

Land-based investment and green development in Indonesia

Lessons from Berau district, East Kalimantan

Anne Casson Yohanes I Ketut Deddy Muliastra Krystof Obidzinski



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Executive summary

Indonesia is rich in natural resources and the Indonesian Government has promoted their extraction and utilization to promote economic development and generate export revenue. This policy has contributed to an increase in national GDP per capita income, helped to alleviate poverty and contributed to improved health and education services. However, it also resulted in environmental impacts, greenhouse gas (GHG) emissions and biodiversity loss.

Growing global concern about the environmental costs of economic development resulting from natural resource extraction has sparked interest in a new economic paradigm known as 'green development'. This concept aims to stimulate economic growth and development from more rational and sustainable use of natural resources. It also aims to encourage policy makers to efficiently allocate natural resources and to derive development and growth from carefully researched spatial planning that maximizes degraded land and conserves environmental services, which will benefit future generations.

Indonesia is currently experimenting with the 'green development' paradigm and trying to define its meaning and better understand its potential application . So far, this process has meant a refinement and realignment of existing policy measures that now fall under the umbrella of 'green development'. The Indonesian Government has released numerous policies that seek to reduce deforestation and GHG emissions since it pledged to protect the climate system for the benefit of present and future generations at the 13th Conference of Parties of the United Nations Frameworks Convention on Climate Change (UNFCCC) in 2007. However, it also released an important, yet contradictory, economic development strategy known as the *Master plan: Acceleration and expansion* of Indonesia economic development (2011–2025) in 2011. The latter strategy outlines a plan to utilize Indonesia's natural resources from the outer islands of Kalimantan, Sumatra, Sulawesi and Papua to increase GDP and allow Indonesia to become one of the world's ten biggest economies by 2025. The

MP3EI contradicts many of Indonesia's policies aiming to reduce deforestation and GHG emissions and efforts were made to harmonize the MP3EI with environmental and climate change policies.

The battle between economic development based on natural resource extraction and more sustainable use of natural resources is currently being played out in the majority of Indonesia's resource rich regions. The case study of Berau in East Kalimantan provides a good example. Berau is a forest frontier as the majority (75%) of its land area is covered primary and secondary forest, while the majority of the forest in neighboring, more accessible districts such as Kutai Kartanegara, has already been cleared. The district is rich in forest and mineral resources and there is significant potential to generate revenue from the extraction and utilization of these resources. Nevertheless, the government of Berau and East Kalimantan also recognize the potential value in conserving and sustainably using these natural resources for present and future generations. Both governments have pledged to trial REDD+ pilot programs, pledged to promote 'green development' and to contribute to Indonesia's national commitment of a 26% reduction in carbon dioxide (CO_2) emissions by 2020.

The challenge is significant. Available data suggests that deforestation in the district has increased from an average of 12,833 ha per annum between 2000 and 2006 to 20,760 ha per annum between 2007 and 2012. Over the last 12 years, between 81.1 and 185.7 million tonnes (t) of CO₂ has been emitted into the atmosphere from deforestation in Berau district. Large areas of land (86% of the total land area of Berau) have been allocated to: oil palm (291,533 ha), logging (1 million ha), industrial timber (223,978 ha) and mining companies (389,150 ha). A large-scale pulp mill was established in the district in 1997 with an official production capacity of 525,000 t of pulp per annum and 542,626 ha of land was excised from the forest estate in 2001 for conversion to other land uses. A proposed revision of the spatial plan (RTRWP 2012) indicates that another 116,656 ha of land will be allocated for conversion and that this land consists

of 35,879 ha of primary forest and 318,944 ha of secondary forest. These forests store between 41–57 million t of carbon, which will be released into the atmosphere as CO_2 if cleared for other land uses.

Nevertheless, considerable opportunities exist for future 'green development' in Berau. Berau's government is committed to the 'green development' paradigm and it has supported the development of the Berau Forest Carbon Program, which seeks to enable Berau to meet its development goals while sustainably managing its forests and reducing GHG emissions. The Indonesian Government has also placed a temporary moratorium on the clearing of primary forest and peatland provided that land has not already been allocated to concessions; and the identification and utilization of degraded land for future plantation development is also being encouraged. The current cabinet, under President Jokowi, is expected to continue the Moratorium Policy.

Significant effort is still required to slow deforestation, GHG emissions and environmental destruction. Significant forest conservation and GHG savings can be realized if the Berau government revaluates the removal of forested land from the forest estate and re-categorizes forests rich in biodiversity and carbon as conservation or protected forest. For instance, a potential saving of between 149.9–267.9 million t CO₂ could be made if primary and secondary forests in the APL land category (land designated for conversion) were recategorized as protected or conservation forest, which could be supported by the East Kalimantan Province Regulation on forest and biodiversity protection. A comprehensive strategic environmental assessment (SEA) of Berau's proposed 2012 spatial plan could help to revaluate current land allocations and identify the carbon rich lands that should be conserved to mitigate GHG emissions. The SEA should ensure that communities are consulted and that available data of community lands is well documented and carefully considered.

The excessive allocation of concessions for logging, mining and plantation expansion also needs to be evaluated to ensure that suitable lands are allocated for these activities and that rational, informed and well thought out land allocations are granted. These initiatives could help Berau to achieve its 'green development' aspirations and contribute to Indonesia's national CO₂ emission commitments. They could also benefit other resource rich regions that wish to narrow the gap between mainstream economic plans that seek to utilize natural resources and 'green development' strategies that seek to promote more sustainable use of natural resources.

Introduction

In the twentieth century, the world's population grew fourfold, economic output 22 times and fossil fuel consumption 14 times (UNEP 2011). The resilience of a wide range of environmental systems is now being tested by the requirements of: a rapidly growing global population and increased levels of economic activity. This includes meeting the energy and food needs of 9 billion people in 2050. Thus the world faces twin challenges: expanding economic opportunities for a growing global population; and addressing environmental pressures that, if left unaddressed, could undermine economic development and growth (OECD 2011). These challenges are particularly relevant in forest-rich developing countries such as Indonesia, where forests are being cleared to generate income and to make way for other developments, including agriculture.

Today, Indonesia is the fourth most populous country in the world (behind China, India and the United States) and the most populous country in Southeast Asia (Population Reference Bureau 2012). Strong economic growth (7% per annum) and expanding population mean there is increasing demand for food, energy and other commodities. This unfortunately means that forested and other carbon-rich lands are cleared to make way for new developments required to support economic growth and feed a growing population.

Deforestation and land-use change accounts for about 18% of global greenhouse gas (GHG) emissions, more than the entire global transportation sector and second only to the energy sector (Stern 2006). In Indonesia, the share of emissions from land-use change and peat degradation was estimated to be 78% of total national emissions in 2005 and is expected to be 68% of total emissions in 2020 (DNPI 2010). Land-based emissions primarily result from deforestation, forest and peatland degradation and other land-use activities through burning, decomposition of waste forest matter and soil degradation in cleared land, rice fields and the use of fertilizer and chemicals in agricultural lands. The potential for future deforestation is high because demand for key commodities (such as oil palm, timber and minerals) is expected to remain strong, especially in China, India and Indonesia (PwC 2012).

The challenges of reducing deforestation and the associated greenhouse gas (GHG) emissions, while feeding a growing population and meeting global demand for fiber and energy, are attracting increasing global attention. In this context, land-based investment and trade in agricultural products, wood fiber and other resources (e.g. minerals) have a strong influence on shaping decisions about how land is allocated and used. As such, they often act as drivers of deforestation and forest degradation in the tropics, constitute opportunity costs to REDD+, and present important obstacles to reducing GHG emissions. In Southeast Asia, the global and regional patterns of investment and trade in agricultural production and natural resources place considerable pressure on land, forests and rural populations. It is estimated, for instance, that since 2000, there has been a 1% annual decline in forest cover in Southeast Asia and that the majority of these forests have been converted to plantations and secondary vegetation (Meittinen et al. 2011).

This is clearly visible in Indonesia where economic development is largely dependent on extraction of natural resources, commodity plantations and the export of unprocessed or semiprocessed goods. The export is not the only driving force behind natural resource extraction. Increasingly, it is the steady and continuous population growth (which almost doubled between 1970 and 20101) and the growth of an emerging middle class with much higher rates of consumption. Responding to the demographic and societal changes in Indonesia, the government is seeking to accelerate economic development. It is doing so by advancing the MP3EI 2011-2025. This policy involves large-scale projects in forestry, oil palm and food production in Indonesia, which are expected to expand by about 17 million ha over the next two decades.

Initially, the program has been almost entirely focused on introducing the measures to attract the investment necessary to achieve its economic policy objectives. However, as concerns intensified over

¹ In 1970, Indonesia's total population was estimated to be 119,208,229 people. In 2010, the population had almost doubled and was estimated to be 237,641,326 people (BPS 2012).

limited environmental safeguards and potential climate change implications of unchecked land-based investment, the Indonesian Government took steps to reduce environmental externalities. It imposed a moratorium on the conversion of primary forests and peatland. It committed to reduce national carbon emissions by 41% with external assistance and by 26% without external aid. It plays host to a range of REDD+ demonstration activities and it promotes 'green development' – a new concept being advanced by influential stakeholders such as the World Bank (Hallegate et al. 2011), Food and Agriculture Organization of the United Nations (FAO 2013), the United Nations Environment Programme (UNEP 2011), the United Nation's Economic and Social Commission for Asia and the Pacific (UNESCAP 2011) and the Organisation for Economic Cooperation and Development (OECD 2011).²

The 'green development' concept aims to foster economic growth and development while ensuring that natural assets continue to provide the resources and environmental services on which our well-being relies (OECD 2011, 9). In other words, it seeks to reconcile low-carbon and sustainable development with other valued outcomes, including job creation, poverty alleviation and high economic growth (Resnick et al. 2012).

Green development focuses on improving human well-being and reducing social inequity in the long term, while not exposing future generations to significant environmental risks and ecological scarcities. It seeks to do this in two ways. First, by increasing investment in the sustainability of ecosystem services upon which much of the world's poor depend, it ensures that the environment can continue to be used for the benefit of current and future generations. Second, by basing strategies for economic growth on the sustainable use of natural resources and the environment, a green economy generates the long-term jobs and wealth that are needed to help eradicate poverty (UNDP 2011). The concept draws upon tax and competition policies that are designed to maximize efficient allocation of resources and encourage efficient use of natural capital (OECD 2011).

The Indonesian Government seeks to increase investment in the sustainability of ecosystem services, as well as strategies for economic growth based on sustainable use of natural resources and the environment. It does so by continuing to be the global leader in developing REDD+ regulatory frameworks and demonstration activities or pilots (Satgas 2012). The government also strives to reposition relevant existing environmental regulations under the umbrella of 'green development' in order to carry the concept forward (Murniningtyas 2014).

It is not clear whether or not development objectives under MP3EI, other similar policies, and GHG emission reduction policies can be reconciled and if so, under what conditions. Within Indonesia, climate change policy is rarely consistent with other sectoral policies. For example, policies that promote the expansion of palm oil (both for food and biofuel production) into new areas often conflict with climate change policies designed to reduce emissions from deforestation and degradation (Gao et al. 2011). Meanwhile, policies that support conventional agriculture (with high use of fossil fuel and synthetic inputs) often prevail over those that support sustainable and climate-smart practices (Mattision and Norris 2005). In addition, development policy planning often is short term (typically 5–10 year cycles), whereas the integration of adaptation and mitigation goals requires longer term planning horizons (Harvey et al. 2014).

In this report, we assess the relationship between these trends and explore options for convergence. The methods used to generate the information required to analyze policy trends began with an exhaustive review of the published and gray literature on commercial land use, government policies associated with land use and environmental protection, and non-government initiatives to reduce GHG emissions from forestry and agriculture (e.g. round tables, other voluntary processes). The review also conducted a thorough

For instance, the Organization for Economic Cooperation 2 and Development (OECD) notes that "'Green development' means fostering economic growth and development while ensuring that natural assets continue to provide the resources and environmental services on which our well-being relies" (OECD 2011, 9). For the United Nation's Environmental Programme (UNEP), the concept refers to "improved human well-being and social equity, while significantly reducing environmental risks and ecological scarcities" (UNEP 2011, 1). According to the United Nation's Economic and Social Commission for Asia and the Pacific (UNESCAP), green development is a policy of: "environmentally sustainable economic progress to foster low-carbon, socially inclusive development" (UNESCAP 2011). World Bank researchers state that, "Green development is about making growth processes resource-efficient, cleaner and more resilient without necessarily slowing them" (Resnick et al. 2012).

analysis of government regulations that seek to adopt certain elements of 'green development', and how this 'greening' is accomplished.

In order to link the analysis of regulation changes at national and subnational levels in Indonesia with the reality on the round, we employed remote sensing and ground-truthing techniques. We examined the linkages between green development objectives with the realities on the ground by looking at forest cover change and GHG emissions in the areas of interest, particularly in Berau district, East Kalimantan province.

In order to ground truth and contextualize the policy analysis and remote sensing observations, we engaged in key stakeholder interviews. These included interviews with donor and development agencies in Jakarta (e.g. EC, GIZ, UNDP, UNEP, USAID, World Bank) who are at the center of the global discourse on green development. We then engaged national level agencies in Indonesia (i.e. Ministry of Agriculture, Ministry of Economic Development, Ministry of Forestry) in order to gauge their understanding and interpretation of the global concept of green development. Finally, through workshops, focus group discussions (FGDs), and individual interviews we traced the understanding and implementation of green development concept to subnational level in East Kalimantan and Berau district, in particular.

The interviews and remote sensing data were improved with the addition of primary field data collected in Berau. We used household surveys to gauge the implications of oil palm investments on rural livelihoods and to analyze the penetration of the green development concept.

Section 1 of this report provides information on land-based investment trends in Indonesia and Indonesia's *Master plan: Acceleration and expansion of Indonesia economic development (2011–2025)*. This plan encourages investment in the expansion of plantations (timber, oil palm and food crops) and in natural resource extraction (particularly logging and mining) and the expansion of plantations (timber, oil palm and food crops) to support economic development and feed Indonesia's growing population.

Section 2 explores other government policies and market-based initiatives that are being implemented in Indonesia to reduce GHG emissions and reduce deforestation. These policies and initiatives are the current manifestation of green development in Indonesia.

Section 3 introduces Berau – a forest-rich district in East Kalimantan – and the challenges it faces with economic development and land-use policies.

Section 4 explores efforts that are being made in Berau to reduce deforestation and offers suggestions for what further steps are needed.

The report concludes by drawing lessons from Berau's experience in seeking to balance economic development and reduce GHG emissions. The lessons are of broader relevance to Indonesia.

1 Land-based investment trends in Indonesia and carbon emissions

Indonesia has long promoted the extraction of natural resources to stimulate economic development and growth. During the Suharto era (1967–1998), logging and timber processing were encouraged in 5-year development plans known as REPELITA (*Rencana Pembangunan Lima Tahun*). Plantation developments were also promoted to increase agricultural production and food efficiency. Largescale oil palm plantation developments were primarily encouraged in REPELITA IV (1994/5– 1998/9) to stimulate employment, GDP growth and export revenue (Potter 1991; Byron 1993; World Bank 1994; Poffenberger 1997).

In 2011, natural resource extraction and the expansion of agriculture, large-scale estate crops and timber plantations were emphasized in the Master plan: Acceleration and expansion of Indonesia economic development (2011–2025). This plan essentially aimed to utilize Indonesia's natural resources in the outer islands (i.e. Sumatra, Sulawesi, Kalimantan and Papua) to increase GDP from USD 700 billion (2010) to USD 17.5 trillion in 2045. Overall, the Master plan: Acceleration and expansion of Indonesia economic development (2011–2025)(MP3EI)³ aimed to leapfrog Indonesia into the world's ten biggest economies by 2025, by increasing GDP to USD 4.5 trillion as well as by increasing GDP per capita income from USD 3000 to USD 15,000 (Coordinating Ministry for Economic Affairs 2011).

The 2011 Master plan: Acceleration and expansion of Indonesia economic development (2011–2025). encouraged large-scale investment in 22 primary activities, including timber, palm oil and agriculture. The policy laid out an ambitious plan to advance Indonesia's economy and it was supposedly formulated in consideration of the National Action Plan for Greenhouse Gas (*Rencana Aksi Nasional Gas Rumah Kaca*) as a national commitment that recognized global climate change (Coordinating Ministry for Economic Affairs 2011, 23). However, it made no mention of REDD, renewable energy, green development, biofuels or the government commitment to reduce GHG emissions by 26% by 2020. It instead focused on building up the oil and gas industry and promoted large-scale investment in the oil palm sector, industrial timber sector and the sugar industry. The Ministry of National Development Planning (Bappenas) was requested to 'green' the MP3EI and to carry out a Strategic Environmental Assessment (SEA) of the plan to assess its impact on the environment (Mongabay 2013). The MP3EI was consequently revised in May 2014 and the revision mentioned the GOI commitment to reduce emissions by 26% and other environmental safeguards such as environmental impact assessments, environmental protection and management laws and green economic policy instruments. However, the fundamental development policies of the MP3EI remained the same. These policies continued to encourage economic development via oil palm and timber plantation expansion, mining, agricultural expansion and logging.⁴

According to the 2011 and 2014 versions of the MP3EI (2011–2025), oil palm development is to be concentrated in Kalimantan, Sulawesi and Sumatra; while sugar will be encouraged in the Merauke Integrated Food and Energy Estate (MIFEE) development program which will be located in an area of 1.2 million ha in Papua (Coordinating Ministry for Economic Affairs, 2011, 159). Commercial scale industrial plantation forest estate (HTI) development is primarily encouraged in the Kalimantan Economic corridor. The large HTI investment is spread across several locations in West Kalimantan (1 million ha with investment of approximately IDR 9.6 trillion), followed by East Kalimantan (417,000 ha, investment of IDR 7.2 trillion), Central Kalimantan (270,000 ha, investment of IDR 5.4 trillion), and South Kalimantan (89,000 ha, investment of IDR 1.3 trillion) (Coordinating Ministry for Economic Affairs 2011; PerPres No. 48/2014).

³ Under Presidential Regulation No. 32/2011, President Yudhoyono launched the MP3EI policy in May 2011 and the policy was supported by sectoral ministries, local governments and state-owned enterprises.

⁴ Peraturan Presiden Republik Indonesia, Nomor 48 Tahun 2014. Master Plan Percepatan dan Perluasan Pembangunan Ekonomi Indonesia 2011–2025.



Figure 1. Kalimantan economic corridor.

Source: Coordinating Ministry for Economic Affairs (2011).

The *Master plan: Acceleration and expansion of Indonesia economic development (2011–2025)* is supported by the *National forestry plan (2011–2030)*, which states that 14.5 million ha of industrial timber plantation forests will be established to produce 362.5 million m³ of timber per year by 2030. The natural forest is expected to be able to produce 14 million m³ per year (MoF 2011). The plan aims to increase the forestry sector's contribution to national GDP by 300% (Obidzinski and Dermawan 2012). The key priority sectors promoted in the MP3EI and the *National forestry plan* are discussed in further detail below.

1.1 Logging

Logging began during the colonial era in Indonesia when the Dutch began to extract teak from Java's forests to build ships and sell to Chinese traders in the seventeenth century (Peluso 1992). Extraction was based on treaties with regional Javanese rulers, which enabled the Dutch to gain access to timber and local labor. Dutch traders and officials initially thought that Java's teak forests were inexhaustible but most of Java's teak forests were exhausted by the end of the eighteenth century (Peluso 1992).

Exploitation of Indonesian forests greatly increased after the creation of the Foreign Capital Investment Law in 1967, which encouraged multinational corporations to extract timber from the outer islands of Indonesia; and the 1967 Basic Forestry Law, which laid the basis for commercial exploitation of outer island timber by giving the state forestry bureaucracy the authority to grant a right of forest exploitation (HPH) to state-owned corporations and private investors in areas classified as production forest. This led to the emergence of large-scale conglomerates that were granted lucrative timber concessions at the expense of local people, who were denied rights to harvest or use forests for their livelihoods (Dauvergne 1997). Throughout the 1970s, 5-year development plans encouraged logging in the outer islands to generate foreign revenue from unprocessed log exports to finance development.

3

The number of logging concessions issued rose from 71 in 1970 to 298 in 1976, stabilizing at approximately 580 throughout the 1980s (Poffenberger 1997). In East Kalimantan alone, during the 1970s, over 100 forest logging leases (Hak Pengusahaan Hutan, HPH) totaling 9.8 million ha of coastal and riverine forests and representing over 50% of the province area were granted (Poffenberger 1997). Logging resulted in heavy damage to the forest ecosystem in many concession areas during the log removal process, often severely affecting 40% to 70% of the remaining trees as well as seedlings and saplings. The compaction of soils caused by bulldozers, winches and dragged trees also diminished the potential for natural regeneration (Poffenberger 1997). Logging also catalyzed deforestation because it provided access roads to follow-on settlers and log scales can help finance the cost of clearing remaining trees and preparing land for planting of crops or pasture (Chamowitz et al. 2007; Chakravarty et al. 2012).

Unprocessed log exports came to an end in 1985 when the government imposed a national ban to discourage log exports⁵ and catalyze downstream investment in the production of plywood and pulp and paper. Nevertheless, logging continues to be carried out in logging concessions and timber is continuously being extracted from areas allocated for industrial timber plantations and oil palm plantations.

Indonesia's decentralization policies (UU 22/1999 on regional autonomy and UU 25/1999 on fiscal balance) have also facilitated unsustainable logging. These policies were released after the fall of President Suharto to reform governance and allow district governments more say in decision-making. They also allowed district governments to reap more economic benefits from natural resource extraction - 80% in the case of forest revenues. These policies effectively gave rise to an increase in logging in areas that had previously been forbidden. They also allowed district governments to reap financial benefits from releasing timber permits and allowing more logging to occur within their jurisdictions (Barr et al. 2001; Casson 2001; McCarthy 2001; McCarthy 2001b; Potter and Badcock 2001; Obidzinski and Barr 2003). This situation was partly curbed when the Indonesian Government revised the decentralization laws in 2004 (UU32/2004 and UU 33/2004) to reassert the Ministry of Forestry's control over the forest estate and require district governments to coordinate their land use planning with provincial and national authorities.

Historically, Indonesia has promoted forest exploitation as a major revenue source (Potter 1991; Brockhaus et al. 2011). The forestry sector and associated industries have traditionally been perceived as an important contributor to the national economy but their contribution to GDP has been relatively small and below 1% since 2002 (Ministry of Forestry 2012). This has historically been the case, even when large-scale logging was at its peak. For instance, between 1984 and 1989 government income from all tariffs and royalties from forest exploitation remained insignificant, never exceeding 0.1% of the central governments' total annual budget (Poffenberger 1997). Large-scale conglomerates who have been awarded logging and other concessions have been the primary beneficiaries of forest extraction (Dauvergne 1998).

1.2 Industrial timber plantations

Industrial timber plantations (*Hutan Tanaman Industri*, HTI) began to expand into the outer islands of Indonesia in the 1990s after the Indonesian Government banned log exports and began to build up its pulp and paper industry and its plywood industry. These plantations are dominated by acacia and eucalyptus species, which grow quickly in Indonesia's tropical climate and can be grown on marginal soils (Barr et al. 2010; Obidzinski and Dermawan 2012). Plantations produce raw material for pulp and paper, plywood, sawn timber and wood pellets – compressed biomass manufactured from wood waste including sawdust, shavings and wood chips.

The national ban produced results as the consumption of timber by wood-processing industries increased from 23.5 million m³ in 1985 to 50.5 million m³ in 2004 (World Bank 2006). The plywood industry grew rapidly from 29 plywood mills in 1980 to 111 mills in 1988. By the early 1990s, there were over 130 plywood mills and Indonesia controlled about 80% of the world trade in tropical plywood (Dauvergne 1997). This level of consumption was well over sustainable and legal limits and industrial timber plantations began to be promoted to fill the supply-demand gap in the forestry sector (Brockhaus et al. 2011).

⁵ This ban was temporarily lifted after the 1997 economic crisis but reinforced in 2011.

HTI plantations and the associated pulp and paper industry, are considered to be the future of Indonesia's forestry sector as they are expected to result in major contributions to the national economy and employment (MoF 2011). Investors have been drawn to the sector because Indonesia's soil and climatic conditions have resulted in plantation growth rates higher than most other parts of the world. Access to financing, human resources and indirect subsidies in the form of cheap timber from land clearing have also given the Indonesian plywood, pulp and paper industries an enviable comparative advantage (Barr 2000; Barr et al. 2010; ITS 2011). Market advantages have also been created. For instance, Indonesia became the world's dominant plywood supplier with more than 70% of the total world trade in plywood after plywood mills were forced to join the Wood Panel Association, known as Apkindo. Apkindo undercut the international market for plywood and gradually established a virtual monopoly (Dauvergne 1994).

The industrial timber plantation sector has generated significant economic benefits in terms of employment, foreign exchange and contributions to GDP. Around 15 million people were employed to establish 5.1 million ha of industrial timber plantations and around 1.7 million people were employed in 2011 to grow and harvest these plantations.⁶ Export earnings of around USD 5.7 billion were generated from the pulp and paper exports in 2011; while the export earnings of the plywood sector were estimated to be worth USD 1.95 billion in the same year. Indonesia exported around 67% of its pulp and paper production, primarily to Japan, Malaysia, Vietnam and the United States in 2011; and around 54% of its plywood production, primarily to China, Japan, Saudi Arabia and Taiwan in the same year. Only around 1% of its sawn timber production was exported, primarily to China, Japan and Malaysia (BPS 2012).

HTI plantation growth has been stimulated by the construction of six large pulp mills that dominate the sector. The two largest mills, Indah Kiat and Riau Andalan Pulp and Paper (RAPP) each have an installed capacity of 2 million t per annum, and together account for around 62% of the total national capacity. The other large mills are Lontar Papyrus, Kiani Nusantara,⁷ PT Tanjung Enim Lestari (TEL) and PT Toba Pulp Lestari, which was previously named PT Indorayon (Jurgens 2007). Another large mill, PT Kertas Kraft Aceh ceased production in 2007.

The mills of Indah Kiat and RAPP are both located in Riau, Sumatra and are located less than 60 km away from each other. Lontar Papyrus is located in Jambi province, PT Tanjung Enim Lestari in South Sumatra Province and PT Toba Pulp Lestari (previously known as PT Indorayon) in North Sumatra Province. The Kiani Nusantara (previously known as Kiani Kertas) mill is located in East Kalimantan, making it the only large mill to be established outside of the island of Sumatra (Barr et al. 2010).

Ministry of Forestry statistics are inconsistent but they indicate that 5.1 million ha of industrial timber plantations had been planted in Indonesia by 2011 and that over 10 million ha of land has been allocated for industrial timber plantations. Industrial timber plantations have expanded on average by around 250,000 ha per annum (Ministry of Forestry 2012). Nevertheless, plantations have not been established fast enough to meet the demand of Indonesia's timber processing industry. Natural timber has consequently been cleared via illegal logging and the clearing of natural forests to make way for timber plantations and oil palm estates (Barr 2000; Barr et al. 2010).

Industrial tree plantation development is supported through the Ministry of Forestry's industrial forest plantation program (*Hutan Tanaman Industri*) that was initiated in the late 1980s largely to provide a secure supply of raw materials to the pulp and paper industry⁸ (Barr 2000). This program was financed by capital from the Reforestation Fund (*Dana Reboisasi*⁹) which was generated through a tax on

⁶ The World Agroforestry Centre and the Indonesian Climate Change Council estimated that the labour requirements of pulpwood plantations during growing and harvesting phases was around 0.336 people per hectare (Ekadinata et al. 2010). During the establishment phase, around 3.1 persons per hectare are required (ITS 2011). These numbers indicate that around 15 million people have been employed to establish 5.1 million ha of industrial timber plantations and that around 1.7 million people would have been employed in 2011 to grow and harvest these plantations. These estimates do not include indirect or flow-on employment multipliers. Researchers estimate an employment multiplier for the forestry sector of 41 jobs created for every IDR 1 billion invested in the industry (ITS 2011).

⁷ Previously known as Kiani Kertas.

⁸ Kepmen No. 341/Kpts-II/1992 initiated the HTI transmigration scheme.

⁹ Kepmen No. 375/Kpts/1986, allowed HTI transmigration schemes to access the reforestation fund.



Figure 2. Location of major pulp mills in Indonesia.

timber felled in natural forests (Poffenberger 1997). The fund provided 14% of the projects total cost in the form of equity capital and 35% in the form of a no-interest loan with a repayment period of 10 years. It also allowed companies to draw on loans from the reforestation fund at commercial rates to finance 32.5% of the projects expenses, effectively allowing the firm establishing the plantations to commit only 21% of the overall investment from its own funds (Barr 2000; Barr et al. 2010).

An ambitious smallholder timber plantation policy (HTR, *Hutan Tanaman Rakyat*) was also launched in 2006 to support the expansion of industrial timber plantations in Indonesia. The program sought to develop 5.4 million ha of smallholder timber plantations by 2016 (Obidzinski and Dermawan 2010). The program was to be supported by a range of incentives including low-interest loans, streamlined application procedures, assistance with land acquisition and simplified reporting on operations. These plantations were expected to reduce demand on natural forests and to provide raw materials for Indonesia's timber processing industry (Obidzinski and Dermawan 2010). More recently, industrial timber plantations have also been promoted via a memorandum of agreement between the Ministry of Forestry and the South Korean Forest Service who wish to establish timber plantations for wood pellet production (Dermawan et al. 2012).

According to the Food and Agriculture Organization of the United Nations (FAO), Indonesia produced 6.4 million t of wood pulp, 3.3 million t of plywood and around 4.2 million t of sawn timber in 2011. It is unlikely that all of these timber products solely originated from Indonesia's industrial timber plantations as the industry is heavily reliant on natural forest (Barr 2000). Specific statistics on the production of industrial timber plantations do not exist, or are at least difficult to locate. A study carried out in 2005, estimated that around 80% of the timber utilized for the pulp and paper sector came from natural timber sources, while the remaining 20% came from HTI plantations (Jurgens 2007). Another study published in 2011, estimated that pulp and paper producers in Riau, Sumatra, sourced more than half of their raw material from the conversion of natural forest (IWGFF 2010). Studies on HTI plantations have determined that they are poorly stocked and have limited productivity (Barr et al. 2010). Productivity has been affected by forest fires, limited finance and social conflict in the field (Pirard and Cossalter 2006).

Despite a shortfall in plantation timber supplies, Indonesia has released plans for the establishment of 7 new pulp mills with a capacity of nearly 5 million t (Obidzinski and Dermawan 2012). These new mills are to be established in South Sumatra, East Kalimantan, Papua, West Kalimantan and East Kalimantan by dominant conglomerates such as Barito, Sinar Mas, Korindo, Djarum and Medco (Obidzinski and Dermawan 2012). Further timber plantation expansion is being encouraged to justify the establishment of these mills. The Ministry of Forestry announced that it would promote the development of 9 million ha of new timber and pulpwood plantations by 2016. About 3.6 million ha were to be developed by industrial timber plantation companies and 5.4 million ha were to be developed by smallholders in community-based plantations (Hutan Tanaman Rakyat or HTR) (Barr et al. 2010; Obidzinski and Dermawan 2012). The majority of these plantations will be established on 'degraded' forest land.

1.3 Agricultural expansion

In general, agricultural expansion tends to occur as populations increase and demand for food correspondingly increases with it (Anglesen and Kaimowitz 2001). Agricultural expansion tends to expand into forested areas and to be a major driver of deforestation. For instance a study conducted by Gibbs et al. 2009 determined that more than 55% of new agricultural land came at the expense of intact forests and another 28% came from disturbed forests between 1980 and 2000. It has been hypothesized that agricultural yields can be increased to meet growing global food demand and avoid further encroachment by agriculture onto forested land (Angelsen and Kaimowitz 2001). However, basic economic theory also suggests that anything that makes agriculture more profitable should stimulate land expansion and deforestation (Angelsen and Kaimowitz 2001; Pirard and Belna 2012; Villoria et al. 2014).

Cash crop expansion has also resulted in deforestation in Indonesia, however, expansion of other cash crops, aside from oil palm, has only increased marginally over the last 23 years.¹⁰ The area devoted to some cash crops such as tea, clove and tobacco has declined during the period 1990–2013. The only cash crop that experienced substantial growth in Indonesia aside from oil palm has been cocoa. Cocoa plantations have increased by close to 17% per annum from 357,490 ha in 1990 to 1.75 million ha in 2013.

After oil palm, the largest area of land devoted to a cash crop is 3.8 million ha, which is planted with coconut followed by 3.4 million ha for rubber. These crops are thought to have less impact on forests than oil palm because they are often planted in agroforestry systems rather than in monoculture plantations. Rubber is often planted in forests and these agroforestry systems are known as jungle rubber. Jungle rubber agroforestry systems have been found to contain around half the biodiversity of primary forests (Joshi et al. 2002). Michon and De Foresta (1994) found that sample jungle rubber sites contained 92 tree species, 97 lianas and 28 epiphytes vs 171, 89 and 63 respectively in primary forest and compared to 1 and 2 in monoculture estates. Thiollay (1995) estimates that jungle rubber supports about 127 (45% of them associated with primary forests) bird species vs 241 in the primary forest itself. Jungle rubber is widespread in Sumatra and Kalimantan, however, these agroforests have incurred an accelerated conversion rate to more intensive agriculture since 2000 (Joshi et al. 2002; Beukema et al. 2007; Ekadinata and Vincent 2012).

Rice is an important source of calories and protein for the Indonesian population (Lee and Palsu 2012). According to BPS (2013), Indonesia harvested 69 million t of rice from 13.4 million ha of land in 2012. Area planted to rice has increased by around 1.8% per annum over the past 5 years. Most of

¹⁰ For instance, coconut plantations have increased by 0.5% per annum from 3.39 million ha in 1990 to 3.82 million ha in 2013. Rubber plantations have increased by 0.4% per annum from 3.14 million ha in 1990 to 3.47 million ha in 2013. Cashew nut plantations have increased by 5% per annum from 275,221 ha in 1990 to 598,503 ha in 2013. Pepper plantations have increased by 1.87% per annum from 127,582 ha in 1990 to 182,728 ha in 2013. Coffee plantations have increased by 0.6% per annum from 1.06 million ha in 1990 to 1.23 million ha in 2013 and sugar plantations have increased by 1.43% per annum from 363,968 ha in 1990 to 484, 011 ha in 2013.

	Теа	Coconut	Clove	Сосоа	Rubber	Cashew nut	Tobacco	Pepper	Coffee	Sugar
1990	129,080	3,393,922	692,682	357,490	3,141,609	275,221	235,866	127,582	1,069,848	363,968
1991	133,705	3,573,320	668,204	444,062	3,173,916	354,873	214,838	126,783	1,119,854	386,304
1992	137,507	3,598,565	608,350	496,006	3,289,220	378,289	166,847	127,200	1,133,898	404,062
1993	142,583	3,635,855	571,047	535,285	3,405,023	400,593	178,496	130,676	1,147,567	425,653
1994	145,524	3,681,380	534,376	597,011	3,472,379	418,625	193,095	127,673	1,140,385	428,736
1995	152,431	3,723,856	501,823	602,119	3,495,901	464,824	220,944	134,689	1,167,511	436,037
1996	142,482	3,736,056	491,713	655,331	3,518,441	492,950	225,475	126,632	1,159,079	446,533
1997	142,222	3,669,233	457,542	529,057	3,474,402	499,279	248,877	111,263	1,170,028	386,878
1998	157,039	3,705,924	428,735	572,553	3,607,295	530,990	165,487	131,265	1,153,369	377,089
1999	156,839	3,679,376	415,859	667,715	3,595,060	557,582	167,271	136,842	1,127,277	342,211
2000	153,675	3,691,414	415,598	749,917	3,372,421	561,310	239,737	150,531	1,260,687	340,660
2001	150,872	3,897,467	429,300	821,449	3,344,767	559,812	260,738	186,022	1,313,383	344,441
2002	150,707	3,884,950	430,212	914,051	3,318,359	569,924	256,081	204,068	1,372,184	350,722
2003	143,604	3,913,130	442,333	964,223	3,290,112	573,281	256,801	204,364	1,291,910	335,725
2004	142,548	3,797,004	438,253	1,090,960	3,262,267	566,309	200,973	201,484	1,303,943	344,793
2005	139,121	3,803,614	448,857	1,167,046	3,279,391	579,650	198,212	191,992	1,255,272	381,786
2006	135,590	3,788,892	444,715	1,320,820	3,346,427	569,197	172,234	192,604	1,308,732	396,441
2007	133,734	3,787,989	453,292	1,379,279	3,413,717	570,409	198,054	189,054	1,295,912	441,440
2008	127,712	3,783,074	456,471	1,425,216	3,424,217	573,721	196,627	183,082	1,295,110	448,745
2009	123,506	3,799,124	467,316	1,587,136	3,435,270	572,870	204,450	185,941	1,266,235	441,440
2010	122,898	3,739,350	470,041	1,650,621	3,445,415	570,930	216,271	179,318	1,210,365	454,111
2011	123,938	3,752,144	485,191	1,677,254	3,456,127	575,841	227,510	177,490	1,233,698	457,615
2012	124,294	3,796,144	485,304	1,709,050	3,461,728	586,358	227,943	178,622	1,233,982	475,868
2013ª	128,160	3,826,610	485,539	1,753,384	3,476,371	598,503	228,775	182,728	1,235,802	484,011

Table 1. Cash crop expansion or decline from 1990–2013

a Estimated area for 2013

Sources: Directorate General of Estates 2012 a, b, c, d, e f, g, h, i, j.

this growth is occurring on the islands of Java and Sumatra. Very little growth has occurred on the island of Kalimantan over the last 5 years. In fact, area dedicated to rice has fallen in the provinces of South Kalimantan and East Kalimantan.

Most of the land dedicated to rice could be found in the island of Java where 6.1 million ha (45%) of land was dedicated to rice. In 2012, around 3.5 million ha of land was planted with rice in Sumatra (26%), primarily in North Sumatra and South Sumatra; 1.3 million ha (9.7%) was planted in Kalimantan (primarily in West Kalimantan); and 1.6 million ha (11.8%) was planted in Sulawesi, primarily in South Sulawesi. Only 44,899 ha (0.3%) was planted in Papua and the area dedicated to rice in West Papua has fallen over the last 5 years (BPS 2013). Rice production on the island of Bali has increased but is showing a downward trend overall.

Indonesia's food security is primarily constrained by the dwindling area of prime agricultural land in Java and Bali, which can be harnessed to produce food. According to government statistics, each year about 100,000 ha of arable land is lost in Java, to nonagricultural uses (commercial, industrial, urban) (USDA 2012b). The main cause of this land transformation is population growth and growing demands for higher standards of living (Doos 2002). This situation is putting increasing pressure on rice production as close to 60% of Indonesia's rice is produced in Java (USDA 2012b). As a result, Indonesia increasingly relies on imports to meet domestic demands for rice, sugar, soybean and other foods (Warr 2011). There is also some evidence to suggest that that the rapid expansion of estate crops, particularly oil palm, is replacing food crops and occupying available fertile land in outer islands, such as Kalimantan (Potter 2011). In the province of Jambi, large-scale plantations have reduced available agricultural land by 26% over the last 10 years (Afrizal 2014).

Indonesian policy promotes self-sufficiency in food production and the Master plan: Acceleration and expansion of Indonesia economic development (2011–2025) encourages the development of new food production centers outside of Java. Integrated, large-scale food estates are the preferred means for stimulating mass food production. One of the largest estates currently under development is the Merauke Integrated Food and Energy Estate (MIFEE), for which 1.2 million ha of land was to be allocated in Papua by 2030 (Coordinating Ministry for Economic Affairs 2011; PerPres Nomor 48 Tahun 2014).¹¹ MIFEE supports the development of rice, corn, soybean, sorghum, wheat, vegetables, fruits and livestock for animal husbandry (including chickens, cows, goats and rabbits), but concessions have primarily been allocated for oil palm, sugar and HTI developments (Awas MIFEE 2013a). Other food estates are being planned for East Kalimantan, Sulawesi, Maluku and Sumatra (Coordinating Ministry for Economic Affairs 2011). The Indonesian Government has also embarked on a campaign to encourage the use of partial substitutes for rice, which forms a large component of the Indonesian diet, by focusing on indigenous staple foods such as corn, cassava and yams (Potter 2011).

1.4 Oil palm

Oil palm (*Elaeis guineensis* Jacq.) has become a popular crop in Indonesia because rainfall, climate and soil conditions are ideal for oil palm developments in much of Sumatra, Kalimantan, Sulawesi, Java and even Papua. Indonesia is also perceived to have an abundant supply of available lands that can be planted with oil palm. Suitable lands in Malaysia, Indonesia's main crude palm oil (CPO) producing competitor are now scarce. Moreover, Indonesia is able to offer a relatively cheap labor force for oil palm developments, compared to Malaysia and other CPO producing countries. The main product derived from the oil palm tree is crude palm oil and this oil can be used in a number of commercial products including cooking oil, soap, cosmetics and margarine. Crude palm oil (CPO) is also used as a lubricant in industrial processes and is used to produce esters, plastics, textiles, emulsifiers, explosives and pharmaceutical products (FFP and Sawit Watch 2006). More recently, crude palm oil has been used as a biofuel, but it must be processed to make it similar to mineral diesel fuel, or vehicles and machines have to be modified to accept pure vegetable oil.

Investors have also been attracted to this crop because oil palm is one of the highest yielding oil plants in the world, producing 3.5–4.0 t of oil per hectare in contrast to its main competitor -soybean - which only produces 2.4 t of oil per hectare, and sunflower, which produces around 1.57 t of oil per hectare. This means that oil palm uses land more efficiently than other vegetable crops (Hardter and Fairhurst 2003). Palm oil currently dominates the world vegetable oil market. In 2012, 52.27 million t of palm oil was produced globally. The second largest global vegetable oil producer is soybean, which produced 43.33 million t of oil, while the third largest global vegetable oil producer was rapeseed, which produced 23.89 million t of oil (BisInfocus 2012). Other minor feedstocks for the global vegetable oil market are coconuts, cottonseed, olive, peanut, palm kernel and sunflower seed.

Since 1990, oil palm has been one of the fastest growing sectors of the Indonesian economy, increasing eight fold and totaling 9.2 million ha in 2012 (BisInfocus 2012). Most oil palm growth occurred in the six provinces of Riau (by 1.95 million ha), Central Kalimantan (by 1.03 million ha), South Sumatra (767,924 ha), West Kalimantan (by 783,164 ha), North Sumatra (by 587,121 ha), Jambi (by 462,924) and East Kalimantan (by 447,172) between 1991 and 2012 (BisInfocus 2012).

Private and smallholder oil palm estates have been responsible for the majority of this growth. By 2012, privately owned oil palm estates had planted oil palm on approximately 4.98 million ha of land, while smallholders and government estates had planted oil palm on 3.64 million ha and 0.64 million ha of land respectively. Between 1990 and 2012, private estate area planted to oil palm increased 11 fold from just 403,093 ha to 4.98 million ha; while smallholder plantations increased 12 fold from 291,328 ha to 3.64 million ha. Government estates increased

¹¹ Only around 220,000 ha of land may eventually be released for the MIFEE as the original land allocation of 1.2 million ha has been reduced to accommodate indigenous land rights and other areas that need to be protected (Lang 2012).

9



Figure 3. Area growth of smallholder, government and private oil palm estates in Indonesia (1990-2012) Source: BisInfocus (2006) and BisInfocus (2012).

by only twofold from 372,246 ha in 1990 until 2006 when they peaked at 687,428 ha. The area of government estates has since declined to 640,081 ha in 2012 (Figure 3).

The Indonesian Government has encouraged oil palm developments by setting aside lands for plantation developments, endeavoring to keep the export tax on CPO exports below 5%,¹² offering credit at concessionary interest rates (Larson 1996),¹³ allocating land for oil palm plantations, expanding the license to use and exploit land for plantation developments (HGU) from 25 years to 35 years, and releasing policies that encourage investors to develop large-scale plantations in the outer islands of Kalimantan and Papua (Casson et al. 2007).

Smallholder growth has also been stimulated by government schemes that aimed to encourage private estate sector involvement in smallholder

developments: the PIR-trans programme (1985-1994) and the Prime Cooperative Credit for Members Scheme (1995–1998) (Papenfus 2001; Potter and Badcock 2007). In both of these schemes, smallholders were given between 5 and 7.5 ha of land and were then re-allocated 2-3 ha land holdings to plant oil palm, along with an additional 0.5–1 ha for housing and subsistence agriculture (FPP and Sawit Watch 2006). In 2007, companies were also instructed to allocate 20% of their plantation area to smallholders;¹⁴ and in 2013 companies were obligated to allocate at least 30% of their shares to smallholders after 15 years of business and to assist with the development of plantations outside the plantation area.¹⁵ The Indonesian Government has also offered subsidized loans with interest rates of 10% to smallholders developing, replanting or rehabilitating oil palm plantations on 4 ha of land over a 5-year period.16

¹² Despite this policy, the export tax on CPO exports has fluctuated between 60% in 1999 and 2.5%. A ban on CPO exports was also put in place between January and April 1998 to ensure a constant supply of cooking oil to the domestic market when CPO prices rose.

¹³ Menteri Pertaninan PP 33/2006 tentang Pengembangan Perkebunan Melalui Revitalisasi Perkebunan.

¹⁴ Peraturan Menteri Pertanian No. 26/Permentan/ OT.140/2/2007 tentang Pedoman Perizinan Usaha Perkebunan

¹⁵ Peraturan Menteri Pertanian Nomor 98/Permentan/ OT.140/9/2013 tentant Pedoman Perizinan Usaha Perkebunan.

¹⁶ Menteri Pertanian PP 33/2006 tentang Pengembangan Perkebunan Melalui Revitalisasi Perkebunan.

Indonesia overtook Malaysia in 2006 to become the number one producer of crude palm oil (CPO) in the world (BisInfocus 2012). In 2012, Indonesia produced 25.4 million t of CPO; while Malaysia produced 19.2 million t of CPO. Together, Malaysia and Indonesia produced around 85% of the world's palm oil. Other minor producers of CPO are Colombia, Ecuador, Nigeria and Thailand (BisInfocus 2012).

Global demand for palm oil has grown exponentially; palm oil is now the most consumed edible oil in the world (BisInfocus 2012). Most of the world's palm oil is consumed in India, (14%), Indonesia (14%), China (13%), the European Union (11%), Malaysia (4%) and Pakistan (4%) (BisInfocus 2012). Indonesia is the main consumer of its own CPO production as it consumed around 7.5 million t of palm oil in 2011, which is 31% of Indonesia's total production for that same year (23.9 million t) (BisInfocus 2012).

Indonesia's oil palm sector is poised for further growth. BisInfocus (2012) predicts that oil palm area will increase from 8.2 million ha in 2011 to 15.2 million ha in 2025. This effectively means that palm oil area is expected to increase by more than 7 million ha between 2011 and 2025 (BisInfocus 2012). Most of this oil palm is likely to be planted in Sumatra and Kalimantan, although investors are increasingly looking to plant oil palm in Papua and South Sulawesi (Casson 2000).

The prolific growth of the oil palm sector has conferred important economic benefits in Indonesia: palm oil has become a valuable source of foreign exchange and employment and resulted in attractive returns for investors. In 2010, 16.2 million t (73% of total production in 2010) of palm oil were exported bringing in earnings valued at USD 13.46 billion. This contributed to around 2.5% of Indonesia's total GDP (USD 539,352 billion) in 2010. The majority (71%) of Indonesia's export earnings in 2010 were generated from exporting CPO to India (32%), EU 27 (16%), China (14%) and Malaysia (9%) (BisInfocus 2012).

The oil palm sector has also generated considerable employment for the rural poor. Workers are primarily employed to maintain nurseries, plant and maintain seedlings, apply fertilizers and harvest fresh fruit bunches. An average oil palm plantation employs around 1 person for every 3 ha of oil palm in Indonesia (Barlow et al. 2003). This means that a 20,000 ha plantation in Indonesia employs around 6000 people, with many times that number supported directly or indirectly by the plantation. In 2011, Indonesia's oil palm plantations are estimated to employ around 2.9 million people.¹⁷ This is still more than soybean plantations employ. These plantations generally employ around 1 person for every 160–200 ha. A 20,000 ha of soybean plantations would therefore only directly employ around 100–125 people (Proforest 2003).

1.5 Mining

Large-scale mining only began to develop significantly when the government began to promote mining in the 1980s (McMahon et al. 2000). The mining sector now consists of four mine types: largescale, medium-scale, artisanal and small-scale. Largescale mines tend to be managed by international companies with significant investment. These mines tend to use up-to-date technology and practices. Domestic companies largely undertake medium-scale mines. Small-scale mining uses mechanization and at times heavy equipment, while artisanal mining relies mostly on hand tools and no mechanization (McMahon et al. 2000).

The main minerals mined in Indonesia are coal, gold, silver, copper, nickel and tin. Large-scale mines produce all minerals except tin, while mediumscale mines produce all minerals except copper. The dominant product of artisanal and small-scale mining is gold, although coal production has become more prevalent in recent years (McMahon et al. 2000).

The mining sector is regulated principally by the Basic Mining Law whose most important provisions concern the classification of minerals, the form of organizations eligible to engage in mining, and the legal basis on which mining can be undertaken. To obtain a concession to explore and develop a medium or large-scale mine in Indonesia, a company must apply for and receive a contract of work (CoW) from the Ministry of Mines and Energy (McMahon et al. 2000). The mining industry plays a pivotal role in Indonesia's economy. In 2011 and 2012, the mining industry's contribution to the overall Indonesian economy was approximately 5% and

¹⁷ Large-scale oil palm plantations have very high labor requirements during the establishment phase and the operational phase for tree-crop maintenance and harvesting (Budidarsono et al. 2012).

		2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Coal	'000 t	102,372	114,491	132,255	151,594	180,753	180,003	240,000	283,000	325,000	353,000	386,000
Copper	million lb	2,497	2,165	1,819	2,285	1,753	1,696	1,394	2,135	1,764	1,128	1,608
Gold	'000 oz	4,326	4,389	2,719	4,550	2,621	3,604	1,533	3,638	2,543	1,713	2,112
Nickel	million lb	151	174	177	185	190	211	199	176	209	191	196
Tin	'000 t	67	65	63	68	66	58	46	45	40	54	91

Table 2. Mineral production in Indonesia (2002–2012)

Source: PwC (2012).

6% of total Indonesian GDP and more than 17% of export revenues (PwC 2012). The contribution to government (in the form of taxation and nontax revenue) is also significant. The indirect multiplier effect that the mining industry's direct contribution has on other economic activity, particularly in regional and remote areas where the industry operates, is significant. For instance, the industry makes significant contributions to regional and community development (IDR 1.8 trillion or USD 198.5 million in 2011) (PwC 2012) and employs approximately 47,970 people directly in 2011 (PwC 2012).

Nevertheless, the gold and copper mining industry has been significantly affected by declining commodity prices¹⁸ over the past few years and production has declined.¹⁹ Tin and nickel production has increased marginally over the last 10 years²⁰ but coal has emerged as the leading sector. Coal production has increased dramatically from 102 million t in 2002 to 386 million t in 2012. Coal is increasingly being used as an energy source in Indonesia and consumption has more than quadrupled over the past 11 years (MEMR 2012). By 2012, Indonesia had become the world's fifth largest coal producer (BP 2013). The mining industry is often affected by changes to government regulations. During 2011 and 2012, the government issued several new mining sector regulations, such as divestment requirements for mining permits (Izin Usaha Pertambangan, IUP) holders, an export ban on unprocessed minerals and in-country processing requirements. The government is now also in the process of contract of work and coal contract of work re-negotiations to bring them in line with the terms of Mining Law No. 4/2009. Current developments in the regulatory framework may result in the sector becoming less attractive to new investors but existing operators appear to be willing to continue operating and do not intend to leave Indonesia (PwC 2012). New mining companies are hesitant to invest in mining because it requires substantial investments (approximately USD 1 billion) and the rules of the game can change unexpectedly – from relatively simple changes such as higher royalties to dramatic changes such as partial nationalization (McMahon et al. 2000).

The environmental effects of mining can be substantial. These effects include extensive land disturbance, loss of forest cover and habitat, contamination of rivers used for drinking water and food supplies, and increasing social conflict over access to mineral resources (McMahon et al. 2000). Mining operations can also be vulnerable to catastrophic accidents, such as a tailing spill, with irreversible or long-term negative environmental consequences, especially via river systems (McMahon et al. 2000). The Freeport mine in Indonesia had a tailings spill in 1990 with an impact covering an area of about 30 km² (3000 ha) (McMahon et al. 2000).

Because large-scale mines tend to use up-to-date technology and practices, environmental damage can be minimized. However, medium-scale, artisanal and small-scale mining is often undertaken with little or no attention to environmental care (McMahon

¹⁸ For instance, the price of gold has dropped from USD 1,800/oz in 2012 to USD 1,200/oz in 2014... Copper prices have also declined from USD 4.50/lb in 2011 to USD 3.00/lb in 2014; and coal prices have declined from USD 80/t in 2011 to USD 60/t in 2014.

¹⁹ For instance, copper production has declined from 2,497 million tons in 2002 to 1,608 million tons in 2012; gold production has almost halved from 4,326,000 oz to 2,112 oz in 2012.

²⁰ Tin production has increased by around 3% per annum from 67,000 t in 2002 to 91,000 t in 2012; and Nickel production has increased by around 2.7% per annum from 151 Mlh in 2002 to 1996 Mlh in 2012.

et al. 2000). The main environmental effects of artisanal mining are soil erosion, sedimentation of water bodies, mercury pollution, and a lack of land reclamation after closure. Of these, the most irreversible and dangerous for human health is mercury contamination. Mercury is not biodegradable and if not appropriately discarded, it can combine with other elements in more toxic forms. River dumping can result in dramatic loss of plant and wildlife for considerable distances downstream (McMahon et al. 2000). Given that mercury use is universal in small-scale gold mining, reclamation costs can soar above those for largescale mining, where precautionary measures to limit mercury emissions are usually taken (McMahon et al. 2000).

Compared with other land uses, mining has limited direct impact on deforestation. A recent study estimated that mining had resulted in the loss of 0.3 million ha of forest between 2000 and 2010 (Abood et al. 2013). Analysis carried out by Gaveau et al. (2013) also indicated that open-pit coal mining resulted in 1% of total natural forest loss (1,421,200 ha) in Kalimantan between 2000 and 2010, compared to 3.5% (50,570 ha) of total forest loss for industrial timber plantations and 43% of total forest loss for oil palm plantations (611,986 ha) of total forest loss, respectively (Obidzinski et al. In press). The impact of mining is relatively small because mining tends to be very intensive and the area of land involved is usually quite small (Mather 1999). However, the indirect impact of mining may be more significant. Mining is a lucrative activity and it may attract population growth in remote forested areas with consequent high rates of deforestation (Chakravarty et al. 2012). Moreover, roads constructed to support the mining operations open up remote areas to shifting cultivation, permanent farming and infrastructure developments. This brings increasing numbers of people to the forest frontier (Chakravarty et al. 2012; Obidzinski et al. 2014). Ministry of Forestry Regulation No 18/2011 on the Guidelines for Temporary Use of State Forest Land for Mining also now allows coal mining companies to operate in protected forest areas.

1.6 Summary

Indonesia has extracted natural resources to generate economic development and growth for many years. The extraction of natural resources was promoted in 5-year development plans known as REPELITA during the Suharto era and is now emphasized in the *Master plan: Acceleration and expansion of Indonesia economic development (2011–2025).* This plan encourages timber extraction and the expansion of oil palm estates, industrial timber plantations and largescale food estates, such as the Merauke Integrated Food and Energy Estate Development in Papua province. The *Master plan: Acceleration and expansion of Indonesia economic development (2011–2025)* is also supported by the *National forestry plan (2011– 2030)*, which supports the establishment of 14.5 million ha of industrial timber plantation forests and the extraction of natural forest to produce 14 million m³ per year (MoF 2011).

Large-scale logging was initiated in Indonesia after the creation of the Foreign Capital Investment Law in 1967, which encouraged multinational corporations to extract timber from the outer islands of Indonesia, and the 1967 Basic Forestry Law, which provided the basis for commercial exploitation of outer island timber by giving the state forestry bureaucracy the authority to grant a right of forest exploitation (HPH) to state-owned corporations and private investors in areas classified as production forest. This led to the emergence of large-scale conglomerates that were granted lucrative timber concessions at the expense of local people, who were denied rights to harvest or use forests for their livelihoods. Logging has resulted in heavy damage to the forest ecosystem in many concession areas during the log removal process, often severely affecting 40 to 70% of the remaining trees as well as seedlings and saplings. The compaction of soils caused by bulldozers, winches and dragged trees has also reduced the potential for natural regeneration. Logging has catalyzed deforestation because it provided access roads to follow-on settlers and log scales can help finance the cost of clearing remaining trees and preparing land for planting of crops or pasture. Unprocessed log exports came to an end in 1985 when the government imposed a national ban to discourage log exports and catalyze downstream investment in the production of plywood and pulp and paper. Nevertheless, logging continues to be carried out in logging concessions and timber is extracted from areas allocated for industrial timber plantations and oil palm plantations. Illegal and smallholder logging also takes place throughout the archipelago and has in fact increased since the release of Indonesia's decentralization policies in 1999.

Industrial timber plantations (*Hutan Tanaman Industri*, HTI) began to expand into the outer islands of Indonesia in the 1990s after the Indonesian Government banned log exports and

began to develop its pulp and paper industry and its plywood industry. Around 5.1 million ha of timber plantations had been planted by 2011 and 10 million ha had been allocated for these plantations overall. Timber plantations are dominated by acacia and eucalyptus species, which grow quickly in Indonesia's tropical climate and can be grown on marginal soils. Plantations produce raw material for pulp and paper, plywood, sawn timber and wood pellets - compressed biomass manufactured from wood waste including sawdust, shavings and wood chips. HTI plantations, and the associated pulp and paper industry, are the future of Indonesia's forestry sector as they are expected to provide major contributions to the national economy and employment. Investors have been drawn to the sector because Indonesia's soil and climatic conditions have resulted in plantation growth rates higher than in most other parts of the world. Access to financing, markets, human resources and indirect subsidies in the form of cheap timber from land clearing have also given the Indonesian plywood, pulp and paper industries an enviable comparative advantage. Growth has been stimulated by the construction of six large pulp mills in Sumatra and East Kalimantan. The two largest mills, Indah Kiat and Riau Andalan Pulp and Paper (RAPP) each have an installed capacity of 2 million t per annum, and together account for around 62% of the total national capacity. Plantations have not been established fast enough to meet the demand of the timber processing industry and natural timber is used to supply raw material for the mills. This timber is felled from logging concessions or from oil palm and industrial timber concessions, which are cleared before plantations are established. Natural forests are further threatened by plans for the establishment of 7 new pulp mills in Sumatra and Kalimantan with a capacity of nearly 5 million t.

Agricultural expansion tends to expand into forested areas as populations increase and demand for food correspondingly increases. Population pressure tends to make traditional swidden agriculture unsustainable and unable to meet growing demands for food. This can encourage farmers to ignore traditional practices, overwork the land and turn to cash crops (such as oil palm, rubber, coffee, cocoa, pepper, tea etc.) rather than traditional agricultural systems. Oil palm plantations and cocoa plantations have experienced rapid growth over the last 20 years but other crops (such as rubber, coconut, pepper and coffee and sugar plantations) have only experienced marginal growth. After oil palm, the largest area of land devoted to a cash crop is 3.8 million ha

(coconut) followed by 3.4 million ha (rubber). These crops are thought to have less impact on forests than oil palm because they are often planted in biodiverse agroforestry systems rather than in monoculture plantations. Rice is also planted on a large-scale and 13.4 million ha of land was dedicated to this important crop in 2012. Area planted to rice has increased by around 1.8% per annum over the past 5 years in Java and Sumatra, but little growth has occurred in Kalimantan or Papua. Rice production is also stagnating on the island of Bali. Indonesia's food security is primarily constrained by the dwindling area of prime agricultural land in Java and Bali that can be used to produce food. As a result, Indonesia increasingly relies on imports to meet domestic demands for rice, sugar, soybean and other foods. The Indonesian Government is promoting self-sufficiency in food production via large-scale food estates such as the Merauke Integrated Food and Energy Estate, in which 1.2 million ha of land has been allocated for food production in Merauke, Papua.

Oil palm is one of the key crops promoted in the Master plan: Acceleration and expansion of Indonesia economic development (2011–2025). It has also been promoted in numerous government policies which have encouraged district governments to set aside land for oil palm developments and provided investors with incentives, access to land, subsidized loans and tax benefits. Oil palm has been encouraged because the crop is well suited to Indonesia's climate and soil conditions and is one of the highest yielding oil plants in the world. Oil palm has been one of the fastest growing sectors of the Indonesian economy, increasing eightfold and totaling 9.2 million ha in 2012. This growth allowed Indonesia to overtake Malaysia as the number one producer of crude plan oil in 2006. Private and smallholder estates have been responsible for the majority of this growth. Most oil palm plantations have been planted on the islands of Sumatra and Kalimantan in the provinces of Riau, Central Kalimantan, South Kalimantan, West Kalimantan, North Sumatra, Jambi and East Kalimantan. Indonesia's oil palm sector is poised for further growth. Industry analysts expect oil palm area to reach 15.2 million ha by 2025. Most of this oil palm is likely to be planted in Sumatra and Kalimantan, although investors are increasingly looking to plant oil palm in Papua and South Sulawesi.

The Indonesian Government also began to promote **mining** in the 1980s to exploit gold, silver, copper, nickel, tin and coal deposits. Gold and copper

production has declined in recent years but coal production has increased significantly from 102 million t in 2002 to 386 million t in 2012. The Basic Mining Law regulates the mining sector and it plays a pivotal role in Indonesia's economy. In 2012, the mining industry generated 6% of Indonesian GDP and more than 17% of export revenues. Nevertheless, the environmental effects of mining can be substantial and include: extensive land disturbance, loss of forest cover and habitat,

mercury poisoning and contamination of rivers used for drinking water and food supplies, soil erosion and increasing social conflict over access to mineral resources. Mining may have limited direct impact on deforestation because it tends to be intensive and the area of land involved is usually quite small. However, mining activities can have an indirect effect on forests as they can open up remote forest areas via road networks and other infrastructural development.

2 Green development initiatives in Indonesia

This section describes a set of government and market-based initiatives that are often presented as elements of the emergent concept of green development in Indonesia. We focus on initiatives developed to counter CO₂ emissions expected to result from land-based developments in Indonesia. It aims to describe an evolutionary process where REDD+-based initiatives are re-labeled as supporting "green" development. This section focuses on government-based initiatives that have been introduced to reduce GHG emissions and deforestation, including REDD+; biofuel development plans; Indonesia's moratorium on primary forest and peatland conversion; the One Map Initiative; and national and regional action plans for reducing GHG emissions. It also provides information on some of the market-based initiatives that have been introduced to promote good practice among oil palm and logging operations - the Roundtable on Sustainable Oil Palm, the Indonesian Sustainable Oil Palm initiative and the Timber Legality Assurance System (SVLK).

2.1 Government-led initiatives that support green development

Over the past decade, global concern about human induced climate change has increased. In December 2007, at the 13th Conference of Parties of the United Nations Frameworks Convention on Climate Change (UNFCCC), Parties pledged to protect the climate system for the benefit of present and future generations of humankind, on the basis of equity and in accordance with their common but differentiated responsibilities and respective capabilities.

Consequently, the Indonesian Government committed to reduce GHG emissions by 26% by 2020 with national funding and up to 41% if adequate international support can be made available²¹. GHG emissions are to be achieved through sustainable peatland management, reductions in the rate of deforestation and land degradation; and the development of carbon sequestration projects in forestry and agriculture (Bappenas 2011). This commitment has given rise to a number of government-led initiatives in Indonesia that strive to curb deforestation and climate change and contradict key economic development policies such as the MP3EI. The most important are discussed in detail below and include:

- 1. Reducing Emissions from Deforestation and Forest Degradation (REDD)
- 2. Biofuel development
- 3. Moratorium on conversion of primary forest and peat
- 4. One Map Initiative
- 5. National and regional action plans to reduce GHG emissions (RAN GRK).

2.1.1 Reducing emissions from deforestation and forest degradation (REDD)

Reducing emissions from deforestation and forest degradation, and enhancing forest carbon stocks in developing countries (REDD+) began to emerge in 2005²² as a leading mechanism to combat climate change and encourage forest rich developing countries, such as Indonesia, to curb deforestation (Angelsen 2009). REDD is a term that is used to refer to: (1) developing mechanisms to make payments to developing countries for reducing emissions from deforestation and forest degradation (compared with a reference level); and (2) readiness activities which prepare countries to participate in the REDD mechanism (Angelsen and Wertz-Kanounnikoff 2008). The REDD plus (REDD+) term was introduced at the 13th COP 13 2007 in Bali and stated in the Copenhagen Accord after the COP 15 in 2009. The REDD+ term includes actions on GHG emission reduction from deforestation and forest degradation in developing countries as well as forest conservation, sustainable forest management and carbon sequestration (MoF 2008).

²¹ This commitment was made at the G-20 Summit, September 2009 in Pittsburgh, United States.

²² REDD was discussed during the Kyoto Protocol negotiations, but it was rejected. The REDD scheme was then developed from a proposal by the Coalition of Rainforest Nations in 2005. Two years later, the proposal was presented at the UNFCCC 13th Conference of Parties in Bali, 2007 (Casson 2008).

REDD+ has been promoted as a mechanism to generate large, cheap and quick reductions in global GHG emissions. The international community can achieve this by paying forest owners and users –either through national governments or directly – to fell fewer trees and manage their forests better (Angelson 2009).

Because the international REDD+ architecture is far from clear, it was agreed that Indonesia would embark on a program to test the implementation of Reducing Emissions from Deforestation and Degradation (REDD) in Indonesia during the United Nations UNFCCC 13th Convention of the Parties (COP 13). The guiding principle for this process is that all demonstration projects need to examine how the whole REDD+ supply chain can be implemented under varying spatial sectoral and administrative conditions.

REDD+ can potentially offset the economic benefits of converting forest land to oil palm, industrial timber plantations or other commodities. Nevertheless, the REDD+ mechanism is complicated and poorly understood. In order for a REDD+ scheme to result in payments for carbon units traded, there are a number of steps that must be fulfilled. These steps have been defined as the REDD+ Supply Chain and consist of the establishment of a baseline; reductions in carbon emissions achieved against the 'business as usual' scenario; monitoring and verification of reductions; the accounting of carbon trading units and the distribution of the payments from the market to the agencies responsible for achieving the tradable carbon credits (MoF 2008).

A number of REDD+ demonstration projects have been implemented in Indonesia to test the REDD supply train. In 2013, approximately 52 REDD demonstration projects had been established. Most REDD+ projects are on the islands of Borneo in Kalimantan (21 projects) and Sumatra (6 projects), with only a few each on Java, Lombok and Nusa Tenggara (4), Sulawesi (5) and Papua (6). Project sizes vary in the range of 7000 ha to 2 million ha.²³ Several proponents have developed REDD+ projects where they previously had conservation projects. The activities of these projects range from support of REDD+ policy development at the national-level to large-scale provincial demonstration projects and local capacity building efforts. Most projects plan to pursue certification or at least claim that they will meet the standards of a Voluntary Carbon Scheme.

23 See http://forestclimatecenter.org/

A number of laws have also been put in place to facilitate REDD+, including a law for guidance for REDD+ pilot projects (Ministerial Decree P68/2008), a law that outlines mechanisms for reducing emissions from deforestation and degradation (Ministerial Decree P30/2009), and Ministerial Regulation P20/2012, which outlines basic principles, criteria of demonstration activities, and rights and obligations of forest carbon implementers. In September 2013, the Indonesian president signed a decree to establish the managing agency for the reduction of emissions from deforestation and degradation of forest and peatlands.²⁴ Among other things, the REDD+ Managing Agency will be responsible for forming and developing a REDD+ national strategy; coordinating and formulating REDD+ policies; managing aid funds; developing standards and methodologies to measure GHG emissions and sequestration from REDD+ programs; increasing capability and capacity to implement REDD+; and coordinating law enforcement related to the implementation of REDD+.

A number of provinces have also developed strategies and action plans for implementing REDD+ (Strategi dan Rencana Aksi Propinsi SRAP). One of these provinces is East Kalimantan, which published its action plan in August 2012. The action plan states that East Kalimantan aims to continue to promote the development of oil palm plantation expansion, agricultural expansion and mining and reduce deforestation and forest degradation. This strategy should support the government's RAN GRK and its commitment to reduce GHG emissions by 26%. It seeks to be pro-poor, pro-job, pro-environment and pro-growth. It also outlines 'green' objectives for each district in East Kalimantan. For instance, the district of Berau is required to rehabilitate mining sites, protect conservation forest areas and protected forest areas, revitalize the forest estate and promote sustainable forest management, promote communitybased forestry and develop the forest industry. It also identifies key threats to forests in East Kalimantan and strategies to mitigate them, For instance, for oil palm expansion, the strategy determines that environmental and social impact assessments (AMDAL) should be strengthened and mechanisms for issuing plantation permits should be improved. It encourages more community participation in

²⁴ President of the Republic of Indonesia Decree Number 62 Year 2013 regarding Managing Agency for the Reduction of Emission from Deforestation and Degradation of Forest and Peatlands.

plantation developments and spatial planning. Concrete indicators of success are also provided so that progress can be monitored and verified.

Nevertheless, progress with REDD+ has been slow in Indonesia and several REDD projects have failed or are likely to be discontinued. For instance, one of the largest and well-funded (USD 30 million) REDD+ projects, the Kalimantan Forest Carbon Partnership (KFCP) was discontinued in 2013 because it had failed to secure support from the local government and communities. The KFCP was originally slated to protect 70,000 aha of peat forests, re-flood 200,000 ha of dried peatlands and plant of 100 million trees, projected to lead to 700 million t of GHG reductions over 30 years (Australia-Indonesia Partnership 2009).

The development of an institutional framework for REDD is also behind schedule and major funders. such as Norway, have expressed concern about progress and Indonesia's overall commitment to reducing emissions from deforestation (Rondonuwu 2012). Mounting criticism of the REDD+ concept has worsened this situation. Concerns have been raised about the potential for REDD+ projects to restrict the land-use rights of local people who depend on forest resources for their livelihoods (Sommerville 2013). REDD+ has also been framed as a mechanism for wealthy nations and corporations to expunge their responsibility for carbon emissions onto developing forest rich nations, such as Indonesia. There are also fears that large volumes of REDD+ carbon credits could flood carbon markets and undermine the carbon pricing in the process. REDD+ projects may also clash with food production and the need to allocate productive and fertile land for food crops (Lawlor and Huberman 2008; Ewing 2011). Significant effort is consequently required to allow this concept to gain credibility, acceptance and success in Indonesia.

2.1.2 Biofuel development plans

Strong economic growth and expanding population mean there is increasing demand for energy and a need to secure long-term energy supplies. To meet its energy needs and offset its dependence on fossil fuels, Indonesia has been keen to expand bioenergy production, consumption and exports to meet the emerging global market for bioenergy. In 2006, the Indonesian Government released Presidential Regulation No.5/2006 on Indonesia's National Energy Policy to safeguard the national economic interest by improving domestic energy security (Dillon et al. 2008). This regulation called for 2% biofuels in the energy mix by 2010 and 5% biofuels in the energy mix by 2025. It also instructed 13 central and regional government institutions to promote the establishment of a domestic biofuel industry by allocating land for biofuel developments and offering various incentives to potential investors. Several other government regulations were released to stimulate investment and make it easier for investors to access land for the development of biofuel feedstocks.²⁵ Subsidized loans and tax reductions were also provided to companies wishing to establish biofuel plantations²⁶.

Biofuel investment and development was expected to lead to energy security and job creation (especially in rural areas) (Dillon et al. 2008). The initial road map for biofuel development sought to create 3.5 million jobs for the unemployed and to increase income for on-farm and off-farm workers in biofuel sectors up to regional minimum wage levels by 2010. It also sought to create 1000 self-sufficient energy villages,²⁷ reduce fossil fuels by at least 10% and save USD 10 billion in foreign exchange earnings (Bromokusomo 2007).

To stimulate investment in biofuel feedstock plantations, the biofuel task force (Timnas BBN) allocated 12 special biofuel zones in order to simplify the bureaucratic requirements for biofuel investment and four main feedstocks were targeted – cassava

26 Ministry of Finance Decree No. 117/PMK.06/2006; Ministry of Finance Decree No. 29/PMK.05/2007; and Government Regulation No. 1/2007.

²⁵ Presidential Decree No. 10/2006 established a national biofuels taskforce (Timnas BBN) to coordinate biofuel industry expansion. Presidential Instruction No. 1/2006 mandated governors and district heads to implement biofuel policies by promoting their use and facilitating the acquisition of lands intended for biofuel feedstocks. Ministry of Agriculture Regulation No. 26/Permentan/Ot.140/2/2007 on guidelines for the establishment of estate crop plantations gave governors and district heads the authority to issue plantation business permits for investors to meet biofuel needs (Caroko et al. 2012). This regulation allowed companies to acquire a plantation license covering up to 100,000 ha for oil palm, 150,000 ha for sugarcane and 50,000 ha for jatropha. Twice as much land could be allocated for all of these crops in Papua (Article 12, Paragraph 3). Land allocations for plantations were reduced in Ministry of Agriculture Regulation No. 357/2002 to 20,000 per province and a total of 100,000 ha in Indonesia.

²⁷ This program, known as the Self Sufficient Energy Village Program, was not limited to biofuel as a renewable energy. It also promoted the use of wind, solar, micro-hydro power and biomass (wood, biogas) (Jupetsa et al. 2011).



Figure 4. Indonesia's energy mix target for 2025.

(mostly in Java, Merauke and South Sumatra), Jatropha (physic nut)(mostly in Eastern Indonesia and Sulawesi), oil palm (in Sumatra, Kalimantan and Papua) and sugarcane (in Sumatra, Papua and Sulawesi) (Dermawan et al. 2012). The taskforce projected that meeting biofuel targets would require about 5.25 million ha of land by 2010 and 10.25 million ha of land by 2015. This land was to come from degraded or abandoned land, lands where plantation business permits are no long active, convertible production forestland and forestlands which have been legally released for nonforestry purposes (Caroko et al. 2011).

These policies helped Indonesia to become the sixth largest producer of biodiesel in the world in 2011. Production of biodiesel has consequently increased from 65 million liters (~ 57,420 t) in 2006 to 1.800 million liters (~ 1.6 million t) in 2012 (Slette and Wiyono 2012). Palm oil is the primary feedstock used to produce biodiesel because oil palm plantations are already well established in Indonesia and because oil palm has the highest oil productivity per unit of land on earth. Consequently, consumption of CPO to produce biodiesel has also increased from 64,000 t in 2006 to 1.76 million t in 2012 (Slette and Wiyono 2012). This is around 7% of Indonesia's total estimated CPO production for 2011 (23.9 million t).

Palm oil is the primary feedstock used to produce biodiesel because oil palm plantations are already well established in Indonesia and because oil palm has the highest oil productivity per unit of land on earth. Other biofuel feedstocks, such as Jatropha, cassava and sugarcane have not yet proven to be economically viable.

2.1.3 Moratorium development and implementation

A moratorium on converting primary forest and peatland was issued in May 2011 and extended for another 2 years in May 2013 to allow the government time to develop improved processes for land-use planning and permitting, strengthen data collection and information systems, and build institutions necessary to achieve Indonesia's low emissions development goals (Austin et al. 2012). This moratorium has been designed to ensure that remaining forests and peatlands with high biomass values will not be allocated for land-use change. A map developed to identify primary forest and peatland areas that were restricted in the moratorium has encouraged dialogue between different levels of government and stakeholders about spatial planning and land allocation.

The moratorium process also encouraged provincial and district leaders to protect carbon-rich areas. For instance, the Governor of East Kalimantan declared a moratorium on the issuance of further permits for mining, plantations or logging in early 2013. It was issued via Instruction No. 180/1375-HK/2013 to allow the provincial government to audit and review existing permits issued for mining, plantations and logging and determine if these permits had been issued correctly and in accordance with the law. Any permits found to not be in compliance with the law or to be tainted by other problems would be revoked. The review was expected to aid the national government efforts to review land use permits in the area and was considered to be necessary because excessive amounts of permits had been released (Karim 2013).

Some primary forest and peatland areas were exempt from the moratorium as they had already been allocated to concessionaires in principle by the Ministry of Forestry, regardless of their richness in carbon, biodiversity or other ecosystem services, or because the land was needed for 'vital' national development projects such as food security. The moratorium can only protect primary forest and peatland areas from new investments.

The Ministry of Forestry published an *Indicative* map for suspension on new licenses, in July 2011 that has been revised four times since then by a multidisciplinary team from the Forestry Ministry, Agriculture Ministry, National Land Agency and the Geospatial Information Agency. The initial moratorium map (known as Version 0) was analyzed by several parties, including the World Resources Institute (WRI) and the Center for International Forestry Research (CIFOR) (Murdiyarso et al. 2011; Austin et al. 2012). According to Murdiyarso et al. (2011) the moratorium would temporarily protect a total of 66.4 million ha of forested land or peatland,²⁸ including around 7.2 million ha of primary forest and 11.2 million ha of peatland that was not already included in Indonesia's conservation and protected forest categories.

Nevertheless, the moratorium does have limitations. Considerable primary forest (\approx 9.6 million ha) and peatland (≅ 5.8 million ha, or 29% of the country's total peatland area) was exempt from the original moratorium map because these areas had already been allocated to concessionaires in principle before the moratorium was enforced or were required for food security (Mudiyarso et al. 2011). This situation has not improved in moratorium map revisions, as available analysis indicates that peatland area has reduced from an estimated 11.2 million ha in the original version of the moratorium map to 4.9 million ha in the fourth revision of the moratorium map. Peatland area was reduced after the Ministry of Agriculture argued that the peatland data supplied by Wetlands International and used in the original moratorium map was inaccurate and had not been ground truthed. The peat data supplied by Wetlands International for the original moratorium map was consequently replaced with peat data obtained from the Ministry of Agriculture (Lang 2012). Forest land in the fourth revision of the moratorium map was

also reduced in the Merauke Integrated Food and Energy Estate (MIFEE) area located in Papua to accommodate permits that were issued to companies planning to develop plantations in the area (Awas MIFEE 2013b). Recent deforestation analysis published by Maryland University researchers also indicates that deforestation increased dramatically in 2011/2012 (Hansen et al. 2013) and it has been speculated that clearing was accelerated before primary forests became banned in the moratorium (Lang 2013). Moreover, the moratorium was unable to have an impact on the estimated 6.7 million ha of forests and 1.9 million ha peatlands already allocated in principle to HTI and oil palm companies as these concessions were exempt from the moratorium.

The moratorium is only a temporary measure, which is currently buying the government time to harmonize map data, review permits and data inconsistencies. Peat areas and primary forest areas not already included in protected areas may still be able to be accessed by concessionaires once the moratorium expires. A more permanent measure is required to protect these areas (currently estimated to be 7.4 million ha of primary forest and 4.9 million ha of peatland according to the fourth revision of the moratorium map). The fate of carbon-rich areas that are not included in the moratorium already seems to be clear – these lands can be accessed and are likely to be deforested or cleared in the future.

2.1.4 One map initiative

While the moratorium is a temporary measure designed to provide the government time to improve their forest management practices, another measure known as the One Map Initiative is being designed to offer a more permanent solution for spatial planning discrepancies. This initiative originated in 2010, when the president's Delivery Unit for Development Monitoring and Oversight (UKP4) showed President Susilo Bambang Yudhoyono how maps from the Ministry of Environment and the Ministry of Forestry on forest cover were not the same (Samadhi 2013). This situation arose because spatial data on Indonesia is scattered in various government institutions at different levels of government (i.e. provincial, district and national) and in various non-governmental organizations (NGOs), research institutions and companies. This situation has made it difficult for any level of government to undertake accurate and well-informed spatial planning, allocate concessions and ensure that high conservation value forests and lands with high carbon content

Austin et al. 2012 estimated that around 68.8 million ha would be protected under the moratorium.

are adequately protected and conserved. Spatial information became particularly scattered after Indonesia embarked on its decentralization process in 1999. Decentralization effectively gave district governments more say in spatial planning processes and it allowed them to generate their own spatial data on concessions, forests cover, peatland and even district boundaries. Much of this information is not passed on to provincial or national governments.

Moreover, at all levels of government, different methods have been used to calculate forest cover and forest allocations. For instance, at the national level, six institutions provide land cover maps which are produced in different ways and consequently provide different results. Most of these maps are based on Landsat analysis but they use different land classes. This situation has given rise to differing figures on forest cover and forest types (land classes).²⁹ These discrepancies have made it difficult for different government institutions to agree on spatial planning decisions and critical initiatives, such as the moratorium on primary forest and peatland. Moreover, this situation has allowed corrupt practices related to issuing concessions and other licenses to thrive as government officials have been able to manipulate and alter maps to accommodate different interests (DtE 2012). It has also made it difficult to attribute blame for forest clearing, fires or other illegal activities as overlapping boundaries and differing maps make it hard to identify which stakeholders are active in a particular area. The One Map Initiative is expected to be to clarify concession boundaries and to help to hold companies responsible for their activities and actions (Sizer et al. 2013).

On 23 December 2010, President Susilo Bambang Yudhoyono determined that "there should be one authoritative map for national reference"³⁰ in a cabinet meeting on measures for emission reductions from deforestation and forest degradation (Samdhi 2013). The resulting One Map Initiative strives to build upon Indonesia's national spatial data network to provide better natural resource governance and bureaucratic reform. Ministries and state agencies have been instructed to develop:

- one standard for thematic mapping, which will be approved by the Geospatial Information Agency (*Badan Informasi Geospatial*, BIG);
- a database of spatial and non-spatial information to solve license overlaps;
- a geoportal, which will archive and display any map produced by national and subnational government institutions (UKP4 2012). The geoportal will be made public to increase transparency and allow local people and organizations to provide input (Samdhi 2013).

The One Map Initiative also strives to incorporate indigenous land rights and to include maps of these lands in the geoportal. It is therefore hoped that this initiative will develop a single, inclusive map of Indonesia that aims to contain all relevant information linked to forest licensing and landuse claims.

The One Map Initiative is currently being led by UKP4; the Geospatial Information Agency (BIG) has been tasked with preparing the system infrastructure and the standardization of the existing maps, including maps of indigenous peoples territories. This will allow all thematic maps from each sector plus the indigenous maps to be integrated. According to the Director of Indonesia's Participatory Mapping Network (JKPP) and the Head of Indonesia's Ancestral Domain Registration Agency (BRWA), 265 maps of indigenous territories, covering an extent of 2.4 million ha were passed on to BIG and UKP4 in November 2012 so that these maps could be incorporated into the One Map Inititative. JKPP have also been working with BIG to prepare a participative mapping guide so that indigenous territory maps can be made according to a Community Spatial Data standard and further contribute to the initiative. In 2012, UKP4 also commissioned several groups to acquire existing thematic maps and licenses in key REDD+ provinces (East Kalimantan, Central Kalimantan, South Sumatra, Jambi and Central Kalimantan) (DtE 2012). Further spatial data will be collected from other provinces in late 2013 and 2014.

²⁹ In a presentation provided by the President's Delivery Unit for Development Monitoring and Oversight (UKP4) it was revealed that the Ministry of Environment 2009 land cover map indicates that there was 112.4 million ha of primary and secondary forest in Indonesia, however, the Ministry of Forestry land cover map indicated that there was only 100.6 million ha of primary and secondary forest in 2009. Moreover, the Ministry of Environment land cover map indicated that there was 44.2 million ha of primary forest in 2009, however, the Ministry of Forestry land cover map indicated that there was 59.8 million ha of primary forest. These discrepancies were particularly evident in Papua.

^{30 &#}x27;Harus ada satu peta yang menjadi rukukan nasional'.

The One Map Initiative will take considerable time to develop because it will require extensive consultation with provincial and district governments and other stakeholders. It will also need to be continuously reviewed and updated to include new spatial data and inputs from stakeholders. This process will allow different levels of government to harmonize spatial data and to utilize up-to-date and accurate spatial data for good forest governance and spatial planning.

2.1.5 National and regional action plans for reducing greenhouse gas (GHG) emissions

In 2011, the president of Indonesia issued a Presidential Regulation (61/2011) on a National action plan for reducing greenhouse gas emissions (RAN GRK). This regulation provides the basis for various related ministries/institutions as well as the regional governments to implement activities that will directly and indirectly reduce GHG emissions resulting from land use, land-use change and forestry (LULUCF). The regulation reaffirmed the Indonesian Government commitment made at the G20 meeting held in Pittsburgh in September 2009 to reduce GHG emissions by 26% by 2020 with national funding and up to 41% if adequate international support can be made available, and their commitment to develop Nationally Appropriate Mitigation Actions (NAMAs) at the 13th Conference of Parties of the UNFCCC in December 2007.

The RAN GRK primarily seeks to design programs and activities that will reduce GHG emissions, and serve as guidance on investment relating to coordinated GHG emission reduction at national and regional levels. GHG emission reductions are to be achieved through sustainable peatland management, reductions in the rate of deforestation and land degradation and the development of carbon sequestration projects in forestry and agriculture (Bappenas 2011).

As part of RAN-GRK, each province will need to develop a *Regional action plan on greenhouse gas emissions reduction (RAD-GRK)*. Provincial governments are expected to construct a business as usual (BAU) baseline, develop a strategy for emissions reductions and calculate the potential mitigation potential. They are also expected to select local GHG mitigation actions and identify key stakeholders/institutions and financial resources for these actions (Bappenas 2011). Guidelines on formulating RAD GRK were issued in late 2011 (Bappenas 2011). The guidelines stipulated that the RAD GRK should continue to prioritize people's welfare to achieve sustainable development and not hinder economic growth and poverty alleviation (Hernowo 2012). The regional action plans were also supposed to be developed in a participatory manner and to be aligned with development plans and spatial plans (Bappenas 2011). The guidelines provided detail guidance on the required structure and content of the RAD GRK and stressed that provinces would need to propose concrete mitigation actions to reduce GHG emissions from existing and new activities (Bappenas 2011).

Significant progress has been accomplished to date. A total of 31 of Indonesia's 33³¹ provinces had finalized their regional action plans by mid-2013. A summary of 29 of these regional action plans were published by in late 2012 (Bappenas 2012). A national center (Secretariat) for the national action plan for GHG Reduction has also been established to improve the accessibility of information and technical assistance for issues related to the RAN GRK. The secretariat has established a web page, which provides information on the secretariat and relevant documents.³² Guidelines on monitoring, evaluation and reporting progress with the mitigation action plans have also been published (Bappenas 2013) and an online system for RAD GRK monitoring, evaluation and reporting is being established.

Nevertheless, national and regional mitigation action plans are at odds with the current *Master plan: Acceleration and expansion of Indonesia economic development (2011–2025)* as this development plan primarily stresses that economic development should be stimulated through the exploitation of natural resources and the establishment of large-scale estate crops in the outer islands of Indonesia. Kalimantan's action plan also encourages industrial timber plantation development and the establishment of new pulp mills. Significant technical capacity will also need to be established in the districts and provinces of Indonesia to ensure that regional GHG mitigation action plans can be implemented, evaluated and reported.

³¹ The two remaining provinces were South Kalimantan and West Papua.

³² http://www.sekretariat-rangrk.org/english/

2.2 Initiatives that promote sustainability and legality

In addition to the above initiatives, which have primarily been activated by the Indonesian Government, a number of market-based initiatives have also been developed to stimulate good practice and sustainable management of forest resources. The most significant are discussed below and include:

- 1. The Roundtable on Sustainable Palm Oil (RSPO)
- 2. The Indonesia Sustainable Palm Oil (ISPO) Standard
- 3. The Timber Legality Assurance System (SVLK)

2.2.1 Roundtable on Sustainable Palm Oil (RSPO)

The Roundtable on Sustainable Palm Oil (RSPO) was officially launched in April 2004 to encourage sustainable oil palm developments that do not result in deforestation or carbon emissions. RSPO is a global, multistakeholder initiative that promotes the production and use of sustainable palm oil products. It comprises oil palm growers, banks and investors, manufacturers of consumer goods, social and environmental NGOs, palm oil processors and retailers. By July 2014, RSPO had 1010 ordinary members, 100 affiliate members and 579 supply chain associates.³³

The RSPO principles and criteria were originally adopted at the end of 2007. These principles and criteria were reviewed after extensive dialogue and consultations were held among different stakeholders in February 2013. The new criteria addresses GHG emissions, which was only just emerging as an issue in 2005 and the science of how to address them was lacking.³⁴ The revised principles and criteria were presented to and endorsed by the RSPO Executive Board in February 2013, and voted on by the RSPO ordinary membership at an extraordinary general assembly on 25 April 2013 in Kuala Lumpur, Malaysia.

By 2012, the RSPO had certified 37 companies, which produced around 2.1 million t of palm oil per annum and occupied around 427, 252 ha of oil palm plantations in Indonesia (BisInfocus 2012). The largest concession to be granted RSPO certification is PT Musim Mas, which is located in Dumai, Riau (BisInfocus 2012). Only 53 of Indonesia's 1612 oil palm companies (3.2%) had been certified by March 2014.³⁵ While this progress is commendable, it highlights that the RSPO has limited traction in Indonesia.

There has been growing concern among some private sector actors and policy makers, particularly in Indonesia and Malaysia, about the inability of RSPO to change the practices of oil palm companies and reassure the international market that Indonesia and Malaysia are committed to sustainability (Paoli et al. 2010). Industry representatives have felt that the RSPO is dominated by the interests of NGOs and that the interests of consumer countries have been prioritized over those of producer countries (Carako et al. 2011). Several executives from the Indonesian Palm Oil Producers Association (GAPKI) and the government-sponsored Indonesian Palm Oil Board have urged local companies to boycott or quit the RSPO, alleging that the organization had departed from its original objective and mission (Jakarta Post 2010). Moreover, RSPO certification is considered costly, especially for smallholders and small-and medium-size companies (Down to Earth 2011). These concerns have led Indonesian policy makers to establish their own certification scheme - the Indonesian Sustainable Palm Oil (ISPO) standard.

2.2.2 Indonesian sustainable palm oil (ISPO)

The Indonesian Sustainable Palm Oil (ISPO) standard³⁶ aims to make Indonesian palm oil producers compliant with Indonesian laws and regulations. The standard was implemented in March 2011 on a trial basis and will be mandatory for all large-scale oil palm plantation companies operating in Indonesia by end of 2014 and all smallholder companies by 2015. The director general for plantations at the Ministry of Agriculture has stated that the Indonesian Government is ready to revoke the licenses of palm oil companies if they do not have a mandatory Indonesian sustainable palm oil certificate by 2014 (*Jakarta Globe* 2013).

³³ see http://www.rspo.org/en/member/listing/membership

³⁴ See criterion 7.8: New plantation developments are designed to minimize net GHG emissions.

³⁵ http://www.rspo.org/en/home

³⁶ Ministry of Agriculture decree No. 19/Permentan/ OT.140/3/2011 launched the Indonesian Sustainable Palm Oil (ISPO) standard in March 2011.

The ISPO standard includes 98 indicators, which elaborate seven principles and criteria contained in the ISPO. These seven principles cover: (1) the plantation licensing and management system; (2) the application of the technical guidelines for palm oil cultivation and processing; (3) environmental management and monitoring; (4) responsibility towards workers; (5) social and community responsibility; (6) empowering the community economy; and (7) sustainable business improvement. The new standard also seeks to support Indonesia's GHG reduction targets.

By March 2014, there were seven companies registered with the ISPO³⁷ who were able to audit oil palm companies and recommend if they were eligible for ISPO certification.³⁸ A total of 40 companies had received ISPO certification by January 2014. These concessions covered 378,061 ha of land and produced an estimated 2.1 million t of CPO per annum. Most of these companies are operating in Riau, South Sumatra, South Kalimantan, Central Kalimantan and Jambi.³⁹

The ISPO standard may encounter difficulties in the international arena as its credibility is likely to be questioned, given Indonesia's governance issues and the abundant evidence linking oil palm to forest conversion (Griffiths 2010). ISPO credibility thus depends on the extent to which the new standard can demonstrate reductions in GHG emissions and the use of peatlands or carbon rich forests (Caroko et al. 2011).

Cooperation with the RSPO is being encouraged by the United Nations Development Programme (UNDP) and both parties have agreed to conduct a joint study on the key differences and similarities between the ISPO and the RSPO (Jakarta Post 2013). Cooperation is necessary because companies aspiring for RSPO certification will first need to get ISPO certification; principle 2 of the RSPO standard requires members to comply with applicable laws and regulations in the countries they operate (Wilmar 2011). Nevertheless, the ISPO is considered to have weaker standards than the RSPO as it does not require the recognition of customary rights or for communities to give or withhold their free, prior and informed consent to planned oil palm plantations on their lands.

The ISPO is mandatory and consequently has a lot of potential to influence the Indonesian oil palm sector. While its principles and criteria primarily require oil palm companies to comply with Indonesian law and are considered to be weaker than the RPSO, its standards are likely to improve if cooperation with the RSPO can be enhanced.

2.2.3 Timber legality assurance system (SVLK)

Indonesia's timber legality assurance system (SVLK-Sistem Verifikasi Legalitas Kayu) has been developed in response to timber trade legislation in key markets, including EU Timber Regulation No. 995/2010 (effective since March 3, 2013)⁴⁰, Australia's Illegal Logging Prohibition Bill, the US Lacey Act and Japan's Goho Wood system. It has also emerged from the Forest Law Enforcement, Governance and Trade (FLEGT) Action Plan to tackle illegal logging and trade – an initiative that has sought to negotiate voluntary partnership agreements (VPAs) between the European Union (EU) and individual timber production countries. VPAs specify mechanisms for verifying compliance with legality; make provision to track timber through the supply chain; and provide for independent monitoring and auditing. To date, six countries (Ghana, Democratic Republic of Congo, Cameroon, Central African Republic, Indonesia and Liberia) have signed VPAs, although none has yet been fully implemented. Nine more VPAs are under negotiation. Indonesia is the first Asian country that has a VPA with the EU, although negotiations between Malaysia and Vietnam and the EU are showing some progress.

The Indonesian Timber Legality Assurance System (SVLK—*Sistem Verifikasi Legalistas Kayu*) has arisen from several multistakeholder meetings and detailed discussions on how legality should be defined, how

^{37 1.} PT Mutu Agung Lestari; 2. PT TUV Nord Indonesia; 3. PT Sucofindo (Persero); 4. PT TUV Rheinland Indonesia; 5. PT SAI Global Indonesia; 6. PT Mutu Hijau Indonesia; 7. PT SGS Indonesia.

³⁸ These seven companies were legitimated via Ministry of Agriculture Regulation No.19/Permentan/OT.140/3/2011 tentang Pedoman Perkebunan Kelapa Sawit Berkalanjutan Indonesia.

³⁹ http://www.ispo-org.or.id

⁴⁰ All imports of timber into any member state of the EU have to pass a due diligence assessment to prevent illegal timber from entering the market. Importers will not have to apply this due diligence assessment to timber products arriving from an exporting country, like Indonesia, that has signed and implemented a VPA with the EU. Such timber is considered as having zero risk of being illegal under the EUTR.

social safeguards can be put in place, how licensing and verification systems can work, and how thirdparty monitoring can be organized. Timber is considered to be legal when its origin, logging permit, logging systems and procedures, transport, processing and trade can be proven to meet all applicable legal requirements.

The Indonesian Ministry of Forestry and the Ministry of Trade endorsed the SVLK in January 2013 and it has been strengthened by Ministry of Trade Regulation No. 64/M-DAG/PER/10/2012 that stipulates that exported timber products require verified legal documents. The system became mandatory for large-scale forestry enterprises on 1 January 2013, and for small-scale operators on 1 January 2014 (Obidzinski et al. 2014).

The SVLK is based on a certification approach also known as operator-based licensing. To achieve certification, conformity assessment bodies must audit the legality of the operations of timber producers, timber traders, processors and exporters. Conformity assessment bodies (CABS) are tasked to ensure that companies audited operate in compliance with SVLK and have credible supply chain controls. Companies that meet these requirements are certified for legality for a period of 3 years, subject to surveillance audits at least once a year. The legality certificate will expire after 3 years and can be renewed, subject to a renewal application and another audit.

On 27 February 2014, the European Union Parliament unanimously ratified the Forest Law Enforcement, Governance and Trade (FLEGT) Voluntary Partnership Agreement with Indonesia⁴¹ ; it recognized Indonesia's SVLK system as a key instrument to ensure that Indonesian timber products exported to the European market are legal and originate from sustainable forest management. The SVLK is a mandatory scheme that has been established to assure the international timber market of the legality of its timber products. Implementation of the standard is expected to help Indonesia to meet growing demand for legal timber and enhance the competitive advantage of the country's timber products in the wider international market.

2.3 Summary

Global concern about human induced climate change has increased and prompted Parties (including Indonesia) to the United Nations Frameworks Convention on Climate Change (UNFCCC) to pledge that they will protect the climate system for the benefit of present and future generations of humankind in 2007. The Indonesian Government also committed to reduce GHG emissions by 26% by 2020 with national funding and up to 41% with international support in 2009. It has released several policies and initiatives to support these commitments. Among the most significant are: a commitment to reduce emissions from deforestation and forest degradation, policies to support biofuel development, a moratorium on the conversion of primary forest and peat, a One Map Initiative which strives to harmonize spatial data for planning purposes, and national and regional action plans which seek to reduce GHG emissions (RAN GRK).

Indonesia agreed to embark upon a program to test the implementation of Reducing Emissions from Deforestation and Degradation (REDD) during the United Nations UNFCCC 13th Convention of the Parties (COP 13) in 2007. It was hoped that REDD can allow Indonesia to receive payments for not converting forest land to oil palm, industrial timber plantations or other commodities. Around 52 REDD demonstration projects were implemented in Indonesia to test the REDD supply train by 2013. The activities of these projects range from support of REDD policy development at the national level to largescale provincial demonstration projects and local capacity building efforts. A number of laws have also been put in place to facilitate REDD and the Indonesian president signed a decree to establish a managing agency for the reduction of emissions from deforestation and degradation of forest and peatlands in 2013. This has encouraged a number of provinces (including East Kalimantan) to develop strategies and action plans for implementing REDD+ (Strategi dan Rencana Aksi Propinsi SRAP). Nevertheless, progress with REDD has been slow in Indonesia and several REDD projects have failed or are likely to be discontinued. The development of an institutional framework for REDD is also behind schedule and concerns have been raised about the potential for REDD+ projects to restrict the land use rights of local people who depend on forest resources for their livelihoods.

⁴¹ Six countries (Ghana, Republic of Congo, Cameroon, Central African Republic, Indonesia and Liberia) had signed VPAs by February 2013. Nine more VPAs were under negotiation. Indonesia is the first Asian country that has a VPA with the EU, although negotiations between Malaysia and Vietnam and the EU are showing some progress.

In 2006, the Indonesian Government released Presidential Regulation No.5/2006 to offset its dependence on fossil fuels and stimulate production of biofuels. This regulation called for 2% biofuels in the energy mix by 2010 and 5% biofuels in the energy mix by 2025, totaling 22.26 billion litres of biodiesel, bioethanol and bio-oil (January 2006). It also instructed 13 central and regional government institutions to support and promote the establishment of a domestic biofuel industry by allocating land for biofuel developments and offering various incentives to potential investors. Biofuel investment and development was expected to lead to energy security and job creation (especially in rural areas). Four main feedstocks were targeted for investment and expansion -cassava (mostly in Java, Merauke and South Sumatra), Jatropha (mostly in Eastern Indonesia and Sulawesi), oil palm (in Sumatra, Kalimantan and Papua) and sugarcane (in Sumatra, Papua and Sulawesi). Several government regulations were released to stimulate investment in these crops and make it easier for investors to access land for development. These policies helped Indonesia to become the sixth largest producer of biodiesel in the world in 2011. Palm oil is the primary feedstock used to produce biodiesel asoil palm plantations are already well established in Indonesia and oil palm has the highest oil productivity per unit of land on earth. Other biofuel feedstocks, such as Jatropha, cassava and sugarcane have not yet proven to be economically viable.

A moratorium on converting primary forest and peatland was also issued in May 2011 and extended for another 2 years in May 2013 to allow the government time to develop improved processes for land-use planning and permitting, strengthen data collection and information systems, and build institutions necessary to achieve Indonesia's low emissions development goals. This moratorium has been designed to ensure that remaining forests and peatlands with high biomass values will not be allocated for land-use change. A map has been produced and revised four times to determine which areas are protected by the moratorium. Some primary forest and peatland areas have been exempted from the moratorium. These areas were exempt because they had already been allocated to concessionaires in principle by the Ministry of Forestry, regardless of their richness in carbon, biodiversity or other ecosystem services, or because the land was needed for 'vital' national development projects, such as food security. In other words, the moratorium can only protect primary forest and peatland areas from new

investments. It is only a temporary measure, which is currently buying the government time to harmonize map data, review permits and data inconsistencies.

Another measure known as the 'One Map Initiative' is being designed to offer a more permanent solution for spatial planning discrepancies. This originated in 2010, when the president determined that "there should be one authoritative map" to combat spatial data discrepancies and poor spatial planning. The One Map Initiative is currently being led by UKP4 and the Geospatial Information Agency (BIG) aims to prepare the system infrastructure and to standardize existing maps, including maps of indigenous peoples territories. This will allow all thematic maps from each sector plus the indigenous maps to be integrated. The initiative will take considerable time to develop because it will require extensive consultation with provincial and district governments and other stakeholders. It will also need to be continuously reviewed and updated to include new spatial data and inputs from stakeholders. This process will allow different levels of government to harmonize spatial data and to use up-to-date and accurate spatial data for good forest governance and spatial planning.

In 2011, the president of Indonesia issued a Presidential Regulation (61/2011) on a National Action Plan For Reducing Greenhouse Gas Emissions (RAN GRK). This regulation provides the basis for various related Ministries/Institutions as well as the Regional Governments to implement activities that will directly and indirectly reduce GHG emissions resulting from land use, land-use change and forestry (LULUCF). The regulation also reaffirmed the Indonesian Government commitment made at the G20 meeting held in Pittsburgh in September 2009 to reduce GHG emissions by 26% by 2020 with national funding and up to 41% if adequate international support can be made available; and their commitment to develop Nationally Appropriate Mitigation Actions (NAMAs) at the 13th Conference of Parties of the UNFCCC in December 2007. Each province is required to develop a Regional action plan on greenhouse gas emissions reduction (RAD-GRK) and guidelines on formulating RAD-GRK were issued in late 2011. 31 of Indonesia's 33 provinces had finalized their regional action plans by mid-2013. A National Center (Secretariat) for the National Action Plan for Greenhouse Gas Reduction has also been established to improve the accessibility of information and technical assistance for issues related to the RAN GRK.

In addition to the above initiatives, which have primarily been activated by the Indonesian Government, a number of market-based initiatives have also been developed to stimulate good practice and sustainable management of forest resources. The Roundtable on Sustainable Palm Oil (RSPO) was officially launched in April 2004 to encourage sustainable oil palm developments that do not result in deforestation or carbon emissions. RSPO is a global, multi-stakeholder initiative that promotes the production and use of sustainable palm oil products. It comprises oil palm growers, banks and investors, manufacturers of consumer goods, social and environmental NGOs, palm oil processors and retailers. Only 53 of Indonesia's 1612 oil palm companies (3.2%) had been certified by March 2014. While this progress is commendable, it highlights that the RSPO has limited traction in Indonesia. Concern has been raised about the inability of RSPO to ensure that sustainable management practices are being engaged by the companies it certifies. Significant cost implications have also made the standard too costly for smallholders or mediumsized companies.

The Indonesian Sustainable Palm Oil (ISPO) standard aims to make Indonesian palm oil producers compliant with Indonesian laws and regulations. The standard was implemented in March 2011 on a trial basis and will be mandatory for all large-scale oil palm plantation companies operating in Indonesia by 2014 and all smallholder companies by 2015. The ISPO standard may encounter difficulties in the international arena as its credibility is likely to be tarnished by Indonesia's governance issues and mounting evidence revealing that oil palm has been planted on peatlands or resulted in forest conversion. ISPO credibility thus depends on the extent to which the new standard can demonstrate reductions in GHG emissions and the use of peatlands or carbon rich forests. The ISPO is mandatory and consequently has great potential to influence the Indonesian oil palm sector. While its principles and criteria primarily require oil palm companies to comply with Indonesian law and are considered to be weaker than the RPSO, its standards are likely to improve if cooperation with the RSPO can be enhanced.

Indonesia's timber legality assurance system (SVLK—Sistem Verifikasi Legalitas Kayu) has been developed in response to timber trade legislation in key markets and the Forest Law Enforcement, Governance and Trade (FLEGT) Action Plan to tackle illegal logging and trade—an initiative that has sought to negotiate voluntary partnership agreements (VPAs) between the European Union (EU) and individual timber production countries. The Indonesian Ministry of Forestry and the Ministry of Trade endorsed the SVLK in January 2013 and the European Union Parliament recognized Indonesia's SVLK system as a key instrument to ensure that Indonesian timber products exported to the European market are legal and originate from sustainable forest management in 2014. The SVLK is a mandatory scheme, which has been established to assure the international timber market of the legality of its timber products. Implementation of the standard is expected to help Indonesia to meet growing demand for legal timber and enhance the competitive advantage of the country's timber products in the wider international market.

These initiatives are often presented, in policy dialogues, as elements or evidence of the emerging concept of "green development" in Indonesia. The following chapter focuses on Berau, a district located in East Kalimantan Province that is rich in forest resources and has strived to implement some of the "green" development initiatives.

3 Land-based investment challenges in Berau district, East Kalimantan

3.1 Introduction

In 2008, the provincial government of East Kalimantan created a REDD+ Working Group to trial and implement a REDD+ pilot program. They also declared their commitment to make East Kalimantan a 'green province' in December 2009 and to contribute to Indonesia's national commitment of a 26% reduction in CO₂ emissions by 2020⁴² (DNPI and Government of East Kalimantan 2010; Berau REDD+ Working Group 2011). Five broad initiatives were put forward to improve land use and reduce CO_2 emissions by a total of 135 million t C0, by 2030: zero burning reduced impact logging, reforestation and rehabilitation of forests, rehabilitation and water management of opened peatlands, using degraded land for future expansion of oil palm and timber plantations (DNPI and Government of East Kalimantan 2010). The district of Berau volunteered to pioneer these initiatives because the majority (75%) of its land area is covered in secondary and primary lowland forest. But as Berau seeks economic development for its people, the forests face multiple threats from legal and illegal logging, clearing for oil palm and timber plantations and coal mining. With such a large area of forest and high degree of threats, Berau represents a strategic place to pioneer REDD+ and 'green development'.

Berau was also considered to be a good place to pioneer these initiatives because a number of international assistance projects have worked with the Indonesian Government, Inhutani I and local stakeholders to promote sustainable forest management and conservation in the district over the past 25 years. Between 1989 and 1996, Inhutani I hosted a French-sponsored STREK project that conducted forest disturbance and recovery studies at its concession area in Labanan. The work initiated by STREK was continued by the EU-funded Berau Forest Management Project (BFMP)-a cooperative project with PT Inhutani I that operated in Berau between 1996 and 2001 with capitalization of USD 14.1 million. This project was followed by the Berau Forest Carbon Program (BFCP) which was

initiated in April 2008 by the Nature Conservation Agency (TNC) in collaboration with the Ministry of Forestry, Berau district government and the East Kalimantan Provincial Government.⁴³ The Berau Forest Carbon Program sought to enable Berau to meet its development goals while sustainably managing its forest by developing a carbon finance mechanism that delivers effective incentives to reduce emissions from forest loss.

In this chapter, we examine the challenges that a natural resource driven economy and spatial planning present for sustainable management of forest resources in the district of Berau.

3.2 Forest resources in Berau

Berau district is one of the remaining forest frontiers in East Kalimantan. More than 75% of Berau's 2.2 million ha are forested. The lowland forests of Berau house one of the world's largest orangutan populations, including the rare black Bornean orangutan. More than 80 tree species that occur in the Berau district are listed as threatened by the World Conservation Union (IUCN). Threatened and/or endangered wildlife in the district include: proboscis monkeys, sun bears, gibbons, banteng (wild cattle), hawksbill turtles, leaf monkeys and Bornean peacock pheasants (Berau REDD+ Working Group 2011).

The Ministry of Forestry's 2011 land cover map indicates that there were 579,939 ha of primary forest and 1.16 million ha of secondary forest remaining in Berau in 2011 (Figure 5). Most of the primary forest detected in Berau could be found in the interior of East Kalimantan, on land that is 800 m above sea level. The high elevation makes logging operations more difficult in these areas. Berau's primary forests are thought to contain between 230–250 t of carbon per hectare, while secondary forests may contain up to 110–180 t of carbon per hectare (Mudiyarso et al. 2002; Tomich et al. 2002; Rahayu et al. 2005; Ludang and Palangkajaya 2007). Ground truthing is

⁴² The vision of KalTim Green is to develop the province as a global example for how to combine GHG emission reduction goals with economic development, while ensuring development is sustainable and environmentally friendly.

⁴³ TNC estimated that funding in the order of USD 50 million over 5 years would be required for successful implementation of the programs and strategies anticipated during the demonstration phase in Berau.



Figure 5. Land cover 2011 map

Source: Ministry of Forestry, 2011

required to verify this, but these preliminary figures indicate that Berau's primary forests contain between 133–145 million t of carbon and its secondary forests store between 127–208 million t of carbon.

According to available spatial data, only 21,243 ha of peatland can be found in the sub-districts of Sambaliung, Batu Putih and Pulau Derawan. This peat may contain 300–700 t carbon ha⁻¹ per meter depth (Agus et al. 2009). When forests and peatland is cleared or degraded their stored carbon is released into the atmosphere as CO_{2} (Gibbs et al. 2007).

3.3 Berau's spatial plans

Spatial planning has had an enormous impact on deforestation and land cover change in Berau. Berau's first spatial plan is known as the Forest Land Use Agreement—*Tata Guna Hutan Kesepakatan* (TGHK). This spatial plan divided Berau's lands into protection forest, production forest, limited production forest, conversion forest and lands falling outside the forest estate (APL). No conservation forest was designated, however, forests on lands with an elevation over 800m were primarily designated as protection forest. These forests primarily lay within the districts of Kelay, Segah Tubaan and Biatan. All of Berau's peatlands were designated as conversion forest (Figure 6).

During the '*reformasi*' era, the TGHK was revised in 2001 and replaced with another spatial plan, which is known as the *Penunjukan Kawasan* (Area designation map). In this spatial plan all of the conversion forest (542,626 ha) was excised outside the forest estate and reclassified as APL (land falling outside the forest estate). In the 2001 *Penunjukan Kawasan* map, the majority of Berau's forest estate is classified as production forest or limited production forest. There is no conservation forest category, however, protection forest has been designated in the kecamatan of Kelay, Segah Tubaan and Biatan (Figure 7). The majority of Berau's peat areas were classified as production forest or lands falling outside the forest estate (APL).



Figure 6. TGHK map for Berau

Source: Ministry of Forestry (1998).



Figure 7. Penunjukan Kawasan map for Berau 2001.

Source: Ministry of Forestry (2001).



Figure 8. Draft RTRWK Berau 2012. Source: Bappeda of Berau (2012).

In the 2001 *Penunjukan Kawasan*, around 522,122 ha of land was allocated as land falling outside the forest estate (APL). The majority of these lands fell around major rivers, such as the Berau and the Segah Rivers. Nevertheless, over 25,551 of these APL lands were covered in primary dry forest according to the 2003 Ministry of Forestry land cover map. Most of this primary dry forest lies in the sub-districts of Biatan, Gunung Tabur, Segah and Talisayan. Over 256,000 ha of secondary forest was also found in the APL lands (Figure 7). These forests could primarily be found in the sub-districts of Segah, Kelay Gunung Tabur, and Biduk Biduk.

Since 2005, the government of Berau, the provincial government of East Kalimantan and the central government have deliberated a new spatial plan for Berau. This spatial plan is currently known as the 2012 RTRWP (*Rencana Tata Ruang Wilayah Propinsi | Proposed provincial land use plan*), and it proposes some major changes that are still under revision.

There are some important things to note about the draft 2012 spatial plan (RTRWP):

- 1. In the 2012 draft RTRWP map for Berau, APL land has been increased by 116,656 ha to cover 638,778 ha of land.
- 2. According to the Ministry of Forestry 2011 land cover map, around 35,879 ha of primary forest fell within the APL land category and 318,944 ha of secondary forest lay within the APL land category in 2011.
- 3. 13,567 ha of conservation forest has been designated in the 2012 RTRWP. Conservation forest was not included in the 1998 TGHK or the 2001 Penunjukan Kawasan. All of the conservation forest allocated in the draft 2012 RTRWP lies along the border of Kutai Timur in the Kecamatan of Kelay.
- 4. Production forest has increased by 121,312 ha.
- 5. Limited production forest has decreased by 253,793 ha.

Year	Protected forest (HL)	Conservation forest (KSA-KPA)	Production forest (HP)	Limited production forest (HPT)	Conversion forest (HPK)	Land falling outside the forest estate (APL)	Other	Total (Ha)
TGHK, 1998	319,814	0	403,973	919,790	542,626	9,474	15,174	2,210,852
SK 79, 2001	361,040	0	637,855	674,786	0	522,132	15,039	2,210,852
Draft RTRWK 2012	357,100	13,567	525,285	665,997	0	638,778	10,124	2,210,852
Difference	+37,286	+13,567	121,312	-253,793	-542,626	629,304	-5,050	

Table 3. Changes in Berau's forest categories between 1998 and 2012.

Source: Batas administrasi Bappeda Provinsi Kalimantan Timur, 2012.

TGHK 1998, SK 79/2001, Draft RTRWK Berau 2012.

Other: river, no data, KSA-KPA dari draft RTRWK Berau : Kawasan Konservasi Pesisir, Kawasan Lindung Geologi (Karst), Suaka Margalaut, Taman Wisata Alam Laut

3.4 Oil palm and other estate crop development in Berau

The allocation of oil palm and other estate crop permits has expanded rapidly in Berau over the past decade. By 2008 only three⁴⁴ companies had been awarded definitive land use permits (HGU), however 19 companies had been awarded land use permits to establish plantations by 2013 and 27 companies had been awarded location permits, land clearing permits or other permits (Casson 2008). Overall, 46 companies have been awarded permits to develop clear land or develop plantations on 291,533 ha of land in Berau by 2013. Smallholder oil palm plantations are also growing. In 2012, government officials estimated that smallholders had planted around 15,592 ha of oil palm. This increased to around 19,000 ha in 2013⁴⁵.

Large-scale oil palm companies that have already acquired land use rights (HGU) are primarily located within the districts of Segah (along the Segah river), Kelay (along the Berau River), Gunung Tabur (along the Berau River), Biatan, Talisayan, Batu Putih and Tanjung Batu (along the coastline). Other permits for oil palm developments have primarily been issued in the sub-districts of Segah (along the Segah River).

According to the 2001 *Penunujukan Kawasan Hutan* map and the latest spatial plan (Ren*cana Ruang Wilayah Propinsi* 2012), the majority of permits allocated to plantation companies have been allocated in APL lands, or lands designated for plantation developments. A total of 39 of the 46 companies awarded permits to develop plantations have been allocated concessions that cover 110,109 ha of secondary forest. Eight of these companies⁴⁶ have also been awarded permits to develop plantations on 8284 ha of primary forest and six⁴⁷ companies have been awarded permits to develop plantations on 2874 ha of peatland.

The majority (95,244 or 86%) of the secondary forests have been awarded to 18 companies with concessions over 2000 ha. The largest area of secondary forests has been awarded to PT Agrosawit Mas (11,820 ha) and PT Berau Karetindo (10,037 ha). Both of these concessions lie in the Kecematan of Segah. At least 8 of the companies⁴⁸ granted concessions in secondary forest have already been awarded land use permits (HGU) and at least four of these companies⁴⁹ have been awarded location permits.

49 PT Agrosawit Mas, PT Indo Alam Bumimakmur Tangung Batu, PT Mahkota Jaya Abadi, PT Multigreen Sepurna.

⁴⁴ PT Jabontara Eka Karsa (14,095 ha), PT Sentosa Kalimantan Jaya (7,026 ha) and PT Tanjung Bayu Perkasa (7,274 ha)...

⁴⁵ Personal communication from government official from Dinas Perkebunan Kabupaten Berau, 2014.

⁴⁶ PT Berkat Sawit Asri (5,216 ha of primary forest); PT Indo Alam Bumimakmur Sukan (1,118 ha of primary forest), PT Repenas Andalan Kalitm (925 ha of primary forest), PT Dwiwira Lestari Jaya (794 ha of primary forest), Pt Multigreen Sepurna (144 ha or primary forest), PT Performa Kalimantan Sejahtera (60 ha of primary forest), PT Koperasi Long Klatak Mandiri (26 ha of primary forest), PT Anugerah Alam Persada (1 ha of primary forest).

⁴⁷ PT Indo Alam Bumimakmur Sukan (967 ha of peatland), PT Multigreen Sepurna Plantation (919 ha of peatland), PT Indo Alam Bumimakmur Tanjung Batu (597 ha of peatland), PT Sentosa Kalimantan Jaya (43 ha), PT Inti Energi Kaltim (3 ha of peatland).

⁴⁸ PT Bina Karya Nuansa Sejahtera, PT Berau Karetindo Lestari, PT Dwiwira Lestari Jaya, PT Jabontara Eka Karsa, PT Maudhy Peshika, PT Natura Pasifik, PT Anugerah Agung Prima Abadi, PT Sentosa Kalimantan Jaya.



Figure 9. Estate crop concessions overlaid with forest and land-use classification map (Penunjukan Kawasan 2001)

A total of 5216 ha of primary forest (62% of the primary forest allocated to estate crop companies) has been allocated to one company – PT Berkat Sawit Asri, which is located in the Kecematan of Tabalar. The permit status of this company is currently unknown. The only company to have been awarded a land-use right (HGU) containing primary forest is PT Dwiwira Lestari Jaya, which has been awarded a concession containing around 794 ha of primary forest in the Kecamatan of Biatan. Other companies with primary forest in their concession boundaries have so far only been awarded location permits.

Timber can effectively be cleared from concessions allocated to oil palm companies via the issuance of wood utilization permits (*Izin Pemanfaatan Kayu*, or IPK). The Ministry of Forestry holds the right to issue IPK permits within the forest estate but district government officials can issue IPK permits within the APL land category. Some companies apply for these permits so that they can clear timber from APL lands but do not go on to plant oil palm plantations. These companies are primarily interested in the timber they can acquire from these lands rather than oil palm establishment.

3.5 Logging

Berau is rich in high-value dipterocarps and it has consequently been one of East Kalimantan's most productive sources of timber over the last three decades. (Obidzinski and Barr 2003). Timber was primarily extracted by companies holding HPH (*Hak Pengusahaan Hutan*) timber concessions issued by the Ministry of Forestry until the fall of Suharto in 1998.⁵⁰ During the 15-year period from 1985– 1999, HPH holders operating in Berau reportedly harvested 10.5 million m³ of logs, or over 13% of the 77 million m³ of roundwood officially extracted

⁵⁰ The Ministry of Forestry in Jakarta assumed authority over issuing HPH licenses for areas classified as permanent or limited production forest following the introduction of Indonesia's Basic Forestry Law in 1967 and Government Regulation 21 of 1970. HPH licenses, which are valid for a period of 20 years, may be assigned to private logging companies or to state- owned forestry enterprises. In managing the concession site, the HPH contract requires the concession holder to employ the Indonesian Selective Cutting and Planting (*Tebang Pilih dan Tanam Indonesia*, or TPTI) system, which restricts harvesting to trees with a minimum diameter of 50 cm and which requires replanting on areas where logging has occurred.

by concessionaires in Indonesia's largest timberproducing province (Dinas Kehutanan 1999). It is likely, however, that the actual volumes of timber harvested have been substantially greater than these official figures suggest, as illegal logging (by HPH holders and by other parties) is known to have been common practice in Berau, and other parts of East Kalimantan (Obidzinski and Barr 2003).

The amount of land allocated to HPH concession holders has not changed much over the last 25 years but the total number of concession holders has increased. This is because large concessions have been divided over time. In the late 1990s, there were nine HPH companies in Berau holding concessions areas ranging in size from 22,500 ha to 530,000 ha, or 1.3 million ha in total (Dinas Kehutanan 1999). These companies produced around 420,000 m³ of logs (Dinas Kehutanan 1999). By 2001, the number of HPH concessions holders had increased from nine to twelve, however, the total area of land allocated to HPH concessions remained the same (Obidzinski and Barr 2003). In 2013, there were 23 HPH companies, however, these companies had a combined total concession area of just over 1 million ha (Dinas Kehutanan Kalimantan Timur 2013). Total log production in 2010 was 318,858 m³ and sawn timber production was 2380 m³ (Badan Pusat Statistik Kabupaten Berau 2012).

In 2013, only two state-owned logging companies held concessions larger than 100,000 ha (PT Inhutani I Labanan—148,426 ha, and PT Sumalindo IV—151,351 ha). Nevertheless, Inhutani I held a total concession area of 335,196 ha, 33% of the total land allocated to HPH concessions in Berau. This area of land was divided among four concessions holders (PT Inhutani I Labanan—148,426 ha, PT Inhutani I Sambarata—80,723 ha, PT Inhutani I Segah Hulu—35,690 ha and PT Inhutani I Unit Meraang—70,348 ha). Inhutani I first became active in 1976 when it was allocated over 2.4 million ha of land in various parts of East Kalimantan (Obidzinski and Barr 2003).

The majority of the logging concessions in Berau are located in limited production forest (591,281 ha) and production forest (204,975 ha). However, almost all of the logging concessions allocated in Berau have also been allocated APL land (136,000 ha), protection forest (73,458 ha) or conservation forest (4142 ha). This should not be the case as logging concessions and industrial timber concessions should only be allocated production forest and limited production forest. Most of the concessions which are in APL, protection forest (73,358 ha) and conservation forest (4,142 ha) were allocated before the *Penunjukan Kawasan* 2001 spatial plan was released. This condition has created debate between the Ministry of Forestry, Berau district government and the provincial government of East Kalimantan about the status of concessions in APL lands, protection forest or conservation forest and whether the permits are still valid. It has also delayed the approval of the latest spatial plan (RTRWP 2012).

Around 637,941 ha of secondary forest and 315,129 ha of primary forest have been allocated to logging concessions. A total of 2377 ha of peatland also lies within these concessions. The majority of the primary forest allocated to logging companies falls within the interior sub-districts of Kelay and Segah.

Logging can also occur in timber or oil palm plantation concessions granted IPK permits or via illegal or small-scale logging operations. Illegal and small-scale logging operations also existed during the Suharto era, but became more prominent after the fall of Suharto and the onset of decentralization (Casson and Obidzinski 2002; Obidzinski and Barr 2003).

3.6 Pulp production and industrial timber plantation development

The development of a large-scale pulp mill in Berau by the Kalimanis Group has posited a significant threat to Berau's forests. The Kiani Kertas pulp mill is located in Mangkajan, 40 km south of Berau's capital city (Tanjung Redeb) and it came online in mid-1997. The mill reportedly cost USD 1.3 billion to build (Barr 2001) and it has an official production capacity of 525,000 t of pulp per annum (Obidzinski and Barr 2003).

To supply fiber to the mill over the long term, 281,355 ha (12.7% of Berau's total land area) has been allocated to seven industrial timber plantation companies. Around 223,978 ha of production forest and 20,147 ha of limited production forest has been allocated to these timber concession companies. No conservation forest falls within the boundaries of existing industrial timber concessions, however, 36,327 ha of APL land and 949 ha of protection forest has been allocated to these companies.

	Company	Permit status	Total concession area (ha)	Secondary forest (ha)	Primary forest (ha)	Peatland (ha)
1	PT Kelawit Wana Lestari	unknown	460.39	2	0	0
2	PT. Acacia Andalan Utama	Definitive	3.07	0	0	0
3	PT.Belantara Pusaka	Definitive	15,794.70	6,339	0	0
4	PT.Sumalindo Alam Lestari Unit I	Definitive	32,585.26	19,737	0	31
5	PT.Sumalindo Lestari Jaya	unknown	17,012.33	16,537	0	0
6	PT.Swadaya Perkasa	SP1 and SP2	22,353.88	21,981	204	0
7	PT.Tanjung Redeb Hutani	Definitive	193,145.82	77,178	14,221	396
	Total		281,355.45	141,174	14,425	427

Table 4. Industrial timber	plantation concessions on	large areas of seconda	ary forest in Berau
	•	-	-

Sources:

Data konsesi IUPHHKHT, Kementerian Kehutanan (2012).

Batas administrasi Kabupaten dari BPS (2011).

Hutan sekunder: Hutan Lahan Kering sekunder, Hutan Mangrove sekunder, Hutan Rawa Sekunder Tutupan lahan (2011).

Hutan primer: Hutan Lahan kering primer, Hutan Mangrove primer Tutupan lahan tahun (2011).

Gambut, Wetland International peat map (2002)

The largest concession covering 193,145 ha has been awarded to PT Tanjung Redab Hutani. This company is jointly owned by the Kalimanis group (65%) and the state forestry enterprise, PT Inhutani I (35%). The HTI operations of this company have been largely financed by the National Reforestation Fund (*Dana Reboisasi*, or DR). However, planting targets have been affected by land claims with local communities and managerial problems (Obidzinski and Barr 2003).

Timber can, nevertheless, be extracted from the HTI concession areas to feed the pulp mill. According to the Ministry of Forestry's 2011 land-cover map, around 141,174 ha of secondary forest and 14,425 ha of primary forest lies within allocated boundaries of existing industrial timber plantations (HTI). Most of this forest (14,221 ha of primary forest and 77,178 ha of secondary forest) lies within the PT Tanjung Redab Hutani concession. This forest can effectively be cleared to make way for industrial timber plantations. Timber (raw material) can also be sourced from IPK permits issued to estate crop companies and from illegal logging operations.

3.7 Mining in Berau

More than half (56%) of Berau's regional income comes from mining. Approximately 389,150 ha of land has been allocated to 90 mining companies.

Only 14 of these companies have been awarded production licenses while the remaining companies have been awarded exploration licenses. One production license was awarded to PT Berau Coal in 2005, however all of the other licenses were issued in 2009 or 2010. All of the companies have been awarded licenses to explore the potential for coal production or to mine coal. No other minerals are being mined in the province.

Around 70,632 ha of secondary forest and 182,485 ha of primary forest has been allocated to mining concessions. The largest area of secondary forest (60,000 ha) has been allocated to PT Berau Coal. P.T. Berau Coal has also been awarded the largest concession area (117,997 ha) and it is currently operating three coalfields in Sambaliung district— Lati mine, Binungan mine and Sambrata mine. Together these three mines have a mineable coal reserve of 1.2 billion t.⁵¹

Large areas of primary forest (over 4000 ha) have also been awarded to 15 mining companies. Only two of these companies had production licences in 2013—PT Anco Millenium Indonesia (which has been awarded 7, 102 ha of primary forest) and PT Nusantara Energy (which has been awarded 4620 ha of primary forest).

⁵¹ See Berau coal website. http://www.beraucoalenergy.co.id



Figure 10. Mining concessions.

Source: Compiled from BPN, BAPPEDA of Province, BAPPEDA of Berau's district, and ESDM (2012).

Coal production has increased dramatically over the last decade. In 2001, Berau produced around 6.25 million t of coal, however, coal production had increased to 27.5 million t in 2011. Around 78% (21.5 million t) of this coal was exported in 2012 (Badan Pusat Statistik Kabupaten Berau 2012). Regional income derived from mining correspondingly increased from IDR 755 billion (US 65,018) to IDR 5,980, billion (USD 514,916) in 2012.

3.8 Deforestation rates and greenhouse gas emissions

Prior to 2000, extensive deforestation occurred south of Berau, in the districts of Kutai Timur, Kutai Kartanegara and Pasir (Figure 11). Berau is the next frontier for deforestation and largescale developments such as oil palm and industrial timber plantations. Regrettably, deforestation has been increasing on average over the past 12 years. Between 2000 and 2012, 201,566 ha of forest was lost in Berau. Between 2000 and 2006, deforestation averaged at around 12,833 ha per annum; however, between 2007 and 2012, deforestation averaged around 20,760 ha per annum. Significant deforestation (62,431 ha) occurred between 2010 and 2012 (Table 5).

When forests are cleared or degraded their stored carbon is released into the atmosphere as CO_2^{52} (Gibbs et al. 2007). If we assume that Berau's forests contain between 110–250 t of carbon per hectare, between 81.1 and 185.7 million t of CO_2 have been released into the atmosphere between 2000 and 2012. Some of these CO_2 emissions have been compensated for by regrowth and plantation establishment, however, several studies have shown that secondary forests, oil palm and timber plantations store less carbon than primary forests (Mudiyarso et al. 2002; Tomich et al. 2002; Rahayu et al. 2005; Ludang and Palangkajaya 2007). The net emission⁵³ from the deforestation of primary forests in particular is significant.

^{52 1} t of carbon stored = 3.67 t of CO₂ emission equivalent.

⁵³ Net emissions assume removal of trees and most of the biomass. It also assumes that all stored carbon is emitted, but allows for counting the carbon stocks on the area deforested as they are replaced by regrowth or plantations.



Figure 11. Land cover in Kalimantan (2011).

	2000- 2001	2001- 2002	2002- 2003	2003- 2004	2004- 2005	2005- 2006	2006- 2007	2007- 2008	2008- 2009	2009- 2010	2010- 2011	2011- 2012	Total 2000- 2012
Batu Putih	677	894	287	1,331	2,135	4,388	1,584	231	869	99	3,379	6,611	22,483
Biatan	997	1,306	691	367	302	218	445	49	360	46	1,575	4,199	10,555
Biduk	175	116	64	258	163	277	113	155	286	105	83	233	2,028
Gunung Tabur	2,847	1,158	774	2,213	1,667	1,473	3,050	661	2,669	928	2,658	3,519	23,617
Kelay	728	760	514	786	270	1,634	1,640	1,924	7,066	3,893	4,109	5,111	28,435
Maratua	4	1		6	3	3	2		3	4	5	23	54
Pulau Derawan	1,047	694	1,343	1,531	626	247	417	136	520	1,058	2,357	2,552	12,527
Sambaliung	2,415	1,300	1,164	2,900	2,519	2,117	1,371	648	2,134	870	2,496	3,271	23,207
Segah	927	1,461	733	2,189	1,829	5,759	6,401	1,577	5,899	4,019	3,141	5,295	39,231
Tabalar	832	1,248	775	1,518	621	794	1,539	1,372	1,135	287	1,746	1,785	13,652
Talisayan	837	460	410	1,143	2,959	1,125	1,923	514	1,498	384	2,160	2,959	16,373
Tanjung Redeb	8	50	6	60	21	26	56	3	61	19	92	96	496
Teluk Bayur	520	424	321	1,235	468	853	595	158	928	431	1,313	1,661	8,908
Total	12,014	9,872	7,082	15,537	13,581	18,916	19,136	7,426	23,429	12,143	25,116	37,315	201,566

Table 5. Annual deforestation 2000–12.

Source: Forest cover change 2000-2012, based on Hansen et al. (2013)

Note: the sub-district boundary is based on BPS (2012).

Most of the deforestation in Berau (72% or 146,305 ha) occurred in APL land (i.e. forested land that has been allocated for other land uses) between 2000 and 2012. However, deforestation was also detected in production forest (42,023 ha) and limited production forest (11,920 ha). Only small areas of deforestation were detected in protection forest (1007 ha), conservation forest (39 ha) and other forest areas (222 ha). There does not appear to be a direct correlation between population density and forest cover change. Most forest cover change has occurred in the sub-districts of Segah, Kelay, Sambaliung, Gunung Tabur and Batu Putih-all of which have relatively low population densities. In fact, most deforestation is occurring in the least two populated districts of Segah and Kelay, which have a population density of less than 2 people per km².

When deforestation areas were overlaid with concession boundary data it was revealed that significant deforestation had occurred within oil palm concessions (34% or 68,598 ha), followed by logging concessions (17% or 34,266), timber plantation concessions (16% or 32,233 ha) and mining concessions (10% or 21,097 ha) between 2000 and 2012. Significant deforestation had occurred within oil palm concessions because these concessions tend to clear fell existing land cover to make way for monoculture oil palm plantations.

This essentially means that oil palm expansion resulted in the release of 27.5–62.7 million t of CO_2 , timber plantation expansion resulted in the release of 12.8–29.3 million t CO_2 , unsustainable logging resulted in the release of 13.5–31.2 million t CO_2 and mining resulted in the release of 8.4–19 million t CO_2 into the atmosphere as CO_2 .⁵⁴ Together, these four sectors were responsible for around 77% of Berau's land-based CO_2 emissions in the period 2000–2012.

⁵⁴ These are rough gross emissions estimates. Gross emission estimates assume removal of trees and most of the biomass and that all carbon is emitted.

4 Opportunities to support a green economy in Berau

The above chapter has revealed that Berau's remaining forests and peatlands are threatened by numerous activities including logging, mining, timber and estate developments and the wood processing industry. However, the biggest threat to Berau's forests is the spatial planning process. If the draft 2012 RTRWP is enacted, this spatial plan will allow 35,879 ha of primary forest and 318,944 ha of secondary forests to be allocated as APL land which can be cleared to make way for agriculture and estate developments (primarily oil palm). To date, 45% (190,475 ha) of the forest in the APL land has already been allocated to concessions (oil palm, mining, logging and oil palm) according to the 2012 RTRWP.

Several efforts have been undertaken to protect Berau's forests and peatlands, particularly the primary forests. The most likely to have an impact include:

- placing a temporary moratorium on the allocation and clearing of primary forest and peatland that has not already been allocated to concessions;
- promoting REDD+ pilots and other initiatives seeking to reduce deforestation;
- identifying suitable degraded land for oil palm developments and promoting land swaps that allow companies allocated primary forest or peatland in their concessions to be able to develop degraded land instead.

In addition to the above, several other initiatives also need to be considered to slow deforestation in Berau. These initiatives would require significant political will and include:

- reevaluating the removal of forested land from the forest estate and reclassifying this land as APL land;
- reconsidering and reevaluating the allocation of forested land to industrial timber concessions and oil palm concessions. Oil palm and industrial timber concessions should be targeted because the establishment of oil palm and industrial timber concessions usually requires the clearfelling of natural vegetation and forest and the establishment of mono-culture plantations that cannot sustain significant biodiversity.

These initiatives are discussed in further detail below.

4.1 Moratorium on primary forest and peatland conversion in Berau

The moratorium map has been revised several times and the amount of primary forest, peatland and other forest protected by this moratorium has been reduced in every revision. This is no different for Berau. In the first moratorium map, 58,307 ha of primary forest, 23,2268 ha of peatland and 364,237 ha of protected forest and sanctuaries were protected. In the most recent version of the moratorium, 55,361 ha of primary forest, 5195 ha of peatland and 264,923 ha of protected forest and sanctuary are protected by the moratorium. Thus, the total amount of carbon-rich land protected by the moratorium was reduced by a total of 4358 ha. The largest reduction was in the peatland category presumably because the Wetlands international map was replaced with the Ministry of Agriculture peatland data. This was offset by an additional 15,662 ha being protected in the protected forest and sanctuary category-forest already designated as protected or conservation forest.

The effectiveness of the moratorium is questionable because less primary forest and peatland is being protected over time and because several companies have been awarded concessions that overlap with the moratorium map. Analysis of the most recent moratorium map revealed that 10 logging (HPH) companies, six estate crop companies, one plantation (HTI) company and one mining company have concessions that overlap with the most recent version of the moratorium map. A total of 15,427 ha of primary forest protected by the moratorium has been awarded to these companies. The largest area of primary forest protected by the moratorium map has been allocated to a HPH company called PT Amindo Wana Persada. Other companies awarded large areas of primary forest protected by the moratorium are PT Puji Sempurna (HPH: 2356 ha), Sumalindo IV (HPH: 2550 ha), PT Berkat Sawit Asri Lestari (oil palm: 1699 ha) and PT Indo Alam Bumi Makmur Sukan (oil palm: 1106 ha). The moratorium was only supposed to be applied to primary forest and peatland that had not already been allocated to concessions so it is possible that the 15,427ha of primary forest allocated to these companies may eventually be taken out of the moratorium.

	Primary forest	Peatland	Protected forest and sanctuary	Total forest and peatland protected
First version of moratorium map SK 6018	58,307	23,268	348,267	429,842
Latest version of moratorium map SK323	55,361	5,195	364,929	425,484
Difference	-2,946	-18,072	+15,662	-4,358

Table 6. Primary forest and peatland protected by the moratorium in Berau

Otherwise, these companies may still be able to clear land and continue with their operations despite the moratorium. This needs to be clarified and discussed between the relevant government authorities as soon as possible.

The future of the moratorium is also unknown as the current moratorium expires in May 2015. Moreover, the moratorium currently only protects 420,227 ha of primary forest. According to the most recent MoF land-cover map there is 579,939 ha of primary forest in Berau. Thus, the moratorium is potentially only protecting 72% of Berau's primary forest.

4.2 REDD+ pilots and other initiatives seeking to reduce deforestation

Considerable focus has been given to REDD+ and the development of Berau as a REDD+ pilot district since the 2007 UNFCCC COP meeting held in Bali. Assistance for this initiative mainly comes from the Berau Forest Carbon Program (BFCP) which is funded by Nature Conservancy Indonesia (TNC-IFP).

The Berau Forest Carbon Program is a partnership between the district government of Berau, East Kalimantan Province, The Ministry of Forestry, other government institutions, non-governmental organizations (NGOs) and funding institutions to jointly develop a forest carbon pilot program to reduce emissions from deforestation and forest degradation and enhance sequestration through sustainable forest management, forest conservation, ecosystem restoration and forest rehabilitation.

The Berau district government established a REDD+ Working Group to support the initiative in 2008 (through Decree No. 313 which was later on modified with Decree 716 year 2009 on 21 December 2009). The REDD+ Working Group carried out an in-depth analysis on the conditions and problems of the forestry sector and landuse change dynamics in Berau. They have also commissioned studies which estimate emissions from Berau's forestry and land-use change sector, the rate of Berau's deforestation and forest degradation the drivers of land use change in Berau, as well as the latest condition in the readiness to implement the pilot phase of REDD+ at the district scale in Berau. They found that the Berau Forest Carbon Program aims to achieve the following outcomes during the first five years of the project:

- improving management of natural production forest on an area of at least 650,000 ha with a potential reduction in emissions by 3 million t of CO₂e over the next 5 years
- improving management of protection forest on an area of at least 100,000 ha and a potential of emissions reduction and carbon sequestration of 2 million t of CO₂e over the next five years
- improving land-use planning and management of oil palm plantations on an area of at least 20,000 ha with a potential reduction in emissions by 7 million t of CO₂e over the next 5 years
- improving land-use planning and management of mangrove areas

National government support was acquired for this initiative in January 2010 when the Minister of Forestry declared the District of Berau as a National REDD+ Demonstration Activity (DA REDD+). In November 2010, a Natural Production Forest Management Unit (KPHP) was established in Berau in accordance with Forestry Ministerial Decree Number: SK.649/Menhut-II/2010. The FMU covers an area of 775,539 ha and its establishment demonstrates strategic support for the Berau Forest Carbon Program. Berau was also chosen as a pilot district for the Forest and Climate Program (FORCLIME)-a bilateral cooperation between the Indonesian Government and the German Government because the district has shown considerable interest in purchasing 'green' development.

4.3 Degraded land opportunities

The Berau Forest Carbon Program (BFCP) has been striving to improve land-use planning and management by identifying suitable degraded lands in Berau that can potentially be swapped with primary forest and peatlands that have been allocated to concessions (primarily oil palm concessions). According to the Ministry of Forestry, there is a total of 1.4 million ha of degraded land in Berau. Most of this degraded land fall within the limited production forest category (484,578 ha), followed by the production forest (437,643 ha) category and the APL category (380,611 ha). The districts of Kelay and Segah have the largest areas of degraded land— 311,875 ha and 373,857 ha respectively.

Currently it appears that 19% (278,406 ha) of the total 1.4 million ha of degraded land has been allocated to oil palm, HTI and mining concessions. This means that the remaining 1.1 million ha of degraded land can potentially be considered for future HTI and oil palm concessions before primary forest or secondary forest is allocated to these concessions. There is also considerable potential for land swaps that allow oil palm or HTI concessions allocated large areas of primary forest or peatland to swap, or be reallocated degraded land instead.

Land swaps are not, nevertheless, easy things to facilitate. In 2005, Asia Pulp and Paper (APP) commissioned an independent study to look into the option of land swaps for high conservation value forests identified within APP's concessions in Riau, Sumatra (Manembu et al. 2005). The study highlighted a number of issues.

- 1. There were differing interpretations of degraded lands among key stakeholders working or living in the area. WWF, for instance, defined degraded lands according to their physical appearance and considered land covered by grass or shrubs to be degraded if these lands were found to have low biodiversity value. However, local people only considered lands to be degraded if they had no economic value or were costly to develop with crops or plantations. They primarily considered peatlands to be degraded because these lands required a great deal of physical treatment before they could be viable for crop developments.
- 2. Consequently, lands identified as degraded through satellite imagery analysis were not necessarily considered to be of no value to local communities. Some of these lands were being utilized by local communities and were

considered to be of value because they could be used for crop or plantation developments.

- 3. Many of the degraded lands identified through satellite imagery analysis were also subjected to overlapping land claims and thus rife with conflict. The authors pointed out that "to find out who owns what and whether the claim is legitimate is at times comparable to looking for a needle in a haystack."
- 4. Most of the available degraded lands that could be available for land swaps were scattered and often not considered to be large enough to develop profitable plantations. Most oil palm companies acquire concessions of around 5000 ha or more in the same location and it is not economically viable to develop smaller plantations scattered over different locations.
- 5. Finally, the study highlighted that APP should not expect to obtain degraded lands that are free of conflict. Apparently, both of these constraints significantly deterred APP from pursuing land swaps for HCVF lands found within their concession boundaries further.

Considerable time, effort and resources is therefore required to identify available degraded lands that can be utilized for land swaps in avoided deforestation projects. According to environmental, economic and legal criteria developed by the POTICO (palm oil, timber, carbon offsets) initiative⁵⁵ (Gingold et al. 2012), there is only 423,203 ha of degraded land that may be suitable for oil palm developments in Berau. All of this land falls within the APL category because this is the only land category that can support oil palm developments according to law. The majority of this degraded land falls within the sub-districts of Gunung Tabur, Segah and Kelay. Social criteria and parameters⁵⁶ would still need to be applied and checked to see if this land is unoccupied and actually available for oil palm developments.

Nevertheless, considerable degraded land exists elsewhere in East Kalimantan, particularly within the four districts that have already been subjected

These parameters are determined for the first stage desktop spatial analysis. Parameters include carbon and biodiversity (land cover, peat, conservation, buffer zones), soil and water protection and crop productivity (topography, rainfall, soil) (Gingold et al. 2012).

⁵⁶ The social criteria include land use (dependence, land use history), local interests (community participation in oil palm, community interest in planting oil palm, political interests) (Gingold et al. 2012).

to substantial forest change and loss—Kutai Timur, Pasir, Kutai Kartanegara and Kutai Barat. Further spatial analysis of these four districts is required in order to identify suitable degraded areas that can be offered for land swaps.

4.4 Evaluation of APL land

Over the last 14 years, 542,626 ha of land has been excised from the forest estate. In the most recent spatial plan for Berau, around 629,304 ha of land has been designated as APL land—land falling outside the forest estate. Much of this land was excised from the forest estate and is therefore forested. According to the most recent land cover map from the Ministry of Forestry, 35,879 ha of primary forest falls within the APL land category and 256,494 ha of secondary forest falls within the APL land category. These forests consequently store between 32.1–73 million t of carbon which will be released into the atmosphere as CO₂ if they are cleared to make way for plantations or other land uses. According to law, this APL land can be cleared and developed with agriculture and estate crops such as oil palm. However, some of the primary forest falling into the APL land category is protected by the moratorium. The latest moratorium map indicates that 25,831 ha of the primary forest falling in the APL land category is currently restricted and cannot be cleared.

Governors and Bupati's were granted the authority to issue land clearing permits and other permits such as location permits to companies wishing to establish agricultural plantations, such as oil palm plantations on APL lands⁵⁷ in 2004 while the Ministry of Forestry retained the right to issue land clearing permits for lands falling within the forest estate.⁵⁸ Because district and provincial governments have the right to issue land clearing permits for APL lands, it is not surprising to find that 16% of these lands have already been designated for oil palm concessions (107,446 ha).

Logging concessions, industrial timber concessions and mining concessions also lie on another 183,029 ha of APL lands meaning that 45% of Berau's APL lands have already been allocated to large-scale concessions. According to Indonesian law, only mining companies and oil palm companies should be located within APL lands. Logging companies and industrial timber companies should only have concessions within the forest estate.

In many cases, the release of forested lands for oil palm companies or industrial timber plantations has not resulted in plantations, but been used as a means to gain access to timber on these lands (Antara 2005; Sijabat 2006). Anecdotal studies have suggested that that the decentralization of land clearing permits has resulted in the widespread deforestation of lands that were reclassified as APL lands (Casson 2000). This can be confirmed in Berau where most deforestation (72%) occurring between 2000 and 2012 was detected within APL lands granted to oil palm companies, industrial timber plantations or logging concessions.

Discrepancies in Berau's APL lands need to be evaluated and dealt with as soon as possible to avoid unnecessary deforestation of primary forests and other carbon rich forests in Berau's APL lands. Priority should be given to the existence of:

- logging concessions and industrial timber concessions in the APL land category. According to law, only mining and oil palm companies should have concessions in this land category. Logging and industrial timber concessions should only be found within the forest estate on production forest or limited production forest.
- 2. primary and secondary forest in the APL land category. While this is not illegal, it is not ideal as the APL land category allows for clear felling and estate development. It is therefore almost certain that 35,879 ha of primary forest falling within the APL land will be cleared. Primary forest falling into this land category should consequently be reevaluated as soon as possible so that it can be protected by the moratorium or re-designated as protected forest.

A comprehensive strategic environmental assessment (SEA) of Berau's spatial plan should also be carried out to access the implications of converting forest and to help the local government to identify green development strategies that will conserve forest but allow economic growth to continue. SEA is an analytical and participatory approach for mainstreaming environmental and social issues into the decision-making and the implementation process at the strategic level. It involves environmental assessment of development programs, plans and

⁵⁷ See SK 282/2004. Prior to 2004, only the Ministry of Forestry and its provincial offices could issue clear-felling permits (IPK) for HPK lands. This process was regulated by SK538/1999.

⁵⁸ These land clearing permits allow companies to begin the process of acquiring land utilization rights (HGU) from the Agrarian Ministry.

RTRWK 2012	Deforestation 2000–2012
APL land	146,305
Production forest	42,023
Conservation forest	39
Protection forest	1,007
Limited production forest	11,970
Other areas	222
Total	201,566

Table 7. Deforestation in forest categories according to the RTRWK 2012 map

policies of non-environmental sectors. A SEA differs from an Environmental Impact Assessment (EIA, or AMDAL in Indonesian) in that it seeks to inform spatial plans and to proactively address the environmental, social and economic consequences of a proposed plan in order to support decision-making. The end point of the SEA should be the definition of clear development and planning options that are the product of consensus among all stakeholders.

Indonesian law now requires all governments to conduct a Strategic Environmental Assessment (SEA, or *Kajian Lingkungan Hidup Strategis* in Indonesian) as part of the spatial planning process. A good SEA should contain information and analysis on the biophysical, ecological, social, cultural, and economic aspects of the landscape and analyze how parts of the landscape interact and affect each other. The SEA should also help local governments to develop effective low emission strategies that can promote economic growth.

4.5 Evaluation of estate crop and industrial timber concessions

4.5.1 Oil palm and estate crop companies

In 2013, at least 19 companies had already been awarded definitive land use permits. Only one of these companies – PT Dwiwira Lestari Jaya – has been allocated a definitive concession with approximately 794 ha of primary forest and 6967 ha of secondary forest. The other companies have all been awarded concessions containing around 44,840 ha of secondary forest. It is now difficult to change this situation but assistance can be provided to ensure that some of this forest is conserved if it is found to be especially rich in biodiversity and carbon. Alternatively, some of these companies can elect to participate in an avoided deforestation scheme that allows them to elect not to convert forest in exchange for carbon credits or to elect to participate in degraded land swaps.

It may, nevertheless, be possible to influence the outcome for the 65,269 ha of secondary forest, 7490 ha of primary forest and 2483 ha of peatland that is located within estate crop concessions that have not yet been allocated a final land-use permit (HGU). Many of these concessions have only been allocated a location permit and their activities can potentially be stopped because their activities will undoubtedly result in deforestation and clear-felling. Companies that should be examined first include:

- 1. PT Berkat Sawit Asri Lestari, which has been allocated 5216 ha of primary forest and 1651 ha of secondary forest.
- 2. PT Berau Agro Karetindo, which has been allocated 10,027 ha of secondary forest
- 3. PT Hijau Sanggam Persada which has been allocated 4,362 ha of secondary forest
- 4. PT Indo Alam Bumimukmur Sukan which has been allocated 424 ha of secondary forest, 1118 ha of primary forest and 967 ha of peatland
- 5. PT Indo Alam Bumimakmur Tanjung Batu which has been allocated 6,363 ha of secondary forest and 597 ha of peatland
- 6. PT Agrosawit Mas which has been allocated 11,820 ha of secondary forest.
- 7. PT Repenas Andalan Kaltim which has been awarded 925 ha or primary forest and 607 ha of secondary forest.

If the primary and secondary forest allocated to these companies could be conserved rather than cleared to make way for oil palm plantations, there would be a gross emission savings of between 21.4-32.2 million t CO₂ against a business-as-usual scenario. This would be a significant contribution to East Kalimantan's provincial CO₂ emission reduction target of 135 million t CO₂ by 2030.

4.5.2 HTI companies

Six industrial timber companies have also been awarded concessions containing considerable primary forest (14,425 ha in total), secondary forest (141,174 ha in total) and peatland (427 ha in total). The majority (58% or 91,399 ha) of this primary and secondary forest has been allocated to one company—PT Tanjung Redeb Hutani. This company is linked to the Kiani Kertas pulp and paper mill and it has already acquired a definitive permit to clear land and plant fast growing timber species. In the most recent version of the moratorium map only 961 ha of the 77,178 ha or primary forest allocated to this company is protected by the moratorium. The allocation of primary forest to PT Tanjung Redeb Hutani should be reviewed as soon as possible. An additional 64,594 ha of secondary forest has been allocated to four companies—PT Belantara Pusaka (6,339 ha), PT Sumalindo Alam Lestari Unit 1 (19,737 ha), PT Sumalindo Lestari Jaya (16,537 ha), PT Swadaya Perkasa (21,981 ha). This secondary forest is also likely to be cleared and fed into the Kiani Kertas pulp mill unless degraded land swaps or other attractive REDD+ options become available.

5 Lessons learned and implications

Economic development from the extraction of natural resources and the conversion of forests to plantations and other land uses has had a significant impact on forests and GHG emissions. Global concern about human induced climate change has increased in recent years and prompted Parties to the United Nations Frameworks Convention on Climate Change (UNFCCC) to pledge that they will protect the climate system for the benefit of present and future generations of humankind in 2007. The Indonesian Government also committed to reduce GHG emissions by 26% by 2020 with national funding and up to 41% with international support in 2009. Several policies and initiatives have been released to support these commitments. Among the most significant are: a commitment to reduce emissions from deforestation and forest degradation (REDD+); a commitment to reduce dependence on fossil fuels and support biofuel production; a temporary moratorium on the conversion of primary forest and peat; a One Map Initiative which strives to harmonize and improve spatial data so that it can be used for spatial planning purposes; and a National Action Plan for Reducing Greenhouse Gas Emissions (RAN GRK). A number of initiatives have also been developed to stimulate good practice, legality and sustainable management of forest resources. The most significant are: the Roundtable on Sustainable Palm Oil (RSPO), The Indonesia Sustainable Palm Oil (ISPO) Standard and the Timber Legality Assurance System (SVLK).

All of these initiatives feed into the emergent concept of green development. These initiatives are often at odds with conventional economic development plans that prioritize the exploitation of natural resources and the establishment of large-scale estate crops in the outer islands of Indonesia. Increasingly, however, 'green development' initiatives are being piloted in some provinces and districts, such as Berau in East Kalimantan. This district volunteered to pioneer REDD+ and other 'green' initiatives because the majority (75%) of its 2.2 million ha is covered in biodiverse and carbon rich secondary (1.16 million ha) and primary lowland forest (579,939 ha). This means that Berau's primary forests potentially contain between 133-145 million t of carbon and its secondary forests store between 127-208 million t of

carbon. The district is consequently striving to foster economic growth and development while ensuring that natural assets continue to provide resources and environmental services. But action is urgently required if this outcome is to be achieved.

Prior to 2000, extensive deforestation occurred south of Berau in the districts of Kutai Timur, Kutai Kartanegara and Pasir and it is now creeping up into Berau where forests are increasingly threatened by legal and illegal logging, clearing for oil palm and timber plantations, coal mining and population growth. Between 2000 and 2012, 201,566 ha of forest was lost in Berau and the deforestation rate has been increasing per annum from an average of 12,833 ha per annum between 2000 and 2006 to 20,760 ha per annum between 2007 and 2012. This means that between 81-185 million t CO, was released into the atmosphere as a gross emission between 2000 and 2012. Most deforestation (72% or 146,305 ha) has occurred in APL land (i.e. forested land that has been moved outside the forest estate) between 2000 and 2012 within oil palm, logging, timber plantation and mining concessions. The APL land category was created in 2001 when the old spatial plan (TGHK) was revised and all of the conversion forest (542,626 ha) falling within the TGHK was excised out of the forest estate. A new spatial plan, known as the Rencana Tata Ruang Wilayah Propinsi (RTRWP), has been drafted and the current 2012 draft increases the APL land category by another 116,656 ha to cover 638,778 ha of land. Much of this land is forested as it contains around 318,944 ha of secondary forest and 25,879 ha of primary forest. These forests potentially store between 41–57 million t of carbon, which will be released into the atmosphere as CO₂ if removed for other land uses. According to Indonesian regulation, all of this APL land can be cleared for agriculture, settlements or other developments and 46 estate companies had already been awarded 291,533 ha of APL land by 2013.

Moreover, over 1 million (1,011,795) ha has already been allocated to 23 logging concessions; 281,355 ha has been allocated to 7 industrial timber plantations and 193,687 ha has been allocated to seven mining companies. In other words, 80% of Berau's total land area (1,778,370 ha) has been allocated to oil palm, industrial timber, mining and logging concessions.

Berau has pledged to promote 'green development' but the reality on the ground indicates that strong political will is required to rectify poor spatial planning and the ad hoc allocation of concessions to large-scale HTI, oil palm, logging and mining companies. The case study of Berau also indicates that current economic development plans need to be better reconciled with Indonesia's 'green' policies that have been designed to reduce deforestation and GHG emissions. More emphasis needs to be placed on ensuring that carbon rich forests and peatlands are protected, plantation developments are directed onto unoccupied degraded land, logging is managed sustainably and coal mining is conducted according to environmental standards.

Key lessons learned from Berau regarding the protection of Indonesia's forests and carbon stocks include:

- Extending the moratorium on the allocation of permits and clearing of primary forest and peatland. The current version of the moratorium map protects 55,361 ha of primary forests, 5,195 ha of peatland and includes 264,923 ha of forest already designated as protected forest. Nevertheless, 15,427 ha of the primary forest protected by the moratorium has already been awarded to logging, oil palm, industrial timber and mining companies. It is currently not clear if this primary forest can be logged or cleared by these companies. Another 159,712 ha of primary forest lying in Berau is also not protected by the moratorium.
- Promoting REDD+ pilots and other initiatives seeking to reduce deforestation. The Berau Forest Carbon Program is currently supporting the Berau district government to implement a REDD+ pilot in Berau. The pilot seeks to improve the management of natural production forest and protection forest; and to improve land use planning and management of oil palm plantations and mangrove areas. National government support was for this initiative was given in January 2010 when the Minister of Forestry declared the District of Berau as a National REDD+ Demonstration Activity (DA REDD+).

- Identifying suitable **degraded land** for oil palm 3. developments and promoting land swaps. The Berau Forest Carbon Program (BFCP) and other initiatives, such as POTICO, have been striving to improve land use planning and management by identifying suitable degraded lands in Berau that can potentially be swapped with primary forest and peatlands that have been allocated to concessions (primarily oil palm concessions). According to the Ministry of Forestry there are 1.4 million ha of degraded land in Berau, however, criteria developed by the POTICO initiative indicated that there are only 423,203 ha of degraded land that may be suitable for oil palm developments. Considerable degraded land exists elsewhere in East Kalimantan, particularly within the four districts that have already been subjected to substantial forest change and loss-Kutai Timur, Pasir, Kutai Kartanegara and Kutai Barat. Nevertheless, much of this land may not be suitable if it is already occupied by local people. Considerable community mapping and land surveys are therefore required to determine if degraded land is available for land swaps.
- 4. Reevaluating the allocation of primary and secondary forest in the APL land category. The latest draft spatial plan indicates that 629,304 ha of land will fall into the APL land category including 35,879 ha of primary forest and 256,494 ha of secondary forest. The land can be cleared and developed with agriculture and estate crops such as oil palm unless protected by the moratorium, which currently protects around 25,831 ha of primary forest in the APL land category. A comprehensive Strategic Environmental Assessment of Berau's spatial plan should also be undertaken.
- 5. Reevaluating the **allocation of estate crop and industrial timber concessions**. In 2013, 65,269 ha of secondary forest, 7490 ha of primary forest and 2483 ha of peatland had been allocated to estate crop companies who had not been allocated a definitive land use permit. 64,595 ha of secondary forest had also been allocated to four HTI companies who had not been allocated a definitive permit. The allocation of this forest and peatland should be reevaluated before these companies are allocated definitive land use permits.

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Growing global concern about the environmental costs of economic development resulting from natural resource extraction has sparked interest in a new economic paradigm known as 'green development'. Indonesia is currently experimenting with the 'green development' paradigm and trying to define its meaning and better understand its potential applications. So far, this process has meant a refinement and realignment of existing policy measures that seek to reduce deforestation and GHG emissions. These regulations often face contradictory economic development strategies.

The search for a balance between economic growth and more sustainable use of natural resources is currently playing out in the majority of Indonesia's resource rich regions. The case study of Berau in East Kalimantan – a forest frontier area covered with primary and secondary forest - provides a good example of how local government's commitment to reducing carbon dioxide (CO2) emissions is confronted by the challenges to generate revenue from the extraction and utilization of forest and mineral resources. Nevertheless, considerable opportunities exist for future 'green development' in Berau. Significant forest conservation and GHG savings can be realized if the Berau government revaluates the removal of forested land from the forest estate and re-categorizes forests rich in biodiversity and carbon as conservation or protected forest. A comprehensive strategic environmental assessment (SEA) of Berau's proposed 2012 spatial plan could help to revaluate current land allocations and identify carbon rich lands that should be conserved to mitigate GHG emissions. These are important lessons for other parts of Indonesia facing similar problems.



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