4

Drivers and effects of agrarian change in Kapuas Hulu Regency, West Kalimantan, Indonesia

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Summary

This chapter examines the potential of the Kapuas Hulu Regency in West Kalimantan as a study site to examine the current drivers of land-use change in Indonesia and the effects of contemporary land-use change on livelihoods and food security. The chapter summarizes preliminary research undertaken in Indonesia as part of the Agrarian Change Project, a multi-country comparative research project conducted by CIFOR. Within the Indonesian component of the project, we focus on the expansion and intensification of oil palm plantations along an agricultural intensification gradient ranging from primary rainforest to monoculture palm oil plantations. We examine the effects of this agrarian change upon local livelihood strategies, economies and food security within nearby communities.

4.1 Introduction

Indonesia stands at an interesting and controversial nexus between food security and conservation (Rival and Levang 2014). On the one hand, agricultural expansion in the form of oil palm plantations offers unique opportunities to raise incomes in rural areas, potentially offering a way out of poverty (Levang et al. 2005; Rist et al. 2010). On the

other hand, researchers and activists point out the destructive impacts of plantations upon biodiversity and numerous accounts of conflict between communities and companies suggest that local people can often experience negative consequences to their livelihoods as a result of loss of access to forestland (FPP 2007; Sandker et al. 2007; Fitzherbert et al. 2008; Rist et al. 2010).

Indonesia now has the highest rate of deforestation in the world (Hansen et al. 2013a), largely driven by the expansion of oil palm plantations as well as timber harvesting and mining (Potter 1991; Lucarelli 2010; Setijadji et al. 2010; van Leeuwen 2014). Over 70% of Indonesia's land mass is designated as forestland equating to around 134 million ha (MOF 2012). The vast majority of deforestation is occurring on the islands of Sumatra and Kalimantan (the Indonesian half of the island of Borneo) (Curran et al. 2004; Margono et al. 2014). Since 1973, around the time that large-scale extractive industries (for timber, oil and minerals) began to operate, around one-third of Kalimantan's natural forests have been lost (based on 2010 data) (Gaveau et al. 2014). Deforestation in Kalimantan has been historically concentrated in lowland and coastal regions. With much of the lowlands already destroyed, there are increasing pressures on remote sub-montane and highland regions, which were previously too remote for commercial plantations and the extraction of timber and minerals. Almost all of the forested regions in Kalimantan outside of protected areas are under some form of concession for planned plantations for oil palm or rubber, or for the exploration or extraction of minerals. In the next 10 years, the landscape of this region will change beyond recognition, bringing with it enormous consequences for the local people who depend on these forests.

We focus on one specific region of Kalimantan, Kapuas Hulu Regency, situated in the northeast of the province of West Kalimantan. Containing two large national parks, large-scale commercial oil palm plantations and smallholder oil palm and rubber plantations, Kapuas Hulu is the subject of widespread debates around the role of tropical forest conservation and oil palm. As such, it operates as a microcosm of broader issues in Indonesia concerning the trade offs between agricultural expansion, intensification and forest conservation. Present day land use and land cover is shown in Figure 4.1. Rubber estates are shown in peach (34), newly opened oil palm plantations are shown in red (37) and established oil palm estates in dark yellow (36), mixed agroforestry in light yellow (40).

4.2 Research objectives

The Agrarian Change Project in Indonesia attempts to address the following research questions:

1. What are the historical and contemporary drivers of land-use change in Kapuas Hulu?
2. What are the effects of palm oil on local food security?
3. How do monoculture plantations compare with smallholder plantations and agroforestry systems in terms of local livelihoods and food security?

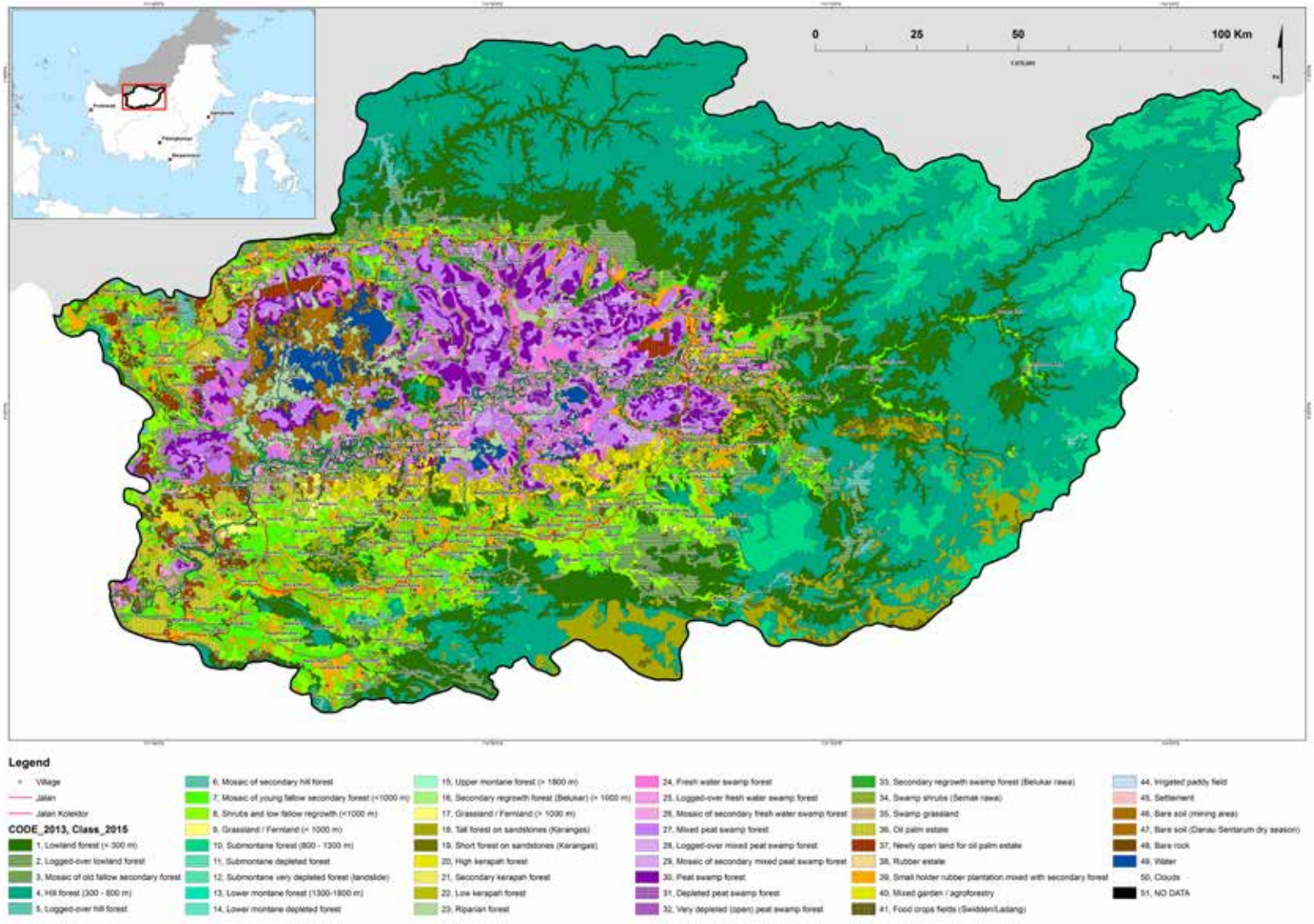


Figure 4.1 Map of Kapuas Hulu.

Source: Laumonier et al. (2013)

4.3 Research Methods

4.3.1 Site selection

Communities were selected as potential study sites on the basis of published and unpublished reports and literature, through examination of land-use maps and informal conversations with researchers and actors in the region. We used land-use maps created by the French Agricultural Research Centre for International Development (Centre de Coopération Internationale en Recherche Agronomique pour le Développement, CIRAD)/CIFOR for the region to first eliminate regions of peat-swamp forest as agricultural practices in these regions differ too greatly from other areas due to the underlying soil type and climatic conditions. We sought to identify three zones that typified different stages of the agrarian transition in the region. Since oil palm is the dominant driver of agrarian change in the region we aimed to identify sites with no oil palm (Zone 1), sites dominated by monoculture palm oil plantations (Zone 3) and sites that reflected intermediate stages of the transition between Zones 1 and 3 (Zone 2). We first identified potential Zone 1 sites that reflected relatively low levels of change by identifying remote and traditional communities, far from state infrastructure (e.g. roads, bridges, medical facilities). Zone 3 sites were identified using government concession maps of companies operating in the region. Zone 2 sites were identified through consultation with other researchers who had operated in the region, in particular those involved in the CIFOR-led Participating in REDD+ Measurement, Reporting and Verification (PMRV) project and the CIRAD-led Collaborative Land-Use and Sustainable Institutional Arrangements (COLUPSIA) project, who have conducted extensive preliminary surveys in the region.

Potential study sites identified using the method above were then discussed with stakeholders in the region during informal discussions and interviews. All sites identified as potential study locations were visited in order to select communities suitable for more in-depth research while in the field.

4.3.2 Literature review

We conducted a literature review of published academic research articles and gray literature. Peer-reviewed publications were accessed through Web of Science and Google Scholar. In addition, we were able to identify important literature through colleagues and fellow researchers in the region. Gray literature was sought by directly contacting organizations active in the region, specialized Google search techniques and through general calls for literature. Both literature in English and Bahasa Indonesia was sought. We focused on literature pertaining to agrarian change, local livelihoods, forestry, agriculture and biodiversity conservation in the region. In addition, government data was acquired through the Indonesian central statistics agency (Badan Pusat Statistik, BPS) and from regional government offices.

4.3.3 Fieldwork

Fieldwork was carried out in October 2014 by Dominic Rowland and Laurio Leonald with assistance from the CIRAD-led COLUPSIA team in Putussibau. Key informant interviews and consultation with stakeholders were first held in Putussibau to narrow the focus of the site selection process, after which the team travelled to each potential study site identified.

Key informant interviews

General information was gathered through interviews and discussions with actors and stakeholders in the region including government officials, international conservation NGOs, local, conservation and social NGOs and active researchers in the region. We obtained interviews and informal discussions with all relevant district (*kabupaten*) government departments including the local forestry department (*dinas kehutanan*) and the local department of agriculture (*dinas pertanian*), the Spatial Planning Department (Badan Perencanaan Pembangunan Daerah, BAPPEDA), and the national park authorities. In addition, we conducted informal discussions with active stakeholders in the region including international NGOs/agencies (WWF; Flora and Fauna International, FFI; GIZ/Forests and Climate Change Project), collaborative research projects such as the CIRAD/CIFOR-led COLUPSIA project, and local NGOs (Lanting Borneo; Riak Bumi; Germawan; Forina; People Resources and Conservation Foundation). Discussions with stakeholders were held to obtain information about current and past activities in the region. In addition, we held informal discussions with other researchers active in the region.

Village survey

In potential study communities, we held informal discussions and meetings with senior community members and conducted semi-structured village surveys with the head of the village (*kepala desa*) where available. Due to the predominant livelihood strategies in these communities, many people spend days or weeks in the forest at a time so the *kepala desa* was not always available. In these cases, we spoke to the highest-ranking village official possible, usually the secretary of the village (*sekdes*), the village representative (*badan permusyawaratan desa*) or the head of the sub-village (*kepala dusun*). The village survey covered basic information about the village including village history, demographic and ethnic composition, land use and land tenure, infrastructure, medical and education facilities, village economy, forest resource use, agricultural practices and seasons, and government/NGO development programs.

Semi-structured interviews

The semi-structured interview contained a series of demographic livelihood and economic questions designed to give an overall picture of the general occupations and livelihoods of the community, as well as open-ended questions concerning perceptions of land-use change. The interviews began with general information about the village, including a brief village history and details of ethnic groups and migrations, followed by questions on the local economy, farming practices and seasons, general food security, healthcare facilities and forest use.

Interviews were conversational in nature and were conducted informally with senior members of the community, as well as in semi-spontaneous group sessions. Where possible, interviews were conducted in as many of the hamlets (*dusuns*) as possible and included both sexes and a wide range of ages.

4.4 Drivers of land-use change

4.4.1 Historical drivers of land-use change in Indonesia

The extraction of resources in Kalimantan is not a recent phenomenon. Gold has been mined in the region since the 4th century and diamonds since the 7th century, although these were small-scale localized operations (Setijadji et al. 2010; van Leeuwen 2014). Kalimantan has seen industrial scale extraction since experiencing a gold rush in the 18th century and the establishment of commercial crude oil extraction by Royal Dutch Shell in 1885 (Wunder 2003). Coal has also been extracted for centuries, starting during colonial times (1849–1945) for use in steam ships (Lucarelli 2010). Many of the policies managing natural resources have changed little since colonial times (Kartodihardjo et al. 2009). The Agrarian Law (*Agrarisch Wet*) issued by the Dutch government in 1870, declared all land without proof of ownership (effectively all forestland) was the property of the State. The State was then entitled to issue permits to companies to cultivate the land and extract resources, in return for taxation. In practice, this model still applies today where the state authority issues companies with concession permits for pre-defined periods of time to operate while retaining ownership of the land.

Following independence in 1945–49 all commercial mining and timber concerns were nationalized under state-controlled companies with a small number of concessions controlled by the Indonesian military and the Indonesian Communist Party (Partai Komunis Indonesia, PKI) (Indonesian Law No. 58/1958). From 1961, forest management was regulated and controlled by the state forestry company, Perhutani, though lack of funding required extensive profit sharing initiatives with foreign companies (Kartodihardjo et al. 2009). Following the fall of nationalist president Soekarno and the rise of General Soeharto in a coup, Indonesia's forestry sector underwent dramatic militarization. Companies and foundations associated with the Indonesian military took control of vast areas of forest estates and senior military officials took personal control of large proportions of company shares (Samego 1999) leading to "quasi capitalism, state corporatism … system of corruption, collusion and nepotism" (Kartodihardjo et al. 2009).

Since the fall of Soeharto in 1998, significant powers have been devolved to the regions of Indonesia under the policy of decentralization (*decentralisasi*) and over 80 million ha now fall under the control of district/regency governments (Indrato et al. 2012; Moeliono and Limberg 2012). The economic crisis that led to Soeharto's fall resulted in widespread illegal activity and the loss of state control. In addition, structural adjustment programs insisted on by the IMF in return for an economic bailout resulted in the lifting of restrictions on foreign investment and companies in forests and for the first time imposed limits on rates of natural forest conversion.

4.4.2 A brief history of palm oil plantations in Indonesia

The era of industrial-scale palm oil plantations in Indonesia began around 1983 when General Soeharto's government placed the responsibility for developing the sector under the control of the Ministry of Transmigration (Levang 1997). Under the policy of Transmigration (*Transmigrasi*), poor people from overpopulated areas of Indonesia

such as Java, Bali and Madura were offered work and additional incentives to relocate to less densely populated regions of Indonesia, in particular Kalimantan, Sumatra and Papua. The history of palm oil in Indonesia is inextricably linked to state policies of transmigration, with the original companies, workers and infrastructure all coming from transmigrants (Rival and Levang 2014). During the 1980s, palm oil companies backed by state loans were given free access to land and began clearing large areas of forests, planting oil palm and building the mills and associated infrastructure. In return for state support, they were required to facilitate the development of an equivalent area of smallholder plantations. After the 1980s, the State no longer provided land free of charge to companies. Rather a policy known as Members' Primary Credit Cooperative (*Koperasi Kredit Primer Anggota*, KKPA) allowed local villagers and landowners (either transmigrants or indigenous people) to trade land with palm oil companies (Rival and Levang 2014). A local landowner might therefore trade his or her smallholding with the company in return for an area of land roughly between one tenth and one third of the size. In return, the company develops the land on their behalf paying the smallholder a share of the profits (minus costs to develop the land). Such schemes are now rarely seen as more smallholders opt instead to develop their own plantations, aided by the formation of cooperatives and improved access to credit.

4.4.3 Historical drivers of land-use change in Kapuas Hulu Regency

Over the past four-and-a-half decades, the main drivers of land-use change have altered greatly in Kapuas Hulu (as shown in Figure 4.2). Prior to the late 1960s and early 1970s, the forests of Kapuas Hulu were too remote for commercial operations and the main drivers of land use were local communities practicing small-scale shifting cultivation (slash and burn). From the 1970s to late 1990s, logging (both legal and illegal) was the main driver of land-use change. Timber harvesting began in Kapuas Hulu, beginning

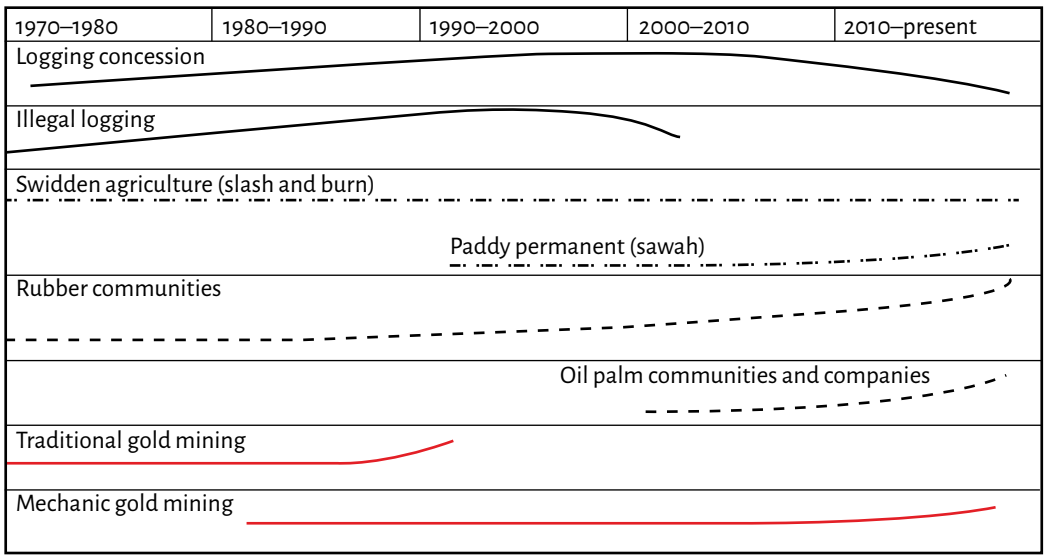


Figure 4.2 Historical land use in Kapuas Hulu.

Note: The y-axis shows relative increase/decrease in activity.

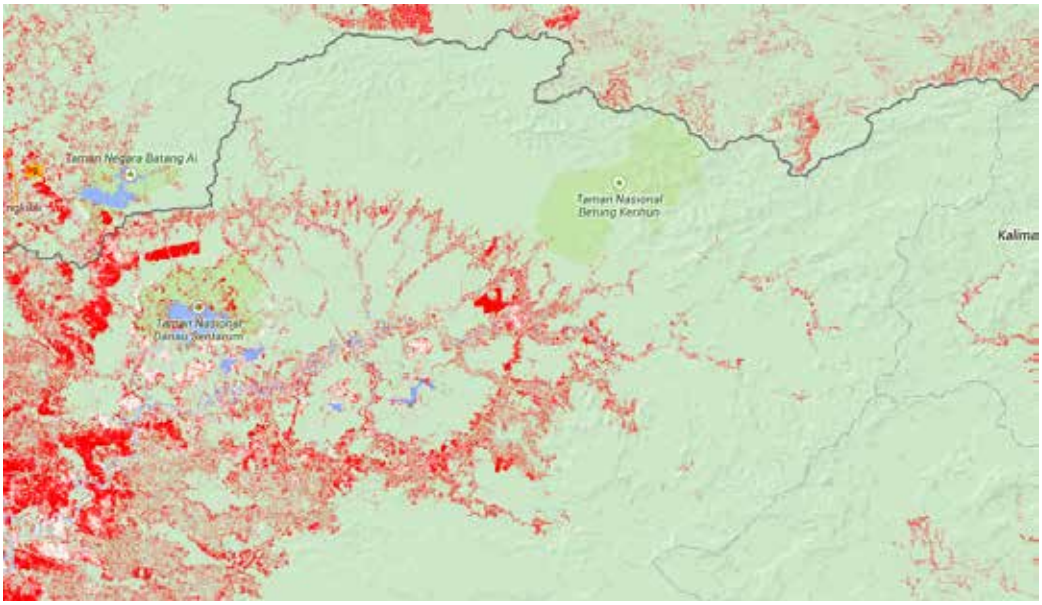


Figure 4.3 Forest loss in Kapuas Hulu 2000–13.

Source: Hansen/UMD/Google/USGS/NASA (2014)

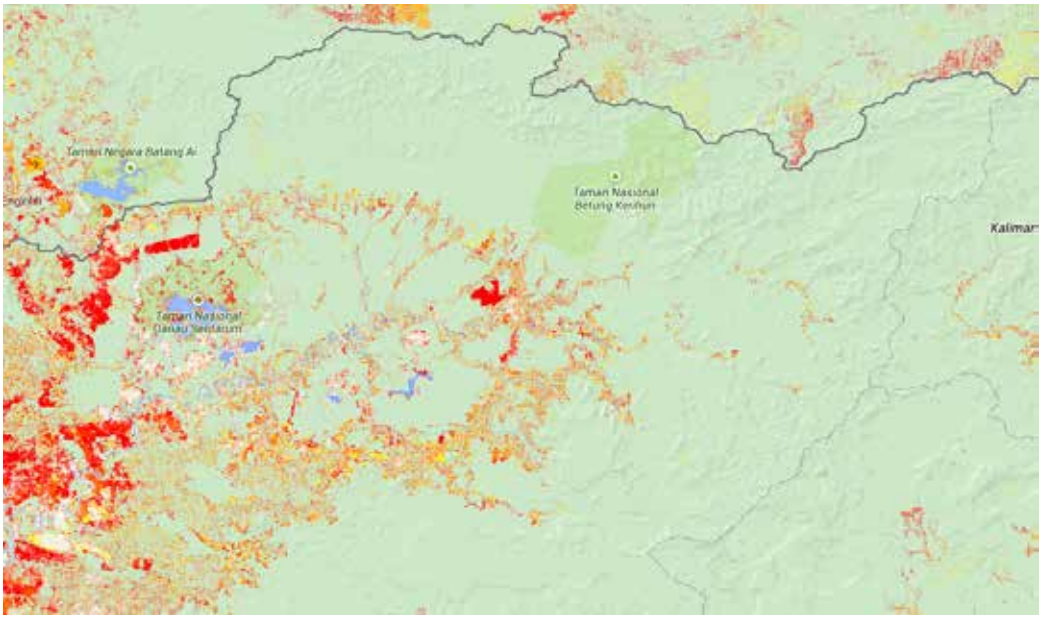


Figure 4.4 Forest loss by year in Kapuas Hulu 2000–13.

Note: Darker areas indicate deforestation closer to the year 2013. Red indicates forest loss during 2013, yellow indicates forest loss during the year 2000.

Source: Hansen/UMD/Google/USGS/NASA (2014)

in the late 1960s/early 1970s. During this time large state-owned or military-controlled timber harvesting operations covered almost the entire border with Malaysia. Timber was exported both legally and illegally to the Malaysian state of Sarawak via a network of small border roads, with little to no timber being transported via other regions of Indonesia (see 4.6.3). During this time illegal logging steadily increased, reaching its peak in the aftermath of the 1997/8 financial crisis and fall of Soeharto.

Following *decentralisasi* in the early 2000s, the newly devolved powers to regional government led to significant investments in infrastructure resulting in a once remote region becoming attractive to Indonesian companies and investors. The building of the road to Sintang in the 1980s, further improved in the 1990s and 2000s. It not only connected Kapuas Hulu with the rest of West Kalimantan but also, crucially, connected Kapuas Hulu to the port of Pontianak. The improved infrastructure, combined with incentives from local government led to the development of large oil palm plantations, the first of which arrived in the region in the year 2000.

Figure 4.3 shows the forest loss on Kapuas Hulu Regency between the years of 2000 and 2013 taken from online data (Hansen et al. 2013b). The maps clearly show deforestation concentrated in the western half of the region and a ring of deforestation that matches the location of the main circular road in Kapuas Hulu. Year-by-year forest loss (shown in Figure 4.4) indicates that much of the more recent deforestation has been occurring around the west and southwest while the deforestation around the road occurred longer ago, around the year 2000. A patch of deforestation around the city of Putussibau is the largest major area of recent deforestation in the central and eastern half of the district. The figures show that very little deforestation has occurred between 2000 and 2013 in the northern and eastern region of Kapuas Hulu, and none in the Betung Kerihun National Park (BKNP).

4.5 The context of Kapuas Hulu

4.5.1 Study area description

Kapuas Hulu Regency (Kabupaten Kapuas Hulu) is an administrative district in the province of West Kalimantan (Kalimantan Barat). Situated in the far northeast of West Kalimantan, bordering Central Kalimantan to the east and the Malaysian border to the north, the regency is one of the remotest in Kalimantan (Figure 4.5). Located between 0.5°N and 1.4°S latitude and 111.40°–114.10° E longitude, it covers an area of nearly 30,000 km^2, approximately one fifth of the area of West Kalimantan Province (see Figure 4.5). Kapuas Hulu (literally "upstream Kapuas") is centered along the Kapuas river, which for centuries has formed the main economic and transportation hub of the region. The Kapuas river stretches 1143 km from source to sea, making it the largest river in Indonesia. The source of the Kapuas is the Muller mountain range and meanders in a southwesterly direction, reaching the sea southwest of the provincial capital of Pontianak. The topography of the region varies from alluvial flat to hilly to mountainous (Table 4.1). Most areas are situated between 25 and 500 masl, though the highest point of Mt. Kerihun is 1790 masl. The most mountainous region lies to the northeast where the region borders the Muller mountain range in Central Kalimantan.

Table 4.1 Slope class in Kapuas Hulu.

Slope class	Area (ha)	Percentage (%)
0%–2%	898,240	30.10
2%–15%	336,150	11.26
15%–40%	583.240	19.54
> 40%	1,116,570	39.09

Source: BPS (2005)

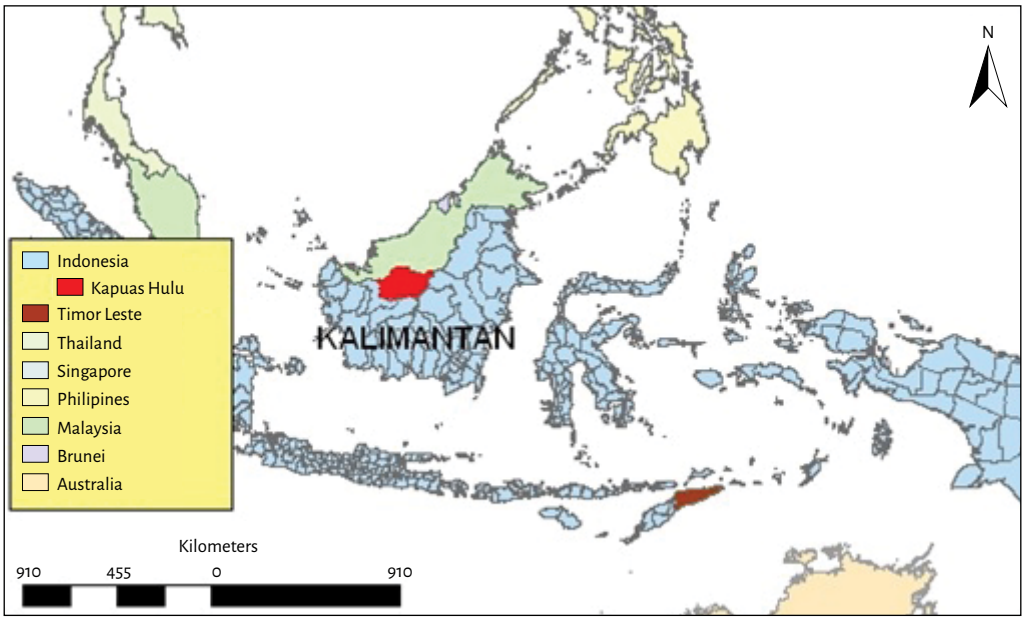


Figure 4.5 Location of Kapuas Hulu Regency in Indonesia.

4.5.2 Population and ethnic composition

Census data for the year 2013 reports a population of 231,000 people at an average population density of 7–8 people per km^2 (BPS 2014). However, the population is unevenly distributed with the highest population centers situated in and around the administrative capital Putussibau (159 inhabitants/km^2) and the lowest in Embaloh Hulu subdistrict (1 inhabitant/km^2). Population growth in the region is expected to be steady due to a young population and immigration from Java and other regions of Kalimantan (Shantiko et al. 2013).

Kapuas Hulu is ethnically and culturally diverse. In general terms, the population can be classified as Malay and Dayak. However, the Dayak are distributed across the district and consist of 20 sub-ethnic groups and 20 languages (Institut Dayakologi

Table 4.2 Education certificates obtained by the population of Kapuas Hulu.

Highest certificate	Male (%)	Female (%)	Total (%)
No certificate	33.10	31.51	32.36
Elementary school	29.41	37.70	33.23
Junior high school	18.95	16.59	17.86
Senior high school	15.23	12.51	13.98
Vocational high school	1.55	0.14	0.90
University	1.76	1.56	1.66

Source: BPS (2014)

2008). The majority of Dayaks in the population are Christian (Protestant and Catholic), while the Malay population is mostly Muslim. In addition, there are transmigrants from Java, who first arrived in 1975 as part of the national *transmigrasi* policy. The first transmigrant communities settled in the subdistrict of Silat Hilir, where they practiced permanent dryland agriculture. Each sub-ethnicity has its own language that is the primary language used in the household. Bahasa Indonesia is widely spoken and taught in all schools, and with the exception of some elderly people in remote villages is universally understood.

While the majority of the population has access to basic education, 32.36% of the population does not hold any form of education certificate. As the level of qualification increases, the frequency decreases sharply, with only 1.66% of the population graduating from higher education (Table 4.2). Most villages in the region have at least an elementary school, although it is common to have to travel to larger settlements for a high school education. A lack of teachers and poor infrastructure are contributing factors to the low levels of formal education.

4.5.3 Ecological context

Despite widespread deforestation, the region remains heavily forested. Tropical forests cover 74% of the total area of the district, consisting of 13,110.84 km^2 of primary forest (42.08%), 5229.50 km^2 of secondary forest (16.78%) and 4753.01 km^2 of peat-swamp forest (15.25%).

Kapuas Hulu has one of the highest proportions of protected forest in Kalimantan. Over half (57%) of forest is under some form of conservation protection (Table 4.3), compared to an average of 26% for West Kalimantan (Shantiko et al. 2013). The entire region was designated a conservation area in 2003, a voluntary decision endorsed and legally enacted through a decree issued by the district head (Kantor Bupati 2003).

Table 4.3 Forest area by official classification.

Forestland classification	Area (ha)	Percentage (%)
National park	930,940	29.80
Protected forest	834,140	26.70
Limited production forest	485,495	15.54
Production forest	174,440	5.58
Production forest for conversion	109,065	3.49
Area for other uses	589,470	18.87
Total	**3,123,550**	**100**

Source: BAPPEDA (2013)

4.5.4 National parks

Two national parks dominate the landscape; BKNP, a mixed dipterocarp forest that extends from the north of the region to the Malaysian border, and Danau Sentarum National Park, a network of lakes and forested islands situated in areas of peat-swamp forest in the west of the region (see Figure 4.6).

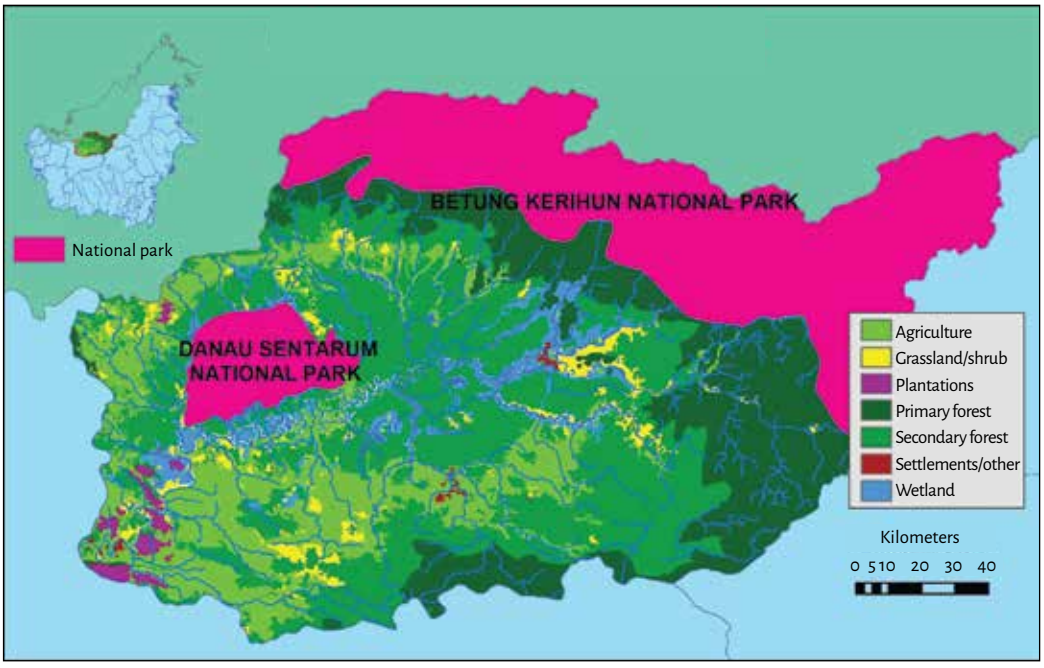


Figure 4.6 Map of national parks in Kapuas Hulu.

Source: WRI (2013)

Betung Kerihun National Park

Betung Kerihun National Park (BKNP) covers 800,000 ha, making it the largest conservation area in West Kalimantan (Susilo 2003). Ranging from 150 to 2000 masl, the park is host to high levels of biodiversity including 54 mammal species (including 8 primate species, 17 rodent and 17 bat species), 112 species of amphibians and reptiles, and 695 woody plant species (of which 50 are endemic to Borneo) (Susilo 2003). Like most of Kalimantan's dipterocarp forests, BKNP is a masting forest, with mass-fruiting events thought to be triggered by the El Niño Southern Oscillation (Curran et al. 1999). The park is also the source of the Kapuas River, the largest river in Indonesia and an economic driver of the province of West Kalimantan. It is estimated that 80% of the upstream catchment of the Kapuas River lies within the national park (ITTO 2005). The park covers four administrative districts, Embaloh Hulu, Embaloh Hilir, Putussibau Utara and Putussibau Selatatan, but is under the management of the Forest Protection and Nature Conservation Department (Direktorat Jenderal Perlindungan Hutan dan Konservasi Alam, PHKA), a regional office of the national Ministry of Forestry.

Several communities live within the park boundaries and zones have been established regulating activities in different areas (Susilo 2003). The remote interior and northern regions of the park are classified as the 'core zone,' consisting of extremely high conservation value forest with high wildlife sensitivity and thus all forms of human activity are prohibited. Outside this zone lies the 'wilderness zone,' also of high conservation value but where human disturbance is considered less of a threat to wildlife. All forms of extraction of forest products including sustainable use of NTFPs are banned within the wilderness zones although ecotourism is permitted and indeed encouraged. All communities within BKNP lie within an 'intensive use zone' where the extraction of NTFPs, bushmeat hunting and shifting cultivation are permitted along with certain sanctioned agroforestry practices. In addition, a number of areas are categorized as 'reserve zones,' where special activities such as rehabilitation of wildlife and ecotourism are strictly permitted.

The monitoring of activities in the region is conducted by the National Park authorities, who patrol the area, although the patrol effort to area ratio is extremely low. There are reports of occasional conflicts between local people and the Park authorities, though most appear to be minor miscommunications surrounding the legality of certain land-use practices. WWF, the most active NGO in the national park, provide support to park authorities but in the past have criticized some of the management practices. In particular, WWF have highlighted the lack of park management personnel (57 professionals and 20 honorary local staff, of whom 24 are park rangers), lack of funding resulting in bi-monthly field visits only, the persistence of illegal logging in the park and limited engagement with local people (WWF 2005).

Danau Sentarum National Park

Danau Sentarum National Park, a network of wetlands, forested islands and freshwater lakes, is situated in seven subdistricts in the west of the regency; Batang Lupar, Badu, Embau, Bunut Hilir, Suhaid, Selimbau and Semitau districts. The park covers an area of 132,000 ha, surrounded by a buffer zone of approximately 65,000 ha. The buffer zone

is more populated than BKNP with around 10,300 people living within the park (Indriatmoko 2010). These communities, of whom 93% are ethnically Malay, are heavily dependent on the fisheries the lake provides. The remainder are Dayak Iban, who practice shifting cultivation (Wadley et al. 2010; Yuliani et al. 2014).

Danau Sentarum was initially established in 1985 as a wildlife reserve, and later converted to the higher protection status of national park in 1999 (Giesen 1987; Wadley et al. 2010). To this day, the exact boundaries of the park and its buffer zone remain unclear, and most management and protection is carried out by local communities themselves (Dennis et al. 2001; Indriatmoko 2010; Colfer and Minarchek 2012; Yuliani et al. 2008). Prior to the establishment of the National Park Management Unit in 2007, official protection was carried out solely by two forest rangers and two fire-patrol guards (Yuliani et al. 2008, 2014). Danau Sentarum provides habitat for a number of flagship species including the Bornean orang-utan and the proboscis monkey, as well as a vast range of other species including 143 species of mammals, 282 species of birds, 27 reptile species and 221 species of fish (Jeanes and Meijaard 2000; Kottelat and Widjanarti 2005).

As well as national parks, which fall under the authority of the Ministry of Forestry, district governments administer other forms of protected forest (Law No. 62 Forestry Act; Conservation Act; Government Regulation No. 62/1998). Protected forests are defined in forestry law as forested areas that have the principle function of water management, flood prevention or erosion control (Law No. 41 on Forestry 1999). Protected forest makes up 26.7% of forested land in Kapuas Hulu, although usually little-to-no on the ground management exists in these regions.

4.5.5 Land tenure

All forestlands in Indonesia are by default owned by the State, although significant areas of forest have yet to be gazetted (Indrato et al. 2012). State authority for the ownership of all forestlands was codified in 1999 by forestry law (Law No. 41 on Forestry 1999), based upon an assumption that the State owned the forests on behalf of the Indonesian people (Butt 2014). Following a constitutional court ruling in 2013 on a case brought by the Alliance of Indigenous Peoples (AMAN) in which the 1999 forestry law was ruled as being unconstitutional, the State has the legal obligation to grant ownership of forests to indigenous people (Butt 2014). In reality, few attempts to transfer ownership of forestlands to indigenous people have been successful (Sahide and Giessen 2015).

To date, there is no legalized customary forest (*hutan adat*) in Kapuas Hulu, though several local and national NGOs are involved in attempts to legally register land claims. AMAN campaigns for "local government policy changes in Kapuas Hulu and the protection and recognition of existence of indigenous people" (AMAN 2014). Other organizations such as the Registration Agency of Indigenous Territories (Badan Registrasi Wilayah Adat, BRWA), Forest Watch Indonesia, Sawit Watch, the Participatory Mapping Network (Jaringan Kerja Pemetaan Partisipatif, JKPP) and the Consortium for Supporting Community

Table 4.4 Villages with community forest.

Village	Subdistrict	Legally recognized	Unofficially recognized
Ujung Said	Jongkong	☐	
Nanga Betung	Boyan Tanjung	☐	
Manua Sadap	Embaloh	☐	
Tanjung	Mentebah	☐	
Sri Wangi	Boyan Tanjung	☐	
Nanga Jemah	Boyan Tanjung	☐	
Penepian Raya	Jongkong	☐	
Nanga Lauk	Embaloh Hilir	☐	
Piasak	Selimbau		☐
Jongkong Hilir	Jongkong		☐
Buak Limbang	Pengkadan		☐
Nanga Yen	Hulu Gurung		☐

Source: BAPPEDA (2013)

Based Forest System (Konsorsium pendukung Sitem Hutan Kerakyatan, KpSHK) also campaign for "[the] recognition of the existence of indigenous peoples and the rights over their customary lands" (KpSHK 2014).

Another form of local land tenure takes the form of village forest (*hutan desa*) (Table 4.4). Village forest is technically still owned by the State, but gifted to communities for sustainable use, such as the collection of forest products including eaglewood (*gaharu*) rattan and honey. Occasionally *hutan desa* can be used for small-scale plantations and agroforestry systems for gaharu and rubber. There are currently eight legally recognized *hutan desas* in Kapuas Hulu and a further four that are unofficially recognized or pending legal recognition.

4.5.6 Economic context

Agriculture is the largest sector of the economy in Kapuas Hulu accounting for 32% of regional GDP and 72% of employment (see Figure 4.7). The agricultural sector includes food crops (12.15%), forestry (6.32%), fisheries (5.41%), plantations (4.66%) and livestock (2.69%). Construction is the second biggest contributor to gross regional domestic product (24.42%) reflecting the steady flow of domestic and international investment in the region, though the sector employs comparatively few people (4.71%).

The agricultural sector has remained relatively stable over time in Kapuas Hulu while extractive industries, especially timber, have fluctuated. Many people in Kapuas Hulu have more than one occupation and/or switch professions regularly depending on available economic opportunities (Table 4.5).

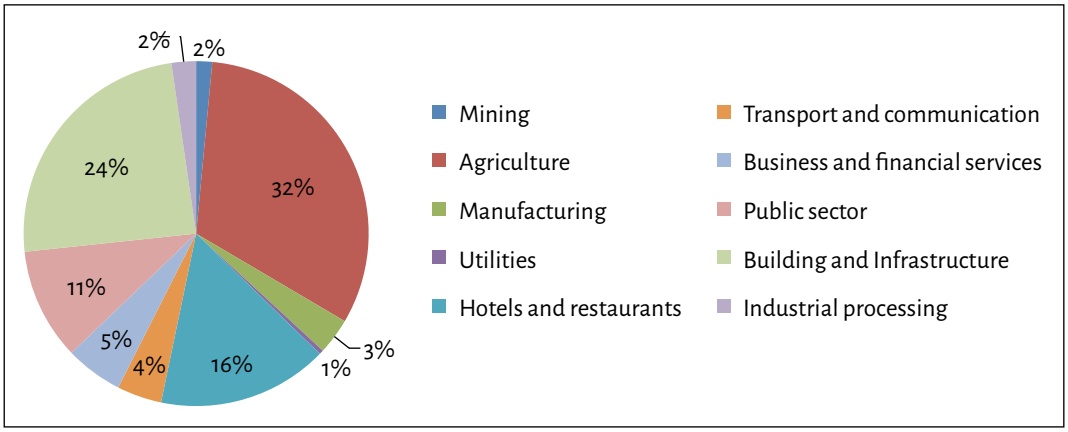


Figure 4.7 Contribution to regional GDP of economic sectors.

Source: BAPPEDA (2013)

Table 4.5 Percentage of population by occupation.

Economic sector	Male (%)	Female (%)	Total (%)
Agriculture	65.03	87.72	72.03
Mining	9.57	1.73	6.47
Processing industry	3.13	1.22	2.38
Electricity, gas and water	0.13	0.00	0.08
Construction	7.80	0.00	4.71
Trade, restaurants and hotels	5.27	9.13	6.80
Transportation and communication	1.31	0.000	0.79
Financial institutions and other services	3.16	2.63	2.95
Other services	4.59	2.57	3.79

4.6 Land use and land-use change in Kapuas Hulu

4.6.1 Oil palm plantations

Oil palm plantations first appeared in Kapuas Hulu in the year 2000, in the subdistrict of Silat Hilir. This subdistrict borders the neighboring district of Sintang, where large-scale oil palm plantations had been in operation for many years. As a result, operational oil palm concessions are heavily concentrated in the west of the region, though in recent years new concessions have been opened and developed around

the district capital of Putussibau and toward the north of the region in the "biodiversity corridor" (see Figure 4.8) between the two national parks (Shantiko et al. 2013). Indonesia's Ministry of Industry has established national production targets of 50 million tons of crude palm oil a year by 2020 (KOMPAS 2009; BPS 2010; Yuliani et al. 2014). In response, local and regional government are predicted to grant 20 million ha of new plantation concessions by 2020 (Clerc 2011). In Kapuas Hulu, the regional land-use planning process (Rencana Tata Ruang Wilayah, RTRWK) has allocated an additional 19% of land to 'alternative land use,' a change in land classification necessary for the development of new plantations (Shantiko et al. 2013). The extent of oil palm is shown in Figure 4.9.

Two conglomerates dominate oil palm in the region: SMART Group and First Borneo International. SMART (Sinar Mas Agro Resources Technology), is the palm oil subsidiary of the Sinar Mas consortium, one of the largest conglomerates in Indonesia, which also includes Asian Pulp and Paper, one of the largest timber and pulp companies in the world, with operations extending as far as China. In Kapuas Hulu, SMART manages 159,500 ha of palm oil plantations, split over nine subsidiary companies (Table 4.6).

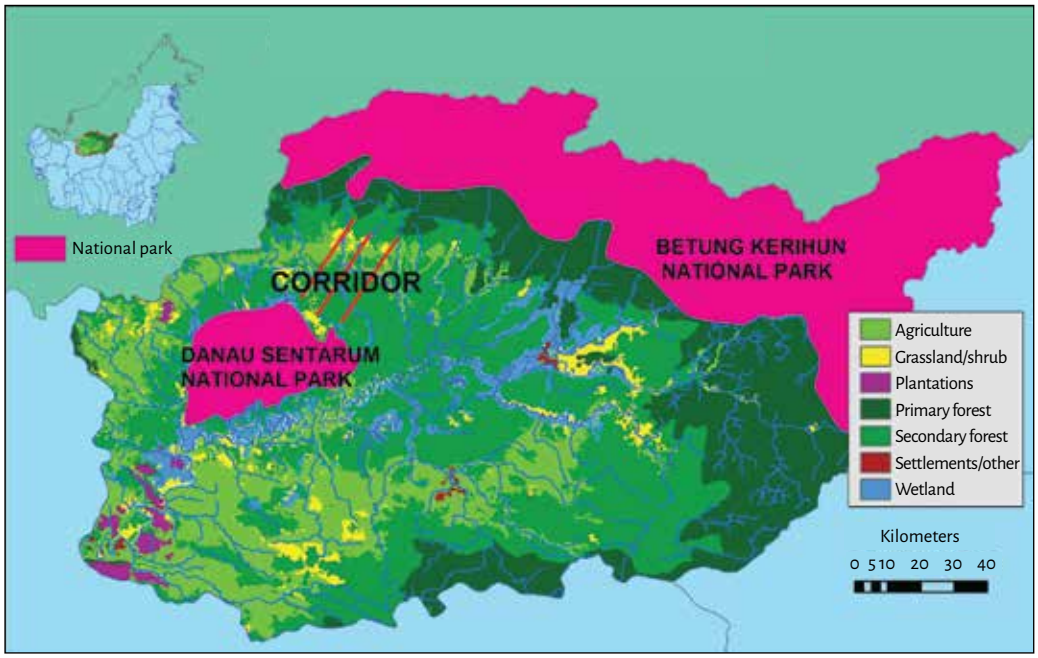


Figure 4.8 Proposed biodiversity corridor in Kapuas Hulu.

Source: Map created using data from WRI (2013), with additional information from WWF (personal communication, 2015)

Table 4.6 Palm oil companies in Kapuas Hulu.

Company	Group	Area (ha)
PT. Borneo Estate Sejahtera[a]	First Borneo International	14,219
PT. Bumi Tani Jaya[a]	Metro	20,783
PT. Berkah Sawit Abadi[a]	FBI 2006	12,778
PT. Kapuas Bio Agro[a]	First Borneo International	17,386
PT. Primanusa Mitra Serasi[a]	SMART 2006	19,933
PT. Rimba Utara[a]	Takeover 2005	26,514
Kud. Mitra Kenepai Kurnia[a]	–	9,060
PT. Tanjung Berkah Mulia[a]	–	17,825
PT. Tanjung Berkah Mulya[a]	–	17,784
PT. Mitra Kapuas Agro	FBI 2006	7,229
PT. Mitra Kapuas Hulu	First Borneo International	22,846
PT. Karita Prima Cipta	SMART 2008	20,182
PT. Khatulistiwa Agro Abadi	First Borneo International	16,873
PT. Buana Tunas Sejahtera	SMART 2006	15,844
PT. Sentrakarya Manunggal	SMART 2007	19,970
PT. Sawit Kapuas Kencana	Metro 2007	17,227
PT. Kapuas Indo Palm Industri	SMART 2006	19,068
PT. Duta Nusa Lestari	SMART 2006	16,480
PT. Anugrah Makmur Sejati	SMART 2006	21,912
PT. Paramita Internusa Pratama	SMART 2006	19,973
PT. Persada Graha Mandiri	SMART2006	18,762
PT. Riau Agrotama Plantation	Salim 2008	9,682
PT. Borneo International Anugerah	FBI 2006	8,681
PT. Borneo International Anugerah	FBI	12,089
PT. Wahana Hamparan Hijau	FBI 2006	2,740
PT. Wahana Hamparan Hijau	FBI	16,979
PT. HPHM	–	4,995
PT. Dinamika Multi Prakasa	–	–
Total		**426,821**

a Yet to begin land clearing.
Source: BAPPEDA (2013)

Table 4.7 Area of community-owned oil palm, 2009–12.

Year	Yet to produce (ha)	Productive (ha)	Total area (ha)
2009	7,483	8,376	15,859
2010	26,844	8,376	35,220
2011	26,844	8,376	35,220
2012	37.616	8,876	46,592

Source: BPS (2014)

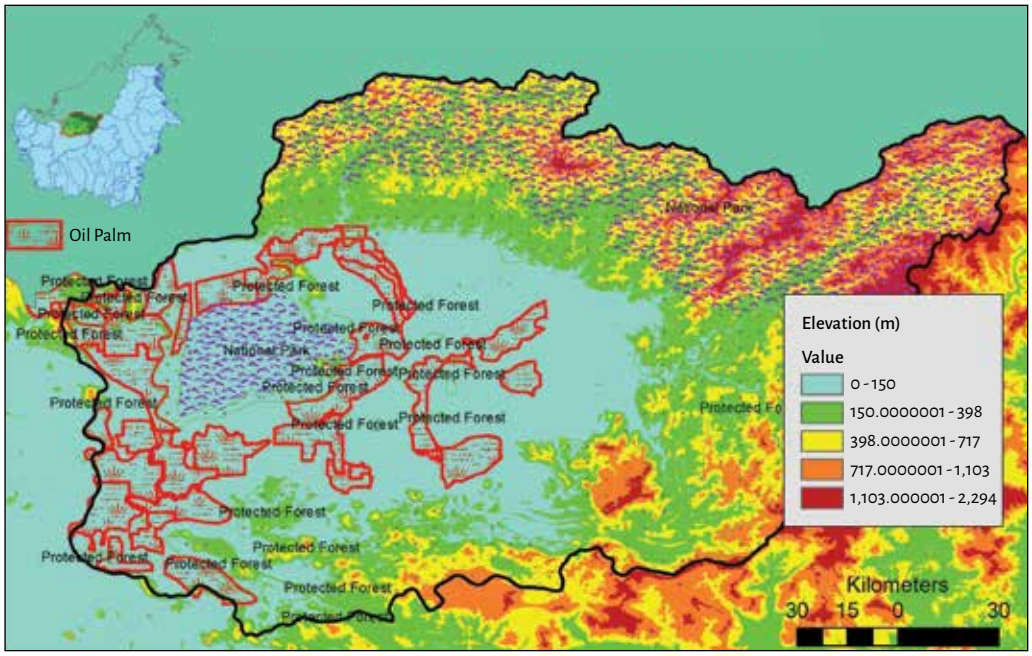


Figure 4.9 Oil palm plantations in Kapuas Hulu.

Note: NP = national park; PF = protected forest.
Source: Created using data from from WRI (2013)

The SMART group has received extensive criticism from environmental groups, most notably from Greenpeace, who have accused the company of clearing large areas of deep peat forests and of operating without appropriate permits and environmental impact assessments (Greenpeace 2010). Following criticism of Sinar Mas's practices, several buyers of palm oil, including Unilever, suspended or stopped the purchase of Sinar Mas oil palm (Unilever 2009).

In addition to corporate plantations, several communities have private or cooperative ventures (Table 4.7). Such community plantations are relatively recent with fewer than 20% of plantations in the production stage.

4.6.2 Mining

Kapuas Hulu has considerable deposits of gold, coal, antimony, bauxite, mercury, lead and copper. To date, these mineral deposits have been relatively underexploited though a variety of companies are currently conducting exploration. Of the 69 mining companies operating in the region, 60 are in the exploration phase with only 9 companies involved in active extraction of minerals (see Table 4.8).

Table 4.8 Mining operations in Kapuas Hulu.

Commodities	Number of Companies	Area (ha)
Coal	39	301,272
Gold	18	193.439
Antimony	7	22,095
Bauxite	1	4,466
Copper	1	1,978
Mercury	1	1,000
Laterite ferro manganese	1	4,970
Lead	1	516

Source: Personal communication with Dinas Pertambangan dan Energi (2012)

Local mining operation on the upper Kapuas Hulu. (Dominic Rowland/CIFOR)

Traditional gold-panning has been conducted by many communities for centuries. Since 1984, some communities have had recognized legal mining operations. The vast majority of local mining activities are illegal but generally ignored by law enforcement. Today gold-panning has been largely replaced with mechanized mining consisting of rafts fitted with diesel powered pumps driving suction tubes, occasionally directed by a diver breathing surface air through a tube. Riverbed sediment is then cascaded over a series of surfaces on a manual conveyer belt to separate gold from other stones. Such work is extremely risky, both financially, due to high overheads, and in terms of safety. Accidents and even deaths are far from uncommon. The use of mercury as an amalgam to separate the gold from rocks is common in small-scale mining operations, especially in the more remote northern regions of Kapuas Hulu (Adijaya and Yamashita 2004). Mercury pollution in the Kapuas River is so high that fish are deemed to be unsafe for human consumption and even the municipal water supply in both Putusibau and Pontianak is affected (Lusiana et al. 2008). Mercury levels in human hair and nails are high across the region, highest in people living near mines, followed by miners themselves and consumers of municipal water supplies (Bider 2003).

4.6.3 Timber

Commercial timber harvesting has been carried out in Kapuas Hulu since the 1970s, growing rapidly in scale until the early 2000s. During the Soeharto era, logging concessions were run by or had close links to the military. Some companies were directly run by the military, while other owners of logging licenses were either former or current military personnel (Eilenberg 2009, 2012). These large-scale operations, conducted by companies such as PT Yamaker, often resulted in conflicts between local communities and companies. Community grievances included companies employing Javanese migrants rather than local people and ignoring traditional and customary claims to the land (Eilenberg 2009, 2012; Wadley et al. 2010). Community resistance against companies occasionally took the form of direct action, including the setting up of road blocks (van Klinken 2008; Eilenberg 2009, 2012). In Kapuas Hulu, with its border to Malaysia, domination by companies owned by or with close links to the military was also seen to have a national security motivation, or at least a national security justification. During this period concessions stretched across almost the entire border, effectively establishing military control of the border (Eilenberg 2009). It is widely accepted that the military were heavily involved in the smuggling of illegal timber across the border (Eilenberg 2012).

The collapse of the Soeharto New Order in 1998, and the economic crisis that precipitated it, led to significant changes in logging ownership and practices in the region. A process of decentralization (*decentralisasi*) gave back power, at least in theory, to local and regional authorities (Fox et al. 2005). Permits for companies with close links to the dictatorship were terminated (Eilenberg 2009). Whereas before the entire forest estate of Indonesia was under direct control of the Ministry of Forestry, a series of new laws and decrees lead to confusion and conflict over which section of government exerted authority over the land (McCarthy 2004; Fox et al. 2005). As a result, a power vacuum developed that was filled by illegal logging companies and entrepreneurs from Malaysia. The confusion over the legal status of forests, combined with the new requirement for provinces and districts to raise their own revenue and a great deal of corruption led to

officially sanctioned yet illegal operations exporting to Malaysia via newly developed cross-border roads (Obidzinski et al. 2007). In 2004, it was estimated that 1000 m^3 of timber were exported across the border to the Malaysian state of Sarawak every day (Pontianak Post 2004), and at one point it was estimated 80% of timber in Sarawak came from West Kalimantan (Eilenberg 2009, 2012). Illegal logging has recently declined as a result of government enforcement. Local-scale illegal logging still occurs yet is very small in scale relative to the large commercial operations of the post-Soeharto era.

4.6.4 Rubber

The province of West Kalimantan contains more commercial rubber trees than any other province in Indonesia, due predominantly to historical reasons (Peluso 2009). Some form of rubber has been collected and traded across Kalimantan for centuries, traditionally native wild rubber would be tapped and traded with Chinese merchants in exchange for goods such as metal tools, sugar, salt and tobacco not readily available in the region (Heidhues 2003). Smallholder rubber plantations, using exotic rubber species, became the norm during the British and Dutch colonial eras and continue to dominate the production to this day (Dove 1993; Peluso 2009).

Rubber still forms an important source of income for many people in rural Kapuas Hulu, though since the 1970s the tapping of wild rubber trees has largely been superseded by smallholder plantations and agroforestry systems. Unlike many other regions of Kalimantan, there are no company-owned rubber plantations in Kapuas Hulu. The popularity of rubber as a smallholder concern stems, in part, from its flexibility. Rubber tapping requires relatively little time investment and periods of non-tapping do not compromise yields. As a result, rubber can function as a safety-net when cash income is low and can be switched to when prices of other commodities fall (Belcher et al. 2004). In the past few years, the price of rubber has fallen considerably from IDR 10,000 (USD 0.74)[1] to IDR 4000–5000 (USD 0.29–0.37) per kg. As a result, many rubber farmers and smallholders have switched to waged labor on palm oil plantations, or less commonly to smallholder palm oil plantations.

4.6.5 Fishing

Fishing is common across Kapuas Hulu, both as a means of subsistence and as a source of income. Commercial aquaculture is predominantly found around freshwater lakes such as Danau Sentarum. Cultivation of fish for consumption, commonly focuses on the following species: *jelawat* (*Leptobarbus hoeveni*), goldfish (*Cyprinus* sp.), *betutu* (*Oxyeleotris marmorata*), *toman* (*Channa micropeltes*), *belida* (*Notopetrus borneensis*), *nila* (*Oreochromis niloticus*), *gourami* (*Osphronemus goramy*), *lele* (*Clarias* sp.), *bawal* (*Colossoma* sp.), *patin* (*Pangasius* sp.) and *semah* (*Tor* sp.). Prices for desirable species such as *semah* can reach up to IDR 300,000 (USD 22) per kg locally and retails in Malaysia for up to IDR 800,000 (USD 59). In addition to edible species, the cultivation of ornamental species is gaining increasing popularity with communities in Kapuas Hulu. Ornamental species such as arowana (*Scleropages formosus*) can sell for IDR 2,000,000–3,000,000 (USD 147–221) and broodstock individuals can sell for up to IDR 15,000,000 (USD 1103).

1 USD 1 = IDR 13,600 as at 10 November 2015. This conversion rate is used throughout the text.

4.6.6 Non-timber forest products

The collection of NTFPs is widespread in Kapuas Hulu, although it is a main livelihood strategy only in heavily forested regions in the north and northwest of the region. *Gaharu*, a resin caused by natural infection of eaglewood species (*Aquilara* spp.) is one of the highest value NFTPs in the world with high-grade resins reaching prices of over USD 10 per gram. High-grade *gaharu* is used to make incense, while medium and low grades are used for perfumes and cosmetics (Soehartono and Newton 2000). Throughout Indonesia, it is not unusual for high-grade *gaharu* to fetch prices of USD 500 per kg and USD 60–80 per kg for medium-grade resins (Paoli et al. 2001). In the 1990s, a *gaharu* boom led to massive overexploitation of *gaharu*, resulting in rapidly declining population numbers. As a result, it was placed on the Convention on International Trade of Endangered Species (CITES) Appendix II in 1995, effectively prohibiting international trade (Lim and Noorainie 2010). Despite the ban on trade, demand is still extremely high (Soehartono and Newton 2000) and *gaharu* is still a major source of income for large proportions of forest-based people across Indonesia (Paoli et al. 2001; Wollenberg 2001).

In addition to *gaharu*, edible swiftlet nests are a major source of income for NTFP collectors in Kapuas Hulu. Swiftlet nests, sometimes called 'the caviar of the East' (Marcone 2005), are highly valuable with prices reaching up to USD 2500 per kg for end consumers (*Investvine* 2014). Demand for swiftlet nests is particularly high in China where they are widely believed to have medicinal and aphrodisiac properties (Thorburn 2014). Wild harvesting of swiftlet nests usually occurs in caves in mountainous forested regions, though commercial harvesting with artificial towers is growing in popularity in villages near forests across Kalimantan. In Kapuas Hulu, our informants reported prices of approximately IDR 2,000,000 (USD 147) per kg, a lower price than reported elsewhere in Kalimantan where prices can reach as high as IDR 15,000,000–35,000,000 (USD 1103–2574). Other NFTPs collected in Kapuas Hulu include wild honey, which sells for IDR 120,000–200,000 (USD 8.8–14.6) per kg, as well as rattan and bamboo used to make handicrafts and furniture.

Gaharu from Kalimantan. (Andrea Hoeing/BRINCC)

4.7 Descriptions of zones

We selected three zones as pilot sites to represent landscapes at different stages of agrarian change in Kapuas Hulu Regency (Figure 4.10). Zone 1 consists primarily of natural forest, Zone 2 of mixed agroforestry and Zone 3 of monoculture oil palm plantations.

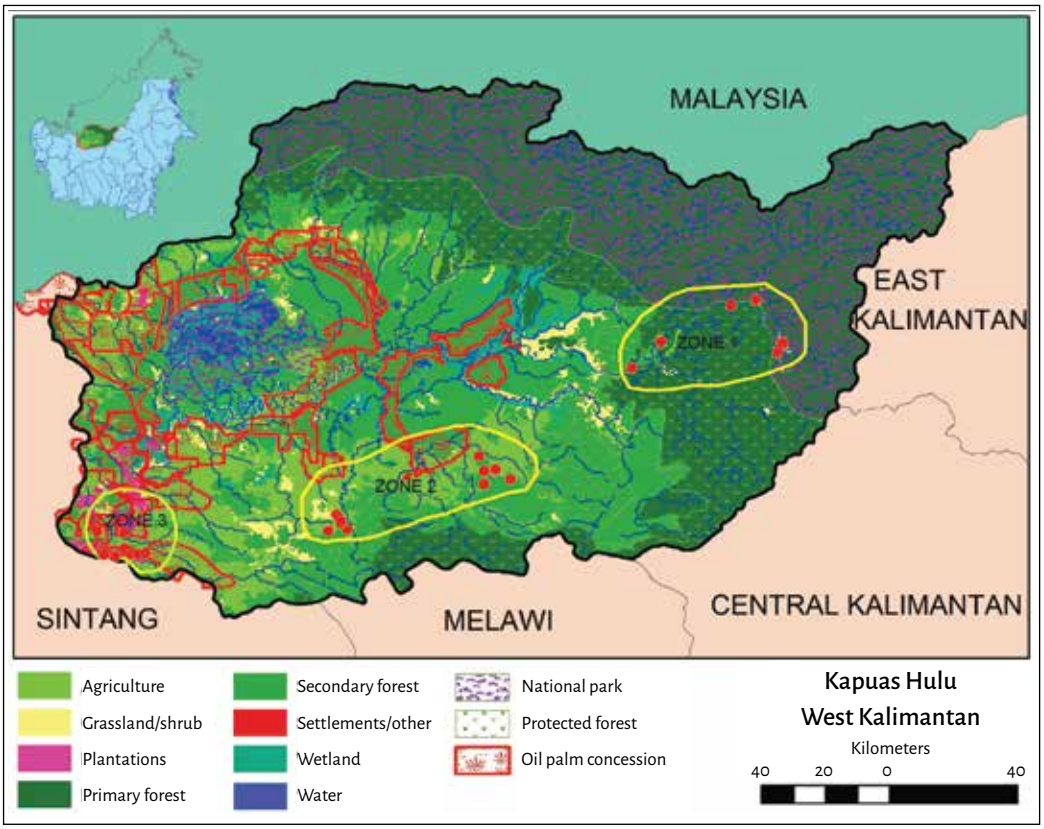


Figure 4.10 Location of study zones.

Source: Created using data from WRI (2013)

4.7.1 Zone 1

Zone 1 is geographically located in the upstream part of the Kapuas River within the boundary of BKNP. The region is accessible only by boat via a series of rapids, impassable during periods of heavy rain and periods of drought. The forest in the region primarily consists of montane and sub-montane dipterocarp forest. We selected three villages as pilot sites: Beringin Jaya, Bungan Jaya and Tanjung Lokang (see Figure 4.11).

Beringin Jaya and Bungan Jaya villages are located on the banks of the Kapuas River, while Tanjung Lokang village is located on the banks of Bungan River. Bungan Jaya and Tanjung Lokang share a boundary with BKNP, while Beringin Jaya is located in the BKNP buffer zone. Each village is separated into two or three hamlets (*dusuns*) usually a

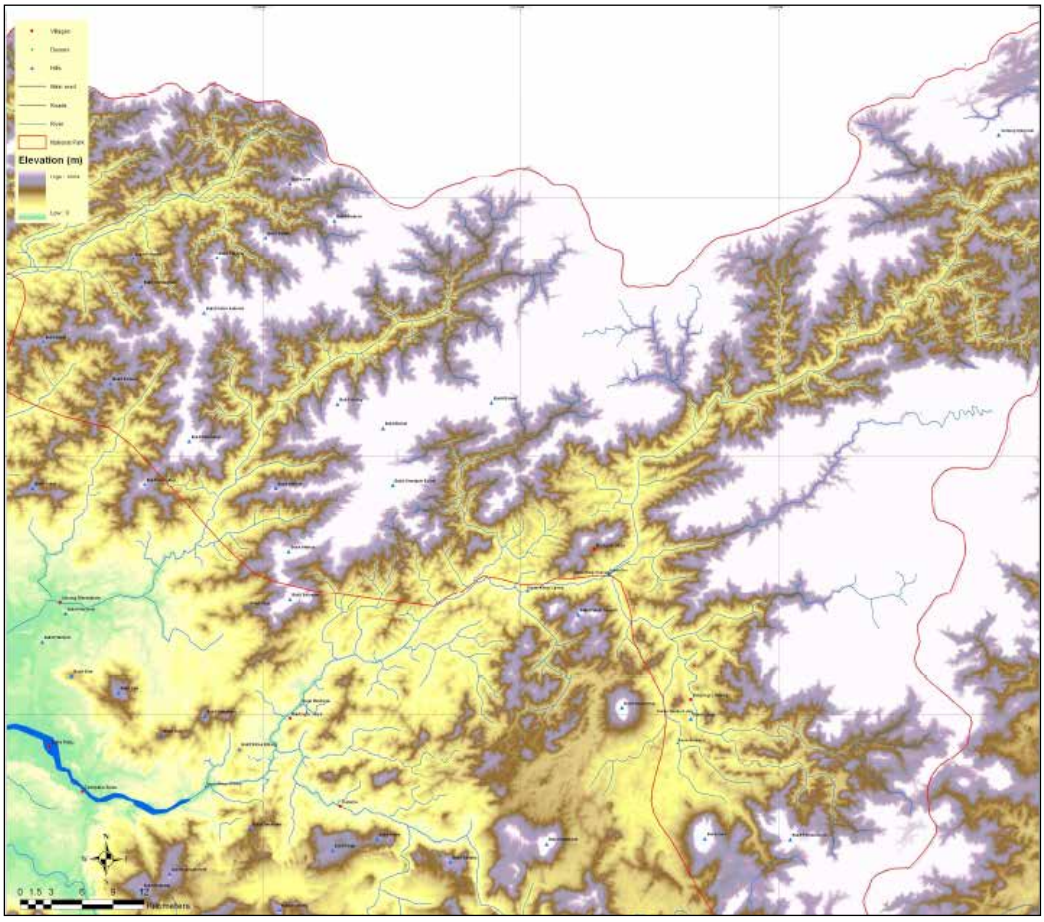
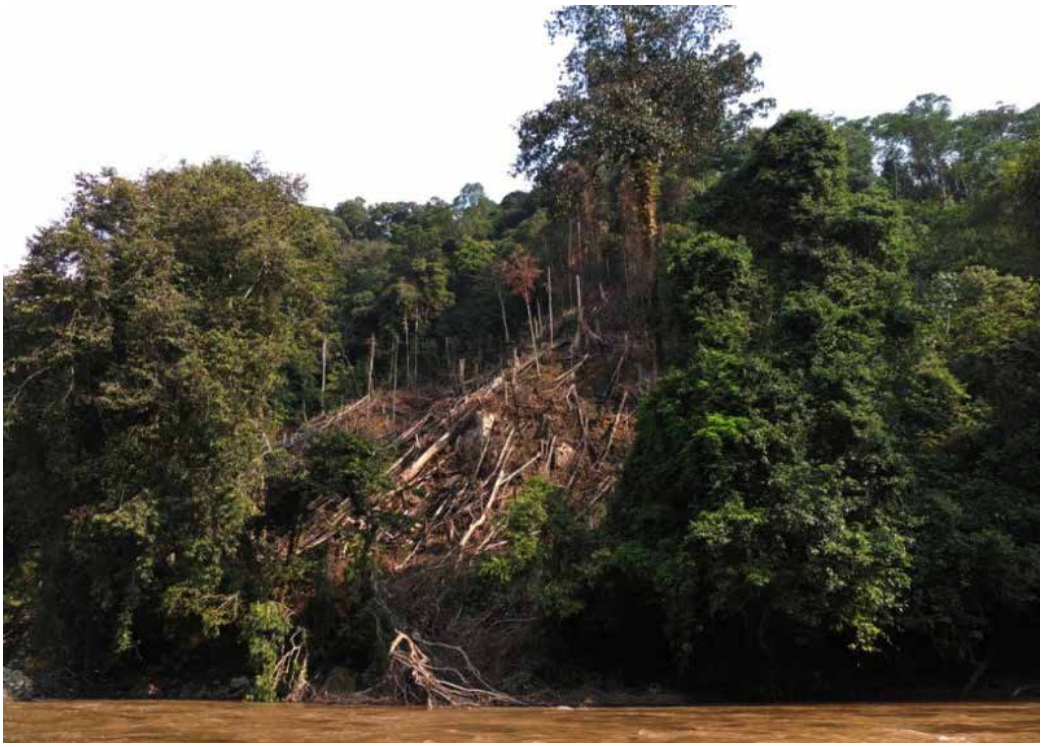


Figure 4.11 Map of Zone 1 settlements.

few kilometers away from one another by boat or forest trail. Communities in the region consist of two sub-ethnic groups namely the Bukat in Beringin Jaya and the Punan in Bungan Jaya and Tanjung Lokang. Traditionally, both ethnicities adopted a nomadic lifestyle, but became sedentary following the influence of the Christian missionaries in the 18th century. Their nomadic heritage means that unlike other sub-ethnic groups in the region such as the Iban, they do not practice the traditional long-house culture widely found in the region.

Livelihoods in Zone 1 consist primarily of subsistence agriculture, fishing and bushmeat hunting, supplemented by income from gold mining, *gaharu* seeking and the sale of swiftlet nests. Shifting cultivation (often called swidden in Southeast Asia) operates on a 3–4 plot (*ladang*) rotation with one plot per year actively planted and harvested although wild and semi-cultivated plants are harvested from fallow plots. Slash and burn activities are timed to coincide with the end of the wet season and start of the dry season, and crops mainly consist of upland rice cultivars and green leafy vegetables. Typically *ladangs* are located less than 50 m from the side of a river and cover an area of 1–2 ha. It is common for *ladangs* located far from the home village to have basic shelters/houses used during times of planting or harvest.

Bungun Jaya Village. (Laurio Leonald/CIFOR)



Ladang (shifting agriculture plot) near the village of Tanjung Lokang. (Laurio Leonald/CIFOR)

Mining activities, traditionally carried out by panning, are now mechanized with the use of generator–powered pumps atop rafts that dredge river bed sediment and cascade them over carpet to separate gold from silt and stones. Timber harvesting, a significant source of income in the 1990s, is no longer present in the region with the exception of logging for construction of houses, boats and other uses within the villages. See Table 4.9 for a summary.

Table 4.9 Summary of Zone 1 settlements.

Village	Beringin Jaya	Bungan Jaya	Tanjung Lokang
Hamlets	Nanga Balang, Mata Lunai	Nanga Bungan, Aso, Lapung	Tesoing Loing, Buung, Belatung
Area	760 km²	1,984 km²	795 km²
Sub ethnicities	Bayak Buket, Dayak Punan	Dayak Punan	Dayak Punan
Population size	520 (133 households)	677 (198 households)	400 (170 households)
Accessibility from Putussibau	4–6 hours by speedboat	5–8 hours by speedboat	9–13 hours by speedboat
Settlement pattern	Side of river	Side of river	Side of river
Educational facilities	Elementary school, junior high school	Elementary school	Elementary school
Health facilities	Village clinic	Village clinic	Village clinic
Religious buildings	Protestant church, Catholic church	Catholic church	Catholic church
Electricity supply	Generator (micro hydro being built at time of writing)	Micro hydro electricity (Nanga Bungan and Aso), generator (Lapung)	Micro hydro/ generator
Farming seasons	April–May (slash and burn), July–September (planting), January–February (harvesting)	April–May (slash and burn), July–September (planting), January–February (harvesting)	April–-May (slash and burn), July–September (Planting), January–February (harvesting)
Livelihoods	Main sources of income: gold mining, *gaharu* (eaglewood), swiftlet nest, rubber (newly planted at time of writing) Subsistence: swidden agriculture, fishing, hunting, NTFPs	Main sources of income: gold mining, *gaharu* (eaglewood), swiftlet nest Subsistence: swidden agriculture, fishing, hunting, NTFPs	Main sources of income: gold mining, gaharu (eaglewood), swiftlet nest Subsistence: swidden agriculture, fishing, hunting, NTFPs

4.7.2 Zone 2

Zone 2 is situated in the southern part of Kapuas Hulu (see Figure 4.12). We conducted interviews in eight villages identified as potential Zone 2 sites: Tangai Jaya, Suka Maju, Kepala Gurung, Tanjung, Nanga Betung, Sri Wangi, Nanga Jemah and Nanga Yen. The ethnic composition of the zone consists of two local sub ethnicities, Dayak Suruk/Su'yuk and Malay, though some villages contain significant populations of Javanese migrants. The communities are accessible by motorcycle or car, approximately 2–3 hours from Putussibau. Built in 1990, one main paved road transects the southern region of Kapuas Hulu, though villages generally connect to this road via dirt or gravel roads or tracks that are dangerous or impassible during or after periods of heavy rain.

Land use in the region is highly variable with communities practicing shifting cultivation or permanent rice paddies. Where shifting cultivation is used, plots are used for approximately 1–2 years, returning to the initial plot after a cycle of 5 years. Rice paddies have been used in the region since the 1990s as a reaction to concerns over

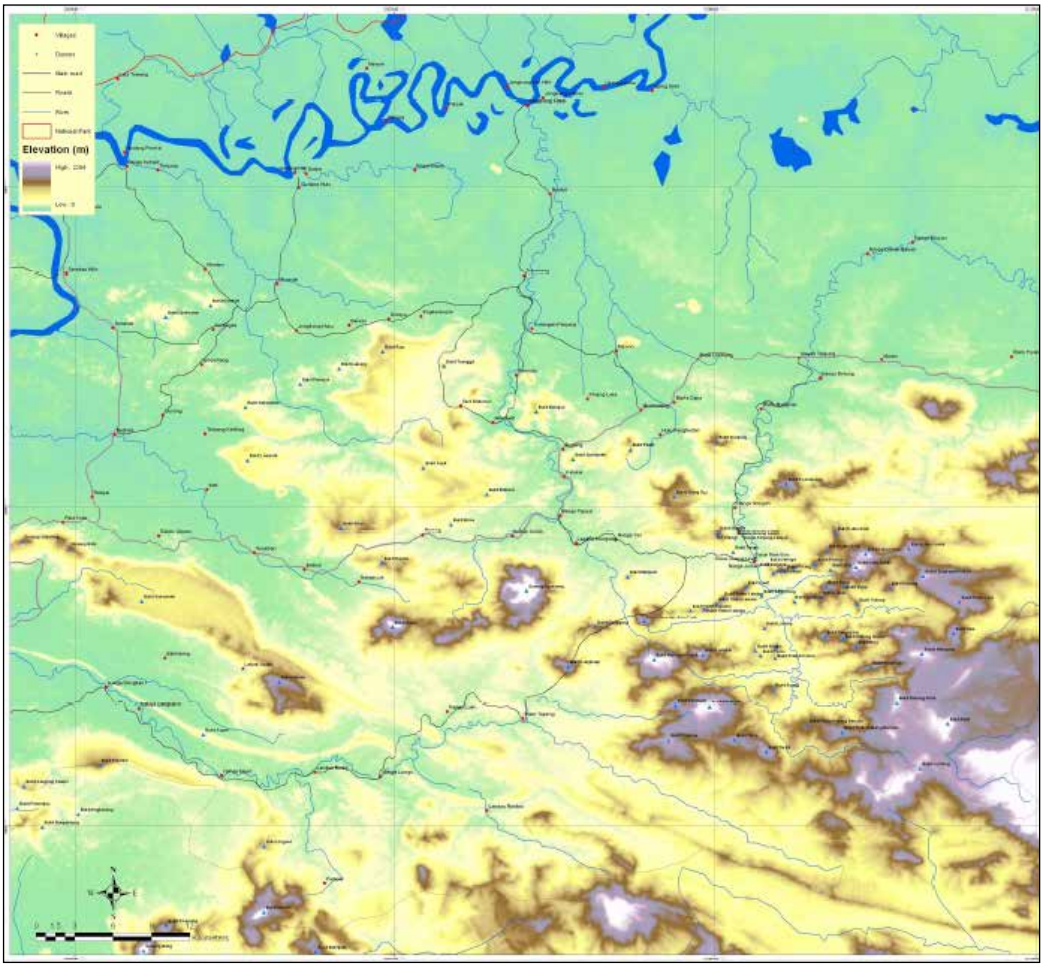


Figure 4.12 Map of Zone 2 settlements.

food security. Food from agriculture is mainly used for subsistence and only sold on rare occasions of surplus. Bushmeat hunting and fishing, common 3–5 years ago, is in decline as forest cover and fish stocks decline. Rubber cultivation is the primary source of income generation for these communities, planted on old swidden plots (shifting cultivation), in mixed agroforestry gardens or in rare cases, through deliberate forest clearing. The average size of a rubber garden is between 1 and 3 ha. Where agroforestry is used to grow rubber, it is usually intercropped with mango trees, Borneo tallow nut trees and *gaharu*. Though rubber has been widely cultivated in the region since the 1970s, improved infrastructure in the 1990s significantly improved access to markets resulting in a notable increase in the number of households practicing rubber farming. Prior to rubber becoming the main source of household income for the majority of households, many communities also practiced traditional gold mining and *gaharu* seeking, but the declining availability of these resources in the past 3–5 years has resulted in most households transitioning to rubber farming as a source of cash income. Collection of NTFPs such as rattan, honey, fruits and medicinal plants is widely carried out and primarily used for subsistence; trade in NTFPs is rare.

Some villages in Zone 2 have legalized access to community forest (*hutan desa*), aided by community mapping carried out by FFI. The villages of Tanjung, Nanga Betung, Sri Wangi, Nanga Jemah have legally recognized *hutan desa*, while the village of Nanga Yen has unofficial recognition pending official approval. The latter community forest overlaps with a concession issued for a mining company for the exploration of antimony. See Table 4.10 for a summary.

Dryland rice and vegetable farming in Zone 2. (Laurio Leonald/CIFOR)

Small rubber garden in Zone 2. (Laurio Leonald/CIFOR)

Typical access road to Zone 2 settlements. (Dominic Rowland/CIFOR)

Table 4.10 Summary of Zone 2 settlements.

Village	Tangai Jaya	Suka Maju	Kepala Gurung	Tanjung	Nanga Betung	Sri Wangi	Nanga Jemah	Nanga Yen
Area	64 km²	88 km²	152 km²	201 km²	12,763 km²	7,683 km²	7,432 km²	3,046 km²
Hamlets	Padang Jaya, Tekuyung	Sungai Jambu, Hilir Gurung, Jelemu (transmigrant), Akung Jaya (transmigrant)	Lubuk Tapang, Landau Ijuk, Kepala Gurung, Pengkadan (transmigrant)	Roban, Gurung Langkang, Biang II	–	Noyan Tanjung, Suka Ramai, Tintin Kemantan	–	–
Sub-ethnicities	Dayak Suruk, Malay	Dayak Suruk, Malay, Javanese, Sudanese	Dayak Suruk, Malay, Javanese, Sudanese	Kayak Suruk	Malay	Malay	Malay	Malay
Population size	861 (217 households)	1,625 (460 households)	1,477 (370 households)	1,004 (251 households)	864 (217 households)	545 (145 households)	1,073 (3228 households)	1,110 (372 households)
Languages	Malay, Suruk	Malay, Suruk	Malay, Suruk	Malay, Suruk	Malay, Suruk	Malay, Suruk	Malay, Suruk	Malay, Suruk
Accessibility from Putussibau	2 hours by car or motorcycle, between hamlets approx. 30 mins walk	2 hours by car or motorcycle, between hamlets approx. 30 mins walk	3 hours by car or motorcycle, between hamlets approx. 30 mins walk	3 hours by car or motorcycle, between hamlets approx. 30 mins walk	2 hours by car or motorcycle, between hamlets approx. 30 mins walk	2 hours by car or motorcycle, between hamlets approx. 30 mins walk	3 hours by car or motorcycle, between hamlets approx. 30 mins walk	3 hours by car or motorcycle, between hamlets approx. 30 mins walk
Settlement pattern	Side of road	Side of road	Side of road	Side of road	Side of road	Side of road	Side of road	Side of road
Electricity	State electricity company (Perusahaan Listrik Negara,PLN)	State electricity company (Perusahaan Listrik Negara, PLN)/generator	State electricity company (Perusahaan Listrik Negara, PLN)	State electricity company (Perusahaan Listrik Negara, PLN)	State electricity company (Perusahaan Listrik Negara, PLN)	*Lisdes* (village generator)	*Lisdes* (village generator)	State electricity company (Perusahaan Listrik Negara, PLN)
Educational facilities	Elementary school	Elementary school	Elementary school	Elementary school	Elementary school	Elementary school	Elementary school	Elementary school

continued on next page

Table 4.10 (continued)

Village	Tangai Jaya	Suka Maju	Kepala Gurung	Tanjung	Nanga Betung	Sri Wangi	Nanga Jemah	Nanga Yen
Health facilities	Village clinic	Village clinic	Village clinic	Village clinic	Village clinic	Village clinic	Village clinic	Village clinic
Religious building	Protestant church, Catholic church, mosque	Protestant church, Catholic church, mosque	Protestant church, Catholic church, mosque	Protestant church, Catholic church	Protestant church, Catholic church, mosque	Protestant church, Catholic church, mosque	Protestant church, Catholic church, mosque	Protestant church, Catholic church
Livelihoods	Income: rubber (major), *gaharu* (minor) Subsistence: agriculture/ swidden, paddy, fishing, hunting, livestock, NTFPs	Income: rubber (major), *gaharu* (minor) Subsistence: agriculture/ swidden, paddy, fishing, hunting, livestock, NTFPs	Income: rubber (major), *gaharu* (minor) Subsistence: agriculture/ swidden, paddy, fishing, hunting, livestock, NTFPs	Income: rubber (major), *gaharu* (minor) Subsistence: agriculture/ swidden, paddy, fishing, hunting, livestock, NTFPs	Income: rubber (major), *gaharu* (minor) Subsistence: paddy, fishing, hunting, NTFPs	Income: rubber (major), *gaharu* (minor) Subsistence: paddy, fishing, NTFPs	Income: rubber (major), *gaharu* (minor) Subsistence: paddy, fishing, hunting, livestock, NTFPs	Income: rubber (major), *gaharu* (minor) Subsistence: paddy, fishing, hunting, livestock, NTFPs
Hutan desa	None	None	None	Leally recognized	Legally recognized	Legally recognized	Legally recognized	Unofficially recognized

4.7.3 Zone 3

Zone 3 is situated in the southwest of Kapuas Hulu in the subdistrict (Kecematan) of Silat Hilir, bordering the district of Sintang (see Figure 4.13). The development of palm oil plantations in Kapuas Hulu spread from neighboring Sintang where commercial plantations have been in operation for many years. We conducted interviews in five villages in the region: Seberu, Nanga Nuar, Miau Merah, Pangeran and Sungai Sena. The region is accessible by car or motorcycle in 5–7 hours from Putussibau, though access to towns in Sintang is only a few hours away.

Ethnic diversity in Zone 3 is much greater than in Zones 1 and 2, partially reflecting higher levels of migration due to the presence of palm oil companies. Among the many local sub ethnicities are Dayak Sekapat, Dayak Ensilat, Dayak Sebaru, Dayak Desa. In addition to Dayak ethnicities, there are substantial populations of Malay, Javanese and Sudanese people, who settled in the region during the transmigration program in the 1980s.

The dominant land-use type in Zone 3 is oil palm, which first appeared in the region in the early 2000s. The vast majority of existing plantations are company owned, though community-owned and local cooperative plantations have recently emerged in almost all villages (though none have yet begun harvesting). Local and community palm oil operations are generally small in scale utilizing old swidden plots and rubber gardens.

Until recently, communities were able to balance their need for land for subsistence agriculture (either through shifting cultivation or paddy) with the demand for land required by palm oil operations. Recently, however, villagers have expressed concern about competing land use between subsistence agriculture and palm oil. Likewise, fishing and

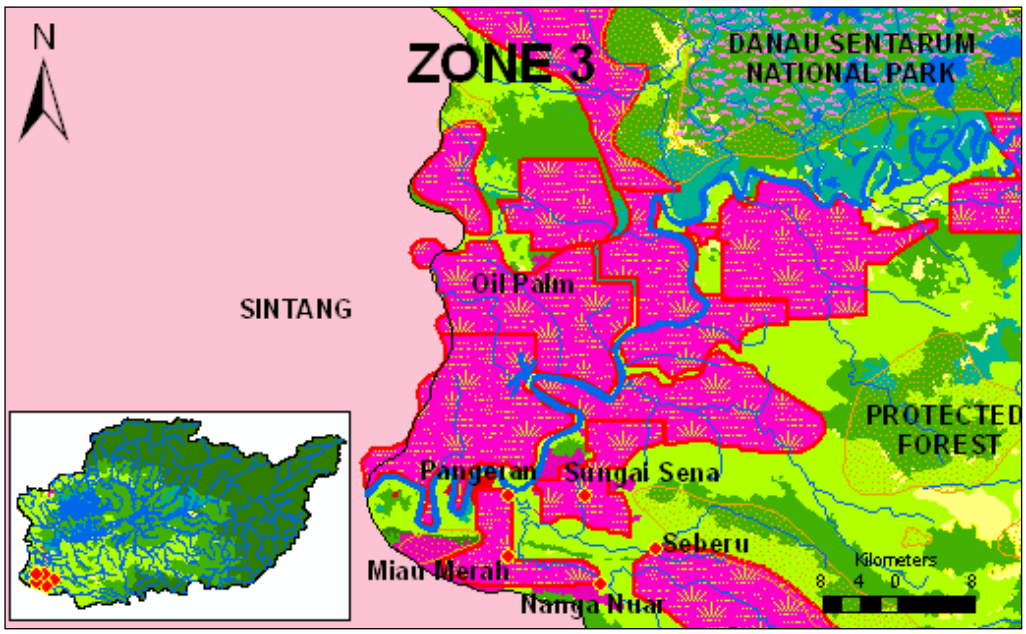


Figure 4.13 Map of Zone 3 settlements and oil palm plantations.

A community-owned palm oil plantation in Miau Merah. (Dominic Rowland/CIFOR)

hunting still take place, but due to the lack of natural forest in the region these are uncommon as a livelihood strategy (except in Pangeran village, where fish is sold to neighboring villages). Local opinions concerning oil palm developments are mixed. Many local people welcome the developments due to the availability of waged labor and improved infrastructure access to markets. However, some interviewees expressed concern over dust and pollution caused by trucks carrying palm oil, as well as the damage caused by large vehicles to the roads. Village officials in Nanga Nuar have also brought the alleged establishment of palm oil plantations on protected forest areas to the attention of legal authorities.

Waged labor on oil palm plantations is by far the largest source of income in Zone 3, where men can earn approximately IDR 60,000 (USD 4.4) per day for manual labor. A small number of local people are employed as managers on plantations, though these jobs usually go to Javanese migrants who generally have higher levels of education. Waged labor on plantations is currently popular due to the low market price for rubber (IDR 4000–5000/kg or USD 0.29–0.37/kg), which means that a day's rubber tapping would earn roughly IDR 40,000 (USD 2.9) per day. A significant proportion of men interviewed stated that they also had access to rubber gardens, but did not tap them unless the price of rubber was higher than they could earn working for palm oil companies. Other sources of cash income available in the region are gold mining and *gaharu* seeking, both of which are increasingly rare due to the scarcity of gold and *gaharu*, which have been overexploited for decades in the region. The use of NTFPs is almost non-existent in the region, though a small number of households harvest the Borneo tallow nut one to four times a year from mixed cropping in rubber gardens. See Table 4.11 for a summary.

Table 4.11 Summary of Zone 3 settlements.

Village	Seberu	Nanga Nuar	Miau Merah	Pamgeran	Sungai Sena
Hamlets	Sekar Jaya, Sungai Mali, Sauk Atas, Sungai Ringin	Engkaras, Bududaya rantau, keduway, Teluk pau	Bersatu, jemeluk, Panca Usaha 1 (transmigrant), Panca Usaha 2 (transmigrant), Sidorejo Simpang Silat (mixed transmigrant and local)	Keluarga, Rejosari (local and transmigrant), Rejosari (local and transmigrant)	Plangi I, Pelangi II, Pelangi III, Setia Usaha, Sungai Ganggai
Area	139 km²	110 km²	105 km²	124 km²	108 km²
Sub-ethnicities	Dayak Seberuang, Malay	Dayak Silat, Malay	Dayak kantuk, Dayak Seberuang	Dayak Seberuang, Malay, Javanese	Dayak Silat, Javanese
Population size	1,560 (431 households)	1,239 (365 households)	2,032 (653 households)	1,368 (402 households)	1,688 (508 households)
Languages	Malay	Malay	Malay	Malay	Malay
Accessibility	5–6 hours by car or motorbike from Putussibau	5–6 hours by car or motorbike from Putussibau	5–6 hours by car or motorbike from Putussibau	6–7 hours by car or motorbike from Putussibau	5–6 hours by car or motorbike from Putussibau
Palm oil workers	50%	70%	–	70%	70%
Settlement patterns	Side of road	Side of road	Side of road	Side of road	Side of road
Educational facilities	Elementary school	Elementary school	Elementary school, junior high school, senior high school	Elementary school	Elementary school, junior high school
Religious buildings	Protestant church, Catholic church, Mosque	Protestant church, Catholic church, Mosque	Protestant church, Catholic church, Mosque	Protestant church, Catholic church, Mosque	Protestant church, Catholic church, Mosque
Electricity	Generator	State electricity company (Perusahaan Listrik Negara, PLN)	State electricity company (Perusahaan Listrik Negara, PLN)	Generator	*Lisdes* (village generator)

continued on next page

Table 4.11 (continued)

Village	Seberu	Nanga Nuar	Miau Merah	Pamgeran	Sungai Sena
Farming Seasons	April–May (slash and burn), June–August (planting), December–January (harvesting)	April–May (slash and burn), June–August (planting), December–January (harvesting)	April–May (slash and burn), June–August (planting), December–January (harvesting)	April–May (slash and burn), June–August (planting), December–January (harvesting)	April–May (slash and burn), June–August (planting), December–January (harvesting)
Livelihoods	Income: rubber (major), oil palm labor (major), *gaharu* (minor), gold (minor) Subsistance: swidden/paddy, fishing, hunting, NTFPs	Income: rubber (major), oil palm labor (major), gaharu (minor), gold (minor) Subsistance: swidden/paddy, fishing, hunting, NTFPs	Income: rubber (major), oil palm labor (major), *gaharu* (minor), gold (minor) Subsistance: swidden/paddy, fishing, hunting, NTFPs	Income: oil palm labor (major), gold (minor) Subsistance: swidden/paddy, fishing, hunting, NTFPs	Income: oil palm labor (major) Subsistance: swidden/paddy, fishing, hunting, NTFPs

4.8 The agrarian change transition

Under typical agrarian change scenarios in Kapuas Hulu Regency, West Kalimantan, smallholders (primarily shifting cultivators) begin to supplement subsistence-based agriculture with some form of agricultural commercialization in particular rubber, nuts and fruits. Agricultural commercialization is driven by improved infrastructure, providing access to markets and government rural development programs such as subsidized seeds. Shifting cultivation is not immediately abandoned, rather some fallow plots are taken out of rotation to become smallholder plantations and new swidden plots are opened in their place. Improved infrastructure, however, makes these regions more attractive to commercial investors and commercialization is often rapidly followed by large-scale agribusiness operations in the form of oil palm estates. During this stage, it is not uncommon for local people to combine waged labor on plantations with other occupations and sources of income, often switching professions depending on relative commodity prices.

Figure 4.14 shows three typical land-use change scenarios present in West Kalimantan. The most common trajectory in Kapuas Hulu involves the conversion of shifting cultivation plots (*ladangs*) into small-scale rubber plantations or mixed agroforestry rubber gardens (*kebuns*) (Scenario 1), after which large-scale commercial oil palm

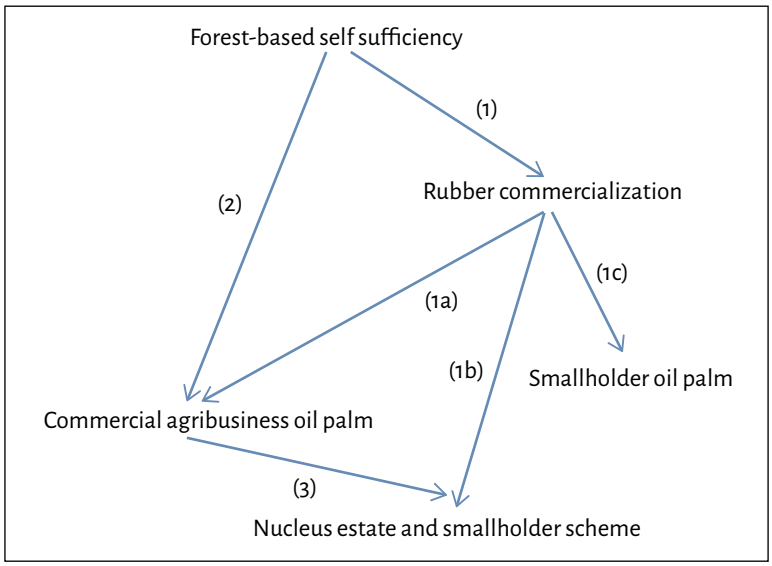


Figure 4.14 Common agrarian transitions in Kapuas Hulu.

Note: Numbers represent various land-use change scenarios. Scenario 1 represents land-use change scenarios where rubber agroforestry is an intermediate stage between smallholder oil palm (1c), nuclear estate and smallholder schemes (1b), and commercial agribusiness (1a). Scenario 2 is direct expansion of oil palm estates into forestlands. Scenario 3 represents the expansion of commercial oil palm into smallholder land through the use of nuclear estate and smallholder schemes.

plantations become established, dominated by large agribusiness (Scenario 1a) either by purchasing or incorporating smallholder land or, more commonly, simply displacing farmers due to the lack of legal land tenure. Occasionally, smallholder rubber plots are converted or supplemented by smallholder or cooperative palm oil plantations (Scenario 1c). This scenario is rare and has only emerged recently due to changes in district legislation concerning tenure and the legal process by which agribusiness can acquire usage rights over forestland. Another relatively recent development is the establishment of nuclear estate and smallholder (NES) schemes. This scenario, promoted by local and regional government involves the trade of land between smallholders and agribusiness. In a typical scenario, a farmer will trade approximately 10 ha of their land (whether legally owned or not) with the company in return for approximately 2 ha of the plantation. The 2 ha of smallholder plantation are then either developed by the company in return for a share of the profits (after costs are deducted) or less commonly are cultivated by the smallholder or a smallholder cooperative. Such schemes are present in Kapuas Hulu when new plantations are established (Scenario 1b, in Figure 4.14) or when a company attempts to expand an existing plantation into land currently used by smallholders (Scenario 3). Due to the rapidity of the expansion of commercial palm oil estates in the region, a great number of communities experience the entire transition from self-sufficiency to waged labor in a period of years without the intermediate stage of rubber at all (Scenario 2). Each of the transitions outlined in the scenario above are likely to have different consequences for the food security and nutrition of local people.

4.8.1 Smallholder commercialization

Transitions 1 and 1b shown in Figure 4.14 reflect the process of smallholder commercialization widely studied in the rural development literature. Despite some controversy, smallholder commercialization, market orientation and cash crop production appears to lower poverty and improve nutrition, provided that such ventures are not subject to market failures. Traditionally, economists have argued that agricultural commercialization and specialization allows households to increase their income by focusing production on crops that provide the highest income (Timmer 1997). Assuming a functioning market, households can then use their comparative advantage to purchase foods using their increased incomes. Other advantages of agricultural commercialization include household level synergies, whereby cash cropping can provide access to resources that can also be used for food crops, such as increased access to credit, fertilizer, animal traction/mechanization, support and training, and improved infrastructure. Agricultural commercialization can also have positive effects for farmers who are not practicing cash crop farming via regional spillover effects increasing access to credit and infrastructure of all farmers in a region regardless of whether or not they are farming cash crops (Govereh and Jayne 2003). There is some opposition to this dominant model both within academia and more broadly in civil society. Within academia, there is a tradition of Marxist critique of the process, based partially in colonial history and cases of forced commercialization (von Braun and Kennedy 1994). Such work, however, is often based upon an idealized view of smallholders as self-sufficient or 'food sovereign'. Such positions are often rooted in historical and ideological reasoning and support for this position suffers from methodological flaws based on "generalizations and extrapolations" (von Braun and Kennedy 1994; Longhurst 1988). Most well-designed studies appear to show that when agricultural commercialization occurs as a result of well-designed interventions, the effects on nutrition are generally positive. In civil society, the issue is intractable from wider campaigns from green lobbies, antiglobalization movements, pro- and anti-technology movements and concerns over the extent of corporate power (Stone 2002). There is a widely held perception among civil society groups that agricultural commercialization directly undermines food security and nutrition by competing with food production for land, labor and other resources (Stone 2002).

Within Kapuas Hulu, rubber commercialization is widespread, but smallholder palm oil is relatively undeveloped. The prevalence of rubber in part stems from low capital costs associated with rubber commercialization and its flexibility as a crop; rubber does not have to be regularly harvested and long periods of not tapping rubber do not affect yields. As a result, many smallholders use rubber as an income safety net. Likewise, rubber gardens often fall outside of the scope of government spatial planning processes meaning that it is not necessary to ensure secure land tenure before planting. In contrast, palm oil requires secure land tenure and high capital costs. Recent co-ventures with commercial agribusiness in the form of the NES scheme have increased the area of palm oil under the control of smallholders and communities but smallholder plantations remain a relatively minor concern. In Kapuas Hulu, smallholder palm or community palm oil occupies around 10% of the total palm oil land, less than 20% of which has reached the production stage (BAPPEDA 2013). Almost no research has been conducted into the food

security and nutrition implications of smallholder rubber and oil palm plantations in Indonesia, though studies on smallholder livelihoods appear to show higher household incomes compared to subsistence farmers (Rist et al. 2010). Because smallholder palm oil plantations not operating under an NES scheme require significant capital and agricultural skill, the benefits are disproportionately allocated to migrant workers and local elites over poorer farmers and indigenous populations (Obidzinski et al. 2012).

4.8.2 Commercial agribusiness

Large-scale estate farms have potential to contribute to food security utilizing economies of scale, providing greater market access, sources of employment, increasing investment in a region and contributing to regional economic growth. Palm oil plantations have contributed greatly to economic growth in West Kalimantan and other regions of Indonesia (Bunyamin 2008; Obidinski et al. 2012). In general, the presence of commercial palm oil appears to raise incomes and lower poverty rates (McCarthy and Cramb 2009; Rist et al. 2010), but broader negative social consequences are widespread (FFP 2006). In certain cases commercial palm oil plantations have been documented to displace populations of swidden agriculturalists, directly threatening food security (Orth 2007), and conflicts between company land rights and customary land rights are common. For example, 630 separate land disputes between communities and companies were recorded in the year 2010 alone (Colchester and Chao 2011). In general, those most likely to suffer negative livelihood consequences are customary landowners, those dependent on the collection of NTFPs and those practicing traditional agriculture (Obidinski et al. 2012). Despite concerns over the impacts of commercial palm oil, and numerous cases of egregious corporate malpractice, the limited evidence that exists from Indonesia suggests that remote forest communities suffer from higher infant mortality rates than those in less remote areas where commercial palm oil operates (Levang et al. 2005). However, there is also limited evidence that the nutritional status of individuals may be higher among more traditional societies (Dounias and Froment 2006). It is clear that improved access to healthcare and higher cash income, along with access to schooling and markets does lower poverty rates and result in better health. Indeed, this is the vision of development that many indigenous people in Indonesia themselves profess to want (Levang et al. 2005). The distribution of these benefits within society, the longevity of their effects and the long-term consequences for food security however, remain to be seen.

Proponents of forest conversion for development would argue that commercial palm oil estates provide a source of waged labor, lead to higher household incomes, improved infrastructure and development, and therefore access to state-provisioned services such as schooling and healthcare. With respect to food security and nutrition it is argued that increases in household income lead to higher purchasing power and thus improved nutritional status. While there are some merits to this argument, the situation is likely to be more complicated.

Firstly, links between increased household income and nutrition are far from clear. Increased household income can have effects upon energy/calorie consumption, though its effects on nutritional status are often weak or insignificant (Kennedy et al. 1992). Within forest-based communities the links between waged labor, income and nutrition

are even more complex. Income from waged labor does not necessarily lead to higher household incomes as forest-dependent people often lose important sources of income from the sale of NTFPs. In addition, economic analyses often fail to take into account the role of environmental income (Angelsen et al. 2014). If for instance a community without forest has a higher income but now needs to purchase firewood, fuel, food, medicinal products, etc. (products that were previously free), their net state of economic security is not necessarily higher. In addition, the effects of income on nutrition are dependent both on market access to nutritious foods (fruits, vegetables, animal source foods) and a preference to use income to purchase these foods. There is almost no empirical evidence from Indonesia that such assertions are true and the relationship between income and nutrition remains controversial.

Secondly regional economic growth, although often associated with improved health and nutrition, does not automatically lead to improved food security. The effects of economic growth on food security have mostly been examined in terms of energy (calorie) consumption and protein consumption, and have been shown to have significant positive effects upon reducing the prevalence of hunger and undernutrition. In terms of the nutritional quality of diets consumed however, economic growth is widely regarded as "necessary but not sufficient" for improving nutritional standards (FAO 2012).

Thirdly, the issue of who benefits from palm oil expansion is central to understanding its effects upon nutrition. Economic simulations based on empirical evidence suggest that average household incomes are in the long term raised under land-use scenarios dominated by palm oil (Sandker et al. 2007), yet there is concern both over the longevity of such effects and which sections of society benefit the most. Plantations in Kalimantan are associated with high levels of migration from Java, and Javanese migrants tend to be favored over local people by companies due to their higher levels of educational attainment. Several authors have suggested that those who really benefit are migrants and local elites, while the local middle class experience modest improvements in health and the local poor experience declines (e.g. Myers et al. 2013). As noted by multiple authors, indigenous populations and the forest dwelling poor in general are often neglected by the services of the state (Coimbra et al. 2004; Stephens et al. 2006; King et al. 2009). Forest-based people, in particular indigenous people, are among those least likely to benefit from regional economic booms (Stephens et al. 2006) and in Indonesia are among the poorest communities with the most limited access to state services (Sunderlin et al. 2007). The long-term effects of rapid investment in these historically remote and isolated regions of Indonesia are still unknown and inter- and intra-community inequality, corruption, nepotism, economic possibilities and livelihood strategies will all play a role in determining the trajectory a household or community ultimately take.

4.8.3 Nuclear estate and smallholder schemes

Existing evidence suggests that the effect of NES schemes raises the average level of household income for smallholder farmers (Rist et al. 2010). However, income is only one dimension of food security and broader livelihood impacts have not been fully investigated (Colchester and Jiwan 2006). Such schemes are also not universally

favored by farmers themselves. Contracts between farmers and companies are often not clear and farmers frequently do not understand or have not even read the contract agreements, in some cases leading to uncertainty over the amount and terms of debt repayment owed by the farmer in return for the plantation (Rist et al. 2010). Lack of secure land tenure, the frequent absence of free and informed prior consent, negative impacts upon ecosystem services for agriculture, and broader cultural and social implications for NES schemes have yet to be sufficiently addressed. In addition, while in some circumstances, palm oil can mitigate the effects of price shocks (Feintrenie et al. 2010), concerns over income dependence on food security that result from such schemes are still widespread (Butler et al. 2009; Syafriel 2009).

4.8.4 Agrarian change in the Agrarian Change Project zones in Kapuas Hulu

The three zones examined in this preliminary study exhibit different stages of agrarian change and each can be considered a stage of an overall transition from forest-based agriculture to permanent monoculture oil palm plantations. In Zone 1, the dominant form of agriculture is forest-based shifting cultivation, supplemented by bushmeat hunting. Although cash income is available though gold mining, *gaharu* seeking, swiftlet nest seeking and the trade of other NTFPs, income is generally not used to purchase food. Food is almost never purchased from outside the village (except for snacks and certain luxuries), as transport to the nearest town or market is too far, too expensive and too difficult.

Zone 2 represents an intermediate stage between forest dependence and dependence on cash income. While households have the option of purchasing food, which is readily available, most households still grow at least their staple foods themselves, either through shifting cultivation or through permanent paddies. The transition toward increased use of permanent agriculture has been driven by several factors, including the high proportion of transmigrants from Java, who have no traditional heritage of shifting cultivation as well as loss of forest area and concerns over food security.

Another factor affecting food security in Zone 2 settlements is the popularity of rubber as a cash crop. Rubber is a versatile and reliable crop that can be used as an income safety net in times of need. As a result, it is common practice (though not universal) to plant rubber in old *ladangs* after harvesting, making them unavailable for subsistence agriculture and out of the rotation cycle. While this utilizes forest that has already been cleared, it leads either to the need to clear more forest for shifting agriculture, or to a dependence on cash income to purchase food. Many households within Zone 2 settlements appear to switch activities between waged labor on plantations and rubber tapping, depending on the market price of rubber and labor.

The number of households practicing subsistence agriculture in Zone 3 is greatly outnumbered by the households conducting waged labor for palm oil. Households engaged in waged labor generally purchase food from nearby villages, though many households will still maintain small home gardens to supplement their diet. Any form of significant agriculture in Zone 3 is rare, with very few households engaged in sufficient levels of farming to meet their food requirements. Food security is therefore very much dependent on the availability of work.

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