

Addressing the threats to biodiversity from oil-palm agriculture

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Abstract Oil-palm agriculture is the greatest immediate threat to biodiversity in Southeast Asia. Despite the efforts of environmentalists, oil palm continues to expand across the tropics. Those concerned about the impacts of oil palm on biodiversity must face some harsh social, economic, and ecological realities: (i) oil palm has been a very profitable crop; (ii) palm oil is used in so many products that simple, direct actions, such as boycotts, are unlikely to succeed; (iii) there is currently insufficient demand for certified sustainable palm oil and inadequate political clout from environmental groups in two of the biggest markets for palm oil—China and India—to slow the rate of forest conversion; and (iv) oil-palm agriculture has improved the lives of poor rural communities in Southeast Asia (although it has also disenfranchised some indigenous communities). To address the threats posed by oil-palm agriculture to biodiversity, environmentalists must change the behavior of the palm oil business through: (i) regulations to curb undesirable activities (e.g., a ban on converting forests to oil palm); (ii) financial incentives to promote desirable behavior (e.g., production of certified, sustainable oil palm); (iii) financial disincentives designed to discourage undesirable behavior (e.g., consumer pressure on major manufacturers and retailers to use palm oil that does not come from plantations created at the expense of forests); and (iv) the promotion of alternative, more biodiversity-friendly uses of forested land that might otherwise be converted to oil palm. There is no single best approach for dealing with the oil-palm crisis in Southeast Asia; a mixture of regulations, incentives, and disincentives targeted at all sectors of the oil-palm industry is necessary to protect the region's rapidly disappearing forests.

Keywords Tropical deforestation · Oil palm · Monoculture · Biodiversity conservation · Reconciliation ecology · Biofuels

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Introduction

Global land area under oil palm quadrupled from 3.6 million ha in 1961 to 13.9 million ha in 2007 (FAO 2009). Oil palm is spreading throughout the tropics, most notably in Southeast Asia. In 2008, Malaysia's Federal Land Development Authority (FELDA) announced plans to establish oil-palm plantations in Kalimantan (20,000 ha), Aceh (45,000 ha), Papua New Guinea (105,000 ha), and Brazil (100,000 ha) (Butler 2008). In May 2009, Sime Darby, the world's largest oil-palm company, also announced plans to invest US\$800 million in oil-palm and rubber plantations in Liberia, covering some 200,000 ha (80% for oil palm) (Butler 2009a). In June 2009, Malaysian oil-palm developers announced plans to establish a 100,000 ha oil-palm plantation and an extraction facility on the island of Mindanao in the Philippines (Butler 2009b). Given that large expanses of forested areas in these regions are suitable for oil palm (Butler and Laurance 2009), oil palm will likely continue to replace tropical forests (Fig. 1).

Indeed, we would argue that oil-palm agriculture is the greatest immediate threat to biodiversity in Southeast Asia (and a growing threat elsewhere). We derive this conclusion from the extent to which forests are being converted to oil palm and the magnitude of biodiversity losses associated with this process. For example, in Malaysia, at least 1,040,000 ha of forest were converted to oil palm from 1990 to 2005, which accounted for 94% of the total extent of the nation's deforestation (of secondary forests and timber plantation forests) during that period (1,109,000 ha; FAO 2009). Even though Malaysia has a much larger area of production forests undergoing selective logging (11 million ha of Permanent Forest Estate; ITTO 2005), studies have demonstrated that these selectively logged forests retain, or can recover over time, a significant fraction of their original fauna (Fitzherbert et al. 2008; Koh and Wilcove 2008; Brühl and Eltz 2009; Danielsen et al. 2009); oil-palm plantations, in contrast, are almost devoid of forest-dwelling species. Thus, the conversion of a single hectare of forested land to oil palm represents a far greater loss of biodiversity than logging of that same hectare.

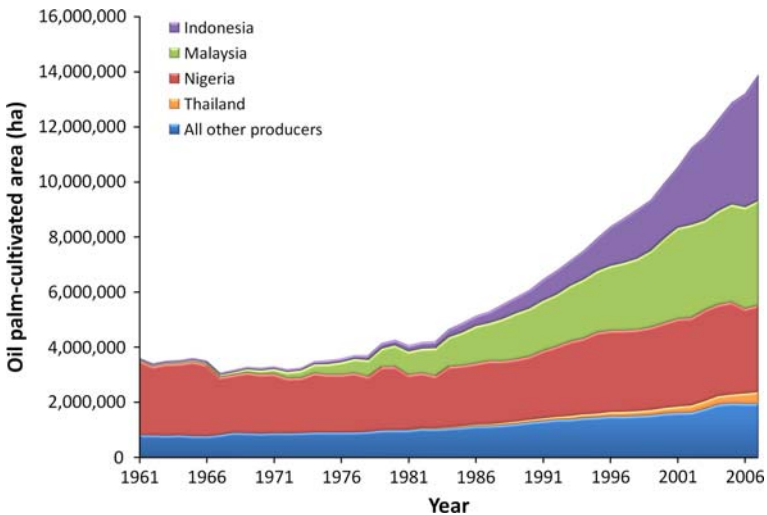


Fig. 1 Increase in oil-palm cultivated area from 1961 to 2007 in the world's four largest producers of oil palm (FAO 2009)

Despite the aggressive efforts of environmentalists to make people aware of its environmental damage (FoE 2005; CSPI 2006; Greenpeace 2007; Koh et al. 2010), oil palm continues to expand across the tropics. Why hasn't the environmental movement been successful thus far in slowing the conversion of tropical forests to oil palm? The answer, we believe, lies in the social, economic, and ecological realities surrounding this issue. First, oil palm has been a very profitable crop (Koh and Wilcove 2007). Thus, producers have been understandably eager to increase the amount of land under oil-palm cultivation, and governments in Southeast Asian countries (especially Malaysia and Indonesia) have been all too willing to facilitate that expansion. Second, palm oil is used in so many products that simple, direct actions, such as boycotts, are unlikely to succeed without other complementary measures (which we discuss below). Third, two of the biggest markets for palm oil are India and China (FAO 2009). To date, these countries have shown little interest in purchasing palm oil that has been certified sustainable by the Roundtable on Sustainable Palm Oil (RSPO; <http://www.rspo.org>), which is 8–15% more expensive than uncertified palm oil (RSPO 2008). Furthermore, environmental nongovernmental organizations (NGOs) in both countries may lack the clout of their counterparts in Europe and the USA. Thus, it is unrealistic to expect tremendous public support within either India or China for restrictions on the import of unsustainably grown palm oil. At least for the foreseeable future, therefore, the strongest push for sustainable oil palm is likely to come from the citizens of Europe, the USA, and Australia, who consume only about 19% of global palm oil (FAO 2009). Fourth, whereas activities such as logging and mining often occur at the expense of indigenous people in developing countries, the situation is more complex with respect to oil-palm agriculture. Many (but not all) oil-palm growers provide their workers with salaries, medical care, schooling, and housing. While Malaysian growers in particular have been criticized for hiring foreign workers instead of nationals, it is nonetheless true that oil-palm agriculture has improved the lives of those workers (Rist et al. 2010). On the other hand, there have been allegations by human-rights and social-development NGOs that native communities in Indonesia are being unjustly displaced from their traditional lands by some oil-palm companies (Colchester and Jiwan 2006). Moreover, conversion of forests to oil-palm plantations can deprive local communities of the ability to utilize forest resources. Thus, there are serious human-rights issues associated with the expansion of oil-palm agriculture that merit further scrutiny.

On the ecological front, the most important and sobering reality facing conservationists is that little can be done to make oil-palm plantations hospitable to biodiversity. Steps such as protecting riparian buffers, leaving patches of natural forest within plantations, and growing flowering plants in the understory of oil-palm plantations generate, at best, minor increases in the number of forest-dwelling species in plantations (Koh 2008a). At the landscape level, these measures result in isolated patches and narrow strips of forest within a vast matrix of oil palm. Some of these steps may be desirable for other reasons, such as improving water quality or protecting oil palms from insect pests (Koh 2008b), but they do little to conserve the imperiled fauna and flora of Southeast Asia's tropical forests. The best way—and probably the only way—to reconcile biodiversity conservation and oil-palm agriculture is to stop clearing primary or secondary forests in order to plant oil palm (Koh and Wilcove 2008, 2009).

Pressure points

All of this leaves conservationists with an exceedingly difficult challenge: how do they address the threat posed by a rapidly expanding, profitable, widely used crop that is, to a

large degree, grown in and exported to countries with weak environmental regulations? We can think of this problem in the context of a matrix of possible “pressure points” (see Table 1). Along one axis of the matrix are the major categories of players involved in the palm oil business: growers of oil palm, producers of palm oil, manufacturers of products containing palm oil, and retailers of those products. Because the cultivation of oil palm and the production of palm oil tend to be done by the same companies, we lump them into one group: growers/producers. And, to make the analysis simpler, we also lump together the manufacturers and retailers of products containing palm oil. Along the other axis are four distinct approaches to changing the behavior of the palm oil business: regulations to curb undesirable activities (e.g., a ban on converting forests to oil palm); financial incentives to promote desirable behavior (e.g., production of certified, sustainable oil palm); financial disincentives designed to discourage undesirable behavior (e.g., consumer boycotts of unsustainably grown oil palm); and the promotion of alternative, more biodiversity-friendly uses of forested land that might otherwise be converted to oil palm. The resulting 4×2 matrix provides a summary of possible strategies for dealing with the oil-palm crisis in Southeast Asia. By searching the internet and speaking to representatives of conservation organizations, oil-palm companies, and government officials, we have been able to identify examples of these possible strategies currently being used by NGOs, government officials, or oil-palm companies.

Each of these strategies has its strengths and weaknesses. Regulatory approaches, for example, can be used to tackle the issue of forest conversion directly (e.g., an outright ban on forest conversion) or indirectly (e.g., a requirement that producers and manufacturers use sustainably grown oil palm in their products). Of course, the effectiveness of any regulation depends, in large measure, on its precise wording. A regulation to restrict oil palm expansion to degraded lands and agricultural lands would, on the face of it, appear to solve the problem. But, if logged forests are classified as degraded lands, then biodiversity will continue to decline, inasmuch as studies have demonstrated the value of logged forests, even intensively logged forests, to many Southeast Asian forest-dwelling species (Lambert 1992; Hamer et al. 2003; Dunn 2004; Fitzherbert et al. 2008; Koh and Wilcove 2008; Brühl and Eltz 2009; Danielsen et al. 2009; Berry et al. 2010; D. Edwards pers. comm.). Similarly, a requirement that manufacturers use sustainably grown palm oil is only as effective as the regulatory definition of “sustainably grown”. If that definition focuses on practices such as pesticide and herbicide use, and does not deal with the type of land on which the oil palms are planted, then it will fail to address the core problem associated with oil-palm agriculture. Finally, regulations are only as effective as the ability of the government in question to enforce them, which varies widely from country to country. In Malaysia, the government simultaneously acts as oil palm producer, regulator and enforcer of regulations, which presents potential conflicts of interest (Lopez and Laan 2008).

As an alternative to traditional, command-and-control approaches to conservation, financial incentives have the advantage of being non-regulatory and voluntary. That makes them less prone to political resistance and easier to implement outside a governmental framework. They have been used successfully to address a number of environmental problems, including endangered species protection and habitat restoration (Wilcove and Lee 2004). In the case of oil-palm and tropical deforestation, the two most notable examples of financial incentives have been the RSPO certification program and payments for reducing carbon emissions from deforestation and forest degradation (REDD) (Miles and Kapos 2008). The RSPO certification program faces some of the same definitional challenges discussed in the context of regulations (Laurance et al. 2010). For example, the

Table 1 Matrix of “pressure points” for dealing with the oil palm crisis in southeast Asia

Stakeholder	Regulation	Financial incentives	Financial disincentives	Alternative land uses
Growers of oil palm; producers of palm oil	<p>Example: policies restricting new OP plantations to degraded lands or lands designated for agriculture; proposed EU restriction on importation of palm oil grown on converted forestlands</p> <p>Pros and cons: directly addresses primary threat to biodiversity posed by OP; certain lands that are valuable for diversity (e.g., logged forests) may be excluded from protection if they are classified as degraded; EU restriction requires ground truthing and careful monitoring of sources of imported palm oil</p>	<p>Examples: manufacturers pay premium for certified sustainable OP (e.g., RSPO certified OP); REDD payments</p> <p>Pros and cons: voluntary, market-driven scheme that does not require new regulations; certification effective only if criteria are sufficiently high; manufacturers must be willing to pay premium, which has not been the case; requires careful monitoring of flow of certified versus non-certified OP into and through manufacturing process. REDD payments require reliable, adequate funding sources</p> <p>Other options: tax breaks for companies growing certified sustainable OP</p>	<p>Hypothetical example: added tax on sale of non-certified OP</p> <p>Pros and cons: could create much larger market for certified OP; would increase price of OP, engendering strong opposition from growers, manufacturers, some consumers; effective only if criteria for certification are sufficiently high</p>	<p>Example: WRIs POTICO program; see also REDD payments</p> <p>Pros and cons: voluntary, market-driven scheme; feasible only if income from other land uses (e.g., carbon storage, timber production) is greater than income that could be generated by OP—therefore may require external funding if OP prices are high and/or carbon credit prices are low; requires an established, stable carbon market, which will ultimately depend on international agreements</p>

Table 1 continued

Stakeholder	Regulation	Financial incentives	Financial disincentives	Alternative land uses
Manufacturers and retailers of products containing palm oil	<p>Example: proposed EU standard that all biofuel feedstocks must have $\geq 35\%$ greenhouse gas savings compared with fossil fuels</p> <p>Pros and cons: easier for environmental NGOs in Europe, USA to pressure their own governments to impose standards than it is for them to pressure China, India, and other importers of OP products; free trade agreements could pose roadblocks to certain types of regulations; current supply of certified palm oil might be insufficient to meet demand if major importing countries required certified palm oil (but such legislation would solve current lack of demand for certified sustainable palm oil); requires careful monitoring of sources of palm oil used in manufacturing</p>	<p>Examples: Sainsbury's (UK) and Whole Foods (US) require certified, sustainable palm oil in all their brand-name products</p> <p>Pros and cons: depends on willingness of consumers to pay extra for products containing certified palm oil; unlikely to induce major changes in grower behavior unless requirement encompasses large segment of OP market; unlikely to affect large markets in India, China, and other developing countries</p>	<p>Examples: consumer boycott of products containing non-certified palm oil; proposed EU requirement that producers of biofuels pay a fee to offset net carbon emissions associated with production of particular biofuels</p> <p>Pros and cons: boycotts unlikely to succeed given number of products containing palm oil and large market for palm oil in countries with weak environmental movements; fee on carbon emissions requires accurate assessment of carbon emissions associated with different types of plantations</p>	<p>Hypothetical example: find a substitute for oil palm</p> <p>Pros and cons: feasible only if cost, functionality, and availability of substitute equal to or exceeds that of oil palm (not true thus far), and if manufacture or cultivation of substitute does not create equal or greater threats to biodiversity</p>

Each box represents a different strategic approach for addressing this issue

Note: Abbreviations are defined as follows: *OP* oil palm, *EU* European Union, *RSPO* Roundtable on Sustainable Palm Oil, *REDD* carbon payment scheme for reducing emissions from deforestation and forest degradation, *WRI* World Resources Institute, *NGO* nongovernmental organization

criteria for certification must address the conversion of both primary and secondary forests, and they must do so in a manner that distinguishes between oil palm grown on once-forested land that was converted prior to the creation of the certification program and oil palm grown on land that was converted after the certification program. Moreover, the success of any certification program depends on the willingness of manufacturers and consumers to preferentially pick the certified product, even if they have to pay a premium for it. Yet according to a May 2009 press release from the World Wildlife Fund, less than 1% of the RSPO certified palm oil produced since November 2008 had been sold (Butler 2009c).

REDD payments have attracted a great deal of attention from the environmental community in large part because they hold the promise of re-directing large sums of money from developed countries to developing countries for the purpose of protecting forests and other carbon-rich ecosystems (Laurance 2006; Turner et al. 2009). REDD payments could, in principle, be sufficient to convince at least some oil-palm growers to leave portions of their landholdings in forest, rather than converting them to oil palm. Here, too, market conditions will determine whether REDD payments succeed in stemming forest conversions. The growing demand for biofuels, coupled with higher overall energy prices, could make oil palm more profitable than carbon and undermine the financial incentives of REDD (Butler et al. 2009). However, if REDD becomes recognized as a legitimate emissions reduction activity by the United Nations Framework Convention on Climate Change for the second commitment period of the Kyoto Protocol (2013–17), carbon credits generated from REDD schemes would be tradable in Kyoto-compliance markets, which could make REDD economically competitive with oil palm (Butler et al. 2009).

Financial disincentives can be designed to discourage harmful behavior. We have already noted our skepticism that consumer boycotts per se will be effective in changing the behavior of the oil-palm industry (although pressure on large multi-national companies from stockholders and consumers may have some impact). A fee on biofuels to offset net carbon emissions (as has been proposed in the European Union) strikes us as more promising, but it will require sophisticated accounting of carbon emissions associated with growing biofuels on lands that were previously covered by other vegetation types.

It is possible, of course, that a cheaper, less environmentally harmful substitute for palm oil will be developed, thereby taking some of the pressure off Southeast Asia's forests. In the meantime, the World Resources Institute (WRI) has unveiled an ambitious albeit untested plan to work with oil-palm growers to reduce forest conversion by making a combination of land uses as profitable as a traditional oil-palm monoculture (<http://www.wri.org/project/potico>). Under this plan, entitled Project POTICO, companies with concessions that allow them to convert forests to oil palm would agree to restrict oil palm expansion to already degraded lands. Primary forests, in turn, would be logged sustainably, with the resulting timber sold under a certification program. The companies would also receive REDD payments (carbon credits) for averted deforestation stemming from the decision to use the primary forests as timberlands rather than converting them to oil palm. The hope is that these multiple streams of revenue—oil palm grown on degraded lands, timber from the forests, and REDD payments—will equal or exceed what the companies would earn from a wholesale conversion of the forested land to oil palm. Such a scheme is sensitive to changes in the market prices of palm oil, timber, and carbon. And, of course, it matters greatly what types of land are thought to be sufficiently degraded to justify their conversion to oil palm; some seemingly degraded lands may, in fact, retain significant numbers of vulnerable species.

Conclusion

There seems to be no single best approach for dealing with the oil-palm crisis in Southeast Asia. All of the existing strategies have their strengths and weaknesses. Thus, a mixture of regulations and incentives targeted at all sectors of the oil-palm industry will be necessary to protect the region's rapidly disappearing forests. We remain cautiously optimistic that the use of incentives can promote more responsible behavior on the part of the oil-palm growers. REDD payments, in particular, may be one of the few practical ways to make forest conservation competitive with oil-palm production, although much will depend on the price of carbon relative to biofuels in the coming years. Calls for boycotts of palm oil are likely to be ineffectual, but continued pressure on the governments of Southeast Asia to ban forest conversions and on the major purchasers of palm oil to demand a more sustainable product may produce positive results. The big question is whether any of these steps can happen fast enough to prevent an impending extinction crisis.

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