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Forests, Food and Fuel: REDD+ and Indonesia's Land-use Conundrum

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Abstract

Indonesia faces pronounced land-use challenges. The sprawling archipelagic state must deal with the legacies of short-sighted land conversions, the need to pursue foreign investment, capital growth and employment generation through profitable land intensive industries, and the rising food demands of a growing and increasingly urban population. Moreover, Indonesia must pursue these already daunting objectives without overly compromising its endowment of forest resources; which provide a range of valuable services both domestically and internationally.

This paper explores the intersection of these issues and comments upon some of the most pressing challenges inherent to maintaining food security, protecting the essential services that forest ecosystems provide, and remaining open to capital-producing industries that are land intensive. The paper takes as its point of entry the movement of the Reduced Emissions through Deforestation and Forest Degradation (REDD) programme into Indonesia's land-use calculus. REDD, and its successor mechanism REDD+, provide a pathway by which international actors from the developed world can help facilitate forest preservation in developing countries as part of climate change mitigation strategies. While showing some promise, these strategies illuminate potentially combative interests between international actors and the localised stakeholders that depend upon developing the natural resource potential of Indonesian territories. These localised dependencies will only grow as populations increase and changing standards of living create greater needs for food and other capital producing land-based resources, such as rubber and palm oil. It is therefore necessary to explore the various effects and potential trade-offs that will come from payment for ecological services (PES) approaches such as REDD+ and place them within the context of land-use choices in Indonesia.

This paper attempts such explorations by introducing the REDD+ mechanism and discussing its potential to cause social, economic and food-related challenges, discussing the Indonesian land-use situation as it relates to oil palm and food production, as these two sectors demonstrate the important place of land conversion within the country's economy and thus exemplify the context within which REDD+ policies will have to operate, and finally questions some of the primary assumptions upon which the REDD+ discourse currently rests. The paper concludes by offering an expansionist and spatially driven vision of how REDD can effectively contribute to the land-use conundrums in Indonesia and beyond.

This Policy Series presents papers in a preliminary form and serves to stimulate comment and discussion. The views expressed are entirely the author's own and not that of the RSIS Centre for Non-Traditional Security (NTS) Studies. The paper is the result of research conducted under the Asia Security Initiative programme on internal challenges supported by the MacArthur Foundation. Visit www.asicluster3.com to find out more about this initiative. More information on the work of the RSIS Centre for NTS Studies can be found at www.rsis.edu.sg/nts.

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Biography

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Dr Ewing's most current work focuses on the role of identity divisions and natural resource control in fomenting internal conflicts in Indonesia, Thailand and the Philippines. He is also working on projects addressing regional urban climate vulnerabilities, convergences and fracture points connecting environmental and food security agendas, land-use challenges in Indonesia, and climate change and migration trends in Bangladesh.

Introduction

Indonesia faces pronounced land-use challenges. The sprawling archipelago seeks rapid economic progress, infrastructure development that can both facilitate and result from economic growth, continuing influxes of foreign capital seeking minerals and agricultural products, expanding food production to feed its growing and urbanising population, and the preservation of services that its natural ecosystems provide. These goals create inherent competition, a myriad of potential fractures and the ubiquitous presence of unavoidable trade-offs. Moreover, increasing international attention toward efforts that incentivise forest preservation as a climate mitigation strategy has added a relatively new element to Indonesia's land-use strategic calculus. Specifically, the Reducing Emissions from Deforestation and Forest Degradation (REDD) mechanism sees developed world actors seek to protect forests in developing regions as part of wider strategies to reduce global greenhouse gas (GHG) emissions. REDD's potential to preserve vital ecologies and help stabilise atmospheric changes notwithstanding, these external influences exacerbate many difficult land-use choices for Indonesia as well as other REDD programme host countries.

This paper takes REDD as an entry point for exploring Indonesia's land-use challenges that pertain to forest management, the land-intensive actions of the oil palm industry and the country's search for greater food security.[1] The following section begins this objective by introducing the REDD mechanism more thoroughly and briefly discussing its potential to cause social, economic and food-related challenges. The subsequent section discusses the Indonesian land-use situation, as it relates to oil palm and food production, as these two sectors demonstrate the important place of land conversion within the country's economy and thus exemplify the context within which REDD policies will have to operate. The final section concludes by questioning some of the primary assumptions upon which the REDD discourse currently rests and offers an expansionist and spatially driven vision of how REDD can effectively contribute to the land-use conundrums in Indonesia and beyond.

Valuation and Environmental Systems: REDDy yet?

Forests provide an exhaustive range of services that defy quantification in the traditional economic sense and are thus logical ecosystems to target for valuation schemes that are more comprehensive than simple commoditisation. Forests house primary watersheds and act as a linchpin for irrigation, energy generation, and commercial and individual freshwater needs. The degradation of forests can therefore lead to deteriorating water quality and availability, which in turn threatens agricultural and industrial productivity as well as household access to freshwater. Forest root systems play an essential role in preventing soil erosion, particularly in highland areas such as the large swathes of tropical and equatorial regions of Southeast Asia. When left unchecked, soil erosion can further degrade freshwater resources and leave behind land with little agricultural or otherwise strategic value.[2] Such challenges are exacerbated still further when forest conversions alter hydrological cycles and local weather patterns within which forests play a key role, and are also potentially accelerated by changes to climate resulting from anthropogenic changes to the atmosphere.

[1] For a useful definitional foundation for the term 'food security', see: FAO, 'An Introduction to the Basic Concepts of Food Security', *Food Security Information for Action: Practical Guides* (Rome: Food and Agriculture Organization of the United Nations, 2008).
[2] Peter Dauvergne, *Environmental Insecurity, Forest Management, and State Responses in Southeast Asia* (Acton, A.C.T.: Australian National University, Dept. of International Relations, 1998), 3–6.

Additionally, forests are often hubs of biodiversity, which lends them both economic and social value and places them at the centre of long-standing debates on humankind's duty and ability to act as a steward of the earth's flora and fauna.[3]

Despite these wide-ranging roles that forests play in both natural and social systems, they have traditionally been valued only for their commoditisable resources.[4] As the values of ecosystem services have not traditionally been reflected in the prices of the commodities that drive forest clearing, governments, companies and farmers 'often decide that forests are worth more cut down than standing'.[5] Such systemic socioeconomic factors have contributed to large-scale forest conversions in many parts of the world, with Southeast Asia being no exception.[6] During the past decade, however, the movement of climate change up national and international policy spectrums has brought with it calls for a revaluation of forests. Increasingly alarming evidence has coalesced to show that the global climate is changing relatively rapidly, that human activities are playing a significant role in these changes and that forest management represents a potentially powerful mechanism for reducing unsavoury climate impacts.[7] The capacity of forests to absorb carbon dioxide (CO_2) from the atmosphere has thus led to forests being singled out as fundamental ecosystems in global efforts to mitigate climate warming. As a result, and seemingly as a boon for the payment for ecological services (PES) paradigm, forests now appear to be on a path toward valuation beyond simply their extractable resources and the land that they occupy.

Perhaps the most institutionalised PES scheme ever constructed is the REDD mechanism. REDD was originally formulated at the 11th Conference of the Parties (COP11) of the United Nations Framework Convention on Climate Change (UNFCCC) in 2005 and began to garner substantial high-level attention two years later at the COP13 in Bali, Indonesia. COP13 convened on the heels of the release of the Fourth Assessment Report (AR4) of the Intergovernmental Panel on Climate Change (IPCC), which estimated that deforestation accounted for 5.8 gigatonnes (Gt) of CO_2 per year during the 1990s and, in 2007, accounted for 17 per cent of global GHG emissions, thus outstripping the entire transportation sector.[8]

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[3] For a review of contemporary efforts to value biodiversity, see: OECD, *Handbook of Biodiversity Valuation: A Guide for Policy Makers* (Paris: OECD Publishing, 2002). Debates on the relationships connecting humankind and the natural environment stem back to antiquity. However, this modern discourse, at least in English language scholarship, has foundations that can be divided among enlightenment, romantic and Marxist traditions. For a useful comparison of these foundational positions, see: Peter Dickens, *Society & Nature* (Cambridge, UK: Polity Press, 2004).

[4] For example, see: Mark Poffenberger and Kathryn Smith-Hanssen, 'Forest Communities and REDD Climate Initiatives', *Analysis from the East-West Center*, no. 91 (2009); Kathleen Lawlor and David Huberman, 'Reduced Emissions from Deforestation and Forest Degradation (REDD) and Human Rights', in *Rights-based Approaches: Exploring Issues and Opportunities for Conservation*, ed. Jessica Campese et al. (Bogor Barat: Center for International Forestry Research [CIFOR], 2009), 269–85.

[5] Lawlor and Huberman, 'Reduced Emissions from Deforestation and Forest Degradation (REDD) and Human Rights', 269.

[6] For global deforestation figures, see: FAO, *State of the World's Forests 2009* (Rome: Food and Agriculture Organization of the United Nations, 2010). For figures from Southeast Asia, see: Poffenberger and Smith-Hanssen, 'Forest Communities and REDD Climate Initiatives'.

[7] IPCC, *Climate Change 2007: Synthesis Report. Contribution of Working Groups I, II and III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*, ed. Rajendra K. Pachauri and Andy Reisinger (Geneva: Intergovernmental Panel on Climate Change [IPCC], 2007). The Fourth Assessment Report (AR4) of the IPCC remains perhaps the most influential among a growing body of literature on this topic.

[8] IPCC, *Climate Change 2007: Synthesis Report*. For figures with a longer historical range, see: Richard A. Houghton, 'Carbon Flux to the Atmosphere from Land-use Changes: 1850–2005', in *TRENDS: A Compendium*

Reversing this trend could significantly reduce emissions while concurrently preserving other services that forests provide. Not surprisingly, deliberations over the future of REDD became a key element of COP13 proceedings and the resulting 'Bali Road Map' sought to keep policy momentum going on REDD by encouraging technical assistance, methodological development and further resource allocations aimed at exploring possible REDD projects.[9] Underlying all such efforts was the notion that, through funding and other incentivisation policies, forests in developing countries could become more valuable standing than they would be if exploited for timber or converted for land use. Developed countries would play funding roles in this process as part of their larger efforts to mitigate the effects of climate change.

Despite such symbiotic potentialities, REDD has faced controversy and discord since its inception.[10] The critiques of REDD are myriad and complex, but the most pronounced among them stem from the inescapable result that by limiting how forests can be utilised, REDD may potentially undermine the future development and well-being of those who depend on forest resources. Some of the most vociferous opposition to REDD has come from representatives of communities that depend directly on forests for their livelihoods, food, fuel, medicine and other necessities.[11] REDD, such arguments go, could prevent forest-dwelling communities from accessing project-area forests due to fears that they would degrade or destroy the carbon-storing capacity of certain areas. Evacuating or restricting the traditional movements of forest-dwelling communities for the sake of global emissions control, particularly communities with ambiguous or insecure land tenure rights, continues to prompt a host of human rights concerns that challenge the legitimacy of REDD approaches.[12]

Furthermore, REDD creates a series of funding and implementation dilemmas, some of which present potential moral hazards. REDD has been framed as a mechanism that will allow for wealthy nations and corporations to expunge their responsibility for carbon emissions with offsets gained through REDD financing. Such offsets could thus disincentivise these wealthy actors from taking strong actions to rein in their own emissions while concurrently restricting land use in poorer regions.[13] 'Leakage', which refers to the displacement of deforestation from REDD project areas to other locations, represents a

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of Data on Global Change (Oak Ridge: Carbon Dioxide Information Analysis Center, Oak Ridge National Laboratory, US Department of Energy, 2008).

[9] For the text of the Bali Road Map, see: IPCC, *Report of the Conference of the Parties on its Thirteenth Session*, Held in Bali from 3 to 15 December 2007 (FCCC/CP/2007/6/Add.1, New York: United Nations, 2008). http://unfccc.int/resource/docs/2007/cop13/eng/06a01.pdf#page=8 (accessed 23 June 2011).

[10] At COP13, for example, several Indonesian civil society organisations held protests in opposition to the REDD mechanism and the UNFCCC panel sessions on the topic were defined by significant levels of debate. The author was a participant observer to the COP13. For COP13 outcomes on REDD, see: IPCC, *Report of the Conference of the Parties on its Thirteenth Session*, 8–12.

[11] Lawlor and Huberman, 'Reduced Emissions from Deforestation and Forest Degradation (REDD) and Human Rights'; David Brown, Frances Seymour and Leo Peskett, 'How Do We Achieve REDD Co-benefits and Avoid Doing Harm?', in *Moving Ahead with REDD: Issues, Options and Implications*, ed. Arild Angelsen (Bogor Barat: Center for International Forestry Research [CIFOR], 2008).

[12] William D. Sunderlin, Jeffrey Hatcher and Megan Liddle, *From Exclusion to Ownership? Challenges and Opportunities in Advancing Forest Tenure Reform* (Washington D.C.: Rights and Resources Initiative [RRI], 2008).

[13] FoE, *REDD Myths: A Critical Review of Proposed Mechanisms to Reduce Emissions from Deforestation and Degradation in Developing Countries* (London: Friends of the Earth International Secretariat, 2008).

related potential pitfall for the mechanism.[14] Leakage is difficult to measure and could be a likely result if REDD programmes are not adequately coordinated with land-use policies in surrounding territories. Moreover, given the integrated markets that exist for forest and agricultural products, leakage can cross state boundaries and, in doing so, become even less discernible.

Finally, there are very difficult issues to resolve if carbon credits are to be traded effectively in voluntary or compliance markets. There are fears that large volumes of REDD carbon credits could 'flood' carbon markets and undermine the carbon pricing in the process.[15] This problem relates to the concept of 'additionality', which points out that preventing deforestation necessitates that the forest in question was actually at risk. If the forest is actually at risk, and these risks are mitigated by a REDD project, then one can argue that significant carbon emissions were prevented and that 'additional' carbon credits are warranted as a reward. If a forest does not face serious threats, conversely, then protecting it is essentially preserving the status quo and can only lead to 'non-additional' carbon effects. Problematically, it is difficult and, in some cases, impossible to assess what might have happened to a forest in the absence of REDD or other land-use policies and, by extension, requiring recipient countries to prove additionality brings with it the hazard that they must demonstrate a pronounced deforestation problem. Abandoning additionality in favour of rewarding basic forest stewardship, on the other hand, risks flooding carbon markets, decreasing carbon prices and eroding the incentives for emitters to make reductions or invest in clean technologies.[16]

REDD's potential to clash with food production agendas represents an arguably even more fundamental obstacle for the effectiveness of the mechanism. REDD has traditionally valued forests first and foremost for their carbon, but it is increasingly clear that the mechanism's efficacy requires that it also responds to the *reasons* for forest clearance. Food requirements, which can drive significant forest conversions for the sake of agricultural expansion, represent a set of reasons that can be difficult to surmount. The challenge presented by agricultural land requirements is not altogether different from the broader land-rights challenges that are fundamental to REDD; however, the scale of food needs and the tenuousness of food prices in populous and urbanising countries such as Indonesia heighten these traditional hurdles. By 2050, global population is expected to have increased by around a third, potentially driving the conversion of 1 billion hectares (ha) of natural habitat in developing countries to cropland and pasture.[17] The Food and Agriculture Organization of the United Nations (FAO) predicts that a 70 per cent increase in food production (in value terms) will be needed by 2050 to meet the rise in global food demand. When combined with changing food preferences, this translates into a 49 per cent rise in the volume of cereals to be produced and an 85 per cent increase in the volume of global meat production. In absolute terms, such increases equate to roughly a billion extra tonnes of cereals and 200

[14] Sven Wunder, 'How Do We Deal with Leakage', in *Moving Ahead with REDD: Issues, Options and Implications*, ed. Arild Angelsen (Bogor Barat: Center for International Forestry Research [CIFOR], 2008), 65–76; William F. Laurance, 'A New Initiative to Use Carbon Trading for Tropical Forest Conservation', *Biotropica* 39, no. 1 (2007): 20–4.
[15] Lian P. Koh and David S. Wilcove, 'Oil Palm: Disinformation Enables Deforestation', *Trends in Ecology and Evolution* 24, no. 2 (2009): 67–8.
[16] Alain Karsenty, 'The Architecture of Proposed REDD Schemes after Bali: Facing Critical Choices', *International Forestry Review* 10, no. 3 (2008): 443–57.
[17] David Tilman et al., 'Forecasting Agriculturally Driven Global Environmental Change', *Science* 292 (2001): 281–4.

million extra tonnes of meat.[18] In the words of Maryanne Grieg-Gran, due to REDD 'strategies and projects, communities could see their access to forest resources restricted without recompense, or with payments that are too low to make up the shortfall in their food supply'.[19] Such a scenario is clearly untenable.

Arguably the greatest challenge for REDD, however, has to do with the degree to which it can become economically and socially viable for recipient countries. REDD is envisaged as a mechanism that can compete economically with other profit-creating activities that would be possible in a given forest area. It is unclear, however, at least in quantifiable financial terms, whether REDD will be able to reach an adequate degree of economic parity with industries such as those that extract timber, mine minerals and grow products such as oil palm and rubber. There are also important temporal elements for REDD relating to this issue. Agreeing to participate in REDD programmes could impose long-term restrictions on land use, which intrinsically reduces the future freedom of economic land-use choices in recipient countries.[20] This is not to suggest that REDD's potential competitiveness deficit is unavoidable, consistent across different locations or unchangeable. As the REDD mechanism matures, it is foreseeable that its financial competitiveness could increase and it does create economic opportunities by way of protecting the key ecological services that forests provide.[21] However, recognising that REDD exists within a competitive economic setting in which it provides often lower-order economic opportunities is an important starting point for predicting what the mechanism will likely accomplish in the near term.

These myriad social and economic issues have plagued REDD negotiations during UNFCCC sessions as well as its implementation plans within potential REDD target countries. The most noteworthy development to arise from these challenges was the formalisation of the REDD+ framework at the 2010 COP15 in Cancún. REDD+ seeks to go beyond mitigation efforts that target only deforestation and forest degradation and includes the role of conservation, sustainable forest management and forest carbon stock enhancements in its project criteria. Although these additions have been a part of REDD negotiations since the mechanism's inception, recent UNFCCC declarations have made these additional points increasingly relevant.[22] This expansion represents a potential paradigm shift for protecting local rights to forest resources within REDD frameworks, as REDD+ would presumably not completely restrict forest access and at the same time would allow for community-based forest management schemes that have long been advocated by civil society organisations. While REDD+ still leaves many questions unanswered, as the Indonesian case will demonstrate, there is little doubt that the mechanism has become both more encompassing and more flexible through its recent evolution.

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[18] Jelle Bruinsma, 'The Resource Outlook to 2050: By How Much Do Land, Water and Crop Yields Need to Increase by 2050?', Technical Paper from *Expert Meeting on How to Feed the World in 2050* (Rome: Food and Agriculture Organization of the United Nations, Economic and Social Development Department, 2009).
[19] Maryanne Grieg-Gran, 'Beyond Forestry: Why Agriculture is Key to the Success of REDD+', *iied Briefing*, November (2010): 2.
[20] Kate Dooley et al., *Cutting Corners – World Bank's Forest and Carbon Fund Falls Forests and Peoples* (London: Forests and the European Union Resource Network [FERN] and Forest Peoples Programme, 2008).
[21] For a cost-benefit comparison, see: Jaboury Ghazoul et al., 'REDD: A Reckoning of Environment and Development Implications', *Trends in Ecology and Evolution* 25 (2010): 396–402.
[22] These additionalities were placed on equal footing with deforestation and forest degradation in the COP16 agreement. See: UNFCCC, 'Outcome of the Work of the Ad Hoc Working Group on Long-term Cooperative Action under the Convention', *Draft Decision CP.16*, 10–11. http://unfccc.int/files/meetings/cop_16/application/pdf/cop16_lca.pdf (accessed 24 June 2011).

Indonesia's Choices

Indonesia is cautiously but deliberately entering the milieu of REDD+-related challenges and opportunities. Indonesia's forest conversions in the quest to extract timber and expand oil palm, rubber and various agricultural activities have defined much of the country's modern land-use history.[23] This section explores some of the primary features of land-use changes in Indonesia within the food and oil palm sectors.[24] These features provide important insights into the context in which REDD+ pilot programmes are attempting to gain a foothold and, as a result, are vitally important for assessing the potential roles that REDD+ might play in Indonesia's land-use strategies.

The Allure of Oil Palm

Oil palm is a highly productive, highly profitable and highly controversial plant product both in Indonesia and internationally.[25] Polemic arguments frame oil palm as a product posing potentially catastrophic environmental, social, health and economic problems[26] and as a godsend that can create jobs, inject capital into cash-starved economies, provide valuable ecological services, and act as a highly efficient biofuel, cooking oil and ingredient for many household products.[27] More sober assessments unsurprisingly find that oil palm brings with it many trade-offs that, as the world leader in oil palm production, are particularly salient for Indonesia.[28] Douglas Sheil and colleagues at the Center for International Forestry Research (CIFOR) succinctly discuss some of these trade-offs in the Southeast Asia context, stating that:

> Oil palm's considerable profitability offers wealth and development where wealth and development are needed—but also threatens traditional livelihoods. It offers a route out of poverty, while also making people vulnerable to exploitation, misinformation and market instabilities. It threatens rich biological diversity—while also offering the finance needed to protect forest. It offers a renewable source of fuel, but also threatens to increase global carbon emissions.[29]

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[23] For data on land-use changes between 1990 and 2005, see: Andree Ekadinata et al., 'Indonesia's Land-use and Land-cover Changes and Their Trajectories (1990, 2000 and 2005)', *ALLREDDI Brief 01* (Bogor: World Agroforestry Center [ICRAF], 2011).

[24] These sectors have been selected because the scope of this paper is not adequately broad to include the range of land-use issues in Indonesia, and the food and oil palm sectors both hold paramount importance for Indonesia's land-use strategies.

[25] For valuable assessments of the controversy surrounding oil palm production, see: Richard Stone, 'Can Palm Oil Plantations Come Clean?', *Science* 317, no. 5844 (2007): 1491; Anthony L. D'Agostino and Benjamin K. Sovacool, 'Palm Oil in Southeast Asia: Why the Controversy?', *Asian Trends Monitoring Bulletin* 4 (2010): 9–14.

[26] Ellie Brown and Michael F. Jacobson, *Cruel Oil: How Palm Oil Harms Health, Rainforest & Wildlife* (Washington D.C.: Center for Science in the Public Interest, 2005).

[27] World Growth, *Palm Oil and Food Security: The Impediment of Land Supply. How Environmentalists and 'No Conversion' Are Inflating Food Prices* (Arlington: World Growth, 2010).

[28] For a balanced and comprehensive assessment of oil palm issues in Indonesia, see: Douglas Sheil et al., *The Impacts and Opportunities of Oil Palm in Southeast Asia: What Do We Know and What Do We Need to Know?*, Occasional Paper No. 51 (Bogor: Center for International Forestry Research [CIFOR], 2009).

[29] Sheil et al., *The Impacts and Opportunities of Oil Palm in Southeast Asia*, viii.

Transcending these dichotomies, however, is the reality that both domestic and international demand for Indonesian oil palm continues to grow and that pressure to expand oil palm production in the country will remain significant for the foreseeable future.

Oil palm has emerged relatively rapidly as a powerful force in the Indonesian land-based economy. Indonesia's oil palm sector is driven by rising demands for oil for household and industrial processes in Asia, particularly from India and China, and by emergent demands for biofuel domestically, in Europe and elsewhere.[30] While the Dutch reportedly introduced oil palm to Java in 1848, Indonesian oil palm plantations began expanding significantly after 1980; before which oil palm only had a relatively minor presence in the Indonesian economy. By 1999, oil palm had supplanted rubber and coconut to become the country's leading plantation crop.[31] Together, Indonesia and Malaysia produce roughly 90 per cent of global exported crude palm oil (CPO), with Indonesia accounting for a majority of oil palm growth over the past decade.[32] Between 2000 and 2006, for example, more than 350,000 ha of new oil palm plantations were planted each year in Indonesia, and by 2009, the Indonesian government had estimated that more than 7.2 million ha of land were dedicated to oil palm cultivation.[33] The economic and employment footprints of oil palm are correspondingly large, with Indonesia reporting roughly US$15 billion in export earnings from CPO in 2009 and the industry employing over 1 million people.[34] These economic rewards and expansionary possibilities lead some to view oil palm as the land-based 'lubricator' of Southeast Asian economies and industry-based positions trumpet oil palm as a pathway to poverty eradication, employment creation and more solvent financial futures for Indonesia and other producing countries. Authors from the World Growth organisation encapsulate this position when they write that oil palm's 'inherently high productivity and labour-intensity makes it an ideal crop for the developing countries in the tropics that are capable of growing it'.[35]

Oil palm's emergence stems in large part from its versatility and relative efficiency. Palm oil is found in products ranging from chocolate bars, baked goods and ice cream to soaps, lotions and medical supplies. It is also the world's leading cooking oil, and fills an important food niche both in Indonesia and throughout export markets. Such widespread use stems mainly from oil palm productivity. It yields significantly more oil per ha than other major oilseed crops, such as rapeseed, sunflower, soya bean, peanut or cottonseed, with cited

[30] D'Agostino and Sovacool, 'Palm Oil in Southeast Asia'. According to this study from the Lee Kuan Yew School of Public Policy, Europe, the United States and Australia consume roughly 19 per cent of global palm oil while Asia accounts for nearly 70 per cent, with China and India making up approximately 40 per cent of total imports. Demand in Asia, moreover, is on the rise.
[31] Keith O. Fuglie, 'Indonesia: From Food Security to Market-led Agricultural Growth', in *The Shifting Patterns of Agricultural Production and Productivity Worldwide*, ed. Julian M. Alston, Bruce A. Babcock and Philip G. Pardey (Ames: The Midwest Agribusiness Trade Research and Information Center, Iowa State University, 2010), 343–81.
[32] USDA, 'Palm Oil: World Supply and Distribution', *Production, Supply and Distribution Online* (Washington D.C.: United States Department of Agriculture [USDA], 2008). http://www.fas.usda.gov/psdonline/psdHome.aspx (accessed 24 June 2011).
[33] Indonesian Palm Oil Commission (IPOC), *Statistik Kelapa Sawit Indonesia 2005* (Jakarta: Department of Agriculture, 2006); Fuglie, 'Indonesia: From Food Security to Market-led Agricultural Growth'. Most production currently exists in Sumatra, but the oil palm industry is expanding in Kalimantan and Papua.
[34] D'Agostino and Sovacool, 'Palm Oil in Southeast Asia'. Higher employment estimates exist, see: Cheng H. Teoh, *Key Sustainability Issues in the Palm Oil Sector: A Discussion Paper for Multi-Stakeholders Consultations* (commissioned by the World Bank Group) [Washington, D.C.: The World Bank and the International Finance Corporation, 2010].
[35] World Growth, *Palm Oil and Food Security*, 14.

yields that are seven times higher than rapeseed and ten times higher than soya beans per ha.[36] However, these statistics are neither wholly consistent nor static. Oil palm has historically had higher yields per ha on plantations than on small-scale holdings, although this gap is closing, and varieties of oil palm that have been modified through breeding efforts yield 2–3 times more than unimproved varieties.[37] There is every reason to predict that further efficiency gains are possible. Oil palm trees also mature relatively quickly and fruit can be harvested as early as 2–3 years after planting.[38] Such quick maturation rates are vital at the local level in order to make entry into the oil palm market economically viable in the short term, while also encouraging investment in oil palm plantations through quickly realisable profits. From a labour perspective, oil palm fruit can be harvested throughout the year in tropical environments, which are the only locations where it can be grown effectively, and can thus provide job opportunities that are not seasonally dictated.

Palm oil land holdings are currently divided among private plantations (controlling roughly 50 per cent of oil palm production), smallholders (40 per cent) and government-owned plantations (remaining 10 per cent).[39] Plantation-scale, or 'estate', oil palm farming follows deep land use traditions in the Indonesian archipelago, which during the 16th century held a virtual global monopoly on sources of spices including nutmeg, cloves and pepper. Spices were followed by sugar and coffee in the 19th century and a rubber boom that corresponded with a bourgeoning tyre demand in the 20th century.[40] After the economic disruptions of World War II and the War of Independence (1945–1949), the Indonesian government began aggressively encouraging the transmigration of people to underpopulated areas in Sumatra, Sulawesi, Papua and Kalimantan to support corporatised 'nucleus estates' that sought to bolster the country's export revenues. Oil palm, which greatly expanded after 1980, should thus be viewed as the latest manifestation of estate-driven economic growth in Indonesia. Small holdings, meanwhile, can be misleading categorisations, as small-scale oil palm farmers are often reliant upon large companies for initial inputs, such as seeds and fertilisers, as well as for backend necessities, such as transport, processing and marketing. Such arrangements can also lead to small-scale farmers becoming indebted to large oil palm companies as a result of their initial investments.[41] Regulation issues are also relevant here, as government delineations of oil palm plantations is a fairly clear-cut process, whereas individual economic decision making of farmers as to what to plant in their holdings is more difficult to quantify, much less regulate.

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[36] World Growth, *Palm Oil and Food Security*; Foreign Agricultural Service, *Indonesia: Palm Oil Production Prospects Continue to Grow* (Commodity Intelligence Report) [Washington D.C.: US Department of Agriculture, 2007]. http://www.pecad.fas.usda.gov/highlights/2007/12/Indonesia_palmoil/ (accessed 15 June 2011).

[37] Fuglie, 'Indonesia: From Food Security to Market-led Agricultural Growth'. The author discusses the yield gaps between plantation and small-scale oil palm production over the past three decades; Sheil et al., *The Impacts and Opportunities of Oil Palm in Southeast Asia*. The authors note the improvements in yield that result from modified oil palm varieties.

[38] Yusof Basiron, 'Palm Oil Production through Sustainable Plantations', *European Journal of Lipid Science and Technology* 109 (2007): 289–95. It should be noted that trees aged 9–15 years are most productive and after 25–30 years trees become too tall for effective harvesting. New breeds and genetic modification technologies may change these time frames in the future and produce oil palms that are productive past the 30-year mark.

[39] Indonesian Palm Oil Commission (IPOC), *Statistik Kelapa Sawit Indonesia 2005*.

[40] Fuglie, 'Indonesia: From Food Security to Market-led Agricultural Growth', 360.

[41] Sheil et al., *The Impacts and Opportunities of Oil Palm in Southeast Asia*; Interview of Muhammad Ridwansyah, Norwegian Desk Coordinator, Jambi Province, by J. Jackson Ewing and Devin Maeztri on 1 May 2011.

Palm oil's utility as a biofuel provides a further push factor for crop expansions in Indonesia. While calculating palm oil's fuel efficiency from both carbon and economic perspectives is difficult, it does tend to outperform many of its biofuel competitors on both of these fronts. According to the Bogor Agricultural Institute in Indonesia, palm oil can produce 5,830 litres (L) of biodiesel per ha compared to 600 L per ha from jatropha, currently its greatest land-based competitor. The growing international markets for biodiesel, particularly in Europe, and Indonesia's desire to increase the share of biodiesel in its own energy matrix both encourage increasing the land allocation to oil palm cultivation. Europe has ambitious emissions reductions targets that will compel countries to utilise more biodiesel in transportation and power generation sectors. While European regulations that restrict biodiesel imports from deforested lands pose some hurdles, it appears increasingly likely that Europe could represent a robust export market for Indonesian oil palm for years to come. Domestically, meanwhile, the Indonesian government has pledged to reduce fossil fuel dependency by 25 per cent and produce up to 22.26 billion L of biofuel by 2025 as part of its overall strategy to reduce national carbon emissions. The country has incentivised biofuel production through tax break subsidies, and its National Team for Biofuel Development has recommended a mandatory 10 per cent biodiesel blending requirement, much of which would depend upon palm oil contributions.[42] Despite these indicators, the economic viability, social implications and net carbon reductions of biodiesel remain relatively uncertain. What is clear, however, is that the profitability of oil palm's versatility in food, fuel and processing is seductive for both large and small enterprises alike, and that smallholder conversions to oil palm and the large-scale pursuit of new plantation concessions are occurring concurrently in Indonesia.

Oil Palm's Dirty Underbelly

While perhaps understandable, given the potential profit levels involved, oil palm conversion trends in Indonesia pose a number of social and environmental challenges. Palm oil products have been criticised for causing a range of health risks and other consumer-related shortcomings. [43] The most pronounced criticisms, however, focus upon negative environmental fallouts from palm oil production (including biodiversity losses), the industry's impact upon food production and pricing, questions about its emissions reduction value as a biofuel and accusations of misleading economic returns for small-scale planters. Even the successes of oil palm can beget critiques. Industry advocates argue that as oil palm yields per ha rise and palm oil production and refinement becomes more efficient it will in turn reduce land pressures by creating profits in smaller tracts.[44] However, the counterpoint to this production intensification thesis is that greater profitability will encourage more land to come under oil palm cultivation and create greater incentives for plantation expansions.[45] These critical arguments drive pervasive controversies in Indonesia about the oil palm industry's place in the country's economic and social fabric.

[42] Anne Casson, Luca Tacconi and Ketut Deddy, *Strategies to Reduce Carbon Emissions from the Oil Palm Sector in Indonesia* (Jakarta: Indonesian Forest Climate Alliance, 2007).
[43] Brown and Jacobson, *Cruel Oil*.
[44] Denis J. Murphy, 'Future Prospects for Oil Palm in the 21st Century: Biological and Related Challenges', *European Journal of Lipid Science and Technology* 109, no. 4 (2007): 296–306.
[45] Sheil et al., *The Impacts and Opportunities of Oil Palm in Southeast Asia*.

Oil palm expansion has had significant implications for natural forests in Indonesia. FAO estimates for the period between 1990 and 2005 revealed that over 56 per cent of oil palm expansion in Indonesia came at the expense of natural forest cover.[46] Additionally, forest losses are often greater than the plantations that replace them, as the ancillary effects of infrastructure developments, displaced persons and land-clearance frauds all contribute to the deforestation footprint.[47] More contemporarily, oil palm encroachment problems have been partially mitigated by the fact that lowland deforestation is so well established in much of Kalimantan and Sumatra that oil palm has room to expand onto already cleared land.[48] However, as demand and profitability rise, so too does the impetus for further expansions into forested areas and carbon-rich peatlands.[49] In timber forests, logging and oil palm companies are often closely associated and the profits from timber extraction can be used to cover some of the start-up costs for oil palm expansion.[50] Peatlands, meanwhile, are attractive for oil palm expansion because often times relatively few people live in these areas and they can be easily cleared through draining and burning.

The environmental impacts of forest and peatland conversions for oil palm are myriad. Monoculture oil palm plantations store significantly less carbon than natural forests and exponentially less carbon than peatlands.[51] Generally speaking, oil palm plantations also provide less effective ecological services compared to natural forests, and can exacerbate soil erosion and hydrological challenges.[52] Fertiliser use relating to oil palm can lead to GHG emissions, soil degradation and the eutrophication of surrounding water bodies due to runoff. Like all monoculture plantations, oil palm can be catastrophic for biodiversity.[53] In Indonesia, moreover, the scale with which these expansions are being pursued further magnifies the environmental impacts of the oil palm sector.

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[46] Koh and Wilcove, 'Oil Palm: Disinformation Enables Deforestation'. Deforestation figures from oil palm expansion are disputed in Indonesia, with competing positions putting forward different figures and differing definitions of forests.

[47] Sheil et al., *The Impacts and Opportunities of Oil Palm in Southeast Asia*.

[48] Didiek H. Goenadi, Executive Director, Indonesia Palm Oil Association, said in May 2008 that future oil palm expansions would occur primarily on 'idle land'.

[49] For comparative data on the carbon richness of peatland compared to other land types, see: Andree Ekadinata and Sonya Dewi, 'Estimating Losses in Aboveground Carbon Stock from Land-use and Land-cover Changes in Indonesia (1990, 2000, 2005)', *ALLREDDI Brief 03* (Bogor: World Agroforestry Center [ICRAF], 2011).

[50] Anne Casson, *The Hesitant Boom: Indonesia's Oil Palm Sub-sector in an Era of Economic Crisis and Political Change* (Bogor: Center for International Forestry Research [CIFOR], 2000). It should also be noted that oil palm forest conversion licenses are currently easier to obtain than are logging permits, creating an incentive for logging companies to pursue forest conversion concessions with the underlying goal of timber extraction.

[51] Thomas P. Tomich et al., 'Carbon Offsets for Conservation and Development in Indonesia?', *American Journal of Alternative Agriculture* 17, no. 3 (2002): 125–37; Finn Danielsen et al., 'Biofuel Plantations on Forested Lands: Double Jeopardy for Biodiversity and Climate', *Conservation Biology* 23, no. 2 (2008). It is estimated that it takes oil palm between 71 and 93 years to make a positive carbon contribution following forest conversions and over 600 years after the conversion of peatlands. If the forests or peatlands are burned, these timeframes become substantially longer.

[52] It should be noted that well-managed oil palm plantations can do reasonably well in regulating hydrology. See: Z. Yusop, C. H. Chan and A. Katimon, 'Runoff Characteristics and Application of HEC-HMS for Modelling Stormflow Hydrograph in an Oil Palm Catchment', *Water Science & Technology* 56, no. 8 (2007): 41–8.

[53] Brown and Jacobson, *Cruel Oil*.

The social implications of oil palm expansion are also far from wholly positive. As previously stated, oil palm certainly creates jobs and economic opportunities; however, critical arguments point to cultural and livelihood issues accompanying oil palm that are far from ideal. Firstly, some contend that oil palm is not the economic miracle for small farmers that it often claims to be.[54] Secondly, while the industry does create economic opportunities, these can come at the expense of traditional ways of life and livelihood. To borrow from authors for the civil society group, Friends of the Earth:

> The unsustainable expansion of Indonesia's palm oil industry is leaving many indigenous communities without land, water or adequate livelihoods. Previously self-sufficient communities find themselves in debt or struggling to afford education and food. Traditional customs and culture are being damaged alongside Indonesia's forests and wildlife.[55]

The social implications of oil palm cultivation are perhaps nowhere more important than in the food sector. The oil palm industry is relevant to Indonesia's quest for food security both directly and indirectly. Direct connections include the fact that, while the majority of CPO in Indonesia is exported, palm oil does constitute the country's most important cooking oil; a fact that leads its proponents to argue that oil palm is essential for food security.[56] However, oil palm plantations also compete with other agricultural products for land usage both on estate and local scales. Such competition, and the subsequent changes in food crop yields, can affect food pricing and, by extension, food access for Indonesian citizens. Moreover, in an often under-analysed relationship, the environmental impacts of oil palm plantations can affect the agricultural possibilities and outputs in surrounding areas. This relationship is only one of many that affects Indonesia's complex food security environment, which is an essential sector for understanding the fundamentals of Indonesian land-choice challenges.

Indonesia's Food Security Calculus

In the words of David Fullbrook, the '[v]aluation and perceptions of food often overlook its special significance as the source of life, sustaining society and its security. Food is as critical to national security as resources such as oil, steel and rubber that often pre-empt it'.[57] This statement provides a cautionary point for Indonesia, which is a world leader in rice consumption per capita with a population of over 240 million people situated on an archipelago with widely differentiated land calculations. Like many of its Southeast Asian neighbours, Indonesia faces a range of challenges for maintaining food security. The sprawling archipelago suffers in various locations from existing environmental degradation that can undermine agricultural production. Its inescapable physical characteristics and location make Indonesia vulnerable to climate change in a number of ways that could affect food production.[58] It has the dual characteristics of a land-scarce country throughout much of Java and a land-abundant country in parts of Kalimantan, Sumatra and Papua. While this

[54] Interview of Muhammad Ridwansyah, Norwegian Desk Coordinator, Jambi Province, by J. Jackson Ewing and Devin Maeztri on 1 May 2011.
[55] FoE, *REDD Myths*.
[56] World Growth, *Palm Oil and Food Security*.
[57] David Fullbrook, 'Food as Security', *Food Security* 2 (2010): 5.
[58] Rosamond L. Naylor and Micheal D. Mastrandrea, 'Coping with Climate Risks in Indonesian Rice Agriculture: A Policy Perspective', in *Uncertainty and Environmental Decision Making: A Handbook of Research and Best Practice*, ed. Jerzy A. Filar and Alain Haurie (New York: Springer, 2010).

can benefit Indonesia's food calculus, it creates social and food challenges relating to relocations, demographic transitions and overall development in the country's periphery. These calculations, meanwhile, must be constantly coupled with the land-use pressures emanating from urbanisation and infrastructure development, a bourgeoning mining industry and land-intensive activities, such as oil palm and rubber cultivation. As Indonesia continues to develop and grow in population, food challenges on both local and national scales will become more pronounced.

The Indonesian government is all too familiar with the country's food-related challenges. Throughout its modern history, Indonesia has managed to fairly successfully meet food demands through expanding cultivation and progressively increasing yields per ha. Indonesia's cultivated land has unsurprisingly grown significantly during past decades and the country currently has arguably the most ambitious agricultural expansion plans in Southeast Asia.[59] From 1961 to 2005, for example, cropland expanded by 1.4 per cent per year and by 2005 cropland covered 38 million ha.[60] Growth in croplands was accompanied by a near doubling of persons employed in the agricultural sector. Between the 1961–1965 and 2001–2005 periods, agricultural employment grew from 28 million to 51 million, not including the jobs that supported agricultural expansions of this scale.[61] Indonesia's agricultural expansions have now extended into the second decade of the 21st century and the country has announced fast-track development plans in 2010 for vast agricultural estates in areas of Papua and Kalimantan.[62] Indonesia's food ambitions extend beyond its borders and, by 2030, the country hopes to be a major global food producer for products ranging from rice, corn and sugar to poultry, mangoes and bananas.[63]

Productivity gains have also keyed progress for Indonesia's food sector. Yield growth accounted for over two-thirds of Indonesia's total growth in rice production between 1961 and 2007, with land expansions accounting for the other one-third.[64] Rice, which has a level of importance in Indonesia that can scarcely be overstated, accounts for roughly half of Indonesia's gross agricultural output and benefited mightily from green revolution technologies. The New Order government, which came to power in the mid-1960s, prioritised food crop production and was aided by concurrent progress in agrotechnological developments. The government used oil export revenues to heavily subsidise fertiliser and irrigation projects while also encouraging outmigrations from Java to plantation estates in Indonesia's sparsely populated periphery. During the green revolution stage from 1968 to 1992, agricultural output increased by an impressive 4.8 per cent annually. However, the growth in productivity in Indonesia's agricultural sector dropped during the 1990s. National and otherwise accessible agricultural research programmes proved unable to deliver post-green revolution technologies that could keep output growth momentum at the same time

[59] Erwida Maulia, 'Indonesia Pledges to 'Feed the World'', *The Jakarta Post*, 30 January 2010. http://www.thejakartapost.com/news/2010/01/30/indonesia-pledges-feed-world039.html (accessed 25 June 2011).
[60] BPS (Biro Pusal Statistik or the Central Bureau of Statistics), Agricultural Indicators (Jakarta: Central Bureau of Statistics, 2011).
[61] FAO, FAOSTAT Database (Rome: Food and Agriculture Organization of the United Nations). http://faostat.fao.org/default.aspx (accessed 20 June 2011).
[62] The Merauke Integrated Food and Energy Estate (MIFEE) is one manifestation of this strategy and will ultimately cover roughly 2.5 million ha.
[63] Pau K. K. Hangzo, 'Comprehensive Food Security: An Approach to Sustainably Address Food Insecurity', *NTS Perspectives*, no. 3 (2010).
[64] FAO, FAOSTAT Database.

that national priorities began to shift towards industrial sectors.[65] Indonesia became a large importer of grains, particularly for livestock feed – a situation that proved volatile during the lean economic years surrounding the Asian economic crisis.[66] The country is currently in a new phase of agricultural yield progress that is predicated upon market liberalisation. The 'reform' government that came to power after the Asian economic crisis moved away from both subsidies and import restrictions and agricultural growth resumed at a rapid rate of over 4 per cent per year.[67] Liberalisation also affected land acquisition and conversion strategies and, as one might expect from market-based approaches, business sector actors began to exert more control over the nature of land use in Indonesia. Importantly, the resultant expansion of crops into previously forested areas has resulted in pronounced soil erosion,[68] biodiversity losses[69] and GHG emissions from peatland drainage.[70]

Thus, the Indonesian food sector currently has goals for ambitious growth, the realisation of which is vital for the country's food security and economic vitality, while still being in the relatively early stages of a market liberalisation process that threatens to have unviable environmental consequences. Moreover, the food sector faces increasing stiff competition for profitability and land use from market-driven products, such as oil palm. These are two key aspects of Indonesian circumstances into which REDD+ enters. REDD and, more recently, REDD+ attempt to present a counter choice to forest conversions of all kinds and are thus inextricably linked to both food production and the export plantation agendas in Indonesia. The interplays among these land-use choices are still in their infancy. However, the maturation of the REDD mechanism (including its evolution to REDD+) has seen the goals of the framework grow more nuanced in an attempt to support the rights and interests of the range of impacted stakeholders.

Balancing REDD+ Costs and Benefits?

REDD+ recognises that preserving carbon stocks for global climate mitigation efforts must be emphasised in tandem with the co-benefits of forest protection. These efforts, moreover, are tasked with including transparent consultations that seek consent from affected parties and compensation for land-use restrictions; both of which should be conducted along principles of fairness and equity.[71] These are valuable premises for ensuring that REDD+ caters to local contexts, which will be essential for the mechanism's relative successes and

[65] Keith O. Fuglie and Roley R. Piggott, 'Indonesia: Coping with Economic and Political Instability', in *Agricultural R&D in the Developing World: Too Little, Too Late?*, ed. Philip G. Pardey, Julian M. Alston and Roley R. Piggott (Washington D.C.: International Food Policy Research Institute [IFPRI], 2006), 65–104.
[66] Fuglie, 'Indonesia: From Food Security to Market-led Agricultural Growth'. Subsidies for these grain imports dried up due to a lack of government capital and the livestock sector contracted significantly as a result. See: P. Simalupang et al., ed., *Indonesia's Economic Crisis: Effects on Agriculture and Policy Responses* (Adelaide: Centre for International Economic Studies, 1999).
[67] Fuglie and Piggott, 'Indonesia: Coping with Economic and Political Instability'.
[68] Peter H. Lindert, *Shifting Ground: The Changing Agricultural Soils of China and Indonesia* (Cambridge, MA: MIT Press, 2000).
[69] Lian P. Koh and David S. Wilcove, 'Is Oil Palm Agriculture Really Destroying Tropical Biodiversity?', *Conversation Letters* 1, no. 2 (2008): 60–4.
[70] Brown and Jacobson, *Cruel Oil*.
[71] For further analysis on these points, see: Arild Angelsen and Sheila Wertz-Kanounnikoff, 'What are the Key Design Issues for REDD and the Criteria for Assessing Options', in *Moving Ahead with REDD: Issues, Options and Implications*, ed. Arild Angelsen (Bogor Barat: Center for International Forestry Research [CIFOR], 2008), 11–23.

failures. Problematically, however, the notion that REDD+ can adequately and fairly compensate all stakeholders for restrictions that it places upon forest development is overly ambitious. Indonesian examples in the oil palm and food sectors are only some among many that reveal the intricacies of land development trade-offs. Trade-offs have winners and losers, relatively speaking, and suggestions that virtually all interest must be balanced while perhaps just are also unfeasible. REDD+ strategies in Indonesia and elsewhere would do well to recognise this point *a priori*.

Principles of equitable distribution relating to REDD+ costs and benefits have several dimensions.[72] These principles assert that developing countries should be assisted in their participation in REDD+ schemes and that these schemes should be available to forested countries throughout the world, including poor areas that still require significant development. Benefits from REDD+ should also be spread within countries, where the costs and benefits are meant to accrue across land-use actors and levels of governance and administration. REDD+ explicitly seeks through statutes put forth in the UNFCCC to recognise and include in decision-making processes the rights and preferences of local forest-dwelling communities. There is an additional ongoing debate about the responsibility of REDD+ to be 'pro-poor' in the sense that the mechanism will seek to explicitly deliver benefits and development services to communities in need.[73] Some oppose the pro-poor position on the grounds that REDD+ is about emissions reductions not poverty eradication, and these voices propose a 'do no harm' principle as an alternative.[74] Both positions, however, take as a starting point that costs and benefits to REDD+ must be weighed carefully and negative ancillary effects on forest stakeholders must be eliminated.

Such costs and benefits are actually not wholly possible to assess, and notions that REDD+ will consistently assist poor communities or at least do no harm underestimate the fundamental trade-offs that are inherent to the mechanism. These notions, however, continue to define much of the debate surrounding REDD+. In a well-constructed example of the emphasis on balancing the costs and benefits of REDD+, Jaboury Ghazoul and colleagues argue that:

> ... the wider social and economic benefits and beneficiaries of the land uses that REDD seeks to replace need to be recognized and addressed in the course of negotiating and implementing REDD ... the success of these [REDD] schemes will depend on their ability to achieve appropriate compensation that encompasses the full range of economic, social and political implications of avoiding deforestation.[75]

Ghazoul and colleagues also effectively demonstrate that current REDD+ discourse and policy construction do not adequately account for the range of corollary factors that enter into the cost-benefit analysis surrounding the impacts of the mechanism. The authors write:

> … compensation based on the opportunity costs of REDD might underestimate true costs by failing to account for downstream economic values of current land uses, including employment and wealth generated by processing and service industries …

[72] Angelsen and Wertz-Kanounnikoff, 'What Are the Key Design Issues for REDD and the Criteria for Assessing Options', 20–1.
[73] Brown, Seymour and Peskett, 'How Do We Achieve REDD Co-benefits and Avoid Doing Harm?', 109.
[74] Ibid.
[75] Ghazoul et al., 'REDD: a Reckoning of Environment and Development Implications': 396, 398.

> REDD might [also] exclude people from forest land, causing demographic shifts, and the declining tax revenues from commodity production and associated industries might be a disincentive to government investment in forested regions to the detriment of forest communities and regional development.[76]

Ghazoul and colleagues, in an elaboration of the pervading principles of REDD+ goals, further argue that these ancillary issues must be accounted for in order for the mechanism to arrive at appropriate compensation frameworks.[77] Such goals rest on sound moral grounds and any approach to REDD+ would do well to thoroughly explore the cost-benefit contexts within which they are implemented. However, and perhaps unfortunately, the idea that such costs and benefits can be comprehensively balanced is fundamentally flawed.

Regarding equitable compensation, the scope of people and groups who might miss out on opportunities due to REDD+ is exhaustive. The most intuitive costs, such as those that accrue as a direct result of forest conversions, are relatively easily quantified and at least in principle compensated for (although the sources of the funding and the targets of compensation remain complex). In other words, forests can be valued for their commoditisable products, including their carbon, and payment schemes created accordingly. The more indirect costs of REDD+ are far more difficult to assess and bring into the analysis a range of economic and social processes. For example, a timber company in a potential REDD+ site may, among other things, build roads, employ the bulk of an area's community, purchase equipment and trucks along with the maintenance services and fuel to operate them, supply builders with needed timber and contribute to cross-border economic relationships. The company is, in other words, heavily integrated into the economic processes surrounding forest resource development, the tendrils of which extend beyond the realm of realistically establishing and compensating all stakeholders. Indonesia provides a strong national example of this reality, as it is estimated that the forestry sector employs around 350,000 people directly and 3.1 million people in broader forestry-related businesses.[78]

The situation becomes arguably more complex with forest conversions. The potential for capital-producing practices, such as oil palm, rubber and mineral development, to economically benefit from forest clearance is difficult to assess. Like timber, these industries are intricately integrated into the economies of which they are a part and they have the potential for long-term economic returns as a result of initial forest clearances. Aside from quantification difficulties, there are real concerns about the ability of REDD+ to compete, as these industries often have the capacity to far outstrip the resources that REDD+ will bring to bear.[79] Returning to the example of Indonesia, some contemporary estimates claim that the 'net present value of a 30-year palm oil concession was $3,800 to $9,600 per ha. This compares to just $614 to $994 per ha net present value that could be expected in the voluntary carbon market'.[80] There is little reason to expect that REDD+ can compete with

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[76] Ghazoul et al., 'REDD: a Reckoning of Environment and Development Implications': 396.
[77] Ghazoul et al., 'REDD: a Reckoning of Environment and Development Implications'.
[78] Basoeki Karyaatmadja et al., ed., *Indonesia's Forestry Long Term Development Plan 2006–2025* (Jakarta: The Ministry of Forestry of Indonesia, 2006).
[79] Interview of Sonya Dewi, Official, Center for International Forestry Research (CIFOR), by J. Jackson Ewing and Devin Maeztri on 28 April 2010.
[80] Rie Jerichow, 'Palm Oil Could Undermine Carbon Payment Schemes', *COP 15 News*, 1 April 2009. http://www.en.cop15.dk/news/view+news?newsid=1007 (accessed 15 February 2011).

such industries on strictly economic terms.[81] This is not lost on the Indonesian government, which is subject to consistent lobbying from the oil palm and other sectors seeking to avoid REDD+ restrictions upon their activities.[82]

There are also legitimate temporal concerns that REDD+ could impede future economic opportunities and ways of life. Speaking on the Indonesian case, FAO Indonesia Official Benni H. Sormin argues that there are concerns that the country might feel 'restricted' in the future if it is not careful about REDD+ commitments now, stating that 'consent with stakeholders is fine for now, but what about future generations?'.[83] Social issues further problematise the comprehensive and equitable distribution of compensation envisioned by many REDD+ proponents. These issues include the potential for an erosion of traditional ways of life that include various forest development and conversion practices. The social costs of finding alternate livelihoods, skills and new ways of life are also impossible to either quantify or compensate.

The food production sector is particularly germane to the argument that wholly comprehensive compensation for REDD+ represents an unrealistic goal. As a basic human need, food access transcends strictly monetised approaches to land use and extends into the realm of rights and social justice.[84] Food access in Indonesia and throughout many developing countries targeted for REDD+ is predicated to a large extent upon food costs. These costs in turn relate to domestic production and availability, the existence of international macroeconomic forces notwithstanding, which can affect the daily intake of vulnerable populations. Alan Oxley, the Chairman of a business-oriented organisation, World Growth, discusses this point by arguing that:

> While many proponents of REDD+ claim that the poor and impoverished will be compensated for lost development opportunities, it is clear that they fail to consider the impact that this restriction of land conversion has on food prices and food security … schemes such as REDD+ pose a significant threat to food security by restricting the development and conversion of land for agriculture. As the global population continues to grow, the waning food supply is sure to increase food prices and as a result, forcing millions more people into hunger and poverty.[85]

While Oxley and his organisation may have vested interests in opposing REDD+, the points raised here remain relevant. Food price increases in such contexts are tantamount to income reductions for households and individuals that are compelled to spend an increasing percentage of their incomes on food. As REDD+, at least in principle, has the potential to affect food production levels both locally and nationally in the name of forest preservation, it

[81] Interview of Rogier Klaver, FAO UN-REDD, Jakarta Project Officer, by J. Jackson Ewing and Devin Maeztri on 29 April 2011.
[82] According to a panel from the prominent Indonesian environmental civil society group, WARSI, the oil palm industry is making the case to Indonesian officials that Norwegian commitments to fund REDD+ pale in comparison to what could be made from oil palm. Interview of WARSI, Panel, by J. Jackson Ewing and Devin Maeztri on 29 April 2011.
[83] Interview of Benni H. Sormin, FAO Jakarta, by J. Jackson Ewing and Devin Maeztri on 27 April 2011.
[84] For a valuable analysis of the ways in which food differs from other economic commodities, see: Fullbrook, 'Food as Security'.
[85] Alan Oxley in 'New Report – REDD+ Raises Food Prices and Compromises Food Security: Environmental NGOs, No Land Conversion Escalate Global Food Crisis', World Growth, 7 December 2010. http://www.worldgrowth.org/palmoil/index.cfm?sec=19&subSec=66&id=572 (accessed 27 June 2011).

could influence food prices in indirect ways that are extremely difficult to measure. Should absolute food access be compromised even partly as a result of REDD+ programmes, the resulting hunger and social strife would be profoundly difficult to justify, especially on climate change mitigation terms. Overall, despite relative consensus and much iteration about the need for equitable burden sharing and compensation distribution, there is significantly less clarity about how these endeavours might be effectively pursued.[86]

Conclusion: Scope and Spatiality

The challenges outlined in the previous sections are not intended to suggest that REDD+ lacks value as a PES mechanism or that it should be abandoned in Indonesia or elsewhere. Rather, REDD+ must advance through more sober assessments of its limitations, possibilities and appropriate characteristics. Pursuing relatively comprehensive trade-off analyses is valuable, as such analyses can reveal the overall wisdom of going through with a given REDD+ project. It should be recognised, for that matter, that like costs, the total benefits of preserving forest services are extremely difficult to quantify in strict cost-benefit calculations. Inclusive investigations can thus valuably illuminate details about the context in which a REDD+ project will progress and reveal its potential second- and third-order effects that can help inform the specifics of project formulation. However, the notion that all of the related costs and benefits can be accounted for and justly recompensed should be abandoned.

REDD+ will be more effective as a mechanism if it can become further integrated into the larger land-use strategies of countries such as Indonesia. Specifically, REDD+ should emphasise spatially driven approaches to project designs within the underlying premises of the mechanism itself. In Indonesia, for example, and despite calls to the contrary, oil palm production is too valuable to move away from on a substantial level in the foreseeable future. The need for steady increases in food production, meanwhile, is fundamental to both Indonesian citizens and the state itself. Both of these endeavours, as has been discussed, are land intensive and have shown the capacity to create significant pressure on forests. The place for REDD+ is not to compete with, replace or undermine these land-use agendas so much as to complement them through preserving forests in spatially logical locations. It is more important to protect forests in upstream watershed sources than in downstream valleys well suited for farming. It is more appropriate to attempt forest preservation in areas of great biodiversity than those that are already in a degraded state. Likewise, agricultural expansions where possible should look to expand onto fallow and previously converted lands.[87] As Rogier Klaver, an Official at the FAO's UN-REDD office in Jakarta, aptly states, 'REDD+ is not just about leaving forests standing, it is about forest management and spatial planning. Where do you plant oil palm? Where do you retain forests for biodiversity and carbon sequestration? These are the questions for REDD to help answer'.[88]

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[86] Chukwumerije Okereke and Kate Dooley, 'Principles of Justice in Proposals and Policy Approaches to Avoided Deforestation: Towards a post-Kyoto Climate Agreement', *Global Environmental Change* 20, no. 1 (2010): 82–95.

[87] The World Resources Institute in Indonesia focuses on such possibilities, see: Moray McLeish and Craig Hanson, 'Having Your Food and Forests, Too', World Resources Institute, 17 November 2010. http://www.wri.org/stories/2010/11/having-your-food-and-forests-too (accessed 11 June 2011).

[88] Interview of Rogier Klaver, FAO UN-REDD, Jakarta Project Officer, by J. Jackson Ewing and Devin Maeztri on 29 April 2011.

Such approaches to REDD+ require further movement on the international level toward forest protection and management programmes that transcend their value as carbon sinks. In the words of biologist Tom Lovejoy, appreciating forests just for their carbon 'is like valuing a computer chip only for its silicon'.[89] REDD+ is a positive step in this direction and, in Indonesia, it has received a boost of support due to the development that some community-based forest management schemes will become eligible for REDD+ funding. A further positive extension would see REDD+ fit within a larger scheme of 'ecocertifications', which could monetarily reward economic activities that have corollary benefits in the realm of ecological services.[90] In Indonesia, such approaches would require redoubled cooperation among state agencies and provincial governments. Greater REDD+ consultation with the Ministry for Agriculture, which has hitherto been lacking, offers just one pathway towards this end. Provincial cooperation will pose an even greater challenge, especially in the Indonesian context of political decentralisation. It is essential, however, that the ecological contexts transcending political boundaries in Indonesia and elsewhere are recognised in land-use planning. In the realm of forests, REDD+ is a system that can add key inputs toward this end and can help create a more progressive and nuanced approach to managing these key ecological systems.

[89] Tom Lovejoy in 'Something Stirs: But to Save the Forests, the World Needs to Find Somewhere Else to Grow its Food', *The Economist*, 23 September 2010. http://www.economist.com/node/17062727 (accessed 27 June 2011).

[90] Interview of Sonya Dewi, Official, Center for International Forestry Research (CIFOR), by J. Jackson Ewing and Devin Maeztri on 28 April 2010. Dewi provides examples of such ecocertification possibilities in Indonesia to include jungle rubber farms, which preserve biodiversity and act as carbon sinks, and agroforestry efforts in the food production sector.