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POLICY BRIEFS

Farming at Indonesia's forest frontier: Understanding incentives for smallholders

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Contents

Farming at Indonesia's forest frontier:
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About this policy brief

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Farming at Indonesia's forest frontier: Understanding incentives for smallholders

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1. Introduction

Market-based incentives are an increasingly popular tool being promoted to address global deforestation problems. Understanding the incentive structures that shape decision-making processes at the forest frontier, and the nature of institutions linking smallholders to environmental markets, are therefore crucial for developing schemes and policies capable of inducing positive changes in land use practices.

This research takes the case of deforestation caused by smallholders in Indonesia and, through a series of detailed household surveys, identifies key components of the institutional environment that shape forest outcomes at the frontier. These findings hold important implications for the appropriate design and effectiveness of what are commonly referred to as 'Payments for Ecosystem Services' (or PES) schemes.

2. Market-based mechanisms for avoiding deforestation

Due to high rates of deforestation, Indonesia is the third largest emitter of greenhouse gases in the world (after the USA and China), resulting in the recent introduction of various market-based schemes to reduce deforestation. Two examples of such market-based mechanisms considered here are:

(i) the emergence of 'forest stewardship' payments linked to carbon markets

(ii) supply chain certification programs that attempt to create price premiums at the farm level for environmentally-friendly land use practices.

The idea of carbon payments for forest protection was given further sustenance when delegates at the 2007 Bali Climate Change Conference agreed to include 'avoided deforestation' (referred to as REDD, Reducing Emissions from Deforestation and Degradation) as a means for achieving carbon offsets within a post-Kyoto global agreement. Already, voluntary efforts by private companies and individuals to become 'carbon neutral' have created a carbon market outside the Kyoto framework. A key advancement in this regard occurred with the widely publicised decision by Merrill Lynch, in April 2008, to purchase carbon credits through the preservation of the Ulu Masen Ecosystem Area in Aceh. Even before Aceh had begun to enjoy the financial benefits of this nine million dollar deal, and in apparent anticipation of similar carbon deals in the future, Governors of all Sumatra's ten provinces announced a plan to protect Sumatra's remaining forest at the IUCN World Conservation Congress in Barcelona, in October 2008. In Aceh, the proposal is to use carbon dollars to fund buffer zone activities, including support for intensive—rather than extensive—agriculture, exemplifying an Integrated Conservation and Development Project (ICDP) approach to conservation.

Elsewhere, private companies and NGOs (based mainly in affluent consuming countries) have developed various environmental compliance systems enacted throughout global supply chains. Such schemes are now widespread in commodities such as coffee, timber, fisheries and palm oil. Supply chain verification schemes are currently used for Indonesian coffee, and include 'Organic', 'Fairtrade', 'Rainforest Alliance', 'Utz Kapeh', and 'Starbucks

CAFÉ Practices', all of which attempt to address environmental (and social) concerns at sites of production through market signals sent by buyers along the supply chain. A key recommendation from a 2007 WWF report on coffee farming and deforestation in Southern Sumatra (with a focus on Lampung) was to develop and implement rigorous chain of custody controls that would exclude unsustainably grown coffee from the supply chain.

At the heart of these varied schemes are assumptions regarding incentive structures for those proximate actors responsible for forest clearing. Clearly, to induce change, any financial incentive must exceed the opportunity costs of farming in a 'business as usual' scenario and must take into account the effects of changes to labour and capital markets. Complex institutional structures linking proximate actors to sources of payment are required to ensure payment is made to the intended beneficiaries, and that compliance can be adequately monitored. Crucially, specific incentive structures will be ineffective unless adequately contextualised within broader regional and national institutional settings.

3. Coffee farming and deforestation across Indonesia

Indonesia is a major world coffee producer, earning 660 million USD in coffee export earnings during 2007 (BPS, 2008). With the exception of a number of large government-owned estates (PTPNs) in East Java, coffee is predominately a smallholder crop in Indonesia. The average coffee farmer cultivates a one-hectare plot in an isolated region with poor access to social services, and with an income that oscillates between each side of the poverty line (depending on conditions in world commodity markets). Coffee farming performs an important social security function across Indonesia by injecting cash into many otherwise impoverished rural areas with few other employment options. Growth in the Indonesian coffee sector, however, has occurred primarily through access to cheap (forested) land, resulting in reasonable farm profits without the need to invest in agricultural technologies.

This study performed household farmer surveys (n=324) and informal stakeholder interviews (n=24) with traders, processors, cooperative heads, exporters, industry associations, NGOs and government officials in three coffee-producing regions of Indonesia: Lampung, the largest volume producer (of Robusta coffee); Aceh, the major Arabica-producing region in Southeast Asia; and Toraja, a smaller specialty coffee region in Eastern Indonesia. Each region possesses a number of unique characteristics in regard to the structure of its coffee industry, and its environmental conditions, which create specific social and economic dynamics at the farm-forest boundary.

Lampung: The port of Panjang in Lampung Province exports more coffee than any other in Indonesia, pooling coffee grown across the provinces of South Sumatra, Bengkulu and Lampung. Robusta coffee is dry-processed and sold into both the domestic and world market at a discount to world prices due to poor quality. The trade operates on tight margins in a highly competitive world market. Nestle operates an instant coffee factory in Lampung and a number of international trading companies maintain a presence near the port. Green bean exports from Lampung expanded from 42 thousand tonnes in 1975 to 265 thousand tonnes in 2006, and have been associated with a gradual loss of natural forest cover across Southern Sumatra. A slither of natural forest now remains within the Bukit Barisan Selatan National Park (BBSNP), providing habitat for the Sumatran elephant, rhino and tiger (all critically endangered), although even this protected area is under threat from farmer encroachment.

Aceh: The Gayo highlands of Aceh produce high quality Arabica coffee for the international specialty coffee industry, with large buyers such as Starbucks absorbing much of the production (an estimated total of 30 thousand tonnes annually). The coffee is wet-processed and frequently bought and processed by large mills located at the

source with direct links into the international market. Beans are exported from Belawan (Medan) at a significant premium above international market prices. Since the 1990s, various certification schemes such as 'Organic', 'Fairtrade', 'Starbucks CAFÉ Practices' and 'Rainforest Alliance' have made inroads into the industry, such that the industry is now characterised by increased product traceability, a supply chain audit culture, and the presence of various coffee cooperatives to comply with buyer-driven demands. The Gayo highlands are nestled against the Leuser Ecosystem Area, a protected area managed by the Special Province of Aceh with a conservation status equivalent to a National Park. With solid premiums available for this coffee, and with recent high commodity prices, new coffee farms continue to be established within the Leuser Ecosystem Area.

Toraja: Only about four thousand tonnes of high quality Arabica coffee is exported from the port of Makassar, sourced from the various highland areas of South Sulawesi, the most important of which is Tana Toraja District. This premium coffee is sold into specialty markets with particularly strong demand coming from the Japanese and US markets. Coffee production in Toraja is deeply embedded within traditional cultural systems and is characterised by low inputs, low productivity and relatively stagnant production despite strong demand. Torajan coffee is one of the highest grown coffees in the world, with plots found as high as 2000m above sea level, thereby contributing to a unique taste profile. There are currently no formal conservation areas in Toraja, although coffee farms are found adjacent to, and within, land classified by the government as 'Protected Forest' in the upper catchments. Although these forest boundaries have been regularly renegotiated in recent years to take into consideration the realities of local land use practices and to satisfy local political / economic priorities, there is far less forest clearing occurring at this forest front compared with both Aceh and Lampung.

Table 1 Main characteristics of coffee farming at three case-studies

Important Characteristic	Lampung	Aceh	Toraja
Majority of coffee grown in the area	Robusta	Arabica	Arabica
Total coffee production in province ('000 ton)	120	30	5
Average farm-gate coffee price in 2008 ('000 Rp/kg)[1]	15	24	31
Estimated average FOB export price ('000 Rp/kg)[2 3]	20	38	37
In-migration (% of respondents born elsewhere)	52	48	2
% of respondents applying Urea in last 12 months	34	37	15
% of respondents applying herbicides / pesticides in last 12 months	86	80	85
New plantings (% of respondents < 10 years)	30	43	38
Labour costs ('000 Rp/day)	23	38	28
Land costs (million Rp/ha)	34	46	33[4]

4. What drives a coffee farmer to clear forest?

Geist and Lambin (2002) categorise causes of deforestation as either 'proximate' or 'underlying'. Proximate causes refer to human activities at the local level such as agricultural expansion and resource extraction, while 'underlying' drivers are fundamental social processes operating beyond the frontier, such as demographic, economic, technological, and institutional forces. There are usually pre-disposing environmental factors (such as good soil quality, resource availability and suitable topography) that support deforestation, while deforestation can also be triggered by biophysical (fires, droughts and pest outbreaks) and social (revolution and economic shocks) events. This study addresses one kind of proximate cause: smallholder coffee cultivation, although this is frequently linked also to timber extraction.

It is certainly the case in both the central plateau of Bener Meriah (Aceh) and around Sekincau volcano in Lampung that fertile soils constituted powerful pre-disposing environmental conditions for initial coffee expansion. As production reaches the perimeter of these soils, productivity falls and less intensive production systems begin to dominate. Deforestation, however, continues.

The underlying drivers of deforestation are complex, and we found evidence of coffee-related deforestation being driven by:

Markets: During the research period, coffee prices were at some of their highest levels in recent years, following a period of severely depressed prices from 2001 to 2004 (Figure 1). This reflects earlier research, where it was shown that high global coffee prices can be directly correlated with increased rates of forest clearing in Indonesia (Sunderlin et al., 2001; Verbist et al., 2005).

Figure 1. World Coffee Price, 1977-2008 (Source: ICO, 2008)

Demographics and migration: Population increase per se does not lead to deforestation. However, migration can. Examples of Toraja out-migration (with strong cultural barriers to in-migration) seem to mitigate against rapid forest clearing in Toraja, whereas migration-fuelled deforestation is occurring across Aceh and Lampung. As demonstrated in Table 1, migrants constituted nearly 50 per cent of respondents in Lampung and Aceh, and only 2 per cent in Toraja.

Government policy: The necessary movement of labour into frontier regions has been facilitated by the transmigration policy, although Lampung also has a long history of spontaneous migration and the main in-migration evident in Aceh came from intra-provincial migration (from Gayo Lues and Blangkejeren). The Indonesian Department of

Agriculture continues to support expansion of the area under coffee cultivation through the '*Perluasan Areal*' program, providing direct support for expansion.

Institutions: Conservation boundaries are actively contested by farmers at each of the three sites, and land tenure is unclear. The process of obtaining new forest land for cultivation appears to follow a similar pattern at each location and starts with the relatively informal process of gaining approval from traditional leaders and then local village heads or sub-district heads. Most local officials we spoke to explained that they were compelled to provide land to members of the community who needed it (reinforcing the 'social security' function of forests), although this did not necessarily apply to non-locals. The process, therefore, generally involved conversion by members of the local community followed later by transfer to migrants (a process explained elsewhere in Indonesia by Li, 2002). Tenure of coffee farms is overwhelmingly restricted to '*Surat Keterangan Tanah*' (Land Title), or equivalents issued by Village Heads or Sub-District Heads. There are few incentives for farmers to convert title to Land Certificates with the National Land Agency (BPN) due to current taxation policy. The high degree of uncertainty regarding legal status and the influential role of local officials at the frontier provides few institutional constraints to expansion of the frontier. A new policy on community-based forestry management (HKm=*Hutan Kemasyarakatan*) has provided one possible avenue for negotiated settlements of mutual benefit for government and community interests to develop agroforestry systems within the protected forests under some clear rights and responsibilities (Colchester et al., 2005).

5. Buyer-driven environmental regulation in the Indonesian coffee sector

Growth in global coffee production over the last 30 years has inevitably occurred either through expansion of coffee cultivation into new areas (often into previously uncultivated tropical forests) or the adoption of high input, intensive coffee production (commonly with a corresponding loss of shade cover and on-farm biodiversity). Consequently, coffee-related deforestation has occurred in all major producing regions across Central and South America, Asia and Africa.

Growing recognition of the habitat value of some traditional coffee systems, and the threat imposed by their conversion from shaded to non-shaded systems, led to efforts to promote environmentally friendly coffee production through value chain mechanisms. Initial certification arrangements in Central America were pioneered by Smithsonian Bird-Friendly coffee (shade-grown) and Eco-OK (later Rainforest Alliance). The key aim of these schemes was for coffee-growers to be rewarded for their role in on-farm habitat protection. The first 'certified' coffee in Indonesia (according to Mawardi, 2002) was an organic coffee from the Takengon region of Central Aceh, which in 1992 was marketed as Gayo Mountain Organic Coffee. This has since been followed by organic coffee cooperatives in East Timor, Utz Certified coffee in Aceh, Lampung, East Java and in Sulawesi, and the Starbucks CAFÉ Practices scheme being introduced to suppliers in Northern Sumatra (including Aceh) and Sulawesi (including Toraja). Supply chain certification has generally progressed to a far greater extent in the high quality Arabica markets (such as Aceh and Toraja), where opportunities for value-adding are greater and where brand reputations are more susceptible to allegations of environmental and social neglect.

Such schemes have also been embraced by some environmental organisations. A key recommendation from a 2007 WWF report on coffee farming and deforestation in Southern Sumatra (with a focus on Lampung) was to develop and implement rigorous chain of custody controls that would exclude unsustainably grown coffee from the supply chain.

The certification of smallholders generally requires the formation of cooperatives to facilitate product traceability. The process of cooperative formation is most advanced in the case of Aceh, where up to 20 separate farmer cooperatives now supply certified coffee to the market. The experience of Indonesian farmers with agricultural cooperatives in the past, however, has not been good, and there are indications that the most recent spate of international-market driven formation is little different. Cooperatives have generally been unable to secure farmer support in Indonesia due to their inability to provide the same services as traditional market mechanisms, such as hassle-free access to credit and simple marketing procedures, and to the perceived high costs of dealing with rent-seeking cooperative structures. The reality in Aceh is that farmers continue to sell to traditional first-stage collectors who then on-sell to 'cooperatives', many of which have been established by large exporters and may consist of many thousands of members (one we visited claimed a membership base of eight thousand farmers). The first time many farmers learn about the existence of a cooperative is when a plaque is placed in their plots asserting membership[5] . The six coffee cooperatives we visited in Aceh employed, on average, five full-time staff members. None of the 135 coffee farmers randomly sampled in Aceh identified services such as credit provision, input supply or technical advice, as a benefit of cooperative membership. Only one farmer claimed to receive a price premium for organic coffee.

Arabica coffee from both Aceh and Toraja is sold into similar international specialty markets, although only coffee from Aceh is currently marketed as 'organic' (but the process of organic certification is now underway in Toraja). As a result of certification, at the point of export, Aceh coffee frequently receives a slight premium above Toraja coffee. However, somewhat surprisingly, this study found farm-gate prices in Aceh to be substantially lower than those in Toraja (Table 1). Even the one farmer in Aceh claiming a price premium was still only receiving the same price as the average Torajan farmer. Drawing on the insights generated from stakeholder interviews, we conclude that a primary cause of this price difference is due to additional supply chain transaction costs associated with traceability requirements, the insertion of cooperatives within an existing supply chain offering few value-added services, and the costs of the audit process itself. Price premiums are clearly not finding their way to farmers in Aceh and can not be expected to be capable of changing farmer incentive structures.

6. Conclusions: How effective are market-based schemes in preventing deforestation?

Here, we present two key findings from this study.

First, we question the effectiveness of policies that promote agricultural intensification in buffer zones as a tool to reduce pressure on forest resources. Even though coffee is generally produced using extensive methods across Indonesia, with few inputs and generally low per hectare productivity, increased productivity is unlikely to result in the 'full belly' outcome where farmers are satisfied with a set level of income. In coffee frontiers where few restrictions to in-migration exist, enhanced profitability simply acts as a magnet to labour from neighbouring regions. This is exemplified in this study by the case of Lampung and, to a lesser extent, Aceh. Coffee farmers in all three cases demonstrate a preference for labour-saving technologies (such as use of herbicides) that facilitate expansion of area rather than use of inputs (such as fertilisers) that would increase per hectare productivity. The scarcity of fertilisers in the market during 2008 was clearly another factor affecting the ability of farmers to intensify production. Most importantly, however, the ICDP approach of improving livelihoods in the buffer zone ignores the crucial role played by migrants in shaping the forest frontier. Efforts to address deforestation by a policy of agricultural intensification alone, therefore, are unlikely to be successful due to a poor understanding of the underlying demographic and institutional drivers of deforestation.

The second key finding from the study relates to the currently limited capacity of supply chain certification schemes to provide the necessary incentives at the farm-level to encourage changes in land management practices. Certification, or verification of compliance, commonly necessitates the involvement of 'cooperative' trade structures, with their associated high administrative costs, within the supply chain. While coffee certification may be important as a marketing tool at the point of export, it is currently unable to deliver tangible benefits to farmers, who moreover perceive these schemes as restricting their on-farm behaviour and decision-making utility. The large volume of 'organic' coffee exported under the 'Gayo' name does not correspond to the widespread use of synthetic fertilisers and herbicides reported in this study, suggesting there are some fundamental constraints to monitoring environmental performance along a supply chain. Similar schemes to exclude illegally-grown coffee from BBSNP in Lampung are likely to face similar limitations, where the constraints may be even more acute due to the tighter margins of the bulk Robusta market. It is concluded, therefore, that such supply chain mechanisms provide a relatively inefficient and ineffective tool for changing farmer behaviour.

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Notes

[1] Average farm-gate price taken from household survey and converted to a green bean equivalent if sold as cherries, parchment, or wet beans.

[2] Export price for Lampung Robusta is estimated using the average price in London for May 2008 (www.ico.org), and taking into account an exchange rate of Rp9,285 and a discount of 200USD/tonne to the London price.

[3] Export prices for Aceh and Toraja Arabica are estimated using the average price in New York for June 2008 (www.ico.org), and taking into account an exchange rate of Rp9,383 and a premium of +40cents/lb above the New York price (+35cents/lb for Toraja).

[4] Only 47 per cent of respondents in Toraja were able to even estimate local land prices (compared to 90% for Aceh and 83 per cent in Lampung). This indicates the relative absence of a real estate market in Toraja and the near total lack of exchange in coffee farms due to strong adat land arrangements.

[5] Plaques are necessary due to the increasing requirement that certified farms be verified spatially so that individual farms can not be used to claim a membership base larger than reality. Despite these plaques, numerous such 'organic' farms are routinely sprayed with herbicides.


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