

COMMUNITY-BASED FOREST MANAGEMENT IN INDONESIA:
SPATIAL PATTERNS AND TRENDS

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ABSTRACT

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The frequent changes of government regulations, overlapping jurisdictions among institutions and multiple actors who oversee Community-Based Forest Management (CBFM) affect the field implementation of CBFM to achieve management goals. This study aims to document the patterns and trends of CBFM by reviewing historical and legal documents as well as to examine spatial data of CBFM and other forest intervention regimes in Indonesia. There are three main findings identified for this study. First, the issuance of legal policies has been changing since the colonial period to the present. These policies have affected the rights and roles of local people in the forestry sector, land allocation, and the number of permits released to CBFM programs. Second, land is designated by the government mostly for Protected Areas, logging concessions, oil palm concessions, wood fiber concessions and agricultural areas. In contrast, CBFM programs represent a small proportion of Indonesia (0.96%). CBFM in this study consists of four programs: Community Forest, Community-Based Forest Management, Customary Forest and Village Forest. These programs are mostly established in Sumatera island, followed by Borneo, Sulawesi, Bali and Nusa Tenggara, Maluku and Papua, and Java. Lastly, population density is identified as a key predictor associated with the area allocated to CBFM programs. Understanding the legacy and current status of CBFM in Indonesia could help improve policy regulations that encourage social and ecological best practices in the forestry sector.

To my parents, *Bapa* (John Salosso) and *Mama* (Martha Duma Mangalla)
for their advice, their patience, and their faith
because they always believed and understood
thank you for making me be who I am and for supporting me all the way

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KEY TO ABBREVIATIONS

AWG SF	ASEAN Working Group on Social Forestry
BPS	<i>Badan Pusat Statistik</i> (Statistics Indonesia)
CBFM	Community-Based Forest Management
CIFOR	Center International Forest Resources
Dirjen	<i>Direktur Jenderal</i> (Directorate General)
e.g.	exempli gratia
ESRI	Environment System Research Institute
FGW	Forest Global Watch
FWI	Forest Watch Indonesia
GIS	Geographic Information System
HA	<i>Hutan Adat</i> (Customary Forest)
HD	<i>Hutan Desa</i> (Village Forest)
HKm	<i>Hutan Kemasyarakatan</i> (Community Forest)
HTR	<i>Hutan Tanaman Rakyat</i> (Community-Based Forest Management)
ha	hectare
i.e.	id est.
Km	Kilometer
Mha	Million hectare
MOA	Ministry of Agriculture (Kementerian Pertanian)
MOEF	Ministry of Environment and Forestry (<i>Kementerian Lingkungan Hidup dan Kehutanan</i>)
MOF	Ministry of Forestry (Kementerian Kehutanan)
NGO	Non-Governmental Organization
NTFP	Non-Timber Forest Product

PERHUTANI	<i>Perusahaan Hutan Milik Negara</i> (Stated-Owned Enterprise)
P	<i>Permen or Peraturan Menteri</i> (Ministry Regulation)
PP	<i>Peraturan Pemerintah</i> (Government Regulation)
PSKL	<i>Perhutanan Sosial dan Kemitraan Lingkungan</i> (Social Forestry and Environment Partnership)
RECOFTC	Regional Community Forestry Training Center (Asia & The Pacific)
UPT	<i>Unit Pelaksana Teknis</i> (Technical Implementation Unit)
USAID	United States Agency for International Development
WAC	World Agroforestry Centre
WDPA	World Database on Protected Areas

CHAPTER I INTRODUCTION

1.1. *Community-Based Forest Management in Indonesia*

When forested land is managed by local communities, there are benefits to both the environment and livelihoods. Community-based management programs have reduced rates of deforestation (Bowler et al., 2012; Porter-Bolland et al., 2012), increased carbon storage (Torres & Skutsch, 2015), improved forest conditions (Agrawal et al., 2008), conserved biodiversity (Jonas & Mackinnon, 2016) and improved local human welfare (Bowler et al., 2012) and of the lives of people who rely on forest resources (RECOFTC & AWG-SF, 2017). In Indonesia, however, there is often conflict among stakeholders due to lack of transparency and accountability in forestland allocation procedures, the engagement of multiple actors in issuing permits and enforcing regulations, and the overlap of decision-making process and responsibilities (Fisher et al., 2007; De Royer et al., 2014; Benadje et al., 2016; Moeliono et al., 2015). This may lead to a small number of forestlands allocated to locals and a small number of individuals and farming groups interested in joining the programs.

In the past few decades, the Indonesian government has strived to include the community perspective in forest policies, specifically to consider that communities live and depend on forests (Sardjono et al., 2015). Such collaborative approaches to policymaking were established to provide a cooperation chance among the governments, enterprises, and communities in managing and utilizing forests products (Abdurrahim, 2015). Examples include the *Sistem Tumpang Sari* or the Intercropping System program introduced in 1960, the *Perhutanan Sosial* or the Social Forestry created in the 1980s, and the *Pembangunan Masyarakat Desa Hutan Terpadu* or the Development of Integrated Forest Village Community from the 1990s (Purnomo & Anand, 2014; Moeliono et al., 2017). The primary goals of these approaches were tree planting in degraded forest areas due to the increase of deforestation and engaging more local participation in managing their forests. Furthermore, as communities demanded to be more involved in forest management, the government started issuing the

permits to local people through Community-Based Forest Management (CBFM) programs (Directorate of State-owned Forest Enterprise Decree or *Perum Perhutani* Decree 1061/2000). Today, these schemes include *Hutan Kemasyarakatan/HKm* or Community Forest, *Hutan Tanaman Rakyat/HTR* or Community-Based Plantations, *Hutan Desa/HD* or Village Forest, and *Hutan Adat/HA* or Customary Forest (CIFOR 2003; Moeliono et al., 2017).

Following the definition given by The Center for People and Forests (RECOFTC), CBFM is defined as "a broad concept that includes initiatives, sciences, policies, institutions and processes that are intended to increase the role of local people in governing and managing forest resources" (RECOFTC & AWG-SF, 2017). CBFM has been adopted formally in many developing countries, and it has been implemented to suit local historical, cultural, social, political, and bureaucratic contexts (Gilmour, 2016). Therefore, different forms and definitions of CBFM have emerged, and a variety of different terms such as social forestry, community-based forestry, joint forest management and participatory forestry have been applied (CIFOR, 2003; Gilmour, 2016). For this study, CBFM is defined consistently with the Forestry Law 41/1999, *Perum Perhutani* Decree 1061/2000, and Ministry of Forestry Regulation P.83/2016, all of which refer to community-based forestry programs in Indonesia.

Previous studies reported that the field implementation of CBFM programs in Indonesia shows slow progress to meet program objectives (Sardjono et al., 2013). For example, only 320,000 ha has been granted to locals, which is less than 15% of the 2.5 million ha target set by the Ministry of Environment and Forestry (MOEF) between 2010 and 2014 (RECOFTC & AWG-SF, 2017). Also, the progress for plantations has been minimal. Only 7,986.44 ha or 1.11% of the target community plantation areas has been planted (Moeliono et al., 2015). Overlapping policies concerning political, economic and military interest as well as frequent changes in the government policies and forestry regulations are identified as the main factors significantly affected the programs (Abdurrahim, 2015; Kaskoyo et al., 2014; Sardjono et al., 2013).

1.2. *Forest governance in Indonesia*

Forest governance in Indonesia is complex and evolving. Since the collapse of Soeharto's New Order Regime in May 1998, government regulation and administration were transferred from the top level (the state and ministries) to the bottom levels (provincial, regency, and municipal) (Barr et al., 2006). Then, in 1999, the MOEF Indonesia issued The Forestry Law 41/1999 as a fundamental law in the decentralization of forest management. Following the start of forest decentralization in 1999, province and regency governments gained enhanced roles and powers to issue permits in the forestry sector, most significantly the authority to issue small-scale concession licenses (Murdiyarso et al., 2011). These policies allow individuals or small groups in communities to get a permit to harvesting forest products, mainly timber. However, most of the permits were granted to small enterprises or political affiliates of the government (Harahap et al., 2017). This is one factor that contributed to the high rate of deforestation in Indonesia in the 2000s due to over logging as well as illegal logging (FWI/GFW, 2002).

Moreover, the government also has power over spatial planning, by establishing and modifying the forest boundaries (Harahap et al., 2017). Between 1999 and 2002 the government issued large numbers of small-scale logging and forest conversion or concession licenses and imposed regulatory restrictions on timber concessions operating within state forest boundaries. This means that only the state-owned industrial or private companies are allowed to harvest logs. These non-uniform concession practices lead to conflicts and tensions between the state and communities on land ownership, regulations, and use of forest resources (Purnomo & Anand, 2014; CIFOR, 2003). Because of unclear forest boundaries, some areas could be owned and maintained by many parties. This is pointed out by Fisher et al. (2007) that unclear boundaries become the main issues and challenges in establishing legal forest areas in Indonesia.

It has been more than two decades that communities have been faced with challenges in implementing and developing CBFM programs in Indonesia. Forest areas for CBFM schemes

have been reduced due to the regulations of the government on logging concessions, the transmigration program or the opening of new residential areas (Wibowo et al., 2013), and an increase in the deforestation rate (RECOFTC & AWG-SF, 2017). Communities also encounter challenges when implementing the programs because of a lack of good governance, such as corruption, accountability, transparency, and rules enforcement (Riggs et al., 2016). They also face conflicts due to uncertain land tenure rights and lack of knowledge on CBFM schemes shared from the government to communities (De Royer et al., 2014).

There is growing literature base examining the effectiveness of CBFM for the environment and communities, and there is also a voluminous literature that analyzes the actors in the programs, the public policy contexts for CBFM, and factors which influence conflicts and failures of the programs (e.g. Abdurrahim, 2015; Djumhuri, 2012; Irawanti et al., 2014; Kaskoyo et al., 2014; Ota, 2011; Purnomo & Anand, 2014; Santika et al., 2017; Supratman & Sahide, 2013; Wibowo et al., 2013). However, there has been little research that explores how government policies influence locals' participation in CBFM (e.g., Safitri, 2010), and the current status of spatial and temporal extent of CBFM based on various the forest governance interventions in Indonesia. Therefore, this study is an attempt to fill that gap.

1.3. Research questions

This study focused on forest policies regarding CBFM programs and the current status of forest governance intervention in Indonesia. Specifically, this thesis sought to answer the following questions:

1. What are the government policy milestones in Indonesia related to CBFM programs and communities' participation in the forestry sectors?
2. What are the spatial patterns and trends in CBFM in Indonesia?
3. What are the social and ecological factors that predict the extent of Indonesian CBFM currently?

1.4. *Objectives*

This study aimed to document spatial patterns and trends of CBFM and its association with other forest governance interventions in Indonesia. The first objective was to describe the legal and political history of governmental and non-governmental organizations as well as identified factors associated with the enactment of CBFM programs. Concerning locals' role and right on forests, the first section of the analysis and the discussion elaborated a list of regulations issued and the changes of the legal policies from the colonial period to the present. Furthermore, this section also identified legal procedures in obtaining permits as well as actors who engage on each stage of CBFM schemes.

The second objective identified and documented the sites of CBFM programs and other forest governance areas in Indonesia. It aimed to demonstrate the scale of CBFM and its correlation with other forest governance regimes. The second analysis and discussion focused on the current spatial pattern of CBFM as well as other forest regimes. Specifically, the analysis explored the development of CBFM schemes among the forest interventions and correlations with these forest areas as well as another relevant factors (e.g., social and ecological).

CHAPTER II METHODS

2.1. Study site

Indonesia's tropical forest ranks third in the world (behind Brazil and The Republic of Congo) regarding total forest cover, and accounts for 10% of the world's remaining forests (Sunderlin & Resudarmon, 1996; FWI/GFW, 2001). The forest can be classified into seven vegetation zones, ranging from beach forest, peat forest, mangroves, low land tropical rain forest and savanna, to montane and alpine forest (MOEF, 2016). Based on the interpretation of satellite imagery Landsat 8 OLI in 2016, the MOEF Indonesia reported that there are 95 million ha (Mha) of forests or 50.74% of the total land area of the country (MOEF, 2017). The annual report published by the Directorate of Spatial Plan and Stewardship of Forest Areas in 2016, forestlands are estimated 112 Mha based on the decree issued by the MOEF. This forest cover varies among the islands: Papua is 34% forested (38 Mha), Borneo is 25% forested (28 Mha), Sumatera is 20% (23 Mha), Sulawesi is 10% forested (11 Mha), Maluku is 6% forested (6.4 Mha), Java is 3% forested (3 Mha), and Bali and Nusa Tenggara islands are 2% forested (2.6 Mha).

The forest across all islands has high biodiversity. Indonesia is home to 25% of all fish species, 17% of birds, 16% of reptiles and amphibians, 12% of mammals and 10% of plants (Rhee et al., 2004). The total human population is about 60 million people (BPS, 2015). Recently, *Badan Pusat Statistik* (BPS) or Statistic Indonesia reported that there are 33,957 villages or 36,17% of total villages located inside and surrounding forests (BPS, 2017). The villagers live by traditional economic strategies that combine shifting cultivation with fishing, hunting, harvesting and selling of timbers, and gathering non-timber forest products (NTFPs) for use and sale.

2.2. Data

Primary data for this study are data from the Indonesian government institutions and non-governmental organizations (see Appendix A). The data include:

1. Legal documents, i.e., law, regulation, decree, and official reports or publications.
2. Spatial data, i.e., geospatial records or shapefiles and metadata of CBFM programs, forest area, forest governance types in Indonesia, and administrative boundary.

The legal documents to analyze the history of CBFM and forest intervention regimes in Indonesia were mostly collected from the government institutions. These institutions were The Ministry of Environment and Forestry (*Kementerian Lingkungan Hidup dan Kehutanan*) and The Ministry of Agriculture (*Kementerian Pertanian*). Another data source was The World Institutes on the Forest Legality for Indonesia, which also has legal documents from the colonial era to the present. Document types identified were the fundamental Laws (*Undang-Undang* or UU) and Government Regulations (*Peraturan Pemerintah* or PP). Another type of document was Ministerial Regulations (*Peraturan Menteri* or *Permen/P*), which was issued to enact specific instruments further to implement the Government Regulation. These official documents were used to examine changing the policies over-time and its influence on communities' rights and roles in the programs. Additionally, they were needed to describe the permit process, actors and institutions involved in the programs, and implementation mechanisms.

Additional data included planning and annual reports issued by the ministers as well as the relevant institution, such as Statistic Indonesia (BPS Indonesia). Lack of national data in the legal documents, particularly on CBFM programs, was supplemented by literature and reports from credible NGOs. These NGOs were the Center for International Forestry Research (CIFOR), The World Agroforestry Centre (WAC), The Center for People and Forest (RECOFTC), and The United States Agency for International Development (USAID). Study cases in Indonesia were needed to describe factors that affected success and failure of field implementation of CBFM.

Spatial data for this study were also assembled from the government institution and NGOs. Spatial information for CBFM programs (Community Forest, Community-Based Plantation, Customary Forest, and Village Forest) was collected from the MOEF Indonesia. Furthermore, shapefiles represented forest governance intervention gathered from NGOs. First was Global Forest Watch (GFW) which covered spatial information for oil palm plantation, logging concessions, wood fiber concessions, and non-forestland. The second was the World Database on Protected Areas (WDPA) which provided specific shapefiles for protected areas around the worlds. The third was Map for Environment (MFE) which covered data for forest information in Indonesia, such as natural forest areas (intact forest, dry forest, swamp forest, and peatland) and plantation areas. The category of forest governance areas was based on the description given in the table attributes of spatial data. For protected areas, the area sub-categories consisted of nature reserve, nature recreation park, wildlife reserve, national park, grand forest park, hunting park, game reserve, wildlife sanctuary, recreation park, protection forest, *Ramsar* Site (Wetland of International Importance), and UNESCO-MAB Biosphere Reserve, and World Heritage Site (biodiversity or mixed between ecosystem and ecological structures). Plantation areas or agriculture lands includes plantation agricultural products such as coffee, coconut palm, *hevea* or rubber tree, and mixed fruits. For additional GIS data, we collected the shapefile for administrative boundaries of Indonesian provinces (ESRI) which consists of 34 provinces.

2.3. *Analysis*

2.3.1. *Qualitative analysis for legal documents*

Content analysis was used to qualitatively analyze official documents. Content analysis is a research method using computer coded content analysis by systematically identifying and analyzing specific information within the text (Xu & Bengston, 1997). Computerized content analysis for this study was completed using NVivo software (Version 11.4.2).

There were three steps of the content analysis using for this study (see Figure 1). The first step was data organization, which was a preparation stage for the documents and the content categories analysis (Bazeley, 2007). All documents were organized based on the contents or title, i.e., legal policies (law, regulation, decree) and documents published by relevant institutions (study cases, annual reports). Then, the documents were imported into the Internal Source of NVivo through Data section. The content categories for this study covered topics relevant to CBFM e.g. permit, procedure, actors, institution, success, and challenge. Additionally, the categories also included title and issue year to document the frequent changes of the policies regarding CBFM and other forest fundamental policies overtime.

The second step was categorization. Based on the coding categories in the first step, we defined the basic units of text on the documents to be classified. This stage identified individual words and phrases as the basic unit to be organized. Because of the papers were published in Indonesian (*Bahasa Indonesia*) and English, classification was done for all documents by following a list of keywords to ensure consistency of coding categories. For example, coding for the institution were identified in Indonesian as *Kementerian/Dinas/Instansi/Badan/Lembaga/Perusahaan/Agen* etc. and for the actors e.g. *kepala dinas/kepala desa/ pemimpin kelompok/petani lokal* etc. NVivo software has sections called Nodes and Cases to create and document the coding categories automatically (Bazeley, 2007). Those tab sections save all individual words or phrases based on the orders and on multiple category contents (QSR International, 2017).

Finally, the third step was reporting. After coding the categories, all "individual words and phrases" examined using Query and Explore sections given in NVivo (Elo & Kyngas, 2008). The Query synthesizes coding texts and linking information from texts based on each content category. For example, to synthesize the linking of actors, the steps were done by first "Selected Items or Item in Selected Folders (in Nodes)," and then "Run Query." The information was presented in Summary, Reference as well as Word Tree styles. Furthermore, to show a process

of the permit procedure and the actors who involved in each step of procedure, the information from the Query section was exported and used in the Explore Section to create a “Mind Map” or “Hierarchy Chart”.

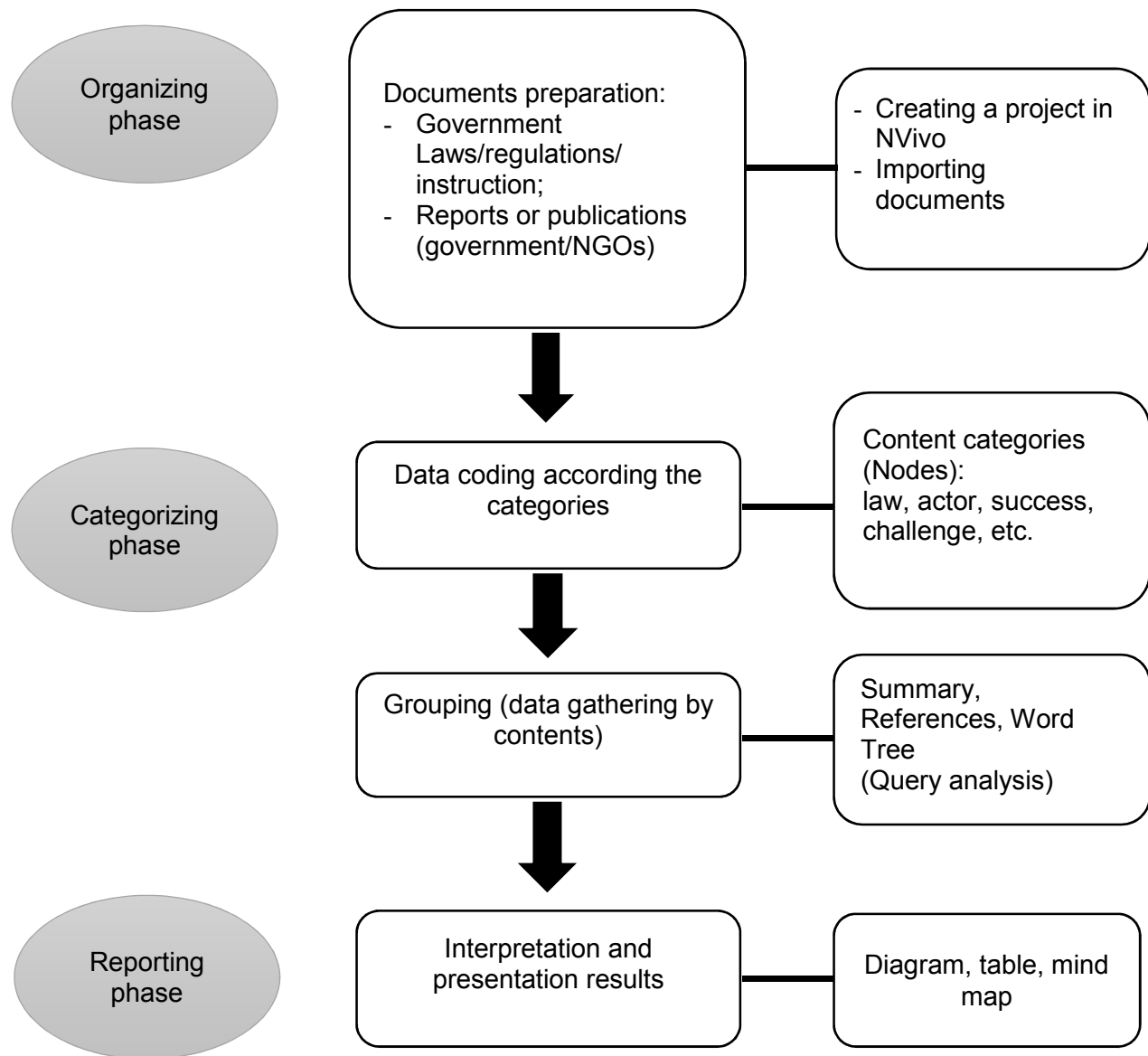


Figure 1 Procedure of the content analysis using NVivo software (Adjusted from Elo and Kyngas, 2008)

2.3.2. Quantitative analysis for spatial information

To examine the patterns and trends of CBFM as well as other intervention areas, we used spatial analysis to assess CBFM relevant present of forest governance status in Indonesia. The analyses were conducted using ArcGIS Software (Version 10.5 from ESRI) as well as appropriate analysis to data visualization basics (see Figure 2). The GIS procedures analysis were described as the following steps.

The first step was data collection for both spatial information and supporting data. We collected spatial data considered the purpose of implementation in the analysis. As described in the data source section (subchapter 2.2.), spatial data for this study included CBFM programs (Community Forest, Community-Based Plantation, Customary Forest, and Village Forest), forest governance areas (protected areas, palm oil concessions, logging concessions, wood fiber concessions, other agriculture areas), natural forest (intact forest, dry forest, swamp forest, and peatland areas), and other spatial information (non-forestlands, and province boundaries). We used data within the range year updated between 2016 and 2018. Another variable was the population density for each province in Indonesia.

The second step was data processing before the analysis. We have various data attributes because of spatial information gathering from different data sources. Therefore, we first standardized the data attributes by setting the Projected Coordinate System and calculating the areas into hectares (for shapefiles without areas calculation). Another consideration in this step was, overlapping shapefiles. Since data layers designed for various purposes included overlapping shapefiles, overlap needed to be accounted for. To do this, we used “Clip Tool” to make sure that the area calculated for a shapefile only included area inside the province boundary. Using *Select by Location*, we overlaid layers between an area and a province boundary. Then apply *Select by Attributes* to calculate total areas and the number of sites per provinces as well as the year of establishment (for the data available). All the numbers recorded in the excel spreadsheet and they used in the next analysis.

Finally, the last step was analysis and data interpretation to produce graphs and evaluate trends, as well as produce maps representing the CBFM and forest governance intervention trends in Indonesia. We used data summaries on excel spreadsheet to produce graphs representing the percentage of areas, number of sites, as well as year establishment (data selected) to show the trend of the programs over year. Because of limited data in the spatial attributes (table properties) of forestry data, we used additional data (statistic data) for logging concessions to understand the trends over time in Indonesia. Therefore, the graphs only cover information for CBFM programs, Protected Areas, oil palm concessions as well as logging concessions. Moreover, we used a Stepwise Regression analysis (R environment for statistical computing, package *mass*) to examine correlation among the data (CBFM and other areas as well as population density). The spreadsheet documenting all data types (areas and number of sites) was exported to R. The correlation coefficient was used to determine bivariate relationships. The correlation coefficient (r) ranges from -1.0 to +1.0. The closer r is to +1 or -1, and the more closely two variables are related. If r is close to 0, there is a very weak relationship between the variables.

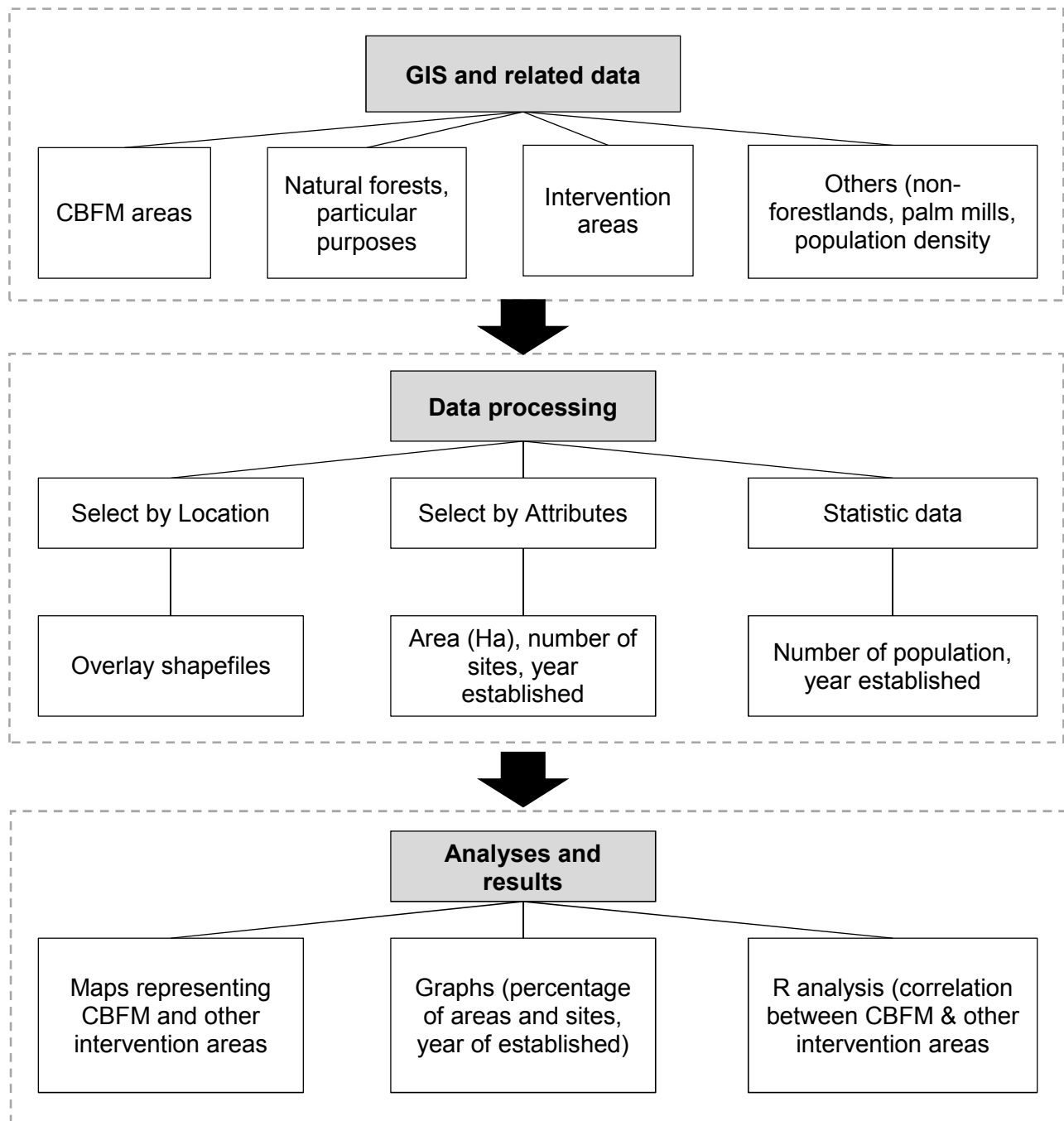


Figure 2 The chart flow of GIS analysis on CBFM and other forest interventions (Adjusted from Dobesova, 2014)

CHAPTER III LEGAL DOCUMENTS OF CBFM AND FOREST TENURE: RESULTS

3.1. *Legal and policy trends and the for communities*

3.1.1. *Legal basis for forest tenure in Indonesia*

The legal history of forest tenure in Indonesia centers on two legal policies enacted during the colonial era (Plaque 8 September 1803 and Agrarian Regulation 1870) and three laws enacted after the independence of Indonesia (Basic Agrarian Law 5/1960, Basic Forestry law 5/1967, and Forestry Law 41/1999). These legal documents changed the role of communities in owning and managing forest over time (Table 1).

The legal policies issued by the Dutch during the colonial period (1602-1945) indicated that all forestlands and natural resources belong to the colonial government and their relevant parties. The Plaque 1803 stated that *“all wood forests in Java island must be under control of the company (colonial) as domain state’s right and regalia (privilege of kings and sovereigns)”*. Moreover, The Regulation 1870 (also known as *Domeinverklaring*), mentioned that *“all lands without legal ownership were the state’s domain”* (Article 1). This means that only the Dutch, kings (this refers to local leaders in Indonesia), and employers were granted rights to manage and enjoy the benefits of forest resources, mainly timbers (in History of Forestry I, published by Department of Forestry Indonesia (DOF), 1986).

After the independence of Indonesia (1945-present), there were three basic forestry laws issued by the government. Basic Agrarian Law 5/1960 was issued by the state to cancel all regulations from the colonial era. It also described mechanisms regarding property rights over lands and resources. Chapter Two in the Law 5/1960 described *“rights on lands and water”* and explained the mechanisms of *“land registration and property rights.”* Because this law did not cover details of the jurisdiction of the forestry sector, the President of Soekarno replaced Law 5/1960 with the Basic Forestry Law 5/1967. This Law was most focused to describe roles of the government on *“forest plan and forest management (Chapter Two and Three), forest exploitation (Chapter Four), and forest conservation (Chapter Five)”*. This means the

government obtained legal authority to take unowned lands, mostly were customary forests, and to issue permits to private enterprises regarding exploitation rights or to utilize the areas for other purposes.

The most recent enactment of the forest policy was Forestry Law 41/1999 that led to substantial changes in local people's forest access and rights. This law was issued to replace the Law 5/1967. The main contents of the Law 41/1999 were transfer forest authority from the top to bottom level of the government institutions (district level). This also recognized the existence of Customary Forest (*Hutan Adat*) as state forest. Through this law the central government retains the rights to organize and regulate everything associated with forests as well as forest products, to define the forest estate and/or change the status of the forest estate, to refine and regulate legal relationship between citizens and forests. Law 41/1999 became a legal basis for establishing CBFM programs in Indonesia.

Table 1 Legal and political progress of forest tenure and CBFM programs in Indonesia

Old document	New document	Community roles
<i>a. Forest tenure:</i>		
Plague 8 September 1803 <i>All wood forests under controlled by the colonial</i>	Forestry Law 41/1999 <i>Cancelled Law 5/1967 and most recent law of the forestry</i> <i>All forest and resource should be controlled by state for maximum Indonesian prosperity (Art.4, Paragraph 1)</i> <i>Recognition of customary forests (as state forests)</i>	<i>Communities lost their rights (in the colonial era) or do not have full rights over lands, particularly to manage and utilize resources</i>
Agrarian Regulation 1870 <i>The colonial claimed lands without legal ownership as state domein (Art. 1)</i>		
Basic Agrarian Law 5/1960 <i>Cancelled all Colonial's policies and established general concept on properties rights</i>		
Basic Forestry Law 5/1967 <i>Cancelled Law 5/1960 and stated that all forests under controlled of state, the state gained rights to set and manage it</i>		
<i>b. CBFM programs</i>		
Directorate of State-Owned Forest Enterprise or <i>Perum Perhutani</i> Decree 1061/2000 about CBFM	<i>Perum Perhutani</i> Decree 682/2009 about CBFM <i>Cancelled Decree 268/2007</i> <i>Added the village institution and local cooperatives in the forest activities (Article 1, Paragraph 5, 6)</i> <i>Pointed out the responsibility of forest villagers in sustainable forests and natural resources regarding the program, and Granted access rights to communities in forest management (Article 4, Paragraph 2)</i>	<i>Local people have a legal basis to join and they able to manage financial and markets (Lembaga Masyarakat Desa Hutan and Koperasi)</i>

Table 1 (cont'd)

Old document	New document	Community roles
Government Regulation PP.6/2007 about <i>Forest Management and Preparation of Forest Management Plans and Forest Utilization</i>	Government Regulation PP.3/2008 <i>Article 13, Paragraph 1 (point b): Forest management takes into account the aspiration, local cultural values, and environment condition</i>	<i>Communities, including indigenous people, have the chances to manage forest and participate in forest utilization programs</i>
Ministry of Forestry Regulation P.37/2007 about Community Forest	Ministry of Forestry Regulation P.88/2014 about Community Forest <i>Cancelled P.37/2007</i> <i>Revised community forest establishment process, including zoning the areas, social mobilization and facilitation by the government, and sets of obligation to communities</i>	<i>Government provided assistance to communities</i> <i>A permit holder has different rights in forest zones regarding utilization forests products and NFTP's</i>
Ministry of Forestry Regulation P.49/2008 about Village Forest	Ministry of Forestry Regulation P.89/2014 about Village Forest <i>Cancelled P.49/2008</i> <i>Revised Article 4 about permits, utilization activities, and obligation and responsibilities of permit holders (Details in Article 40-43)</i>	<i>A group entitled to manage a village forest area based on the plan, gets mentoring as well as facilities</i> <i>The village institutions and communities are responsible for making boundaries, forest monitoring and protection, tree planting, and submitting annual reports</i>
Ministry of Forestry Regulation P.23/2007 about Community-based Plantation	Ministry of Forestry Regulation P.83/2016 about Social Forestry (including Community-based Plantation)	

Table 1 (cont'd)

Old document	New document	Community roles
<p>Forestry Law 41/1999 Article 1 Paragraph 6 <i>Article 1, Paragraph 6</i> <i>“Indigenous forest is state’s forest situated in indigenous law community area”</i></p> <p><i>Article 4, Paragraph 3</i> <i>“Forest control by State shall remain taking into account rights of indigenous law community if any and its existence is acknowledged and not contradictory to the national interest”</i></p> <p><i>Article 5, Paragraph 1</i> <i>Forest based on the status consist of State Forest and Right Forest</i></p>	<p>Constitutional Court Decision 35/2012 <i>Revised the contents in the Law 41/1999 and defined that indigenous forests are private forests, not state forests</i></p> <p>Ministry of Forestry Letter 1/2013 about the Decision 35/2012 (The revisions on Law 41/1999) <i>Article 1, Paragraph 6</i> <i>“Indigenous forest is forest situated in indigenous law community area”</i></p> <p><i>Article 4, Paragraph 3</i> <i>Applied to indigenous people whose existence has not been established by the government regulation in regional level</i></p> <p><i>Article 5, Paragraph 1</i> <i>Forest based on the status consist of State Forest, Indigenous Forest, and Right Forest</i></p> <p>Joint Regulations (79/2014, 11/2014, 17/2014, 8/2014) about <i>Granted rights for indigenous people who managed a land for more than 20 years</i></p>	<p><i>The state recognizes indigenous rights to manage their customary lands</i></p> <p><i>The ownership rights granted to people who have been managing the land over 20 years</i></p>

3.1.2. Legal basis for CBFM in Indonesia

This study also researched and investigated the legal policies issued by the Indonesian government regarding CBFM. The documents were categorized into two groups, 1) General context of the programs (*Perum Perhutani* Decree 1061/2000, 136/2001, 268/2007 and 682/2009, Government Regulation PP.6/2007 and PP.3/2008), and 2) Specific policies for each scheme (Constitution Court Decision 35/2012, Ministry of Forestry Letter 1/2013 and Joint Regulations (79/2014, 11/2014, 17/2014, 8/2014), Ministerial Regulation P.37/2007 and P.88/2014, P.23/2007 and P.83/2016, P.49/2008 and P.89/2014).

Under the Law 41/1999, some other decrees and regulations were passed to detail the operational procedure of CBFM programs. There are seven legal policies that have been issued and have changed by the ministry (MOEF) regarding CBFM programs. The first legal documents that have since been canceled, were *Perum Perhutani* Decree 1061/2000, 136/2001, 268/2007, and Government Regulation PP.6/2007. Meanwhile, there are three new legal bases have identified in this study, i.e., Government Regulation PP.3/2008, *Perum Perhutani* Decree 682/2009, and Ministerial Decree P.83/2016 regarding the general context of CBFM programs.

Goals of the programs, target activities, and recognition of communities' rights became the basis for cancellation of a policy document as well as issuance of a new one. The old legal documents were focused only on forestry activities, and but did not take greatly consideration the existence of communities. From 2000 to 2009 (before the Decree 682/2009 was released), CBFM programs have already recognized locals' presence and rights, but less in the field implementation. Therefore, the Decree 268/2007, also known Guidance of CBFM Plus (*Pedoman Pengelolaan Hutan Berbasis Masyarakat Plus*) was released to improve the implementation of CBFM. The main points of the decree in 2007 were *"to create a flexible collaboration among state enterprises and communities, to accommodate community matters into forestry programs, and to emphasize social responsibility to improve the human*

development index (Indeks Pembangunan Manusia).” However, the implementation of the Decree 268/2007 did not fully involve the communities in forestry sectors.

Therefore, the government issued new legislation to clearly emphasize the locals' role and rights in CBFM schemes. For example, PP.3/2008, in Article 13 Paragraph 1 Point b, stated that “*forest management has to consider the aspiration, local cultural values as well as environment condition*”. It means that local communities, including indigenous people, have the chance to manage forest and participate in forest utilization programs. Moreover, the Decree 682/2009 emphasized that “*the government recognized village institutions in CBFM programs (Article 1, Paragraph 5 and 6), and gave more access to the community in managing forests (Article 4, Paragraph 2 Point c).*” The most recent legal document was in 2016, P.83/2016. This regulation covered the details of the permitting process for each program, rights and obligations of farmers or participants, and the mechanism to implement the programs. It was hoped that the new legal basis would bring transparency, accountability and significant progress in the various CBFM programs.

For all of three CBFM schemes (i.e., Community Forest, Community-Based Plantation, and Village Forest), the general operating procedure was elaborated in Law 41/1999, PP.3/2008, Decree 682/2009, and P.83/2016. The Customary Forest scheme was described under the Constitutional Court Ruling 35/2013, Ministry of Forestry Letter 1/2013, Joint Regulations (79/2014, 11/2014, 17/2014, 8/2014) as well as P.83/2016. The Customary Forest program is still at an early stage of implementation in Indonesia. Therefore, the program is described in this section based on these three legal documents.

Constitutional Court Ruling 35/2013, Ministry of Forestry Letter 1/2013 and Joint Regulations (79/2014, 11/2014, 17/2014, 8/2014) were enacted to revise the contents of the Law 41/1999 regarding customary forest as the state forest. In the Article 1 Paragraph 6 of the Law 41/1999, it is stated that “*Indigenous forest is state’s forest situated in indigenous law community area*” and in the Article 5 Paragraph 1 is stated that “*Forest based on the status*

consist of State Forest and Right Forest”. In another word, the government included the customary forest in state forest boundaries and did not recognize indigenous forest. The Decree 35/2013, the Letter 1/2013 and the Joint Regulations granted ownership rights to indigenous people as well as other local community groups (Table 1). Moreover, people were entitled to obtain a land title if they had been managing the land for more than 20 years (Joint Regulations). Hence, these legal policies emphasized that customary forest programs recognize indigenous territory and they offered the most expansive rights over land as well as forest resources to indigenous people essentially creating privately-owned land.

Furthermore, for the other three CBFM schemes (i.e., Community Forest, Community-Based Plantation, and Village Forest), the general legal policies as the core basis were Law 41/1999, PP.3/2008, Decree 682/2009, and P.83/2016, which discussed previously. There were also specifics regulations that gave detailed explanations for each program, i.e., P.88/2014 (Community Forest), P.83/2016 (Community-Based Plantation), and P.89/2014 (Village Forest). These legal policies explained various mechanisms for each the program, such as location eligible land in forest zones, types of utilization and activities allowed for communities in the program area, duration to implement the program, and who is eligible to enroll in the program (Table 2). The process to apply for a permit to as part of a CBFM program will be explained in a sub-chapter of this section.

Table 2 A brief description of each CBFM scheme

CBFM scheme	Community Forest	Village Forest	Community-Based Plantation
Management institution/ organization	Local groups	Village-based institution	Local farmer groups
Operational Permits	35 years (renewable)	35 years (renewable)	35 years (renewable)
Location	Protection forest (except nature reserves and core zones of national parks) and production forest	Protection forest (except nature reserves and core zones of national parks) and production forest	Production forest (in areas that no longer active)
Utilization & Activities	Forest products, NTFPs, and environmental services	Forest products, NTFPs, and environmental services	Forest products (timber)

Source: Summary from P.88/2014, P.83/2016, P.89/2014

First, Community Forest (*Hutan Kemasyarakatan* or *HKm*) are granted to local groups for 35 years (renewable). One of the goals of this program is to achieve community empowerment through community groups, and the institutional cooperatives. Therefore, the main rights granted to the groups include utilization and management rights of timber (only allowed in production forest zones), and NTFPs such as rattan, bamboo, medicinal plants and herbs (in production and protection forest areas). Environmental services such as eco-tourism is also allowed in the protection zones.

Second, Community-Based Plantation (*Hutan Tanaman Rakyat* or *HTR*) is a program established to local farmer groups for 35 years (renewable). HTR differs from the two other programs in that rights granted to local groups are only to use and manage timber. Additionally, these types of permits are issued only in production forest zones. The community-based plantation was enacted with the purpose to provide materials for timber-based industries.

Finally, Village Forests (*Hutan Desa* or *HD*) are established to grant management rights to villagers or village-based institutions for their prosperity in 35 years leases (renewable). The primary rights are conceded to village institutions, i.e., village government or customary authority (*kepala adat* or *kepala suku*). They empower the community to conduct activities to achieve the goal of this program: (1) management and protection of state forestlands which have not been managed by logging companies (regarding production forests) or government agencies (regarding protection forest); and (2) state-sponsored community empowerment through village-based institutions. Similar to other community forest programs, the village groups are permitted to harvest timbers, NTFPs as well as conduct environmental programs.

3.2. *Permitting process for CBFM programs*

According to the description given in the legal documents regarding CFBM (P.88/2014, P.83/2016, and P.89/2014), the procedure for applicants or farmer groups to apply for a permit to conduct a CBFM program requires multiple levels of government and several steps. These regulations described the institutions or individuals in the government levels that have responsibility for action and decision-making authority. This section focused on three schemes of CBFM (community forest, community-based forest management, and village forest); meanwhile, the description to customary forest was not provided in the documents.

Based on the legal policies of CBFM, the procedure to obtain a permit can be described in four steps as well as implementation, monitoring, and evaluation of the program (see Figure 3). These steps were similar at the ministry level (MOEF) and at a province level. It stated that the MOEF can delegate the authority to a governor to conduct field verification and can issue a permit. This might happen if the provincial government has included the program in the Regional Medium Development Plan (*Rencana Pembangunan Jangka Menengah*) or there is Governor Regulation regarding the program, and the provincial government has allocated

financial resources for the program in the province budget plan (*Anggaran Pendapatan dan Belanja Daerah Provinsi*).

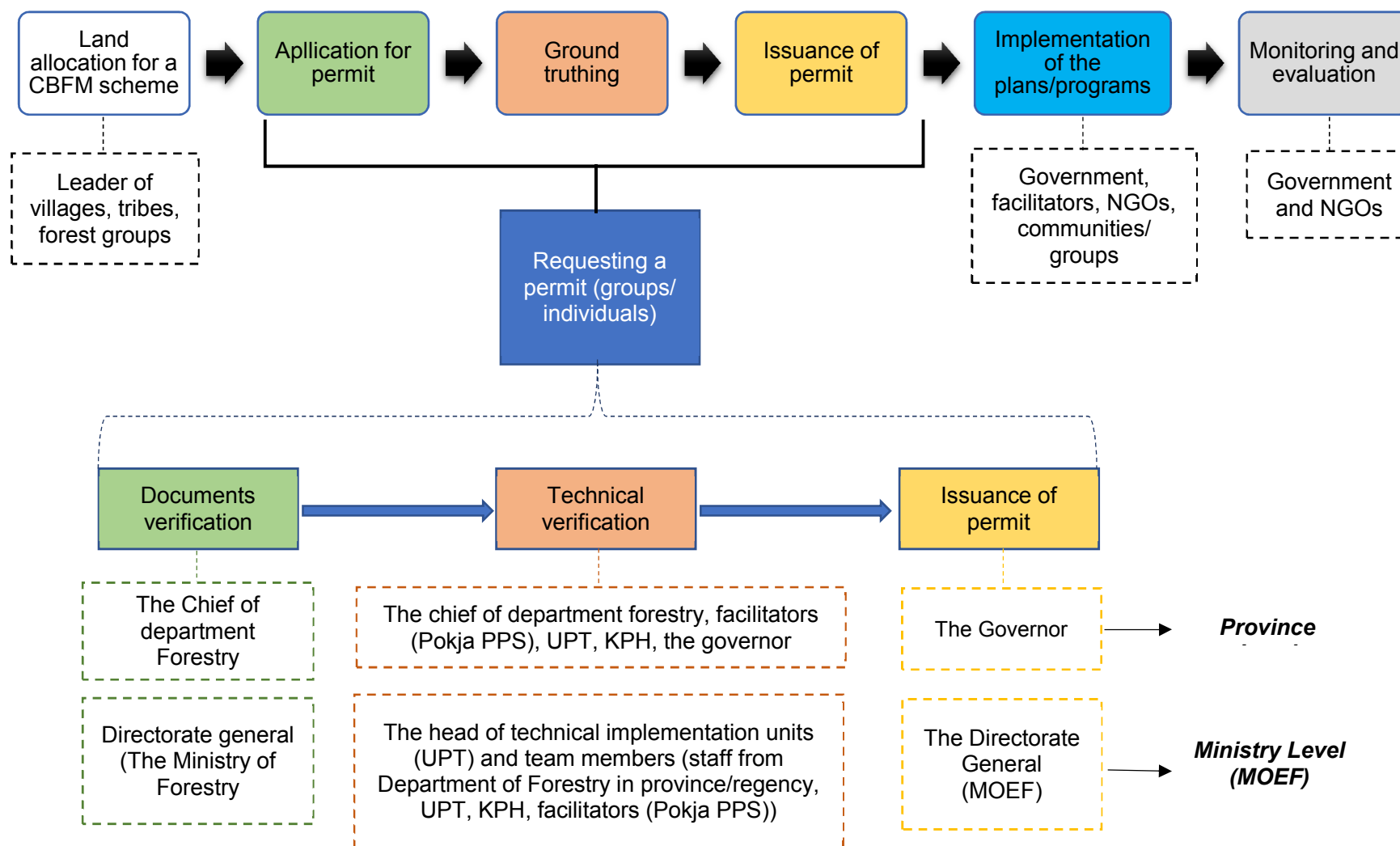


Figure 3 Steps to obtain CBFM permit, including all process and actors who engaged in each stage

Figure 3 showed the process to obtain a permit (the solid boxes) and individuals or government institutions that engage in each stage (the dashed line). The process is started with land preparation, application process, field verification or field checking, issuance of permits, implementation, and monitoring and evaluation. From these steps, there are multiple actors in the government levels who involved. Documents preparation take place in the village levels where village leaders are most responsible for assisting the participants. After the documents submitted to the government, either the provincial government or MOEF will accountable for the next processes. The field implementation, as well as monitoring and evaluation, engaged with multiple actors from various institutions (community groups, village leaders, provincial or ministerial institutions, NGOs).

At the early stage of obtaining a permit, a farmer group or applicants are required to complete administrative documents. In general, the documents consist of the personal information of applicants, biophysical characteristics of forested areas, social and economic conditions of nearby communities, the economic potential of the region, and a map (digital and paper) with the scale 1:50,000 representing the area. Assistance may be provided by the governments to make sure that communities are able to fill these requirements. This support is not only from the government institutions but also provided by NGOs or local universities that are interested to join the program.

All documents are then submitted to the MOEF (at the ministry level) or the Department of Forestry (at the province level). The documents are reviewed by the relevant institution (Figure 3) to decide whether or not the applicant has completed the document requirements to move to the next step. Incomplete applications are returned to the communities by assuming that they will revise and submit back to the government. According to the legal documents, the step from submitting the papers to verification could take nine office days. However, this stage could take much longer to process, particularly when the document returned to the community.

After document verification, a field team is formed to conduct field checking. This step means that the team needs to verify the area that will be allocated to a program. In the ministry level, the field results reported to the UPT (*Unit Pelaksana Teknis* or Technical Implementation Unit) and then it passed to *Dirjen PSKL (Direktur Jenderal Perhutanan Sosial dan Kemitraan Lingkungan* or Directorate General of Social Forestry and Environment Partnership). On behalf of MOEF, *Dirjen PSKL* issues the permit. At the province level, based on the field report, the chief of Forestry Department and the Governor jointly write a letter regarding the permit, and process the documents submitted to the *Dirjen PSKL*. According to the regulations, the official process takes about 24 office days from the verification steps to the issuance of permits.

The permit holders are then responsible for applying the program based on the work plans. After the permit is granted, for example, a farmer group can request training from the relevant government institution to complete their work plan. In the CBFM regulations, it is stated that “*the government will provide assistance such as leadership training, preparing a work plan and reporting, financial, mapping, and tree planting*”. The training could be conducted by the government institutions, NGOs, or universities. By having skills needed in this field, it is expected that a program can be implemented efficiently to achieve the goals of CBFM.

CHAPTER IV GIS AND STEPWISE REGRESSION ANALYSIS: RESULTS

4.1. *Patterns in CBFM and other forest governance areas in Indonesia*

To demonstrate patterns and trends in CBFM and other forest governance types in Indonesia, Geographical Information System analyses were performed using spatial data from the Indonesian government and relevant NGOs. There were six types of forest governance categories identified for this study. The areas included CBFM areas (Community Forest, Community-Based Plantation, Customary Forest, and Village Forest), protected areas, logging concessions, oil palm concessions, wood fiber concessions, other plantation areas or agricultural lands. The concessions in this context refer to permits granted by the government to legal enterprises to manage forest areas or harvest timber for certain period year (CIFOR, 2003). Non-forestlands and other forestlands are also mapped. Maps in Figure 4 present the patterns for the whole country (a) and the maps for more details of forest governance types in the island groups (b).

(a)

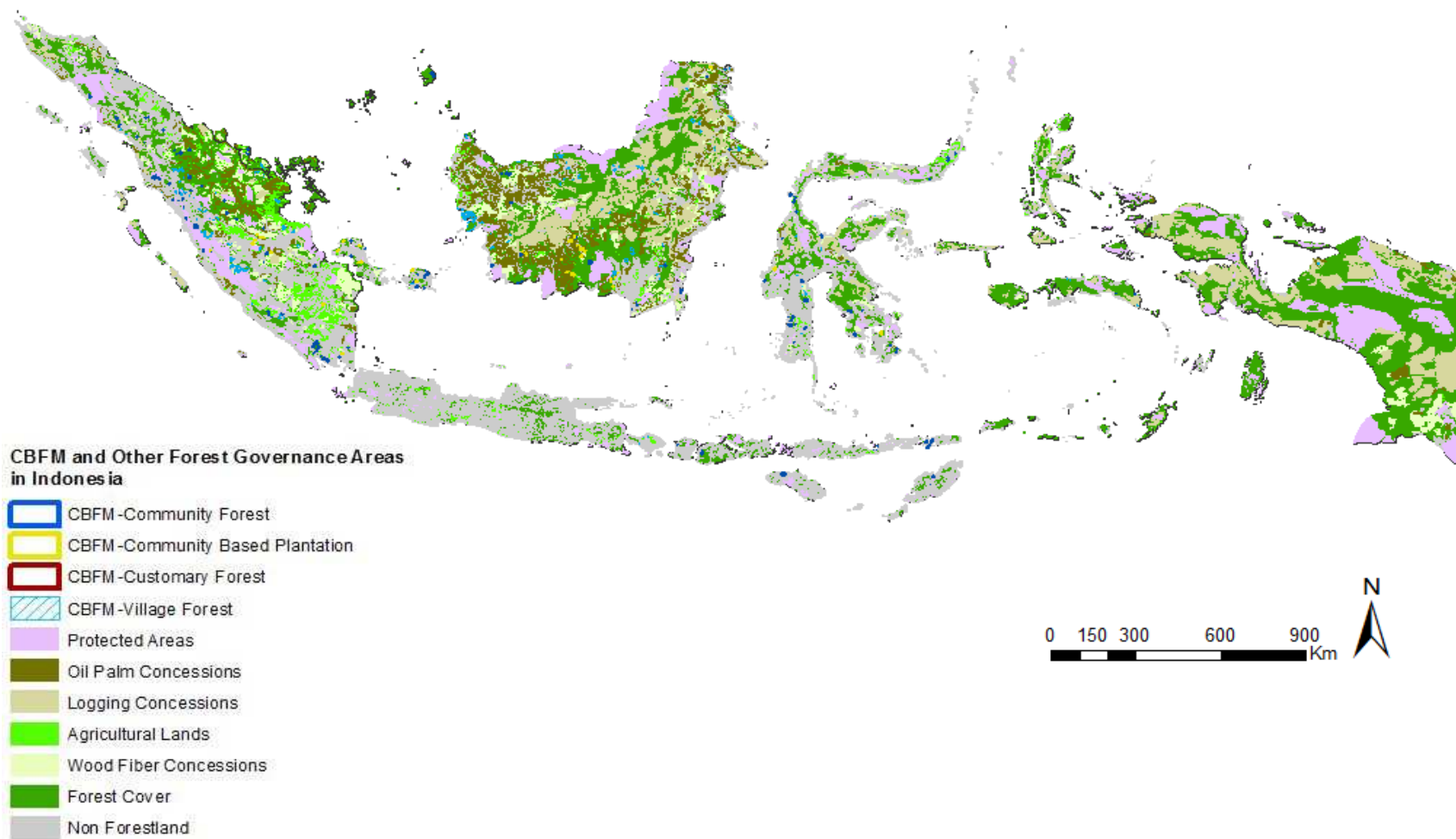


Figure 4 Map of patterns in CBFM areas and forest governance intervention in Indonesia (a) Map for the whole country, (b) Map of forest governance for each island group

Figure 4 (continued)

(b)

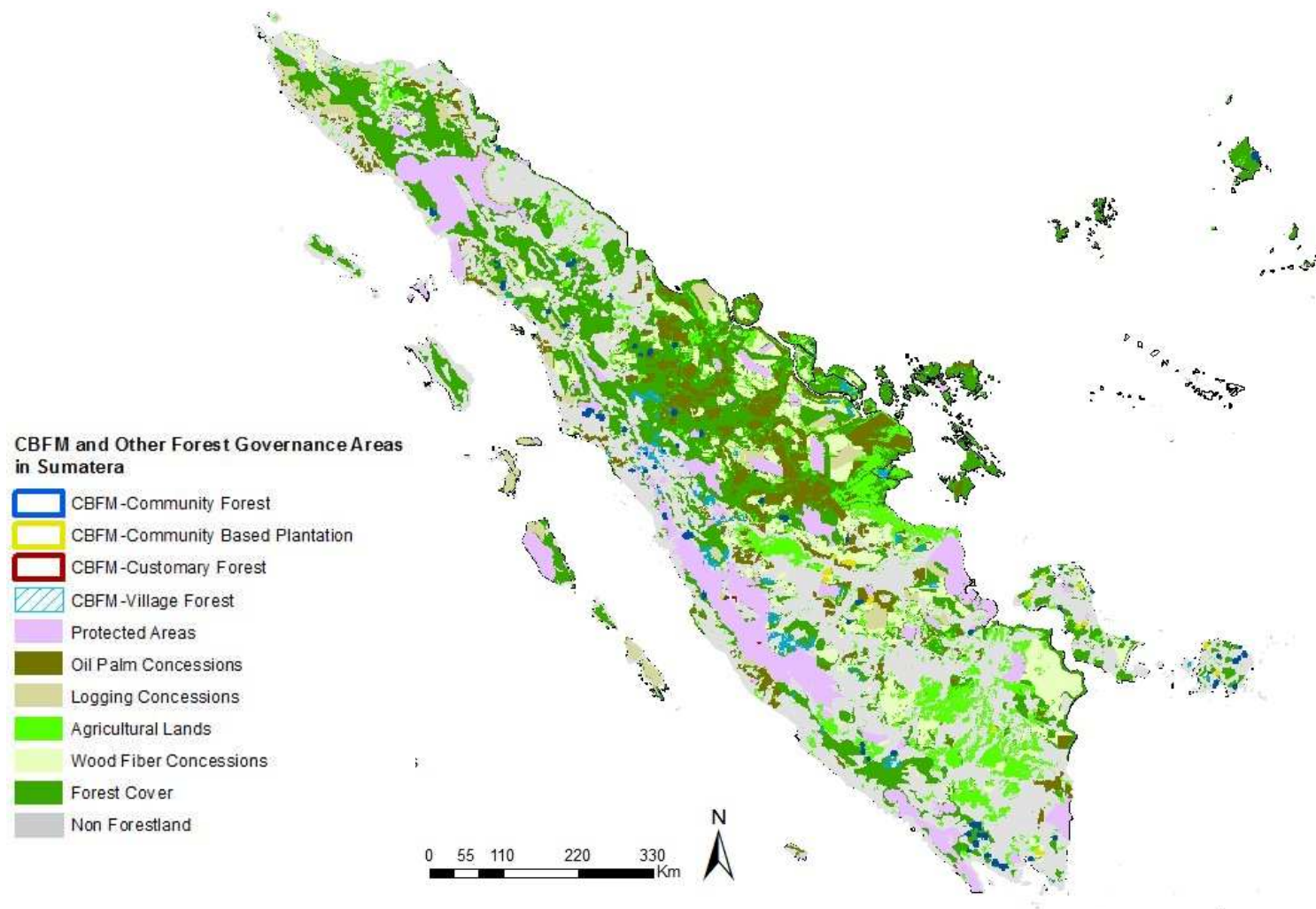


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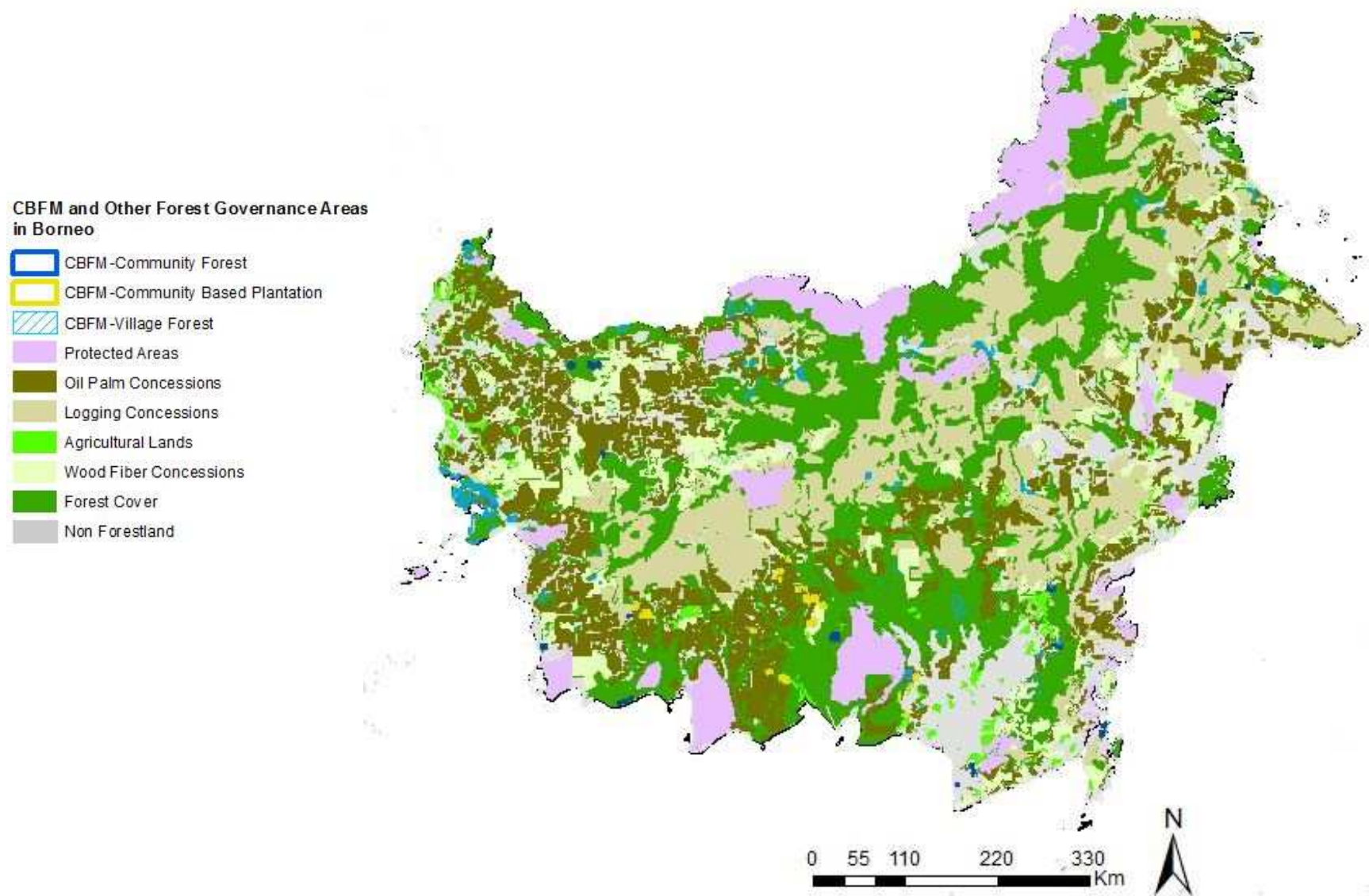


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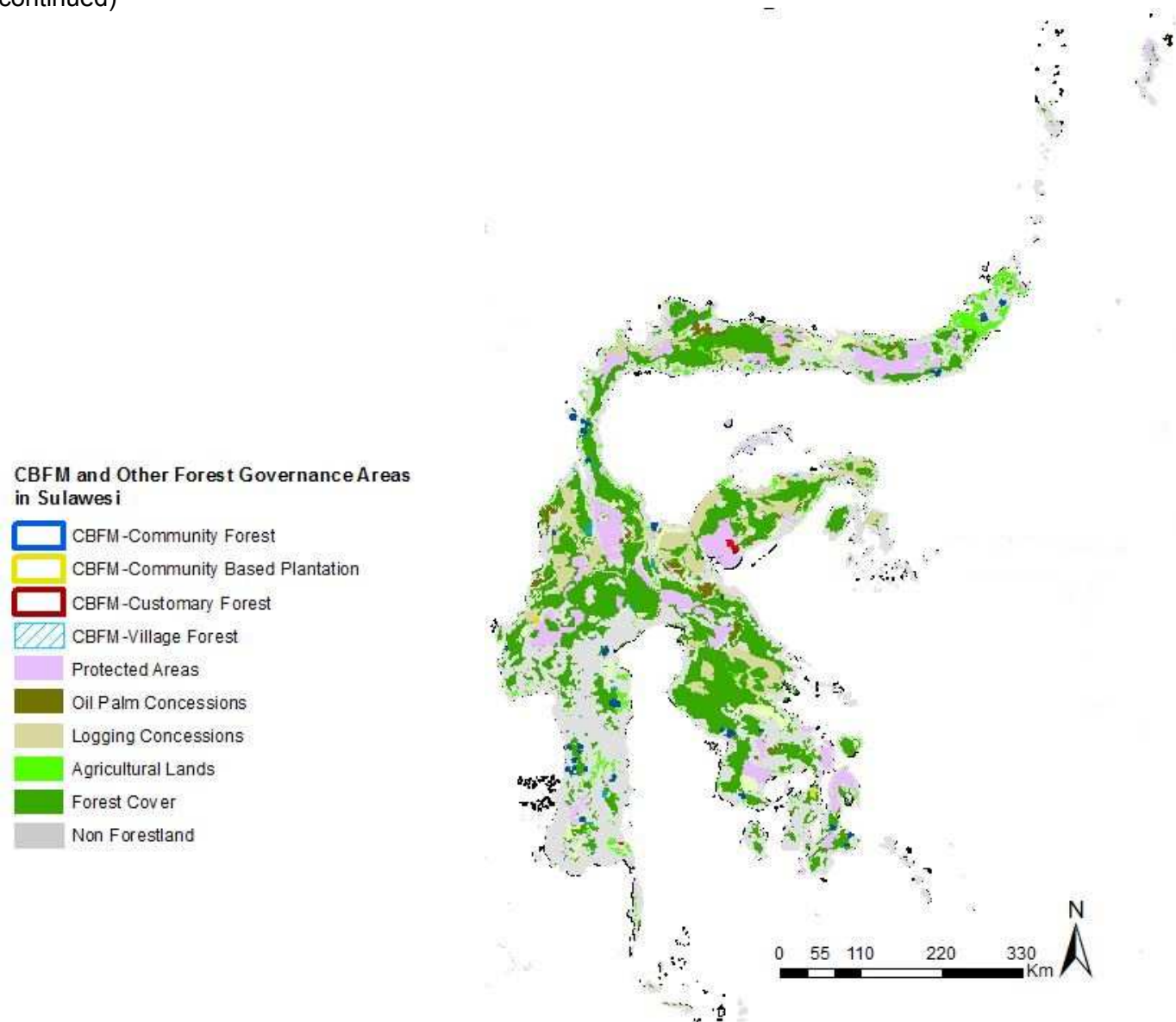


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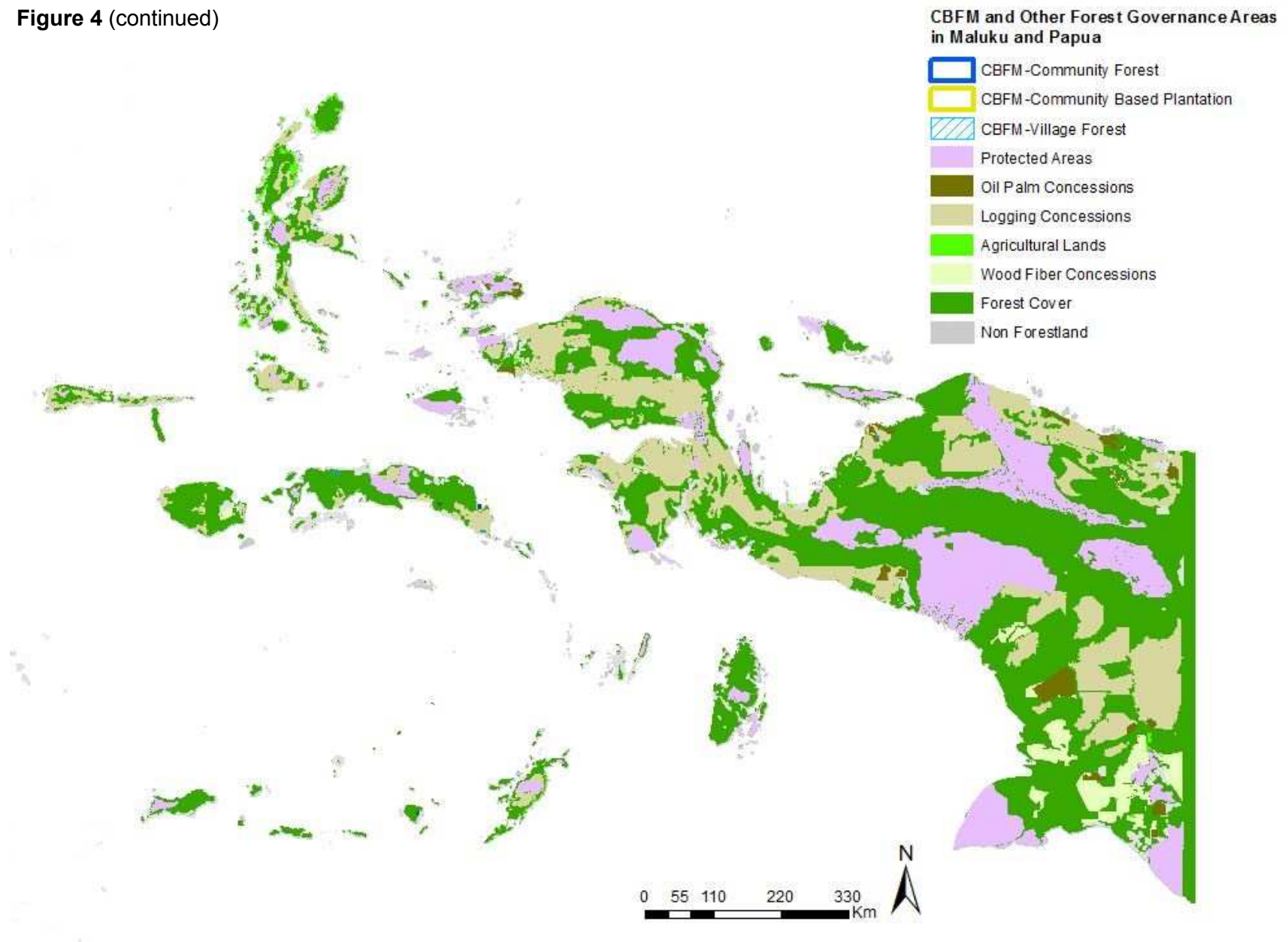


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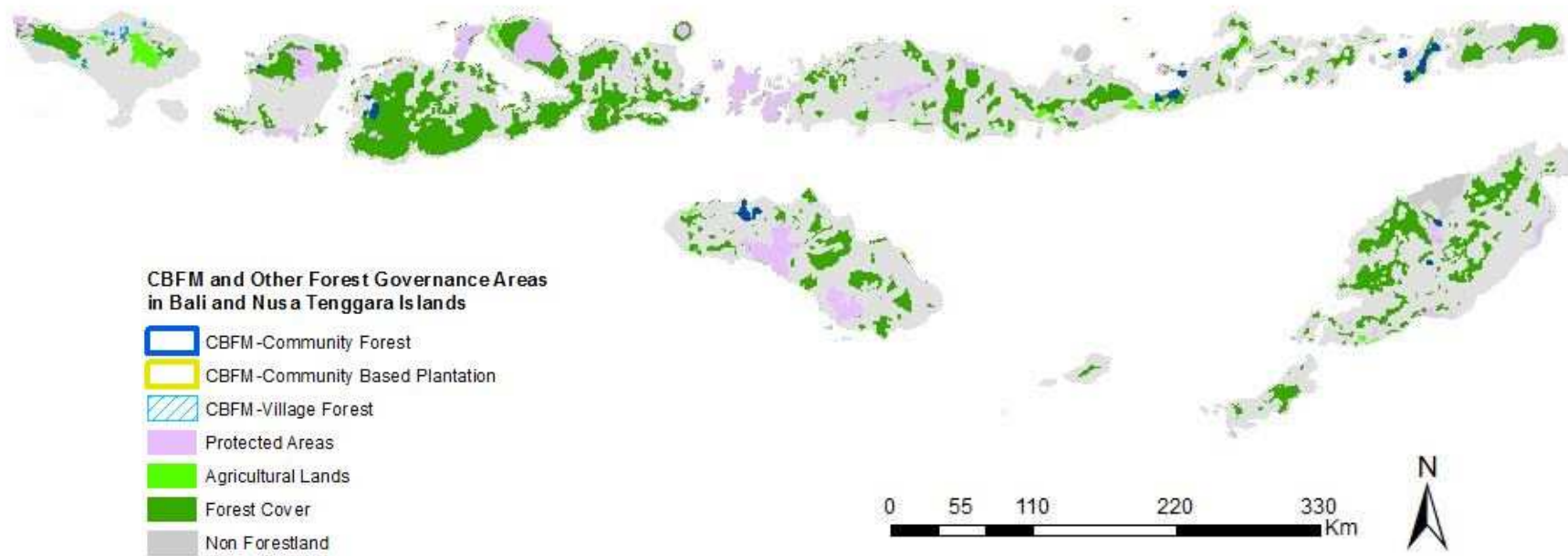
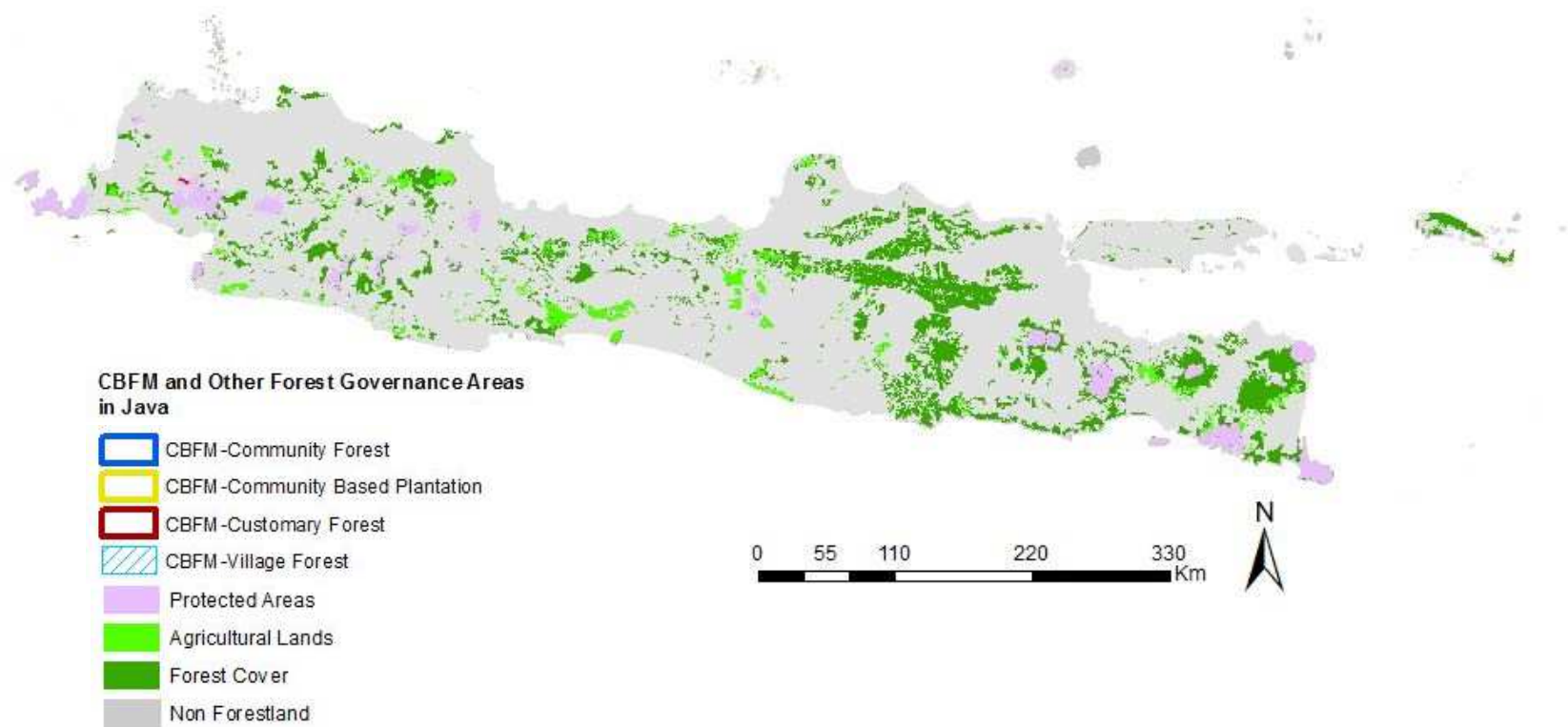


Figure 4 (continued)



The distribution of forest governance areas varies among the islands (Figure 4 (a and b)). For example, most of the Protected Areas (PAs) in Sumatera are close to the coast, while the Palm oil concessions and other concession areas are mainly inland. These are similar to the distribution patterns of Protected Areas and logging concessions in Maluku and Papua Islands. The distribution of Protected Areas that close to coast can be related to the boundaries of Marine Protected Areas, where Protected Areas could cover boundaries of land and marine areas. Furthermore, in Borneo, oil palm concessions are found mostly in the West and Central of the island, while logging areas are distributed mainly inland where most natural forest area is located. In general, oil palm concessions, as well as logged areas, occur in most of the island. In Sulawesi, logging concession areas are mostly distributed in the Central, West and some South part of the island. Other islands, i.e., Java, Bali and Nusa Tenggara, do not show the particular distribution of patterns since these islands only have a small number of forest cover as well as Protected Areas.

CBFM is a small proportion of total land area (0.96%) compare to other forms forest governance and management (Figure 5). The largest category is protected lands (23.96%), followed by logging areas (15.41%), oil palm areas (10.26%), wood fiber areas (6.54%), and other agricultural lands (4.66%). In contrast, the largest proportion of lands in Indonesia is open for other functions (e.g., non-forest activities, settlements), which covered 29.34% of the total inland territory. Forest cover is identified as the forest without any intervention types. Most of this area is considered intact forests or natural forests. Forest governance types in Indonesia designated by the government are focused on the conservation and macro forest sector activities (i.e., concessions).

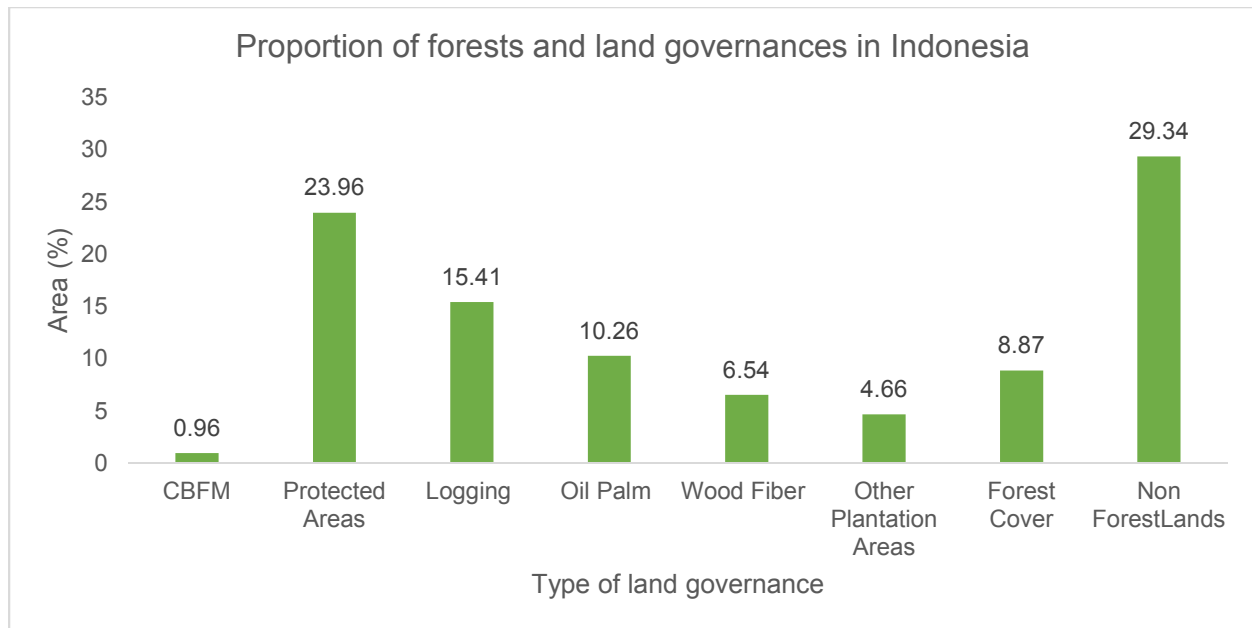


Figure 5 Land allocation for forest governance areas as well as forest cover and non-forestland in Indonesia

The islands in Indonesia were grouped into six groups, i.e., Sumatera, Borneo or Kalimantan, Sulawesi, Maluku and Papua, Bali and Nusa Tenggara, and Java. Data in All of the six forest governance areas occurred in Borneo, Maluku and Papua, Sulawesi, and Sumatera (Figure 6). In contrast, the majority of forestlands in Java, Bali and Nusa Tenggara majority are CBFM, PAs, and agricultural lands.

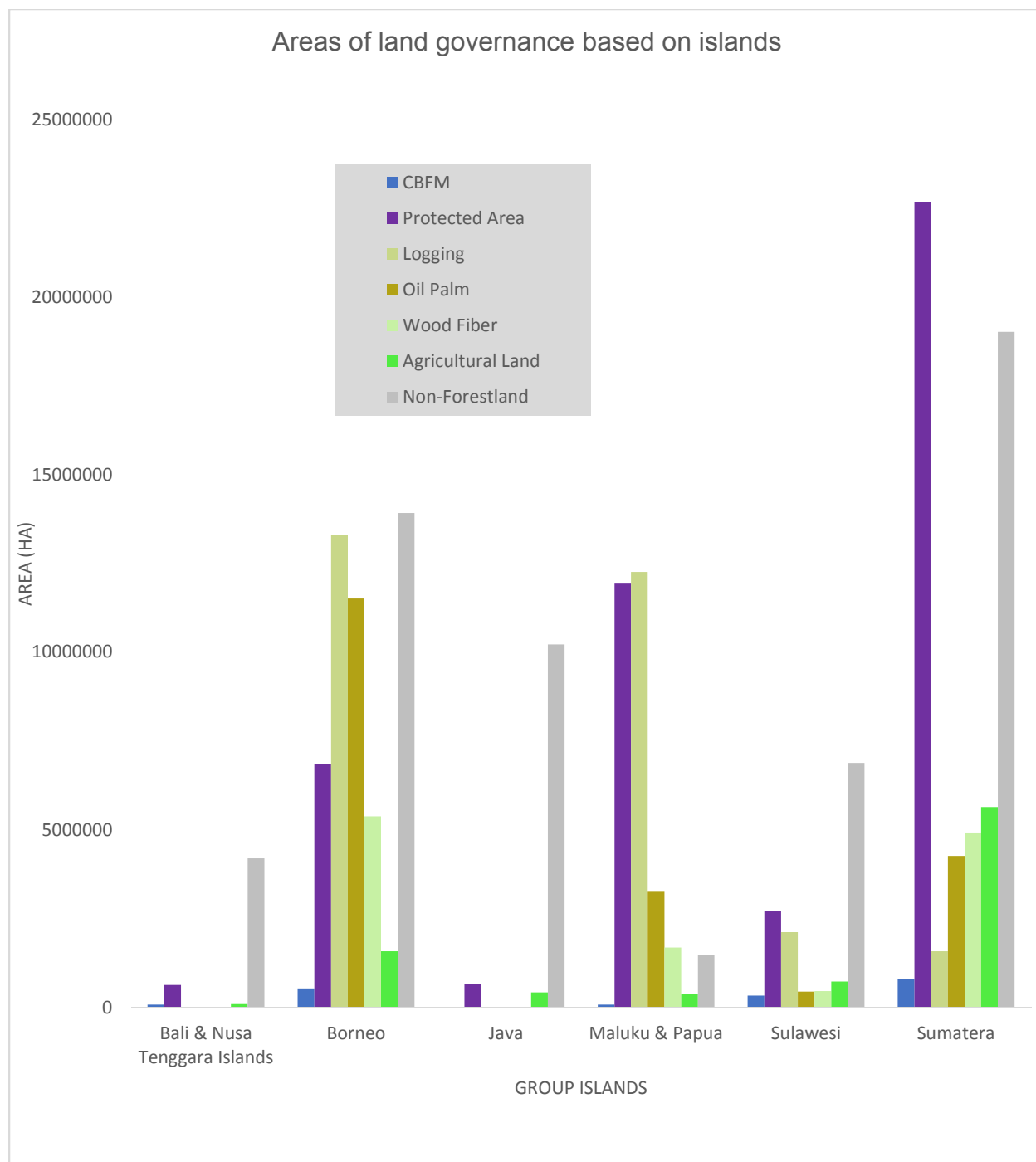


Figure 6 Distribution and cumulative of forest governance areas based on the group islands

Land cover and land use varied for each island. There is a huge difference regarding land allocation between CBFM and other forest governance types, both at the national level and in the regions. Sumatera has the most land in Protected Area status compared to the other

islands (22 million ha), followed by agriculture sectors (5 million ha), and concession activities. Meanwhile, forest in Borneo is allocated mostly for logging concessions and oil palm concessions. Logging area in Borneo is 13 million ha, and oil palm concession is approximately 11 million ha. Forestlands in Maluku and Papua are allocated mostly for logging (12 million ha) and Protected Areas (11 million ha). The island with the majority of logging area is Papua.

There are 1021 different sites with a total 1,821 million ha of CBFM programs across the country (Figure 7). In terms of total areas, the Community-Based Plantation program ranked first with 786,021.96 ha, followed by Village Forest (598,884.98 ha), Community Forest (430,434.5 ha), and Customary Forest (6,267.99 ha). In terms of unique sites, the Community Forest program had the most sites (401 sites), followed by Village Forest (398 sites), Community-Based Plantation (214 sites), and Customary Forest (8 sites). The program with the highest area and number of sites are the Community Forest, Community-Based Plantation, and Village Forest programs. The Customary Forest Program does not have many sites nor much forest area enrolled.

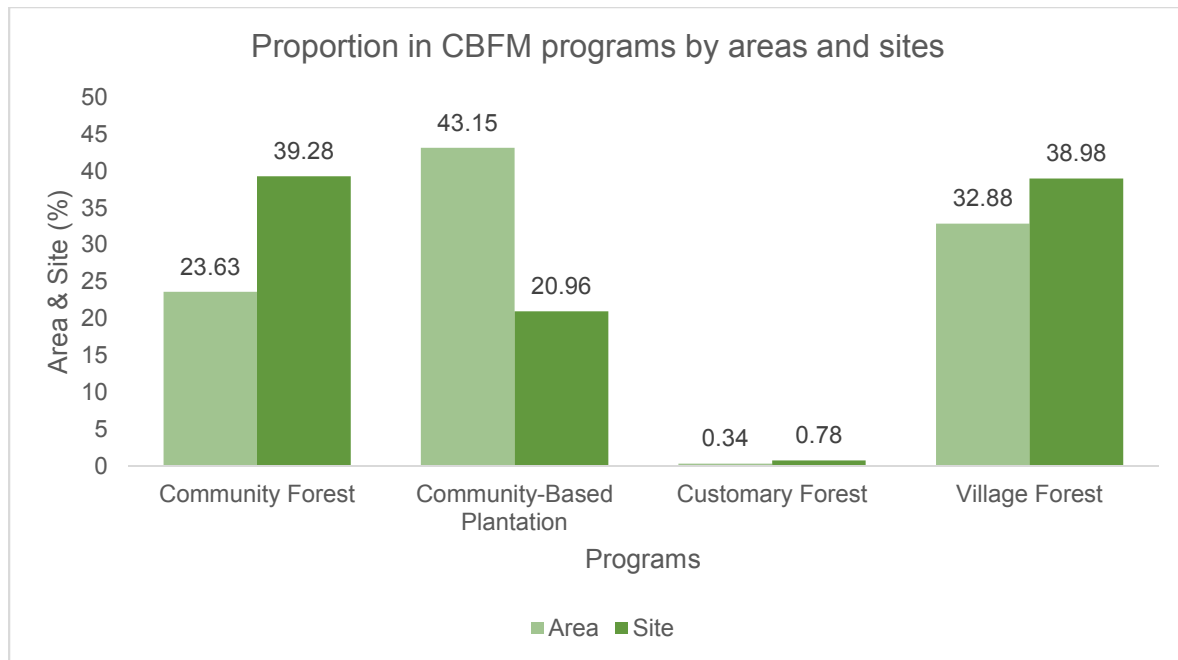


Figure 7 Percentage areas and number of sites of CBFM programs in Indonesia

The four CBFM schemes are identified in Java, Sulawesi, and Sumatera (Figure 8). However, the Customary Forest Program does not have any sites established in the Borneo, Maluku and Papua regions. Based on total areas, Sumatera has the largest land enrolled in CBFM programs (793,100.72 ha). This is followed by Borneo (535,971.99 ha), Sulawesi (333,908.13 ha), Bali and Nusa Tenggara Islands (79,903.60), Maluku and Papua (75,935.79 ha), and Java (2,789.20 ha).

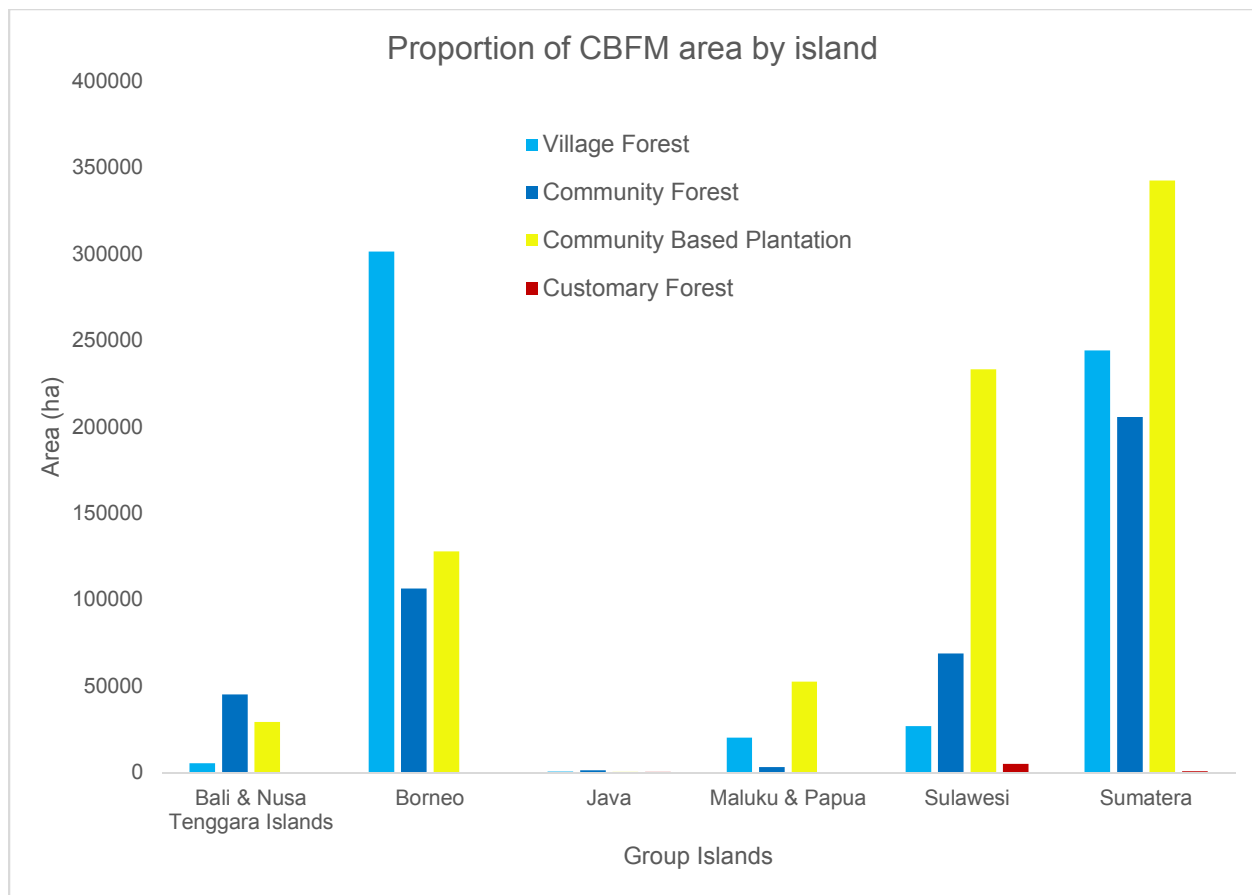


Figure 8 Graph of total areas for CBFM area based on islands in Indonesia

The largest area allocated for the Village Forest Program is in Borneo (301,482.05 ha), and the second is established in Sumatera (244,116.01 ha, Figure 8). Meanwhile, Sumatera also has a large area enrolled in the Community-Based Plantation Program (342,516.18 ha). The second large area in the Community-Based Plantation Program is in Sulawesi (233,181.17 ha). Even though four CBFM programs are established in the Java region, the programs only cover small areas. Examination at the province-level revealed that programs are established two provinces, Yogyakarta and Banten. This suggests that CBFM areas are mostly established on islands that also have other forest governance types, particularly concession activities. Other factors may include objectives of the programs (e.g., rehabilitation and protection functions), which could vary at the provincial level.

4.2. Trends in CBFM and other forest governance areas in Indonesia

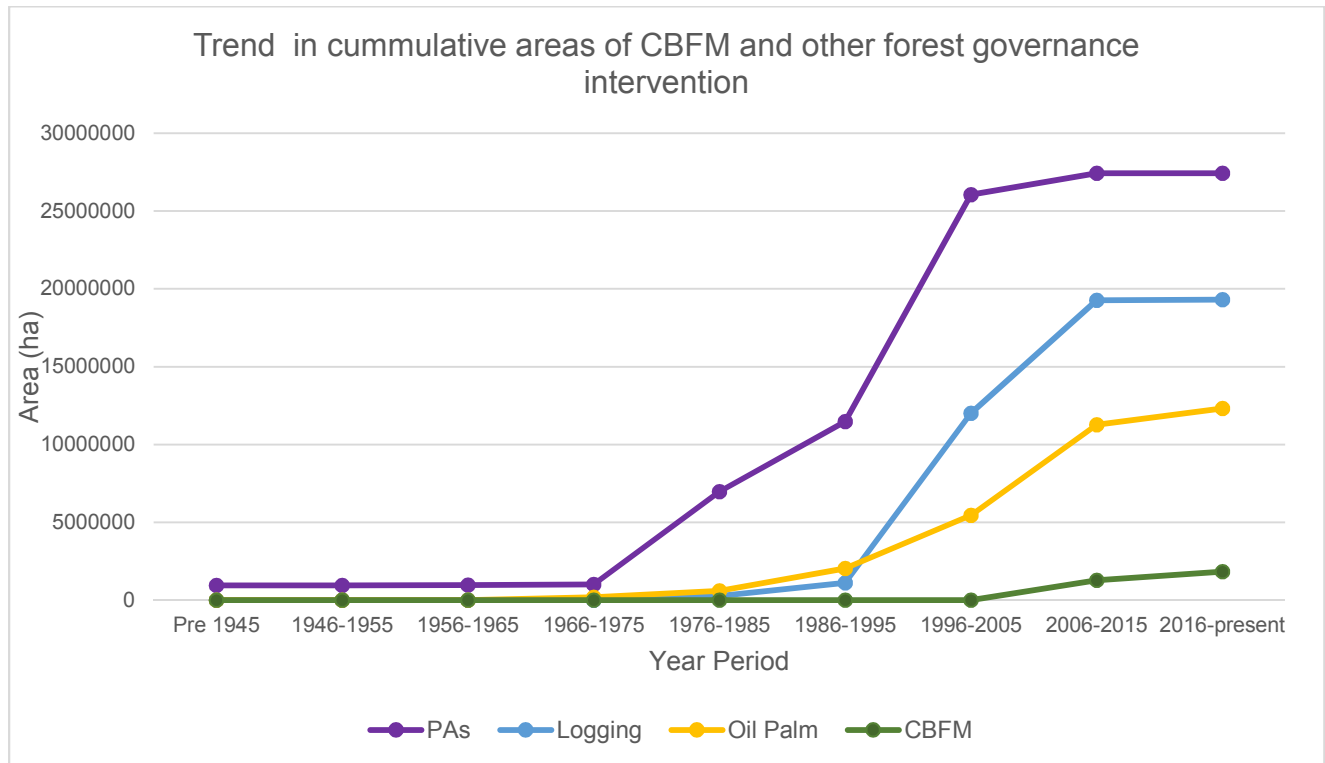


Figure 9 Trends total areas in CBFM and other forest governance intervention in Indonesia over time

Forest governance programs were established at different times in Indonesia (Figure 9). The Protected Areas program was established in 1919 and the last Protected Areas was added in 2013 (based on the data given in table properties). Logging concessions were established in 1978 CBFM and CBFM programs were established in 2007. Finally, palm oil concessions were first established in 1970 (data based on the statistics report published by The Ministry of Agriculture, 2017). There was no important increase in total areas in the early of the establishment of the areas (Figure 9). For example, total Protected Areas were stable before 1960s. However, total Protected Areas increased between the 1960s to 1996. Areas of logging concessions increased between 1986-2015, and oil palm areas showed a fairly constant increase between 1976-2015. However, CBFM programs is slowly increasing. These trends

over time show that the increase in land enrolled in forest governance programs has occurred mainly between the 1970s to the early of the 2010s.

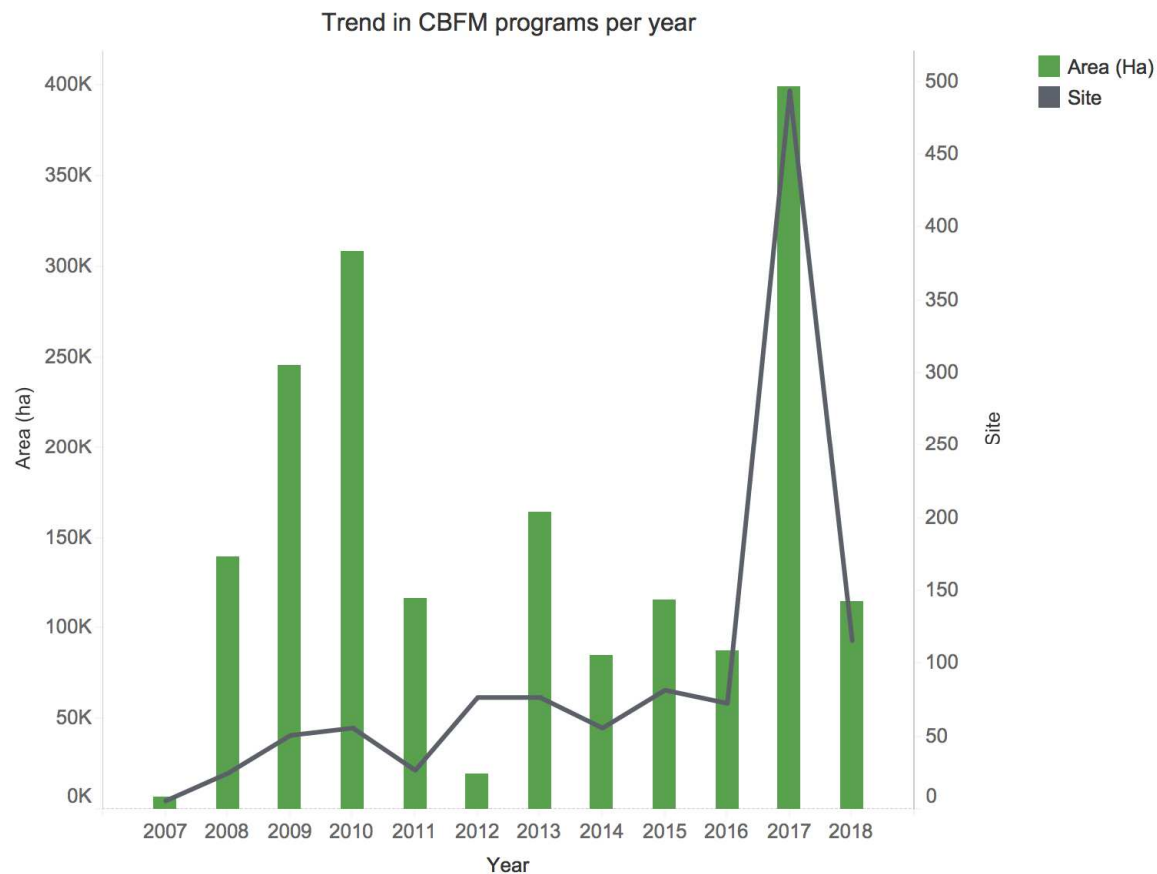


Figure 10 Trends in areas and number of new sites of CBFM program added per year in Indonesia

CBFM programs were documented for the first time in 2007. At that time the total area was 9,490 ha with six locations enrolled. This number, particularly in total areas, increased within the next three years (2007- 2010). However, the programs appeared to have declined in 2012. Even though the total sites increased compared to the previous year (2011), these sites represent a fairly small area (21,195.92 ha). After five years, there was a large increase in 2017 where the government allocated 553,168.55 ha areas for CBFM distributed across the 494 locations. This occurred mostly in Sumatera island (240 sites).

4.3. *Regression Analysis*

Using additional data about population density (BPS Indonesia, 2017), correlations between forest governance and socio-demographic characteristics were examined. To begin (graph a), there was a strong positive correlation between CBFM areas and population density (Figure 12, $R^2 = 0.4936$, $P < 0.0001$), meaning as population density increases, enrolled areas of CBFM increase as well. This indicates that an increase of population density is associated with a higher number of permits issued by the government.

However, there was moderate negative relationship between logging concession areas and population density (Figure 12, $R^2 = 0.4244$, $P < 0.0003$). The scatterplot graph (b) showed that the relationship between logged areas decreases as the population density increases. This was similar in the relationship between logging concessions and CBFM area (c). There is a moderate negative correlation between CBFM areas and logged concession areas (Figure 12, $R^2 = 0.2007$, $P < 0.0143$). This indicates that CBFM areas decrease as logging concession areas increase.

Furthermore, the relationship between forest areas generally and population density is moderately negatively correlated (Figure 12, $R^2 = 0.3931$, $P < 0.0005$). The higher the population area, the less forest area there is in a given province.

A stepwise regression that analyzed population density, island, total area, total forested areas, and palm oil concessions, found that the best predictor (s) to explain total hectares of CBFM is simply population density ($AIC = 239.1$).

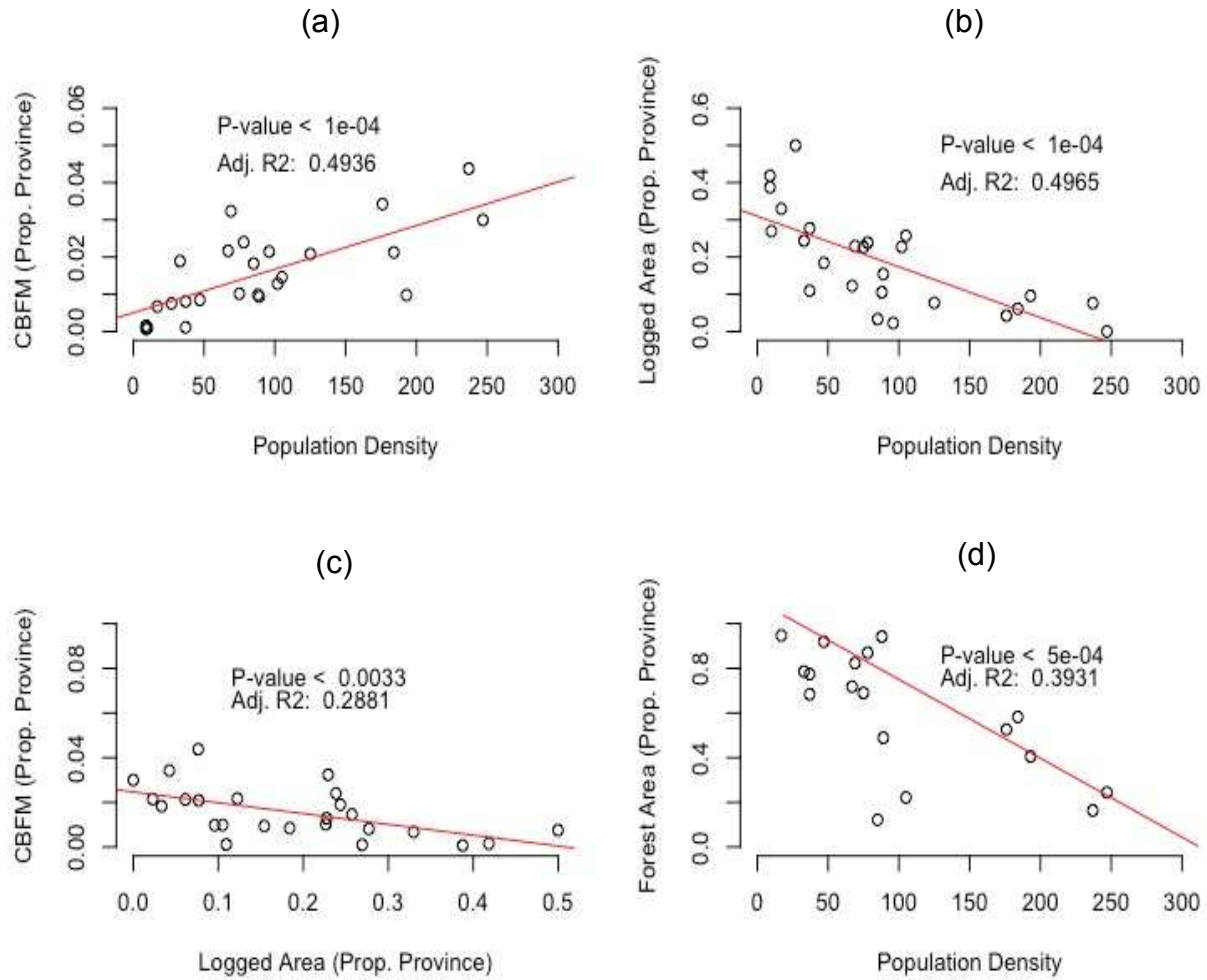


Figure 11 Scatter plots of correlation between CBFM areas and other relevant parameters to estimate the key predictor of patterns in forest governance Indonesia

CHAPTER V DISCUSSION AND CONCLUSION

5.1. *Legal basis in forest tenure and CBFM in Indonesia*

Indonesian government regulations have influenced the roles and rights of locals in the forestry sectors. These policies have also affected lands allocated to communities through various CBFM programs.

The legal regulations in the colonial era became the fundamental basis of the colonial (both in the Dutch era and Japanese era) to expropriate land ownership from local people, and to exploit forest resources (DOF, 1986; Peluso & Poffenberger, 1989). Local citizens were typically labor-providers in the forestry sectors. Boomgaard (1992) stated that exploitation of timber (especially teak or *Jati*) and opening forestlands for coffee plantations became the primary focus of the colonial government. Indigenous rights over their forests and customary boundaries were limited, and communities became forced laborers in the agricultural sectors (*Cultuurstelsel*) (Peluso, 1991). Therefore, forest management during this period was based on the colonial policies, and the primary focus was exploitation of natural resources to support their countries' capital income and economic (Siscawati et al., 2017).

Between 1945-1998 also known as the Old Order Regime and the New Order Regime in Indonesia, the state and the ministerial were fully in control and exclusively managing forestry sectors. The Forestry Law 5/1960 was the primary legal framework in the forestry sector because it elaborated state resource management sovereignty, and it governed three decades of sectoral forestry policies (Colfer & Resosudarmo, 2002). The government gained the mandate to plan and regulate all forest tenure and use arrangements within its jurisdiction. To better emphasize the rights and roles of the government in the forestry sectors, the Law 5/1967 was issued as the beginning of the economic development in Indonesia. This law centered on the authority at the ministry level to designate lands as forests, regulate management, and determine the purpose and use of all forests. As a result, other relevant regulations were issued such as the foreign investment, domestic investment, mining, forest exploitation and forest

product harvesting (Colfer & Resosudarmo, 2002). In 1978, the government released permits to both private and state-owned logging companies as well as to industrial wood fiber or timber plantation companies (Siscawati et al., 2017). By 1990, the government had granted concessions licenses to over 500 companies. This was also related to increased land allocation for concession areas in Indonesia since the 1970s (Figure 9). In this case, it is important to consider that the official concessions may not match land change particularly for logging. The majority of these concession areas were established in Sumatera and Borneo islands.

The new forestry Law 41/1999 recognized the rights and role of local communities as well as indigenous communities. Like other forest user groups (e.g., state enterprise, big business, private companies), forest villagers were now granted equal access for forest use and management. Moreover, large concessionaires whose operation were located near villages were required to work with the local cooperatives (Banjade et al., 2016). Nevertheless, there is debate whether this legal policy was the government's tactic to control forests through government or industry-controlled cooperatives (Colfer & Resosudarmo, 2002). This is partly based on the description given in the document (Article 4) that *"the government (MOEF) was the highest institution to controls and oversees forest territorial function, use, and tenurial arrangements"*. Even though the government recognized indigenous people, their customary forests are still under the government control or as a state forest. Regardless of this debates, Law 41/1999 was the fundamental policy that established CBFM programs in Indonesia.

5.2. Patterns and trends in CBFM: field implementation and challenges

All CBFM programs (Community Forest, Community-Based Plantation, Customary Forest, and Village Forest) are intended to support community livelihoods and help the community to manage forest resources. Since CBFM programs were established in 2000, the programs have had slow progress regarding the total lands enrolled, and the number of sites issued compared to other forest governance types.

In the National Forestry Plan for 2011-2030, the government has allocated forest management areas particularly for large-scale forest utilization (54.52 Mha), protection for natural forests and peatlands (28.40 Mha), conservation areas (23.20 Mha), rehabilitation areas (13.53 Mha), and small-scale timber concessions (6.97 Mha). In contrast, the government has only allocated 5.6 Mha forests for CBFM programs until 2030 (MOEF, 2011). Most of the target areas are in the islands still forested, i.e., Papua, Borneo, Sumatera, Sulawesi, and Maluku. Thus, this national plan has influenced the designation and distribution of forest governance areas in Indonesia.

Another factor is Indonesian politics influencing government regulations in the forestry sectors. In 2011, the government issued new permits and concessions in natural forests because of a moratorium to reduce deforestation (Siscawati et al., 2017). This moratorium was renewed in 2013 and 2015 and covered approximately 68 Mha of forests. Unfortunately, this has been criticized because these areas also include the existing concession lands and Protected Areas. Furthermore, in 2012 MOEF has issued a regulation (Ministry of Forestry Regulation P.6/2012) which transfers a mandate to the 33 governors at the provincial levels regarding forest management. This was also an election year for governor in Indonesia. These political events may have influenced the permits and total areas allocated by the government to CBFM programs, wherein 2012 only small area is allocated for the programs if compare with previous years.

Moreover, challenges have been faced by the farmers and the government institutions to implement the programs. These challenges include the institution level of government and social aspects of local farmers. The targets for areas under these CBFM schemes were not reached because the licensing process was long, bureaucratic and convoluted, and involved multiple actors at different levels (RECOFTC & AWG-SF, 2017; Moelione et al., 2015). The official legal regulation language estimates that the permit process approximately takes 24 official days, but in practice, the licensing of programs is time-consuming and arduous. Once the

communities send an application to the forestry agencies, it could take 2-3 years to complete. This results in a small number of permits issued to local communities per year.

Even though official documents state that the government at the provincial level gained rights to issue the permits, most of the licenses are still granted at the ministerial level. Financial issues and a lack of capacity of the staff might influence the process in issuance the permit (Banjade et al., 2016). Another relevant factor is particular autonomy rights by particular provinces (i.e., Aceh (Law 18/2001), Papua and West Papua (Law 21/2001)). It means that only these provinces seem more capable of implementing this regulation. The rights include the ability to establish regulations and manage the areas, and a specific budget allocation from the central government.

The leadership skills of applicants (farmer groups or village leaders) played essential roles in the decision-making process, especially when they had to deal with the group members and the governments (Moelione et al., 2017). Decisions and voices of a community or a group depend on those actors. A lack of these critical leadership skills sometimes resulted in the low participation of local people in the decision-making process at a high level (government levels). As a result, the negotiation and decision-making process happened primarily through a top-down process.

Some social obstacles occur during the implementation of CBFM programs, such as social strata in a village, a lack of community's skill in implementing program, low capacity of community in securing rights and limited budget to obtain a permit (Banjade et al., 2016; Moeliono et al., 2017; Crevello, 2010; De Royer et al., 2016). The World Agroforestry organization reviewed a CBFM program in Java and found that those involved in the program were the wealthiest community members. These community members had more world experiences, better access to resources (facilities) and capital, they possessed strong ties and networks (particularly with the governments), and they had had acquired entrepreneurial skills. In other words, they had the resources to apply for and implement the program. As a

consequence, many farmers (particularly poor farmers) were not able to enjoy the benefits of the program, and they decided to lease their use-rights to wealthier community members (De Royer et al., 2014).

Even when permits were acquired, the implementation may fail in the first or second year due to limited community skills, such as tree planting knowledge (De Royer et al., 2014). There is very little knowledge-transfer among group members who participate in the same program. Failure is also associated with the roles of the government or NGOs in assisting the communities. A study by USAID (Crevello, 2010) in Borneo reported that early in the program, the government focused more on administrative issues rather than improving the capacity of members via training, to enable implementation of the program. In this case, most of the group members only received partial information about field technique to implement their work plans. Another challenge in applying the program was the limited budgets for obtaining permits. The budget provided by the government was not enough to cover the financial expenditures to administrate the permitting process, particularly in document preparation (Banjade et al., 2016). This financial need increased when the community was asked to revise the documents, which the government did not adequately foresee. Even communities who successfully secured the permits and started to implement the land and forest management plans could only receive moderate benefits from land and forest products because of a lack of access to finances, technology, information, and markets (Banjade et al., 2016; De Royer et al., 2016). In general, this condition occurred when communities relied on the program as their primary income.

This study found that population density is a key predictor of total CBFM area. More population density the greater need or desire to CBFM. This may help programs that are designed with the goal of engaging local people. Furthermore, the island or province that has a large area and forest cover have potential to establish the CBFM programs. For example, Sumatera and Borneo have the greatest potential areas for CBFM because these islands have a large total land area as well as forest cover. These islands are also inhabited by people from

another island, particularly Java, regarding transmigration project by the government (Tsujino et al., 2016). In contrast, CBFM programs in Maluku and Papua cover small areas as well as only a small number of sites issued by the government. Even though these islands have the greatest proportion of forest cover compared to other islands, the islands also have low population density compared to Sumatra or Borneo. In another word, the government could establish a CBFM program closer to villages and more accessible by local communities (De Royer et al., 2016).

Therefore, despite the social and institutional challenges, support from the governments and NGOs as the facilitators are essential to strengthen the capacity of community groups (e.g., providing facilities, giving mentoring and training). Increasing the efforts and space for deliberation among stakeholders and strengthening community institutions and networking for exercising and defending their rights are the key to the success of CBFM programs implementation (CIFOR, 2003).

5.3. Study Limitations

There were obstacles encountered regarding data access and data attributes for spatial analysis. These influenced some of the analysis in this study. First, the spatial information for CBFM programs was only available on the MOEF website. Due to the regulation of MOEF about data use for the public (i.e., data request and access: www.menlhk.go.id), there was a limitation on data downloads. As a result, analysis was based on the table properties from the shapefiles published on the website, and the maps (the underlying layers) were the original files since they were not editable. Thus, supporting data or publication from relevant institutions (the government agencies) were used to verify the results.

The second obstacle for spatial analysis was inconsistency in spatial attributes. Because the spatial information was based on the secondary data sources (i.e., the Indonesian government institutions and non-governmental organizations), there were different spatial attributes or information have identified, e.g., year updated, name and number of sites, year

establishment areas, and unit measurements of the area (in square kilometers or hectares). To minimize the error, a list of data standard has developed (particularly year updated, name or ID of sites, and unit areas in ha). Therefore, spatial tools were set (e.g., Projected Coordinate System, Calculate Geometry) before further analysis. This may have influence results presented in this study, such as establishment year of CBFM and other forest intervention areas (selected results).

Finally, there was overlapping layers of some shapefiles identified in different provinces. Specifically, the shapefiles presenting protected areas, natural forests, and non-forestlands had some discrepancies. This might affect the total number of areas and sites from these data in each province and whole Indonesia, however, area based measures (the basis of our primary analysis) are not impacted because of our GIS approach. To avoid double calculation in the analysis as well as multiple layers on the maps, we conducted data checking before the analysis (i.e., CLIP Tool, re-calculated Geometry).

APPENDICES

APPENDIX A

Table 3 Data sources

Category	Institution	Website	Data Type
Government Institutions of Indonesia	Ministry of Environment and Forestry <i>Kementerian Lingkungan Hidup dan Kehutanan</i>	www.menlhk.go.id	Documents (laws/regulations, annual report), spatial data (CBFM)
	Ministry of Agriculture <i>Kementerian Pertanian</i>	http://www.pertanian.go.id	Document (annual report)
	BPS-Statistic Indonesia <i>Badan Pusat Statistik Indonesia</i>	www.bps.go.id	Document (annual report)
Non-Governmental Organizations	World Resources Institutes	www.forestlegality.org/risk-tool/country/indonesia	Document (laws/regulations)
	Center for International Forestry Research	www.cifor.org	Document (reports)
	World Agroforestry Centre: Indonesia	www.worldagroforestry.org	Document (reports)
	The Center for People and Forest	www.recoftc.org	Document (reports)
	The United States Agency for International Development	www.usaid.gov	Document (reports)
	World Database on Protected Areas	www.protectedplanet.net	Spatial data (protected areas)
	Global Forest Watch	www.globalforestwatch.org	Spatial data (forest and governance areas)
	Map for Environment	www.mapforenvironment.org	Spatial data (governance areas)
	ESRI	www.esri.com	Spatial data (administrative boundaries)

APPENDIX B

Table 4 Legal documents on forestry sectors in Indonesia

Category	Title (English and Native Language/Indonesia)
Law	<i>Plaque Document September 8, 1803.</i> <i>Dokumen Plakat Tanggal 8 September Tahun 1803 tentang</i>
	<i>Agrarian Regulation 1870 (De Agrarische Wet 1870).</i> <i>Undang-Undang Agraria Tahun 1870</i>
	Law 5 of 1960 concerning Basic Regulations on Agrarian Principles, amended by Law 5 of 1967 concerning Basic Forestry Law, amended by Law 41 of 1999. <i>Undang-Undang Nomor 5 Tahun 1960 tentang Peraturan Dasar Pokok-Pokok Agraria, diubah dengan Undang-Undang Nomor 5 Tahun 1967 tentang Ketentuan-ketentuan Pokok Kehutanan, diubah dengan Undang-Undang Nomor 41 Tahun 1999.</i>
Government Regulation	Government Regulation 6 of 2007, amended by Government Regulation 3 of 2008 concerning Forest Management and Preparation of Forest Management Plans and Forest Utilization. <i>Peraturan Pemerintah Nomor 6 Tahun 2007, diubah dengan Peraturan Pemerintah Nomor 3 Tahun 2008 tentang Tata Hutan dan Penyusunan Rencana Pengelolaan Hutan, Serta Pemanfaatan Hutan.</i>

Table 4 (cont'd)

Category	Title (English and Native Language/Indonesia)
Ministerial Regulation/ Decree/Letter	Directorate of State-Owned Forest Enterprise Decree 1061 of 2000 concerning Community-Based Forest Management, amended by Committee of State-Owned Forest Enterprise Decree 136 of 2001 concerning Community-Based Forest Management, amended by Directorate of State-Owned Forest Enterprise Decree 268 of 2007 concerning Guidance on Community-Based Forest Resources Management Plus, amended by Directorate of State-Owned Forest Enterprise Decree 682 of 2009 concerning Guidance on Community-Based Forest Management.
	<i>Keputusan Direksi Perum Perhutani Nomor 1061 Tahun 2000 tentang Pengelolaan Hutan Berbasis Masyarakat, diubah dengan Keputusan Dewan Pengawas Perum Perhutani Nomor 136 Tahun 2001 tentang Pengelolaan Sumberdaya Hutan Bersama Masyarakat, diubah dengan Keputusan Direksi Perum Perhutani Nomor 268 Tahun 2007 tentang Pedoman Pengelolaan Sumberdaya Hutan Bersama Masyarakat Plus (PHBM Plus), diubah dengan Keputusan Direksi Perum Perhutani Nomor 682 Tahun 2009 tentang Pedoman Pengelolaan Sumberdaya Hutan Bersama Masyarakat.</i>
	Ministry of Forestry Regulation 23 of 2007 concerning Procedures for Application of Utilization Forest Products in Community-Based Plantation Forest, amended by Ministry of Forestry Regulation 83 of 2016 concerning Social Forestry.
	<i>Peraturan Menteri Kehutanan Nomor 23 Tahun 2007 tentang Tata Cara Permohonan Izin Usaha Pemanfaatan Hasil Hutan Kayu dalam Hutan Tanaman Rakyat dalam Hutan Tanaman, diubah dengan Peraturan Menteri Kehutanan Nomor 83 Tahun 2016 tentang Perhutanan Sosial.</i>
	Ministry of Forestry Regulation 37 of 2007, amended by Ministry of Forestry Regulation 88 of 2014 concerning Community Forest. <i>Peraturan Menteri Kehutanan Nomor 37 Tahun 2007, diubah dengan Peraturan Menteri Kehutanan Nomor 88 Tahun 2014 tentang Hutan Kemasyarakatan.</i>
	Ministry of Forestry Regulation 49 of 2008, amended by Ministry of Forestry Regulation 89 of 2014 concerning Village Forest. <i>Peraturan Menteri Kehutanan Nomor 49 Tahun 2008, diubah dengan Peraturan Menteri Kehutanan Nomor 89 Tahun 2014 tentang Hutan Desa.</i>

Table 4 (cont'd)

Category	Title (English and Native Language/Indonesia)
	<p>Joint Regulations of Ministry of Internal Affairs (79 of 2014), Ministry of Forestry (11 of 2014), Ministry of Public Works (17/2014), and National Land Agency (8 of 2014) of Indonesia concerning Procedures for Settlement of Land Tenure within the Forest Estate.</p> <p><i>Peraturan Bersama Menteri Dalam Negeri (Nomor 79 Tahun 2014), Menteri Kehutanan (Nomor 11 Tahun 2014), Menteri Pekerjaan Umum (Nomor 17 Tahun 2014), dan Kepala Badan Pertanahan Nasional (Nomor 8 Tahun 2014) Republik Indonesia tentang Tata Cara Penyelesaian Penguasaan Tanah yang Berada Di Dalam Kawasan Hutan.</i></p>
	<p>Ministry of Forestry Letter 1 of 2013 concerning Constitutional Court Decree 35 of 2012.</p> <p><i>Surat Menteri Kehutanan Nomor 1 Tahun 2013 tentang Keputusan Mahkamah Konstitusi Nomor 35 Tahun 2012.</i></p>
Decree	<p>Constitutional Court Decree 35 of 2012 concerning Review Law 41 of 1999 on Forestry. <i>Keputusan Mahkamah Konstitusi Nomor 35 Tahun 2012 tentang Pengujian Konstitusional Undang-Undang Kehutanan Nomor 41 Tahun 1999.</i></p>

APPENDIX C

Table 5 Data of forest, forest governance types, and population density (GIS and statistical data)

Group Island	Province	Inland (ha)	Intact Forest		Dry Forest		Swamp Forest		Peatland	
			Area (ha)	Site	Area (ha)	Site	Area (ha)	Site	Area (ha)	Site
Sumatera	Aceh	5709956.36	1659525.35	6	3405625.44	1174	98928.79	140	216288.77	39
Sumatera	Sumatera Utara	7256395.52	465895.45	3	2019189.44	748	62445.38	104	395091.99	33
Sumatera	Sumatera Barat	4176826.30	1637509.21	8	3263132.47	713	36002.55	57	102493.84	15
Sumatera	Riau	8998170.88	350819.65	4	892979.44	337	992543.52	742	3971788.78	82
Sumatera	Jambi	4914192.14	1144943.4	3	1831258.75	912	189274.3	104	880019.91	11
Sumatera	Sumatera Selatan	8693682.69	929788.12	4	1738280.19	209	132649.77	79	1452099.86	50
Sumatera	Bengkulu	2021391.31	929788.12	4	1578830.28	254	0	0	12835.65	4
Sumatera	Lampung	3378053.43	141110.48	2	321761.85	225	40364.43	15	49514.58	6
Sumatera	Bangka Belitung	1676271.24	0	0	114890.52	180	43975.75	67	44928.37	24
Sumatera	Kepulauan Riau	847523.76	0	0	175848.84	359	22844.97	80	8170.92	7
Borneo	Kalimantan Barat	14701917.13	4432151.01	3	4360261.85	2160	1076959.29	1154	1678905.69	176
Borneo	Kalimantan Tengah	15371378.73	4452999.65	3	5507848.9	1041	1759698.53	806	2837953.23	122
Borneo	Kalimantan Selatan	3739143.51	0	0	671581.17	287	14689.64	16	143349.84	5
Borneo	Kalimantan Timur	12697691.85	8488896.72	3	6175045.95	802	135502.85	120	165536.37	32
Borneo	Kalimantan Utara	6996889.17	4117040.18	5	5386859.21	529	217141.27	146	170744.7	16
Sulawesi	Sulawesi Utara	1462384.93	224816.14	1	544201.39	242	0	0	0	0
Sulawesi	Sulawesi Tengah	6120950.21	1897485.62	12	3725780.87	1394	6068.34	16	0	0
Sulawesi	Sulawesi Selatan	4648331.713	1308120.94	3	1397806.31	431	43.03	2	0	0
Sulawesi	Sulawesi Tenggara	3634805.35	757305.17	4	1847151.67	511	6169.64	16	0	0
Sulawesi	Gorontalo	1199661.57	655722.93	3	689313.92	87	0	0	0	0
Sulawesi	Sulawesi Barat	1620336.91	663560.31	2	745918.42	215	191.83	4	0	0

Table 5 (cont'd)

Group Island	Province	Inland (ha)	Intact Forest		Dry Forest		Swamp Forest		Peatland	
			Area (ha)	Site	Area (ha)	Site	Area (ha)	Site	Area (ha)	Site
Maluku and Papua	Maluku	4666921.84	818615.24	7	2778063.51	830	18074.11	21	0	0
Maluku and Papua	Maluku Utara	3170498.08	231968.71	4	1932823.34	610	4157.79	10	0	0
Maluku and Papua	Papua Barat	9601730.43	3529206.71	20	7269386.495	1744	773650.29	505	1026114.3	348
Maluku and Papua	Papua	31703289.29	13401504.04	68	18943839.56	4074	5470381.49	2456	2654612.79	536
Bali and Nusa Tenggara	Bali	572026.33	0	0	93402.06	53	0	0	0	0
Bali and Nusa Tenggara	Nusa Tenggara Barat	2024684.09	0	0	804719.37	345	0	0	0	0
Bali and Nusa Tenggara	Nusa Tenggara Timur	4785444.69	0	0	1959069.91	732	770.86	6	0	0
Java	DKI Jakarta	68286.79	0	0	0	0	0	0	0	0
Java	Jawa Barat	3759438.57	0	0	208144.6	95	0	0	0	0
Java	Jawa Tengah	3493353.47	0	0	101200.7	62	0	0	0	0
Java	DI Yogyakarta	324048.99	0	0	1725.24	5	0	0	0	0
Java	Jawa Timur	4898381.96	0	0	431345.92	175	14.47	1	0	0
Java	Banten	947720.74	0	0	94456.18	43	0	0	0	0

Table 5 (cont'd)

Group Island	Province	CBFM-Village Forest		CBFM-Community Forest		CBFM-Community Based Plantation		CBFM-Customary Forest	
		Area (ha)	Site	Area (ha)	Site	Area (ha)	Site	Area (ha)	Site
Sumatera	Aceh	10196.98	5	26110.16	11	20011.8	9	0	0
Sumatera	Sumatera Utara	4191.94	13	3620.72	17	63103.57	14	0	0
Sumatera	Sumatera Barat	62253.45	58	17081.91	25	7725.18	4	0	0
Sumatera	Riau	32801.34	20	3305.41	9	55316.66	7	0	0
Sumatera	Jambi	96320.74	39	4011.12	17	57767.6	28	832	5
Sumatera	Sumatera Selatan	32208.32	22	6658.75	11	42393.64	8	0	0
Sumatera	Bengkulu	3478.11	4	16865	9	23016.69	2	0	0
Sumatera	Lampung	2014.48	22	117431.79	52	28383.02	6	0	0
Sumatera	Bangka Belitung	650.65	3	7671.99	18	22277.42	22	0	0
Sumatera	Kepulauan Riau	0	0	2879.68	3	22520.6	3	0	0
Borneo	Kalimantan Barat	149630.06	47	85217.63	12	43181.21	7	0	0
Borneo	Kalimantan Tengah	51610.49	20	12654.71	9	38879.93	22	0	0
Borneo	Kalimantan Selatan	17126.74	13	6388.9	17	30898.61	6	0	0
Borneo	Kalimantan Timur	78694.81	18	1981.81	3	15066.26	5	0	0
Borneo	Kalimantan Utara	4419.95	8	220.88	2	0	0	0	0
Sulawesi	Sulawesi Utara	0	0	1652.64	13	48391.41	9	0	0
Sulawesi	Sulawesi Tengah	10135.73	19	13174	20	23659.35	6	4973.99	2
Sulawesi	Sulawesi Selatan	15688.72	58	39888.84	45	43227.03	14	0	0
Sulawesi	Sulawesi Tenggara	0	0	6727.58	15	72089.47	9	0	0
Sulawesi	Gorontalo	1104.63	6	1109.38	3	13202.31	5	0	0
Sulawesi	Sulawesi Barat	0	0	6271.45	9	32611.6	7	0	0
Maluku and Papua	Maluku	1806.51	5	2597.17	6	752.89	1	0	0
Maluku and Papua	Maluku Utara	1033.21	7	492.85	2	24120.45	4	0	0

Table 5 (cont'd)

Group Island	Province	CBFM-Village Forest		CBFM-Community Forest		CBFM-Community Based Plantation		CBFM-Customary Forest	
		Area (ha)	Site	Area (ha)	Site	Area (ha)	Site	Area (ha)	Site
Maluku and Papua	Papua Barat	14584.19	3	0	0	0	0	0	0
Maluku and Papua	Papua	2848.86	1	0	0	27699.66	2	0	0
Bali and Nusa Tenggara	Bali	5449.39	1	189.7	6	385.31	5	0	0
Bali and Nusa Tenggara	Nusa Tenggara Barat	0	0	7311.98	31	4457.03	5	0	0
Bali and Nusa Tenggara	Nusa Tenggara Timur	0	0	37634.45	34	24475.74	3	0	0
Java	DKI Jakarta	0	0	0	0	0	0	0	0
Java	Jawa Barat	0	0	0	0	0	0	0	0
Java	Jawa Tengah	0	0	0	0	0	0	0	0
Java	DI Yogyakarta	635.68	6	1284	2	407.52	1	0	0
Java	Jawa Timur	0	0	0	0	0	0	0	0
Java	Banten	0	0	0	0	0	0	462	1

Table 5 (cont'd)

Group Island	Province	Protected Area		Logging Concession		Oil Palm Concession		Wood Fiber Concession	
		Area (ha)	Site	Area (ha)	Site	Area (ha)	Site	Area (ha)	Site
Sumatera	Aceh	3682177.993	12	438183.37	15	302088.37	82	162787.53	13
Sumatera	Sumatera Utara	3640401.496	23	342988.55	23	314982.34	80	351839.74	24
Sumatera	Sumatera Barat	1109369.743	23	177288.95	4	241337.75	48	144263.51	9
Sumatera	Riau	655475.5983	17	289518.49	34	2248109.76	457	1749651.05	104
Sumatera	Jambi	4681350.743	14	144009.19	6	417311.95	66	982805.35	55
Sumatera	Sumatera Selatan	4889759.89	13	153459.1	5	404927.71	81	1187318.61	54
Sumatera	Bengkulu	854597.4073	29	38319.4	2	154597.46	29	7619.82	1
Sumatera	Lampung	3101767.007	7	0	0	99080.3	14	258108.4	11
Sumatera	Bangka Belitung	35435.80646	6	0	0	30038.43	45	55923.89	3
Sumatera	Kepulauan Riau	37554.16395	8	0	0	54628.91	13	0	0
Borneo	Kalimantan Barat	1594632.488	19	1410093.38	48	4471199.89	591	2173659.43	100
Borneo	Kalimantan Tengah	2297195.131	9	4339052.41	89	3345359.05	460	730779.34	31
Borneo	Kalimantan Selatan	206685.3017	11	378668.46	9	397483.54	127	583473.59	41
Borneo	Kalimantan Timur	1473647.227	11	4810827.33	115	2599241.76	823	1535560.73	62
Borneo	Kalimantan Utara	1281243.083	1	2356064.61	35	702417.69	152	356150.15	12
Sulawesi	Sulawesi Utara	350955.667	10	57461.43	2	7661.19	2	4665.05	1
Sulawesi	Sulawesi Tengah	969840.7206	24	1026512.57	30	247010.66	29	99958.95	9
Sulawesi	Sulawesi Selatan	502475.5818	21	185439.79	3	23700.85	7	99599.49	16
Sulawesi	Sulawesi Tenggara	315570.2336	20	300556.75	7	38967.16	4	144815.56	4
Sulawesi	Gorontalo	374990.3217	6	188185.14	6	54150.93	7	84743.96	3
Sulawesi	Sulawesi Barat	214923.4137	4	363692.24	8	71276.69	12	22921.08	6
Maluku and Papua	Maluku	457125.8417	18	477958.11	17	11923.84	10	33015.31	1
Maluku and Papua	Maluku Utara	218689.6593	8	867156.82	27	48774.01	11	11643.19	1
Maluku and Papua	Papua Barat	1818837.95	30	4017674.16	67	457744.6	38	0	0
Maluku and Papua	Papua	9435820.504	25	6898341.47	49	2735703.93	119	1642268.45	19
Bali and Nusa Tenggara	Bali	21581.96718	8	0	0	0	0	0	0
Bali and Nusa Tenggara	Nusa Tenggara Barat	188183.9016	28	0	0	0	0	0	0

Table 5 (cont'd)

Group Island	Province	Protected Area		Logging Concession		Oil Palm Concession		Wood Fiber Concession	
		Area (ha)	Site	Area (ha)	Site	Area (ha)	Site	Area (ha)	Site
Bali and Nusa Tenggara	Nusa Tenggara Timur	423364.8946	36	0	0	0	0	0	0
Java	DKI Jakarta	493.642189	5	0	0	0	0	0	0
Java	Jawa Barat	191338.3127	49	0	0	0	0	0	0
Java	Jawa Tengah	18608.39799	36	0	0	0	0	0	0
Java	DI Yogyakarta	7991.020271	8	0	0	0	0	0	0
Java	Jawa Timur	231198.8142	27	0	0	0	0	0	0
Java	Banten	207571.9449	9	0	0	0	0	0	0

Table 5 (cont'd)

Group Island	Province	Other Plantation Areas		Non-Forestland		Population Density
		Area (ha)	Site	Area (ha)	Site	
Sumatera	Aceh	159273.39	103	2259236.47	315	88
Sumatera	Sumatera Utara	255337.47	240	3378016.19	280	193
Sumatera	Sumatera Barat	303398.04	68	1691142.73	244	125
Sumatera	Riau	1420380.79	858	13774.957	60	75
Sumatera	Jambi	704676.48	203	2558582.16	443	69
Sumatera	Sumatera Selatan	1779276.39	604	4629910.48	604	89
Sumatera	Bengkulu	191608.47	99	1081542.81	95	96
Sumatera	Lampung	735480.58	178	2431650.47	76	237
Sumatera	Bangka Belitung	55683.24	126	975841.903	183	85
Sumatera	Kepulauan Riau	34695.41	60	0*	0*	247
Borneo	Kalimantan Barat	630786.77	460	5637282.78	371	33
Borneo	Kalimantan Tengah	284608.77	99	1206424.28	287	17
Borneo	Kalimantan Selatan	296753.12	61	1937784.98	660	105
Borneo	Kalimantan Timur	315945.34	160	3922679.75	2329	27
Borneo	Kalimantan Utara	54730.04	50	1213949.57	1375	9
Sulawesi	Sulawesi Utara	269679.76	71	696354.964	96	176
Sulawesi	Sulawesi Tengah	206414.03	232	1859270.45	788	47
Sulawesi	Sulawesi Selatan	131980.16	113	2323658.47	584	184
Sulawesi	Sulawesi Tenggara	61316.72	101	1154663.99	289	67
Sulawesi	Gorontalo	27571.72	27	360131.462	128	102
Sulawesi	Sulawesi Barat	32061.41	94	490143.186	197	78
Maluku and Papua	Maluku	38003.84	114	285918.104	301	37
Maluku and Papua	Maluku Utara	233449.39	80	279390.532	1548	37
Maluku and Papua	Papua Barat	24375.11	9	253997.165	305	9
Maluku and Papua	Papua	77223.9	22	652466.441	441	10

Table 5 (cont'd)

Group Island	Province	Other Plantation Areas		Non-Forestland		Population Density
		Area (ha)	Site	Area (ha)	Site	
Bali and Nusa Tenggara	Bali	44315.84	15	435729.996	92	727
Bali and Nusa Tenggara	Nusa Tenggara Barat	9919.68	30	749951.745	210	264
Bali and Nusa Tenggara	Nusa Tenggara Timur	40099.55	85	3011066.53	179	107
Java	DKI Jakarta	0	0	65381.0089	7	15478
Java	Jawa Barat	103441.96	198	2903810.34	374	1339
Java	Jawa Tengah	189383.7	420	2801962.94	640	1037
Java	DI Yogyakarta	21410.88	9	300507.464	13	1188
Java	Jawa Timur	85242.54	303	3409582.58	432	817
Java	Banten	25424.57	67	739536.075	36	1263

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