top Forest-dweller demographics in West Kalimantan, Indonesia

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Summary

Although the Government of Indonesia has good data on forest cover and population, it does not have data on how many people live on state-claimed forest land. The objective of this study was to assess the extent of this deficiency and to develop a methodology for over coming it, based on field research in the province of West Kalimantan. The project retrieved and combined government data on forests and people, analyzed their significance in terms of numbers of forest-dwelling people, compared these results with government estimates and an empirical field-check, and sought to explain why knowledge of forest dwellers on state-forest lands is problematic. Results suggest that 20 to 30% of the population of West Kalimantan (approximately 650 000 to one million people) live on state-claimed forests. The main reason why it is difficult to determine how many people live on state-claimed forest lands is that a large number of villages remain unmapped and thus it is not possible to unite census data with forest boundaries in a spatially-precise manner. While the Indonesian Ministry of Forestry has not placed a high priority on determining how many people live on state-claimed forests, this study suggests that the lack of information on forest population densities is as much a consequence of the lack of information on village locations as it is a result of political or institutional interests.

Keywords: Indonesia, tropical forests, population, forest-management policy, political ecology of knowledge

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Introduction

Indonesia can be divided into two major areas: 'Inner Indonesia' (Java, Madura and Bali) and 'Outer Indonesia' (Kalimantan, Sumatra, Sulawesi, West Irian, and the remaining Sunda islands). The outer islands account for 38% of the nation's population (in 1990), 93% of its land mass, and 98% of its forests; 72% of the land mass of these islands is designated as state-claimed forest lands (Biro Pusat Statistik 1994). These forests contain biologically-rich ecosystems and encompass more than half of the rainforests remaining in tropical Asia (Food and Agriculture Organization [FAO] 1986). The exploitation of these forests for timber, non-timber forest products, and swidden cultivation makes a major contribution to the Indonesian economy (Dove 1985, 1993). Despite the importance of this forest resource, however, little is known about how many people live in the forest. Because accurate demographic data are vital to the formation and implementation of forest management policies, this project sought to demonstrate a methodology for using census and other data collected by the Government of Indonesia to determine the number of people living on state-claimed forest lands.

It is important to note the distinction between 'state-claimed' forests and 'forested land'. The term 'state-claimed forest' is a tenurial designation referring to land the national government claims for the state and for which the Ministry of Forestry has the authority to manage.

The Indonesian Basic Forestry Law (BFL) states that the term 'state forest' is used to designate all forests that are not private property forests. State-claimed forests thus include forests designated as such, as well as indigenous territories that are under the joint jurisdiction of customary law *(adat)* communities. While the designation of state-claimed forests under the control of customary law communities does not annul the *adat* property rights of the communities, their exercise of *adat* right must not conflict with the objectives spelled out in the BFL and its regulations. Thus within state-claimed forests, community rights are valid to the extent that they do not conflict with the provisions and implementing regulations of the BFL. People living on state-claimed forests that have been deforested are not 'forest dwellers' in the conventional sense, yet they are legally 'forest dwellers' according to the tenurial designation of their land. The term 'forest dweller' as used in this paper refers to anyone who resides on state-claimed forests.

In 1985, the Indonesian Ministry of Forestry estimated that about 1.2 million households of swidden agriculturists (approximately 7.2 million people) were using an area of 9.3 to 11 million ha of forest lands (H. Harahap, personal communication, 1991). A study funded by the British Overseas Development Administration estimated that, as of 1991, there were 1 199 970 families (approximately 7 000 000 people) of swidden agriculturists using 11 402 300 ha of forest land (H. Pramono, personal communication 1991). Djajadiningrat (1990) gave a much higher estimate of approximately 3.8 million families (about 27 800 000 people) of swidden agriculturists using 35.4 million ha of forest land. To make things more confusing, Poffenberger (1990) estimated approximately 30 to 40 million people, including both swidden agriculturists and 'shifted' lowland farmers, living in and near state-claimed forest lands in the outer islands. More recently, Myers (1996) suggested roughly 60 million shifted cultivators living on forest lands in Indonesia.

Confusion regarding the number of forest dwellers exists at the local level as well. For example, a research team from Gadjah Mada University estimated a population density of 148 people per km2 in a study area in Bulungan District, East Kalimantan, while the official estimate was only 15 people per km2 (National Development Planning Study Centre 1991). Whatever the correct figures, there are serious problems with the government's official estimate of the forest population.

Poor information on forest-dweller demographics is not unique to Indonesia. In the Philippines, the Department of Environment and Natural Resources (DENR) recently estimated a population of 1 327 359 residing on classified 'public' forest lands and unclassified 'public' lands (DENR 1986). Independent researchers, however, estimated that, as of 1980, at least 14.4 million people were residing within the forest zone and that the uplands had an annual population growth rate of 2.5 to 2.8% between 1948 and 1980 (Cruz 1986; Cruz *et al.* 1992).

If we look at the amount of land managed by governmental forest departments in Thailand, the Philippines, and Indonesia, we begin to appreciate the size of the area involved and the potential for the existence of large forest-dweller populations. In the Philippines, 55% of the nation's land area is managed by the DENR, and in Thailand, 40% of the nation's land area is managed by the Royal Forestry Department. In Indonesia, the Ministry of Forestry manages approximately 131 million ha or approximately 68% of the total land area (Biro Pusat Statistik 1994), of which the FAO estimated 113 million ha of closed broadleaf forest (Rao 1990).

The compilation of national census figures is based on administrative boundaries, not on land cover. Hence, even given the best intentions, it is perhaps not surprising that national governments have little idea how many people live in the forests. Observers have tended to attribute such problems to 'poor methodology,' to which the proffered solution usually is 'a really good study'. A few scholars, however, recognize that the disagreements over the data are not just an obstacle on the road to addressing the 'real issues' but are themselves the issue. Thompson *et al.* (1986), for example, argue that these disagreements have institutional origins and illuminate vital development questions. In the Philippines, Lynch & Talbott (1988) suggest jurisdictional motives underlie official insistence on unrealistic population estimates.

In Kalimantan, the total state-claimed forest area is 38.5 million ha or 71% of the total land area of the four provinces (West, Central, South, and East) and 29% of the total forest in Indonesia (Biro Pusat Statistik 1994). The forest in Kalimantan is one of the greatest areas of tropical rainforests in the world; these forests are also rich in species. Altogether there are more than 11 000 species of flowering plants, 10 genera and 270 species of dipterocarps, and 221 species of wild animals, including 92 species of bats, 14 species of primates, and 549 bird species (Clearly & Eaton 1992).

In West Kalimantan, the human population was approximately 3 228 000 in 1990 (Biro Pusat Statistik 1994). Total state-claimed forest land is 9.2 million ha or 63% of the land area in the province (Biro Pusat Statistik 1994), and logging concessions have rights to approximately 74% of this land or 47% of the land area (Alqadrie 1992). At the least, government plans for use of such a large extent of the land can be expected to conflict with, and thus be opposed by, those of the local population dwelling on these lands. The lack of data on forest-dwelling populations ensures that development planning for both the human population and the natural resource will continually be disrupted by the unexamined nexus between them.

This paper has two specific, inter-related objectives. First, we seek to demonstrate a methodology for using census and other data collected by the Government of Indonesia to determine the number of people living on state-claimed forest lands in West Kalimantan. Second, we seek to understand why knowledge of forest dwellers on state-forest lands is problematic. Do we not know how many people are on state-forest lands because the question is not asked, because it is asked but cannot be answered, or because it is asked but then the answers are obfuscated?

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Methods

We sought to determine the official boundaries of state forests for the province of West Kalimantan, and ascertain if census data collected by *propinsi* (province), *kabupaten* (regency), or *kecamatan* (district) governments, can be combined with forest department data on boundaries to determine, within the accuracy of the data set, how many people live in these areas. We also sought to conduct field counts in order to assess the accuracy of official estimates (e.g., from local governments).

Two sets of forest cover maps were acquired. The first were the Indonesian Ministry of Forestry Consensus Forest Land Use Plan maps (i.e., *Tata Guna Hutan Kesepakatan* [TGHK] at 1:500000 scale). The second were the maps developed by the Regional Physical Planning Programme for Transmigration (RePPProT; 1:250000; data of 1990). The study also acquired 1:50000 topographic maps of West Kalimantan (National Co-ordination Agency for Surveys and Mapping [Bakosurtanal]) that correctly identified the name and location of many villages listed in the population census reports. We also procured a 1:1000000 map of district boundaries (Bakosurtanal).

We then obtained census statistics collected at the village level, which were compiled and published at the regency level (e.g., *Penduduk Kabupaten Sanggau: Hasil Pencacahan Lengkap Census Penduduk* 1990, published by the Kantor Statistik, Kabupaten Sanggau, Sanggau, West Kalimantan) for every regency in the province.

We used geographic information system (GIS) technology to integrate the data from these various sources into a map of district and regency boundaries and the location of many villages throughout the province that was tied to a population database for each village. The GIS allowed us to determine which villages were located in state-claimed forests and the percentage of land in each district and regency.

The field study was conducted in two districts, namely Sengah Temila District (Pontianak Regency) and Simpang Hulu District (Ketapang Regency). These districts *(kecamatan)* were chosen because they were small enough to contain a manageable number of settlements, yet large enough to possess substantial ecological, land use, and other kinds of, diversity. More importantly, Sengah Temila District was chosen as representative of heavily-populated districts close to the provincial capital. Simpang Hulu District, on the other hand, was chosen as representative of rural districts with low population densities. Twelve hamlets were surveyed to determine current populations. For the population survey, members of a household were considered to be all people living in the household, whether they were present or absent during the survey. Members of a household who were absent for six months or more were not counted. Visitors, even those living in the house for more than six months, were also not included. The population survey used government census forms, and all households in a village were surveyed in the same month.

Table 1 Comparison of government data and popularion survey of this study

Village	Hamlet	Governm data, July 1994	Survey data, August 1994
Saham			
	Saham	493	496
	Bingge	423	427
	Palanyo	291	294
	Po'ok	152	154
	Nangka	486	489
	Kase	318	318
	Pate	377	379
	Padakng	535	540
	Total	3075	3097
Mekaraya			
	Banjur-Karab	438	445
	Merangin	411	417
	Baya	259	261
	Kembera	543	549
	Total	1651	1672

We used four methods to estimate forest populations. ln the first method we estimated the gross population density of each district by multiplying the population of the district by the percent of land covered with state-claimed forest. In the second method we used the GIS database to produce a map of villages throughout the province tied to a population database for each village. The GIS allowed us to identify which villages are located on state-claimed forests and to estimate forest population. In the third method we adjusted the number of people living on state-claimed forests according to the percent of land covered by state-claimed forests. For districts in which more than 90% of the land was mapped as state-claimed forest lands, we calculated population as though it were spread evenly across the landscape (i.e., if 95% of the land was mapped as forest, we calculated the population as 95% of census figures); for districts with between 60-89% forest cover we arbitrarily adjusted the percentage of land covered by state-claimed forests downward by 10% to offset the fact that population is not spread evenly across the landscape. To check on the accuracy of this model we would have to map every village in several districts to get a sense of the appropriate offset to apply for adjusting forest population. In the fourth method we estimated population densities for specific villages (based on known population and area data) and generalized from these data to the province.

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Results

The Government's population data are highly consistent with the population data of the survey (Table 1). This means that for this analysis, we can use population data from the Office of Statistics *(Kantor Statistik)* at either the regency or provincial level.

Forest-dweller demographics

Method 1. *Estimating gross population density*

This estimate assumes that people are spread evenly across the landscape with as many people living on one km2 of privately-owned land as on a similar area of state-claimed forest. This assumption probably overestimates forest population as population densities are usually greater on private lands than state lands. We use this figure as an estimate of the greatest possible number of forest dwellers. This method produced an estimate of 1 316 828 people, or 41% of the population. Perhaps the best example of the problems with the Ministry of Forestry maps is that they show 44% of Pontianak town, the provincial capital, to be state-claimed forest. If we interpreted this to mean that 44% of the town's population lived on this land, this would add another 173 755 people to the population figures (Table 2).

Method 2. *Mapping forest villages and populations*

This estimate errs on the low side because not all villages were mapped, we were not able to acquire maps of many forested areas, and we did not have any maps of Ketapang Regency. This method produced an estimated 204 491 people, or 6% of the population (Table 2).

Method 3. *Adjusting the gross population density to account for the uneven spread of people across the landscape*

This method, which is arbitrary and which we believe errs on the conservative side, produced an estimate of 635 965 people or 20% of the population (not including Pontianak town; Table 2).

Table 2 Population estimates as calculated by methods 1, 2, and 3 of this study

Regeney	Population *a*	Forest area *b* (km2)	People in forest (method 1)	People in forest (method 2)	People in forest (method 3)
Kapuas Hulu	159 692	26 687	126 487	10 267	89 592
Ketapang	326 377	25 234	213 292		97 726
Pontianak town	397 672	96			
Pontianak	778 744	8 006	341 784	115 726	149 750
Sambas	703 420	4 819	246 919	23 563	73 796
Sanggau	428 412	9 065	179 749	20 809	79 287
Sintang	383 756	24 128	208 597	34 126	145 814
Total	3 178 073	98 036	1 316 828	204 491	635 965
West Kalimantan			4l % *c*	6%	20%

a Population data are compiled from population data (1990) supplied from the office of Statistics (Kantor Statistik) in each regency. This differs slightly from the official census data (3 228 000) published by the Biro Pusat Statistik (1994).

b Forest area data are calculated from GIS analysis of forest and regency boundaries. This is approximately 6% greater than the estimate (92000 km2) published by Biro Pusat Statistik (1994).

c Percent of total population estimated to be living on state-claimed forest lands by method.

Method 4. *Estimating population densities for specific villages and generalizing to the province*

Sengah Temila is one of the 19 districts in Pontianak Regency. We mapped the location of the 96 hamlets in the district and the boundaries of state-claimed forests. Based on the official forest planning map of the Indonesian Forest Department (TGHK), 44 hamlets are located on stateclaimed forests. The population living on forest lands in this district was approximately 15 295. Forest-dweller density was approximately 36 people per km2, the same as the average for the entire district.

Simpang Hulu is one of 14 districts in Ketapang Regency. The population of the district was 23 943 in 1990 (Kantor Statistik Kal Bar 1991). The district is 3338 km2 in area, with an average population density of seven people per km2 (Kantor Statistik Kab Ketapang 1994). The TGHK maps indicate that the entire district (100%) is covered by state-claimed forests. The population of forest dwellers was thus 100% of the district, or 24 600 people in September 1994 (Kantor Statistik Kec Simpang Hulu 1994).

These two case studies demonstrated that in a highly-populated district close to the provincial capital, the population density on state-claimed forests was approximately 36 people per km2. In a sparsely-populated district which is completely covered with state-claimed forests, population density was approximately seven people per km2. We hypothesize that the average population density on state-claimed forest lands in West Kalimantan lies somewhere between these two estimates (Table 3). If only 11 people per km2 live on state-claimed forests, then approximately one million people or 31% of the population live on state-claimed forests.

Table 3 Population density of forest dwellers on state-claimed forest lands - various studies

Area	People/km2
Sengah Temila District (densely-populated area)	36
Simpang Hulu District (sparsely-populated area)	7
Villages mapped in this study	
Bukang (432 people/33 km2, Simpang Hulu District)	13
Selantak (126 people/13 km2, Simpang Hulu District)	10
Sekucing Baru (383 people/290 km2, Simpang Hulu District)	1
Sidas Daya (337 people/10.7 km2, Sengah Temila District)	31
SFDP Sanggau Regency (17000 people/1000 km2) *a*	17

a Social Forestry Development Project funded jointly by the Indonesian Ministry of Forestry and the German Technical Cooperation (Graefen 1995).

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Spatial distribution of forest dwellers and knowledge of forest dwellers

State-claimed forests occupy more than 90% of the land mass of 14 districts ; all but two of these districts lie along or near the remote eastern interior boundaries with Malaysia, and with the provinces of South, Central, and East Kalimantan. Another 52 districts have less than 60% state-claimed forest cover; and all but a few of these districts lie along the Kapuas River corridor (running east-west through the province). Rivers in Kalimantan are important for transportation, settlement, and livelihoods, and hence it makes logical sense that the population is concentrated along this corridor.

The districts with the largest number of forest dwellers are, for the most part, the same as those with the most forest coverage (i.e., the remote interior districts). With the exception of Pontianak, the most populated regency, the regencies with the largest number of forest dwellers (i.e., Sintang, Ketapang, and Kapuas Hulu) are all located along the eastern and southern interior boundaries.

The two regencies with the greatest percentage of state-claimed forest lands (i.e., Kapuas Hulu, 86.36%, and Ketapang, 74.54%) are the only regencies for which we were not able to acquire 1:50000 topographic maps showing the location of village settlements. In Kapuas Hulu, we found a 1 :250000 map of village settlements, but we did not find any map of settlements for Ketapang. Hence, the areas with the most forest coverage and with the most forest dwellers are precisely the areas for which spatial information is most deficient. Forests and forest dwellers are found in the most remote areas of the provinces, and it is in these areas that the government has invested the least resources in mapping.

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Discussion and Conclusions

Forest-dweller demographics

We calculated forest-dweller population by four methods. The two most reasonable estimates (methods 3 and 4) varied from 20 to 30% of the population or approximately 650 000 to one million. We consider an estimate of 25% of the population (850 000) to be a good approximation of the number of forest dwellers on state-claimed forest in West Kalimantan.

Methodology for a national-scale study

The methodology developed in this project is based on several premises. First, we concluded from a small sample of hamlets where we conducted population census counts, that govern ment population counts are accurate at the hamlet and village levels (the number of hamlets sampled, however, is too small to be statistically meaningful). For this study, we concluded that we could, therefore, use government census statistics as accurate representations of human population. In addition, we found that census statistics are collected at the village level and that these data are compiled and published at the regency level. We can use these statistics to identify the number of people living in each district and village in the province.

Second, we demonstrated that the 1:50000 scale topographical maps of West Kalimantan correctly identify the name and location of some of the villages listed in the village level population census reports. We conclude that we can use these maps to determine the location of many villages in the province.

Third, we demonstrated that the Indonesian Ministry of Forestry forest-planning maps (TGHK) and the RePPProT maps show similar lands as state-claimed forests throughout the province. We can use either set of maps as base maps for delineating state-claimed forests. Because the RePPProT maps are at a larger scale (1:250000 as opposed to 1:500000) we felt they made better base maps.

Finally, we demonstrated that GIS technology can be used to integrate the data from these various sources. Using GIS we can develop maps that show the location and population of districts and villages throughout the province, and we can integrate these population maps with state-claimed forest cover maps. In this manner we can develop a database for estimating within the accuracy of the data, the number of people who live on state-claimed forests in West Kalimantan.

Whether we can use this methodology in other provinces is not yet known, but we do know that both the sources of data and their accuracy will vary by province. Thus it will be necessary to develop methods for estimating forest-dweller populations on a province-by-province basis.

The political ecology of knowledge

What do these results have to say about why information of forest dwellers on state-forest lands is problematic? This project has collected the best data available and has subjected them to analysis, but still we are only able to give a rough estimate of the number of forest dwellers. We can conclude that we do not know the population of forest dwellers, at least partially because the spatial data needed to answer the question do not exist. Boundaries between districts and even regencies have not been surveyed. Maps that show these boundaries are an approximation and hence calculations of the percentage of the district or regency covered by forests are also approximations. The locations of many villages have been accurately mapped. Yet many villages are mapped incorrectly or not at all; and it is precisely in the areas with the most forest coverage that mapping is weakest. Thus, attempts to tie census data (which are correct) to physical locations are fraught with difficulty and approximation.

In a broader sense, however, this project is not able to answer questions concerning our lack of knowledge on forest dwellers, because we have focused on the bio-physical level, seeking to influence policy by working from the environment to the institutions. We have asked the question, 'How many people live on state-claimed forest lands?' and sought to answer it. We have not asked the question, 'Why does the state not know how many people live on its forest lands?' We have not looked at the institutions that manage forests, how they are structured, how they operate, and how they decide what it is important to 'know' and what it is not. Institutional skeptics can still conclude the state does not know how many forest dwellers there are because it does not want to know.

Yet, given the lack of historical interest in surveying by the Dutch colonial government (as compared with the British in peninsular Malaysia or India), given the labor intensity and cost of traditional surveying methods, and given the difficulties of acquiring aerial photographic coverage over Kalimantan because of continuous cloud cover, a strong argument can be made that it is not surprising that spatial data are weak in Indonesia in general and Kalimantan in particular. In addition, given the presumed interest any state has in acquiring accurate spatial information on the location of settlements and resources for both planning and security purposes, it is difficult to argue that good maps do not exist because the government does not want good maps. So what are we to conclude?

We think it is reasonable to conclude that the main reason we do not know how many people live on state-claimed forest lands is because the spatial information necessary for uniting census data with forest boundaries do not exist. This does not mean that the Indonesian Ministry of Forestry wants to know how many people live on these lands or that it has made this knowledge a high priority, but it does mean that the lack of information is not totally driven by political or institutional interests. Some gaps in knowledge are exactly that and solutions lie both in collecting better data as well as understanding the institutional interests that determine what data are collected and how they are analyzed.

The results of this study clearly have policy significance for the Indonesian Ministry of Forestry, in that they enhance the Ministry's ability to estimate the number of forest dwellers on lands that it manages. The results also have policy significance for the Biro Pusat Statistik in that they indicate that their data can be used for estimating forest-dweller populations. Finally, these results have policy significance throughout Asia in that they shed new light on the problems of estimating forest-dweller densities.

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