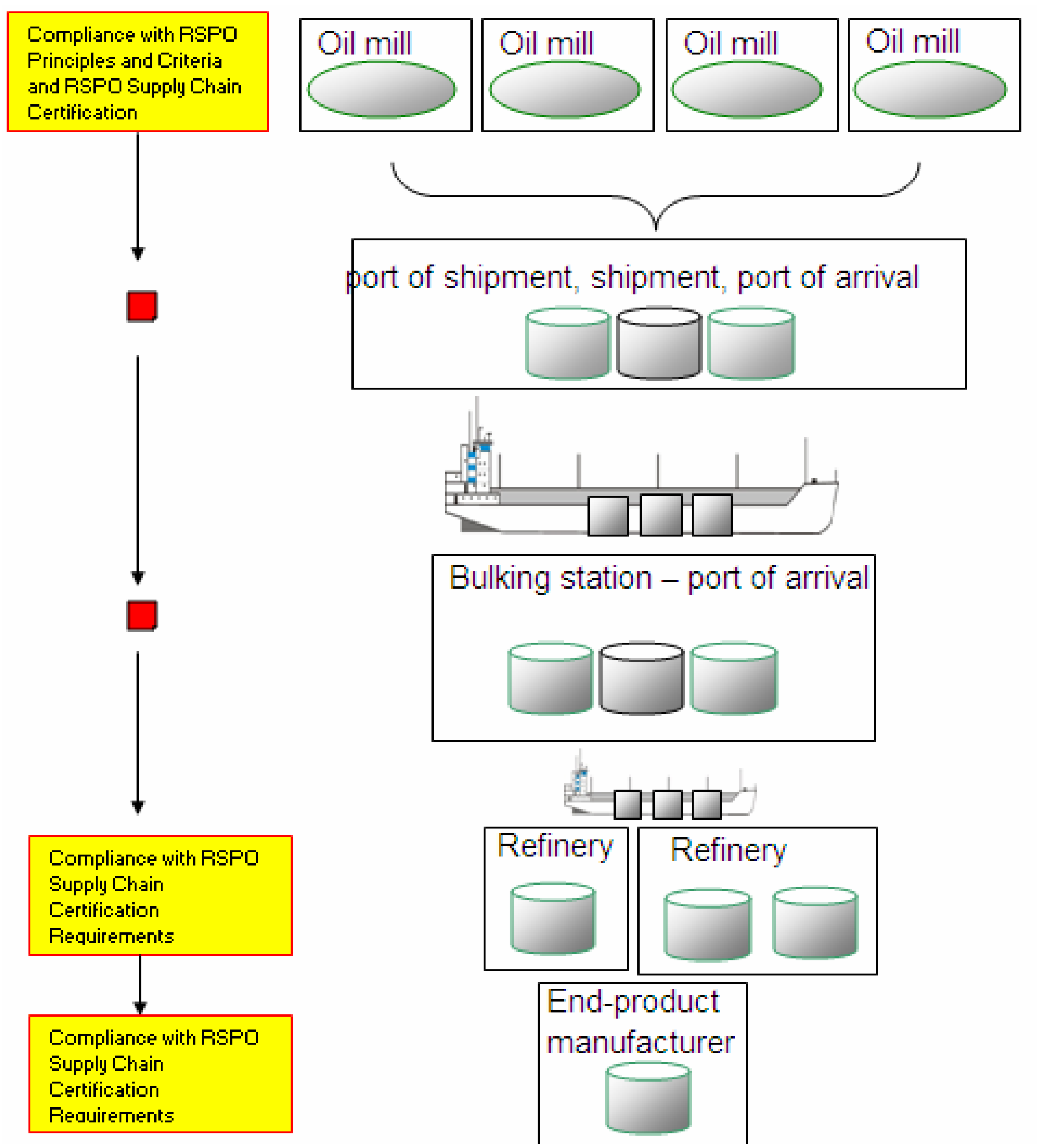
Annex 2.

Table 1. Net Present Values of Various Land Use Options					
a) Partially adapted from Chomitz (2006)					
Study	Location	Year	Land Use Options	Price or NPV per ha	Discount Rate
Butler et al. (2009)	Sumatra, Indonesia	$US2009	REDD-EA (voluntary) REDD-EA (compliance) Oil Palm	$614 - 994 $1,571-6,605 $3,835-9,630	NPV at 10%
Fairhurst and McLaughlin (2009)	Kalimantan, Indonesia	$US2009	Anthropogenic Savannah 2nd Forest: Flat Hilly Heathland	$258 ($66) ($1,929) ($3,576)	NPV at 15%
Tomich et al. (2005)	Cameroon	1990s	Food Crop Cocoa Oil Palm	$283-623 $424-1,409 $722-1,458	NPV at 10%
Tomich et al. (2005)	Sumatra, Indonesia	$US1997	Rubber agroforestry Community forest management Oil palm Unsustainable forest logging	$1 $5 $114 $1,080	NPV at 20%
Yaron (2001)	Cameroon	1997-1998	Small farming . Oil palm and rubber Sustainable timber production	$2,380 - $4,275 ($2,838) - 96 $45 - 470	NPV at 10%
b) Adapted from Grieg-Gran (2008), prices listed in $US2007					
Kotto-Same et al. (2000)	Cameroon		Annual food crops short fallow Annual food crops long fallow Cocoa w/ marketed fruit Cocoa w/o marketed fruit Oil palm and rubber One-off timber harvesting	$821 $367 $1,448 $785 $2,360 $881	NPV at 10%
Zen et al. (2005)	Indonesia		Large scale oil palm Supported growers oil palm High yield ind. Oil palm Low yield ind. oil palm	$3,340 $2,100 $2,340 $960	NPV at 10%
Tomich et al. (1998)	Indonesia		Smallholder rubber Rice fallow Cassava mono-culture	$72 $28 $19	NPV at 10%
Tomich et al. (2002)	Indonesia		One-off timber harvesting	$1,099	NPV at 10%

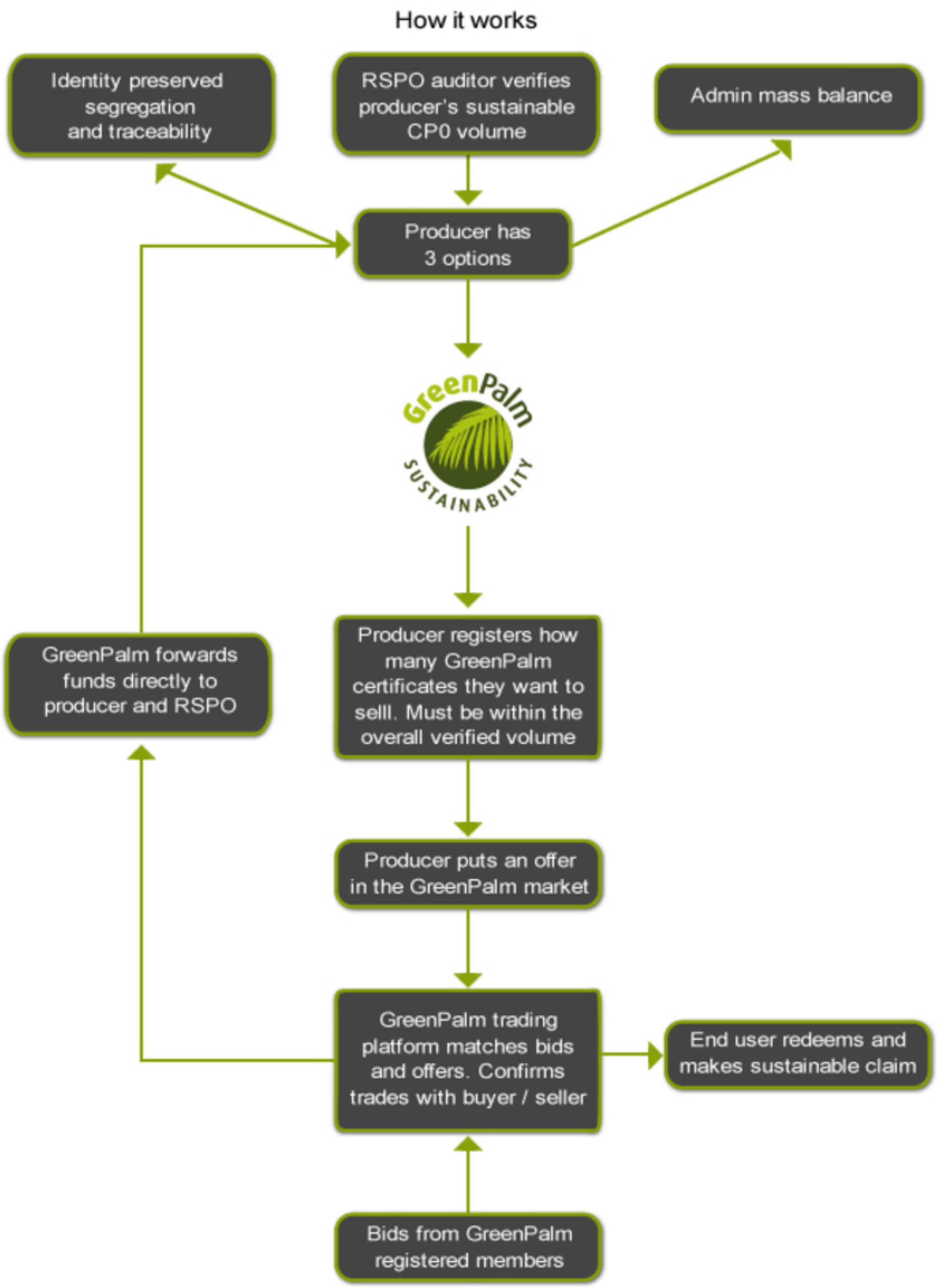
Annex 3: Land Use Profitablity Functions. Derived from Fairhurst and McLaughlin (2009).



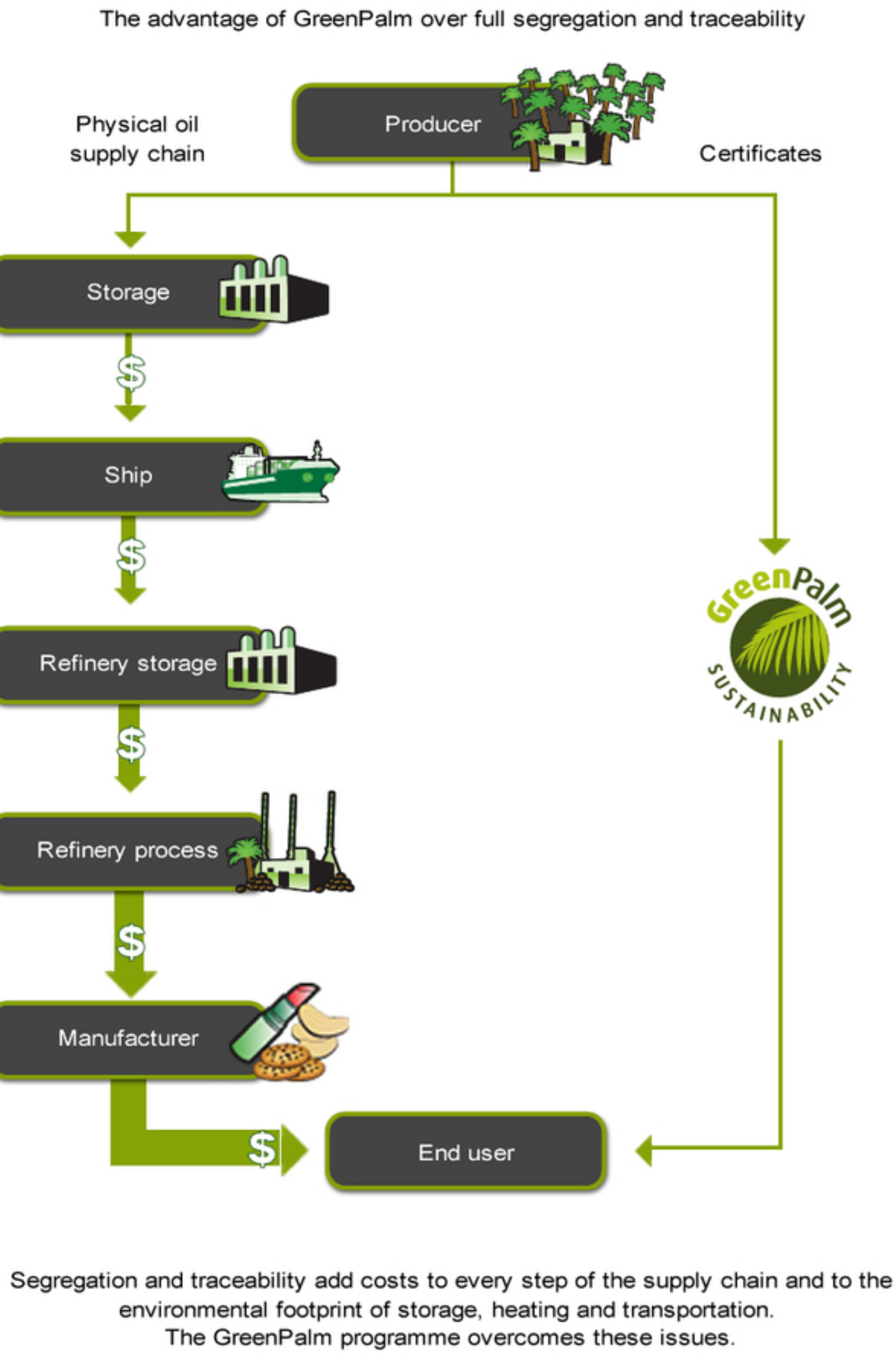
Annex 4: The Palm Oil Supply Chain. RSPO (2008).



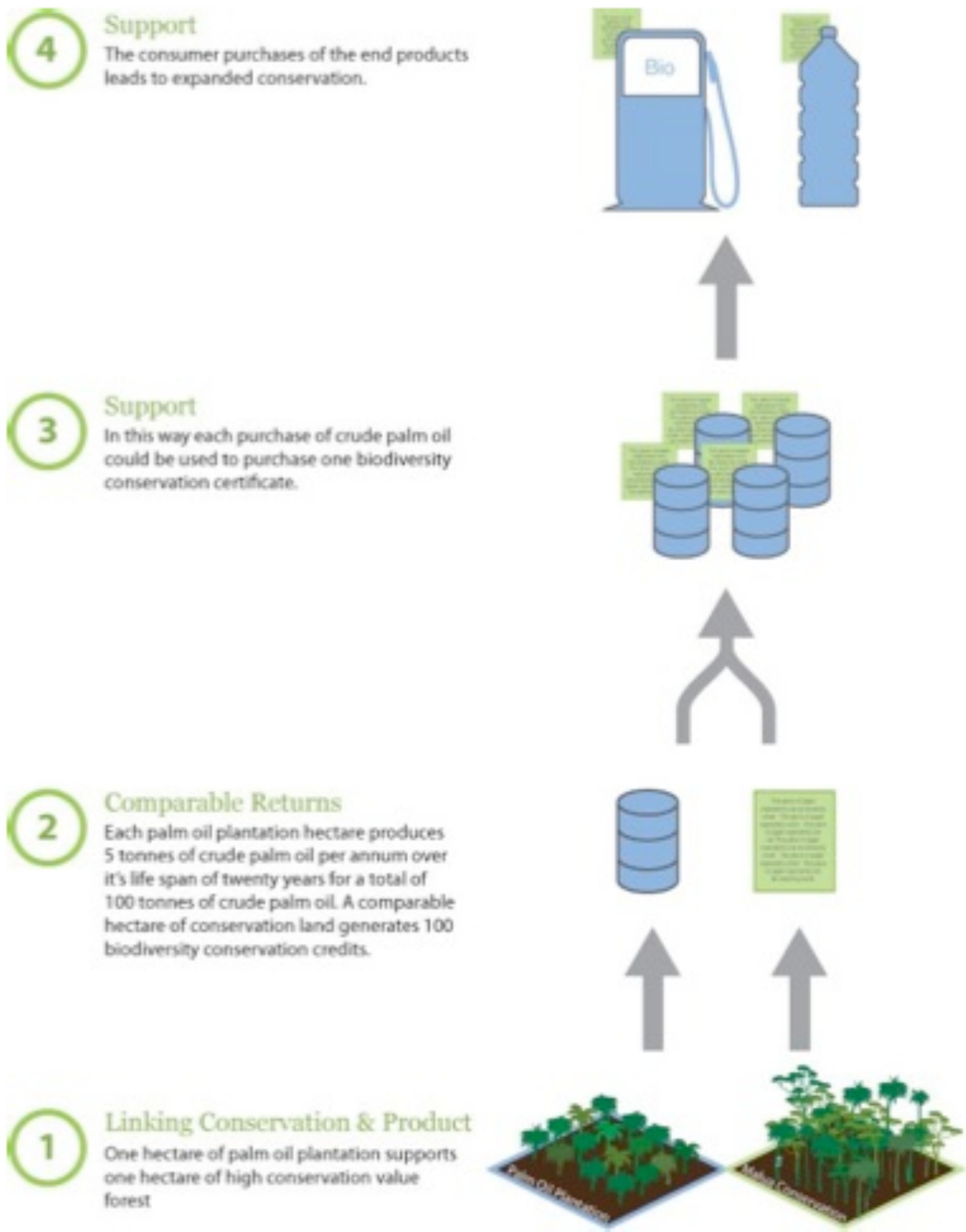
Annex 5: How GreenPalm Works. www.greenpalm.org



Annex 6: GreenPalm Throughout the Supply Chain. www.greenpalm.org



Annex 7: Malua BioBank Conservation Certificates. Brand (2009).



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