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Oil palm expansion transforms tropical landscapes and livelihoods

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ABSTRACT

Oil palm is a highly profitable crop adapted to the humid tropics and the area devoted to this crop is likely to expand significantly in the future. It has many environmentally favourable attributes over its full life cycle. When well managed it has a positive carbon balance and when grown in a landscape mosaic it can play a role in biodiversity conservation. It has driven rapid economic growth in several tropical developing countries and contributed to the alleviation of rural poverty. Abuses during periods of rapid estate expansion into areas of natural forest and onto the lands of poor rural communities have led to criticism by environmental and social activists. With good governance oil palm can make valuable contributions to development and the resulting prosperity may free people to invest in better environmental practices.

1. Introduction

In less than 100 years oil palm has moved from being a relatively minor subsistence crop in West and Central Africa to one of the world's major agricultural commodities. While oil palm in Africa has been cultivated for centuries by deliberate plantings and selective clearing (Zeven, 1972; Smith et al., 1992), it has recently expanded dramatically in Southeast Asia (Wicke et al., 2011), and increasingly in Africa and Latin America (Fig. 1). The expansion is driven by producers responding to real and anticipated increase in consumer demand (Corley, 2009), much of which is from India and China. Oil palm provides much needed revenue to rapidly developing countries, and is an economic boon to thousands of people in tropical rural regions, although economic benefits are not distributed evenly (Rist et al., 2010; Obidzinski et al., 2012). As a major contributor to the economies of several developing countries, the expansion of oil palm cultivation is now a government priority throughout the humid tropics including some of the world's poorest countries. Oil palm expansion has mostly taken place in biodiversity-rich tropical rainforest areas (Carlson et al., 2012). It is also often planted by large corporations, some of whom pay little heed to the rights of local populations (Barr and Sayer, 2012). It has consequently become the latest battleground between environmentalists on the one hand and developers on the other. Claims and counter-claims, often poorly supported, have muddied the waters and polarised opinions (Koh et al., 2010). The reality is, as always, complex, and the oil palm controversy has the elements of a "wicked problem" in the sense that there are no clear solutions, stakeholders hold conflicting views, information is incomplete and contradictory and contexts are constantly changing (Balint et al., 2011).

Here, we emphasise four oil palm 'truths' that we believe should be acknowledged in any meaningful debate. We then consider how management, policy and planning interventions have the potential to improve oil palm production systems from the perspectives of both development and environment. We acknowledge at the outset that solutions that will satisfy everyone are almost certainly impossible; rather the challenge is to minimise negative impacts of continuing oil palm expansion while maximising its benefits.

2. The four oil palm truths

In view of trends in consumer demand, we present the **first oil palm truth** as: *demand for oil palm will continue to increase in response to a growing and increasingly affluent global population.* The implication is that the area under oil palm production will continue to expand, albeit mitigated somewhat by improvements in productivity. Indeed, improving production per unit area is an important topic of research that could benefit producer communities while sparing land for conservation (Griffiths and Fairhurst, 2003; Fischer et al., 2008; Gutierrez-Velez et al., 2011). There is some debate about whether this is better achieved through production on large estates or by smallholders: constraints and opportunities apply to both strategies, towards which research could make valuable contributions.

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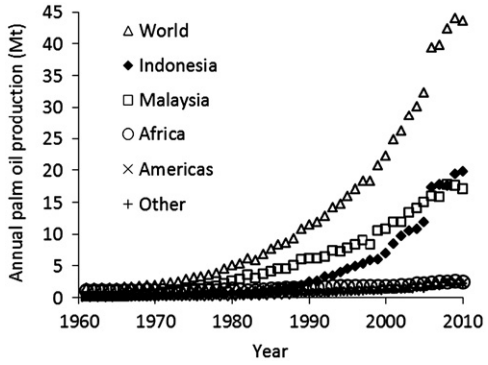

Fig. 1. Global palm oil production, 1961–2010 (source data from FAOSTAT).

Following on from this is the **second oil palm truth**: *Oil palm is one of the most profitable land uses in the humid tropics*. This profitability underpins the desire for local people to plant it, corporations to invest in it, and nations to promote it. While profitability drives expansion of the industry, it also contributes potential for land-saving. High profitability of oil palm implies that forest protection for biodiversity conservation or carbon storage will have high opportunity costs (Butler et al., 2009), but this should be set against the reality that it is generally easier to secure conservation outcomes when people are prosperous. It remains to be seen whether increased societal wealth will facilitate better conservation outcomes (Sayer and Collins, 2012), and progress may come too late for much of Southeast Asia's lowland forests.

National policy is influenced by many factors, including the international communities' efforts to mitigate carbon emissions, particularly through schemes such as REDD. In this respect, oil palm producers have argued that oil palm plantations deliver a net carbon sequestration benefit. Such statements require careful critique, but we suggest that this provides a basis for the **third oil palm truth**: *Oil palm plantations store more carbon than alternative agricultural land uses.* We do not claim that forest conversion to oil palm has no net effect on carbon emissions—indeed we acknowledge that large carbon emissions occur during the establishment phase where oil palm replaces relatively undisturbed forest. Rather we argue that, in terms of carbon emissions alone, and given the need to meet future demands, oil palm is preferable to other agricultural alternatives for oil production.

Carbon storage is, of course, only one of several important environmental objectives. It is biodiversity conservation, alongside carbon emissions, that most attracts scrutiny in the media. There is justified international concern for loss of forest biodiversity through expansion of oil palm. Hence the **fourth oil palm truth** is: *native biodiversity within oil palm plantations is far lower than the natural forests they often replace*. While this seems very evident, oil palm has often been marketed by some companies as being 'environmentally friendly'. The fundamental truth, however, is that biodiversity is drastically reduced following conversion of rainforest habitat to any large scale commercial agricultural system. As with carbon storage, biodiversity loss due to oil palm expansion should be presented relative to that associated with alternative crops for oil or energy (e.g. soybean, rapeseed, maize, sugar cane), and in this respect oil palm compares favourably (de Vries et al., 2010).

Having accepted these four truths we can begin to explore avenues and scenarios by which palm oil cultivation can play a role in improving livelihoods and enriching landscapes in the humid tropics.

3. Global demand and the continuing expansion, and profitability, of oil palm

The recent expansion of the oil palm industry has been in response to global demand for vegetable oil, driven by increasing population, income, and more recently a growing biofuel market. This trend is set to continue. Demand for vegetable oil is expected to be around 240 Mt yr^{-1} by 2050, twice the 2009 value (Corley, 2009); palm oil is particularly favoured on account of its low production cost. In 2011 global production of palm oil was 50.2 Mt, or about 28% of total vegetable oil production (Mielke, 2012). The demand for palm oil as a biofuel feedstock has risen from zero in 2000 to about 10% of crude palm oil in 2011 (Mielke, 2012). Most of the interest in the use of palm oil as biofuel was generated in the 2005–2006 period when crude mineral oil prices surpassed crude palm oil prices. Since then palm oil has consistently traded at higher prices than crude mineral oil; current demand for biofuel is largely driven by government policy rather than market signals (Sheil et al., 2009; Mielke, 2012). The possible effects on food security of using significant quantities of palm oil for biofuel are difficult to predict (Naylor et al., 2007). Yet, regardless of crude oil prices, demand for palm oil is likely to continue to grow due to increasing demands for cooking oil, soap, cosmetics and processed food. As human populations move to cities and switch to diets of processed foods the demand for crops such as palm oil may increase at the expense of staple carbohydrates.

In Southeast Asia oil palm has become a major contributor to the economies of Malaysia and Indonesia. In 2010, 5.4 million ha had been planted with oil palm in Indonesia (3% of total land area), 4.0 million ha in Malaysia (12% of land area), 3.2 million ha in Nigeria (3% of land area) and 2.8 million ha in the rest of the world (FAOSTAT). While recent expansion of oil palm has been in tropical Asia, it is likely that future expansion will be pan-tropical. Peninsular Malaysia is reaching the limits of land available for oil palm, and also suffers labour shortages with a large part of the current labour force coming from Indonesia. The cost of palm oil production is increasing in Malaysia, though it will remain highly profitable if global prices maintain their present levels. Despite these constraints, both Malaysia and Indonesia plan to expand oil palm cultivation through 2020, with projections of annual expansion rates over the next decade ranging between 3 and 8% (Wicke et al., 2011).

Limited land availability has forced Indonesian and Malaysian companies to pursue new options for increasing production. These include expanding estates elsewhere, notably in Africa and South America. Companies such as Golden Veroleum (Indonesia), Equatorial Palm Oil (UK), Sime Darby (Malaysia), OLAM (Singapore) and Herakles Farms (USA), as well as Malaysia's state plantation agency (Federal Land Development Authority) are in the process of negotiating or establishing oil palm plantations (of between 60,000 to well over 100,000 ha) in Liberia, Cameroon and Congo Basin countries. South American nations are also quickly expanding oil palm acreage. Colombia is now the fifth largest producer of oil palm, and production is projected to increase dramatically over the coming decade (Garcia-Ulloa et al., 2012).

These scenarios are alarming for conservationists concerned about the impacts of forest conversion on biodiversity. Decisions on where to locate oil palm plantations are driven more by economics than by environmental suitability. Even so, some recent studies suggest that substantial expansion could be accommodated in Indonesia without necessarily impacting natural forests or biodiversity, although trade-offs with other agricultural crops might have to be accepted (Koh and Ghazoul, 2010). Others have suggested that oil palm expansion in