EVALUATION ON GOVERNMENT'S REFORESTATION PROGRAMME IN INDONESIA

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Abstract

Even though the Government of Indonesia invests billions of rupiah to combat deforestation, the extent to which deforestation has declined as a result of the programs is questionable. The current research identifies aspects of Indonesia's forest management in the early stages when its administration was decentralised, and investigates how this may have interacted with forest programme design and administration to decrease or increase deforestation in Indonesia.

The study analyses changes in rates of forest cover in Indonesia and their association with local government forestry expenditure (FE) and other factors that directly and indirectly contribute to the effectiveness of FE. Linear regression results, based on 2007–10 national data, indicate that forest expenditure has not been effective in reducing deforestation even after factors found to be correlated with forest loss—such as population growth, population density and initial forest cover proportions—are controlled for.

Qualitative analysis for data from 1999 to 2013 from five provinces (two timber producing and three non-timber-producing provinces), provides contextual explanations of why FE is ineffective in decreasing deforestation. In fact, the overall results show that the government has helped contribute to deforestation by incentivising unsustainable transmigration development, palm oil plantation development, mining and timber logging. The absence of government policy to control population density, population growth, settlement extension, rural and urban poverty gaps, tree crop

expansion, property rights, land use allocation, and corruption also contribute to an increase in the Indonesian deforestation rate.

Key words: decentralisation, driving forces of deforestation, government policy, qualitative, quantitative, tropical forest.

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Dedication

This thesis is dedicated to my father. Mohammad Ichsan. Your love, care, example and dedication always lead my life.

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List of Abbreviations

1BTP	1 billion trees planted (*penanaman 1 juta pohon*)
AMAN	Indigenous People's Alliance of the Archipelago (*Aliansi Masyarakat Adat Nusantara*)
BKPM	Funding Investment Coordination Agency (*Badan Koordinasi Penanaman Modal*)
DAK *kehutanan*	Special Allocation Fund in Forestry (*Dana Alokasi Khusus kehutanan*)
DBH-DR	Revenue Sharing from Reforestation Fund (*Dana bagi Hasil - Dana Reboisasi*)
DJR	Reforestation Guarantee Fund (*Dana Jaminan Reboisasi*)
DR	Reforestation Fund (*Dana Reboisasi*)
FE	forestry expenditure
GDP	gross domestic product
GNRHL	National Movement for Forest and Land Rehabilitation (*Gerakan Nasional rehabilitasi hutan dan lahan*)
HPH	small-scale timber concessionaires (*Hak pengusahaan hutan*)
HTR	community-owned plantation (*Hutan tanaman rakyat*)

IDR	Indonesian Rupiah rate
IIUPHH	forest product utilisation business permit fee (*Iuran izin usaha pemanfaatan hasil hutan*)
IPK	timber-utilisation permit (*Izin Pemanfaatan Kayu*)
KP	mining concession (*kuasa pertambangan*)
KPK	Corruption Eradication Commission (*Komisi Pemberantasan Korupsi*)
LPP	limited production forest
NGO	non-government organisation
PE	programme evaluation
PPM	community garden plantation (*penanaman pekarangan masyarakat*)
PSDH	forest resources provision (*Provisi sumber daya hutan*)
US	United States of America

Chapter 1: Introduction

1.1. Background

In 1998, the Soeharto government was forced to step down and a new government was established. This new government introduced a decentralisation mechanism to expedite the success of programmes to decrease deforestation rates. New laws, regulations and budget reports were introduced to increase the flexibility and readiness of the government apparatus, business and people involved in sustainable forest management. Forestry Law 41/1999 adopted the goals of sustainable forest function and local economic development. Changes in budget reporting styles increased transparency and accountability of government money management. The old timber logging control—the Reforestation Guarantee Fund (*Dana Jaminan Reboisasi*, or DJR)—was revisited to ensure it employed new decentralisation mechanisms, with more transparency and accountability attached.

Efforts to decrease deforestation are important because since 2000, Indonesia has the third largest area of rainforest in the world (Rieley in Barr et al. 2010) and is also the world's highest emitter of greenhouse gases as a result of land use changes (Barr et al., 2010). Deforestation in Indonesia is affected by population and agriculture-dependent economic conditions. The country, according to United States Census Bureau (n.d) has the fourth largest population in the world, with 251,160,124 people spread over 17,000 islands (National Statistic 2013). The economy relies on timber logging, mining and plantations. The forest is primarily tropical forest, which has a crucial function in

carbon storage and climate control at a global level. The alarming loss of Earth's tropical forest cover over the past three to five decades (Benhin 2006)—13.5 million ha per year—(Kobayashi 2001) has encouraged many researchers and institutions to find ways to reduce the loss of tropical forest cover. This means that governments of countries with tropical forests are subject to international and national pressure to decrease deforestation.

In Indonesia, decreasing deforestation is a long-term process. From 1965 to 1998, management of forests was seriously unsustainable and centralised. In the 1980s, on the island of Java, policy required that all rice be provided at a national level. This created demand for suitable land and people for paddy plantations and initiated a massive forest conversion into paddy plantations. Committing a larger percentage of land to agriculture to satisfy national rice demands created devastating land use changes. This policy resulted in an industrial (massive production) culture that replaced a subsistence culture (Reni 2011). This industrial development is an integral part of the technological discoveries that drove the changes in society. Therefore, Reni (2011) proposed that industrialisation and the absence of community control drove further increased in deforestation in recent years due to the increasing needs of a large number of people who value money over conservation in Java.

Rapid forest conversion also took place on islands outside Java. Government policies focused on forest extraction—that is, industrial timber, mining and palm oil plantation development— that cause deforestation. In these regions, high-quality natural timber and mining products and suitable land for palm oil plantations are located. The globally high demand for, and high prices of, pulp products, mining products and palm oil

prompted massive timber logging, mining developments in forests and palm oil development. These massive incentives were the likely cause of massive deforestation from 1985 to 1997 when according to Ministry of Forestry the highest deforestation rate was recorded to 1.6 million hectare each year in three islands: Sumatra, Kalimantan and Sulawesi.

In 1998, the government initiated a more effective mechanism for timber logging control, to limit deforestation. The old mechanism of the DJR (1980 to 1997) forced concessionaires to commit funds to guarantee reforestation of their concession area. However, the mechanism was not equipped with sanctions on the absence of fee payment and failure to meet reforestation obligations. Also, deforestation was worsened by the fact that the President had authority to use the DJR for non-forestry purposes.

The job of addressing deforestation and its devastating impacts in all regions was thus left to subsequent governments. However, the forest policy of the current government is still influenced by its reliance on forest products and adjustments to decentralisation. As a developing country, Indonesia's economy is agriculture based. The agricultural industry provides jobs for more than 40 per cent of the working-age population (Statistics Indonesia 2004–13). Agricultural output represents around 15 per cent of total gross domestic product (GDP) (Statistics Indonesia 2001–13). Between 2001 and 2013, oil, gas, mining and quarrying outputs also represented 15 per cent of GDP (Statistics Indonesia 2001–2013). Even though, the percentage of people living in poverty between 2007 and 2012 in rural areas decreased from 20.37 to 15.12 per cent; Statistics Indonesia 2007–2012, the gap between rural areas and cities widened. Over the same period, the percentage of poverty in cities increased from 8.87 to 12.52 per

cent (Statistics Indonesia 2007–2012). This suggests that the number of poor people in rural areas who depend on forests has increased. In addition, large oil and gas mining and quarrying outputs place extra pressure on forests.

The government did bring about a fundamental change in forest management by the introduction of Forestry Law 41/1999, which adopted as its goals sustainable forest function and local economic development. Enactment of regulations to guide sustainable forest management, including the technical forest and re-planting mechanism, has been continuously taking place. The current government empowers the forestry ministry to be responsible for forest management, in providing detailed guidance, regulation and forest data management to shape land and forest rehabilitation. In 2000, the government brought in a fundamental change, in the form of a decentralised budget-allocation mechanism based on revenue sharing. Changes in budget reporting styles took place in 2003 and 2007 to satisfy the need for transparency and accountability in government money management. The DJR was revised and a new scheme called DR (Dana Reboisasi or Reforestation Fund) was introduced to incorporate a decentralisation mechanism, with more transparency and accountability attached. A larger degree of authority over forest management, which includes the control of forest uses, has been approved. However, Burgess (2012) and Casson and Obidinzky (2002) have shown that the readiness of the apparatus, business and the community to carry out sustainable development has not yet been formed. An evaluation the effectiveness of current programmes is therefore timely.

1.2. Scope of the Study

This study aims to evaluate forestry programmes using the method involving the driving factors of deforestation proposed by Geist and Lambin (2002) as a model for outcome evaluation. This study focuses on analysing forest management in the current decentralization era (1999 to 2013). As is usual in programme evaluation, programme input, output and outcome are evaluated. The input in this study is governmental forestry expenditure (FE). It comes from the expenditure in provincial and district budget that are spent on forestry. Since one of the aims of FE is to combat deforestation, it is important to study what impact of money spent for forestry (FE) in reducing deforestation. Therefore, this study use driving force of deforestation output to measure path to achieve its effectiveness. The output is included all the changes in the driving factors of deforestation (demography, infrastructure extension, wood extraction, economic structure, technological, policy, institutional, cultural and other factors). Finally, this study chose to select deforestation rate as its outcome. Progress and extent in deforestation as well as reforestation is included as the outcome in this study. The selection of an input–output–outcome model in this study is based on the most current method of several forestry evaluations in Indonesia, such as Burgess (2012), Casson and Obidinzky (2002) and Palmer and Engel (2007).

The evaluation considers spatial conditions in Indonesia's forest management, which are based on quantity of forest cover. Timber-producing provinces are those that should meet specified natural forest cover levels determined by the central government, while non-timber-producing provinces have not met these criteria. Therefore, the timber-

producing provinces have large and stable shares of FE, in accordance with their contribution to FE.

Empirical assessments of government forestry policy typically focus on cross-country analysis, and use satellite images and socio-economic data to assess trends. In Indonesia, studies such as those by Arnold (2000), Burgess et al. (2002) and Wicke (2012) have focused on agriculture policy (timber, palm oil and mining) and its institutional changes in timber-producing provinces only.

1.3. Research Questions and method

Due to the importance of forests to economic development generally and in Indonesia particularly, this thesis will conduct its own evaluation of Indonesian reforestation programmes. Due to complexity of data and stakeholders, this study chooses to use mixed method and case study design.

Broad measures of programme effectiveness will be calculated on a national basis, and then provincial cases will be examined to answer three research questions:

1. Has the reforestation programme in Indonesia (proxy by government forest expenditure) been effective?
2. How does institutional change influence deforestation in Indonesia's decentralised forest programmes?
3. What negative institutional changes have influence?
4. What positive institutional changes have influence?

1.4. Framework of the Study

In order to have better picture of this thesis, this sub section provide a framework for the overall research design (figure 1).

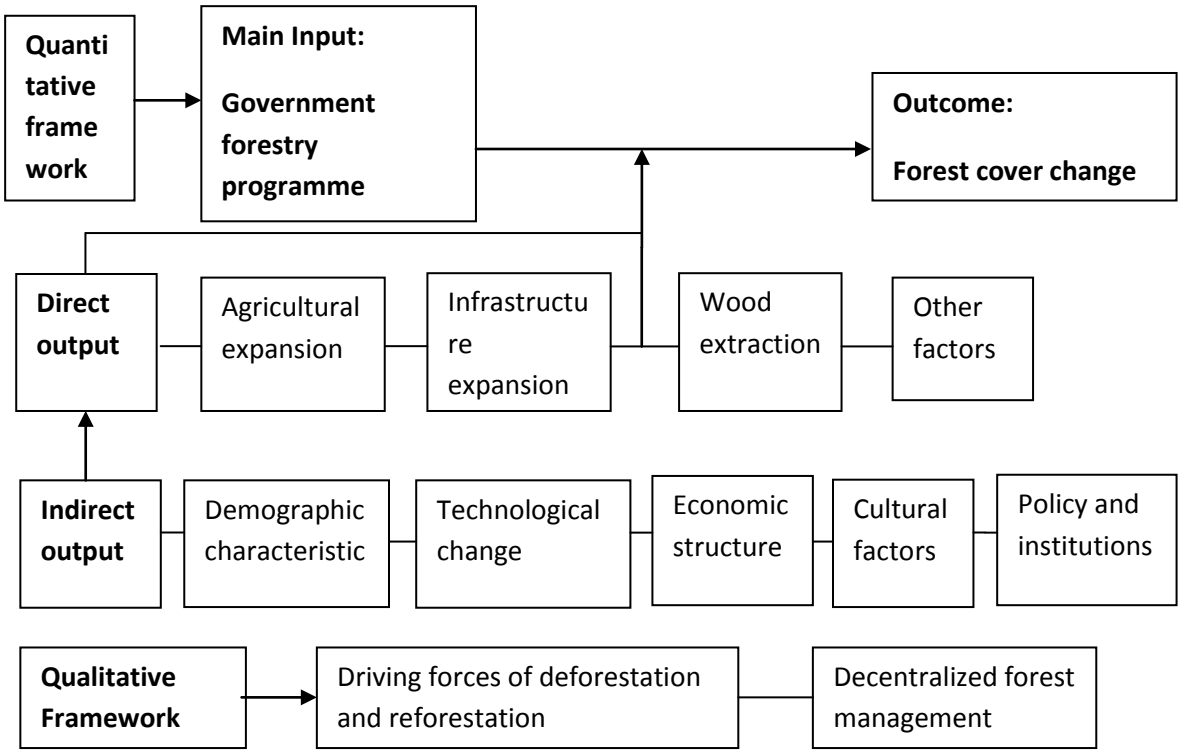

Figure 1: Programme evaluation model

The design employed in this study is mixed method (figure 1). The quantitative method from 2007 to 2010 data is initially used to look at the broad picture how the expenditure may determine the rate given the different characteristics of other direct and indirect factors of deforestation. Initially, a simple linear regression across all provinces in Indonesia is conducted to reveal correlations among FE, key external factors identified in the literature (e.g. demography) and the deforestation rate. This examination can be represented by Figure 1 showing how the connectivity of expenditure and deforestation rate being affected by other factor. Using the same framework with additional

decentralization framework, the qualitative method is implemented. This means we are going to analyze the reports on how these different factors have been recognized by in the mass media as well in different literature as the driver of deforestation/reforestation rate**.** Qualitative case studies (1999 to 2013) on five timber-producing and non-timber-producing provinces (selected from among thirty provinces) are performed to more fully examine and evaluate the role of institutional and cultural factors that shape increases and decreases in deforestation. The time longer time frame is chosen for qualitative data to have better understanding on the factors causing effeceftiveness and ineffectiveness of land and forest rehabilitation. The results from those two analyses then are jointly discussed to provide a broader picture of the effect of government expenditure on reducing the scale of deforestation and demonstrate how other factors may play more important roles in deforestation.

This study concludes that the decentralisation implemented under current government policy influences deforestation rates in Indonesia to a certain degree, but is largely ineffective in reducing them because of a range of factors, only some of which are under government control. Finally the study confirms that assessing multiple factors in deforestation provides a comprehensive and accurate explanation on how to address the problem. Studying only a small number of factors will not result in a comprehensive understanding of the effectiveness of FE, and how this can be increased in the future. In this study, the model proposed by Geist and Lambin (2002) has been populated with data that were either available quantitatively, or were captured by qualitative analysis.

1.5. Thesis Organization

Overall, the outline of this study is as follows. The literature review will be discussed in Chapter 2, which conducts a review of the literature from five perspectives: concepts of programme evaluation, programme evaluation, government programme evaluation, forestry's programme evaluation and decentralisation. Chapter 3 provides an in-depth discussion of forest management in Indonesia and outlines historical (institutional) changes in forest management from 1950 to the present. Chapter 4 presents the research methodology, including the operational method used to examine forestry programme effectiveness. Chapter 5 presents an analysis based on the quantitative method used in this study. Chapter 6 seeks for further explanation of the result using qualitative including evaluation of some government policies that may encourage deforestation. Chapter 7 discusses the factors that may increase the effectiveness of land and forest rehabilitation found in the qualitative analysis. Finally, the last chapter offers conclusions of the thesis, policy implications from the evaluation and suggestions for further research.

Chapter 2: Literature Review

2.1. Introduction

Due to the importance of forests to economic development generally and in Indonesia particularly, this thesis will conduct its own evaluation of Indonesian reforestation programmes.

This chapter explains definitions and concepts that are used to evaluate impact of FE on deforestation rate. Therefore this chapter is started with providing literature review on programme evaluation, is followed by propounding a PE in government sector and is extended with a summary of the development of design and method of forestry programme evaluation. The chapter then describes deforestation theory relating to the factors that influence both increases and decreases in deforestation. Finally, it explains the driving factors of deforestation models used in the current reseach and describes how a decentralisation process is used to define the programme evaluation.

This chapter also reviews previous work that has used similar theories and models. The review of previous studies focuses on 1) arguments based on limited factors of deforestation and 2) arguments based on multiple factors of deforestation.

Section 2.7 presents research questions and method use in this study. To summarise the theory and the model employed in this research, the theoretical framework is presented at the end of this chapter.

2.2. Programme Evaluation Concept and Definitions

Programme evaluation (PE) and policy are inseparable. Despite rapid and extensive public and private use, a single unified definition of PE does not exist (Worthen, Sanders & Fitzpatrick 1997; Vedung 2008; Creswell 1994; Creswell 2011). However, it is largely agreed that an ideal PE should provide a systematic assessment of:

- the worth of a project
- policies or programmes to be continued or replaced
- unintended outcomes
- intended outcomes.

According to Rossi, Lipsey and Freeman (2004), assessment should consider one or more of the following in relation to a programme:

- needs
- design
- implementation and service delivery
- impact or outcomes
- efficiency.

To understand cause and effect, most PE considers inputs, outputs and outcomes as the key elements of PE to link and measure planning, designing and implementation of a programme, project or policy. In essence, PE links programme activities, measures and outcomes (Kane & Trochim 2007).

PE measurement can address either process and outcomesor either separately. Process evaluation deals with the implementation that measures the alignment of a programme and its immediate outputs (Kane & Trochim 2007). Programme outcome evaluation measures output and outcome development to estimate the effects of the programme or intervention (Kane & Trochim 2007).

The design of PE has been developed to correspond with the complexity of data and needs in PE. Much current PE design employs methods that approximate randomised experiments, to secure internal validity (McDavid 2005; DiNardo & Lee 2010), in which a control group that does not receive treatment should be assigned to estimate the effect of a programme. Natural experimental design has been used in much of the relevant research, as initiated by John Snow's (1854) study on cholera. Snow (1854) introduced the concept of treatment and non-treatment groups (the latter being the natural condition), with respect to availability of a public water pump. This fundamental yet simple design has driven the development of natural experimental design in government programmes, because it is unethical to exclude citizens from receiving the benefits of government programmes.

As well as other research designs, the development of PE has expanded with the use of quantitative, qualitative and mixed methods. With certainty of programmes and circumstances, the use of quantitative methods is very effective. However, the need to have deeper analysis of PE drove the emergence of qualitative analysis. This is because the social context of some programmes, for example, requires evaluation of phenomena that cannot be described with numbers.

The complexity of problems and needs faced by researchers and institutions has driven the increased use of mixed methods. As PE requires appropriate solutions and frameworks to determine the worth of a program, the use of mixed methods in evaluation is now more acceptable. Mixed methods are classified as either fixed or emergent mixed methods. The fixed mixed method uses either a planned or predetermined approach (Creswell 2011). Emergent mixed methods are used in response to issues that develop during the process of conducting research (Creswell 2011). The use of the mixed method broadens acceptance by multiple stakeholders with different backgrounds, which is common in any government programme. The need to measure achievements against spending drives the introduction of PE. The large amounts of money involved, the multiple stakeholders engaged and the long time frame required, as well as the complexity of the problem, make it very important to assess the effectiveness and efficiency of such programmes. Therefore, a multidimensional conceptualisation of organisational performance is essential, since this performance depends upon stakeholders, product markets and other unique circumstances (Richard et al. 2009). The main goal of PE varies, as it depends on what outcomes need to be evaluated.

2.3. An Overview of the Literature on Government Programme Evaluation

The need for evaluation is integral to any government programme. Since the emergence of the concentrated power of governments, the evaluation of government programmes is needed. Before then, tracing back the development of PE is almost impossible (Logan 2007). However, a record from 2200 BC was the earliest recorded government PE

(Shadish, Cook & Levington 1991). It is assumed that simple but applicable methods were employed in early PE, because of the absence of records of PE at that time. The rise and maturity of democratisation shaped the development of PE. Democratisation required that more complicated problems and needs be addressed and more stakeholders be involved. Therefore, there is a growing trend in the PE research literature to establish complex and robust evaluation models.

Some scholars have been trying to portray the development in PE. Broad reviews of PE by scholars such as Stuffebeam, Madaus & Kellaghan (2000) and Hogan R.L (2007) identified five stages of PE development (see Table 1). The development of evaluation can be best illustrated using the example of the development of measurement in education, though the methodological points are general ones.

In the early stages, simple but standardised quantitative marking on student performance was established by William Farish in 1792. The availability of such data triggered the use of PE in broader education programmes (Logan 2007), followed by linking student scores and school performance to teacher remuneration.

With the rise of the modern economy (Stage 2 in Table 1), PE was affected by principles used in business. Formal education evaluation was influenced by Frederick W. Taylor's scientific management theory in 1911, which included observation as one important element of evaluation. This was transferred into behavioural observation in education styles, which shaped awareness that different programmes were needed for different outcomes. Addressing different hierarchical education styles affected the

effectiveness of a programme. This effort clearly initiated the need to relate objectives with outcomes.

Table 1: Summary of historical development of PE methods (as applied to education in the US)

source: Hogan R.L 2007, Stufflebeam, Madaus & Kellaghan 2000

Stage	Development of evaluation	Time frame	Background	Achievement
1	Fundamental reform	1700–1900	• No formal standard formed	• Quantitative assessment replaced subjective assessment • Pupil test score as school evaluation
2	Efficiency & testing	1900–59	• Improvement on previous standard • Huge source of funds • Stable economic condition	• Behavioural observation to identify detailed outcomes (i.e. learning styles to address problems in each outcome)
3	Outcome evaluation	1960–70	• Mature democratisation	• Evaluation aimed to guarantee programme success for poor or disadvantaged, and new skill development
4	Professionalism	1971–80	• Mature education system	• Evaluation emerged as a special field in social studies
5	Expansion and integration	1981–present	• Huge budget cuts • Inflation • Environmental degradation	• Evaluation aimed to increase efficiency

The next stage of PE (Stage 3 in Table 1) was influenced by the wealth generation of key countries, which controlled the global economy. The development of PE in

government programmes grew rapidly because of the development of representative government and the substantial money involved. For example, the rapid maturing of United States (US) government democracy and the huge amounts of funding for urban development and programmes for the disadvantaged in the 1950s led to the exercise of PE in non-military US government programmes. The US began the formal use of evaluation of education programmes in 1964 under the Johnson administration, which declared war on poverty, established anti-racism programmes and prompted a large investment of resources in social and education programmes (Logan 2007). Senator Robert Kennedy was concerned that federal money would be misspent and not used to help disadvantaged children (Madaus, Sufflebeam & Scriven 1983). As a response to his concern, he delayed passage of the *Elementary and Secondary Education* Act until an evaluation clause was included. The resulting bill required submission of an evaluation plan by local education agencies and summary reports by state agencies. This action legitimised the use of early stages of evaluation as a tool to make clear the causes of social problems, through clear and specific means designed to fix such problems.

The understanding of proper design and the importance of evaluation shaped the demand for PE as a professional skill and academic discipline (stage 4 in Table 1). This professionalism was initiated to ascertain programme effectiveness. Throughout the 1970s and 1980s, PE design was adjusted due to growing budget cuts that initiated the introduction of evaluation aimed to control inflation. For example, huge cuts in social programmes during the Reagan presidency resulted in less government involvement and diminished or removed evaluation requirements from federal grants. However, the need for PE in every programme was already well established. Therefore, evaluation to measure efficiency has been robustly developed since then.

Finally, the current use of PE (stage 5 in Table 1) has been influenced by a decrease of wealth in many countries. PE is used to increase government programme accountability, which supports an efficient, global and more competitive organisational movement, and this took place in many government evaluation programmes in the 1980s. Since then, PE commonly has been used not only as part of government mandates, but to improve programme effectiveness, enhance organisational learning, and inform allocation decisions in a wide variety of both public and private organisations.

The close connection between community, private organisations and the public has influenced PE development. In addition, the effort to control environmental degradation has shaped the objectives of the evaluation performed in this thesis, which aims to ascertain whether a programme contributes to sustaining environmental functions as well as efficient and competitive organisation. Efficiency, transparency, accountability and the sustainability movement have dominated the use of evaluation in current government programmes all over the world.

2.4. An Overview of the Literature on Forestry Programme Evaluation

The earliest recorded forestry PE was not until the 1980s. This forestry evaluation emerged as a response to increasing awareness of negative and severe impacts of forest degradation on global climate, where many institutions focused on monitoring and evaluating the uses of money for forest conservation (Ferraro and Pattanayak 2006).

Donors and institutions demand appropriate evaluation given that large amounts of money are pouring into forest conservation to expedite the decrease in deforestation.

The demand for proper forestry programmes is difficult to meet due to the complexity of problems in forest management. The absence of direct economic benefit is the most fundamental reason for the ineffectiveness of reforestation programmes. Substantial funds are involved and the ambiguity of land and property rights, regulations and laws add to the complexity of problem. The expansion of government authorities has determined rates of destruction and rehabilitation. The massive extraction of forest products creates degraded forests and severe human-caused disasters. The existence of unsustainable policy in the past creates a burden on later governments to rehabilitate the degraded forest and land. Therefore, government plays an important role in establishment of effective forestry programmes. The government has the obligation to perform this role because natural forest fails to self-regenerate, and this has motivated the development of various types of restoration programmes (Putz et al. 2001).

Studies in forestry PE fall into two main categories: small-scale community and government forest evaluation. The small-scale community programmes involve a relatively small number of people with clear objectives and clear understanding on how forest management is linked to programme effectiveness. However, the clarity and implementation of laws and regulations and property rights crucially contribute to the effectiveness of community-owned forest.

Government forestry programmes tend to be ineffective. The programmes tend to fail in managing increase of reforestation and decrease of deforestation. Multiple forest

management objectives, larger forest areas and multiple stakeholders clearly contribute to this. Regardless of the ineffectiveness of a government programme, its domination and greater influence has shaped the evaluation of forestry PEs in social science.

Similar with other PE, there are variety of design and method used in forestry PE. Majority of current forestry PE used experimental and quasi experimental design (Margoulis et al. 2009). The use of treated (experiment) and untreated (control) group is defined experimental design (Marqoulis et al. 2009). As control group is required, this design should fit in subject that can be controlled such as seed or tree or natural cause of deforestation (i.e.: landslides, rain and fires). Quasi-experimental is an empirical study used to estimate the causal impact of an intervention on its target population (Shadish, Cook & Campbell 2001). This method is usually chosen for the participants' availability or the artificial groups setting probation (Creswell, 2005). Case study methodology is "an intensive study of single unit for the purpose of understanding a larger class of (similar) unit (Gerring 2004, page. 342). This design is used to explore underlying principles of causation (Yin 2009). Natural experiment is observational studies on a well-defined subpopulation that has been a clearly defined exposure but absence of exposure in a similar subpopulation with an expectation that changes in outcomes may be plausibly attributed to the exposure (Dunning 2012). The existence of natural treatment should make this design more appropriate for forestry PE due to difficulty to exclude people to receive benefits from government reforestation program. Lastly, the meta-analysis design is used for literature analysis on subject of interest. It is important to note that the existence of random selection on selecting object of study is performed in forestry's PE. The majority of the program evaluation in forestry used random experiment as the basic of selection (Geist & Lambin 2002).

The development of forest program evaluation takes place both in qualitative and quantitative method. Qualitative research is a series of exploratory studies on several aspects that may influence object of studies (Pekrun et.al. 2002). Craswell (2003) stated that qualitative is more appropriate for search of multiple meaning of individual or group experiences. Quantitative method is a rigorous test of hypotheses (Pekrun et.al. 2002). Finding correlation between cause and effect is more focused in quantitative method (Craswell 2003).

Mixed method is becoming increasingly accepted in research practices as well as forestry PE. Cook (1985) proposed definition of mixed method as examining research questions from different perspectives and combining different methods with different biases. Even though, some researcher such as Craswell (2003) believed that the pragmatic is the most basic reason of the use of mixed method, Johnson, Onwuegbuzie, & Turner, (2007) believed that the use of both quantitative and qualitative method is useful to answer their research questions. Johnson, Onwuegbuzie, & Turner (2007) pointed out that the need of multiple sources and the practical nature of evaluation has motivated the fast development of mixed method in program evaluation.

The need for, and impact or outcome of, evaluation influences the design and method chosen in forestry PE. The complexity of issues involved in forestry PE has spawned a variety of methods and designs of forest program evaluation (Table 2).

Table 2 below showed that even though, quantitative method was developed in early years of research; further development takes place in qualitative method. The need to

evaluate deep and unique causes of deforestation in certain areas has in some cases required the use of qualitative methods with either random or quasi-experimental, or case study design. The type of outcome evaluated also determines the design and method used. For example, Burgess et al. (2012) used a case study involving natural resources rent because they wanted to evaluate the effect of natural resource extraction on deforestation in Indonesia, which was believed to be caused largely by illegal logging. The selection of certain institutions or regions prior to evaluation requires the case study approach. The natural experimental design allows the researcher or evaluator to imitate random design in a natural context. For example, Casson and Obidinzky (2002) create treatment groups based on areas with the most deforestation. This random design is suitable for a natural experimental design. Finally, where there is an absence of reduced deforestation in forest programmes, the counterfactual approach may be used. This allows for comparison with an ideal counterfactual condition that would be achieved in the absence of a programme. Currently, forestry PE is focusing largely on evaluating the factors that are responsible for the ineffectiveness of many forest programmes.

The presence of the ineffectiveness of government restoration programmes has caused PE to move towards process evaluation and outcome evaluation. Ferraro and Pattanayak (2006) suggest that focusing on ‘outcomes’ produced directly from conservation investments (e.g. for species and habitats) is a crucial point in forestry evaluation. They argue that the old paradigm, which focus on ‘inputs’ (e.g. investment dollars) and ‘outputs’ (e.g. training), is no longer appropriate to evaluate the effectiveness of the programme. This argument holds true because forest rehabilitation requires long-term programmes and large sums of money. Therefore, focusing on outcomes evaluation will

Table 2: Summary of methods and designs used in forestry PE

No	Author	Design	Method
1	Bewonder (1982); Bluffstone (1998); Fearnside (1982); Islam & Weil (2000); Mena, Bilsborrow & McLain (2006)	Random experiment	Quantitative
2	Allen (1985); Coleman (2008); Culas (2007); Deacon (1994); DeFries et al. (2010); Dietz & Adger (2003); Etter et al. (2006); Harrison R., Harrison S. & Herbohn J. (2004); Honosuma et al. (2012); Jha & Bawa (2006); Kato (2005); Norman (2007); Shearman et al. (2012); Sunderlin & Resosudarmo (1999); Wicke et al. (2011); Wright (2005)	Quasi-experiment	Quantitative
3	Deacon (1995)	Conceptual analysis	Quantitative
4	Carr, Suter & Barbieri (2005); Sherbinin et al. (2007)	Conceptual analysis	Qualitative
5	Barbier et al. (1997); Sayer et al. (2012)	Quasi-experiment	Qualitative
6	Angelsen & Kaimowitz (1999); Benhin (2006); Carr (2004); Harrison & Suh (2004); Rudel (2005); Rudel et al. (2009); Turner (1998)	Meta-analysis	Qualitative
7	Geist & Lambin (2002); Sodhi et al. (2009)	Meta-analysis	Quantitative
8	Burgess et al. (2012); Carr, Lopez & Bilsborrow (2009); Casson & Obidinzky (2002); Coleman & Fleischman (2012); Sayer et al. (2012); Varkey (2012a); Varkey (2012b)	Natural experiment	Quantitative
9	Arnold (2008)	Natural experiment	Qualitative
10	Burgess et al. (2012); Carr, Lopez & Bilsborrow (2009); Etter et al. (2006); Islam & Weil (2000); Kato (2005); Mena, Bilsborrow & McLain (2006); Shearman et al. (2012); Wicke et al. (2011)	Case study	Quantitative
11	Arnold (2008); Bulinger & Haug (2012); Casson & Obidinzky (2002)	Case study	Qualitative
12	Fisher (2010); Teye (2011)	Case study	Mixed

specifically provide assessment on what outputs influence outcomes and how much money (input) should be allocated.

In contrast, process involves methods and context of program delivery; for example, financial incentive methods, culture, population, wood extraction, infrastructure expansion, agricultural expansion, environment, law and regulation are among the policy levers that can be used to obtain intended outcomes in forest PE (i.e. deforestation). With financial programme methods, payment for environmental services is offered as a scheme to pay the landowner to perform conservation. Studies by Clement et al. (2010), Ferraro (2002) and Pattanayak, Wunder and Ferraro (2010) provide strong evidence that this payment significantly increases the area of conservation when supported by proper pro-conservation institutional mechanisms.

With respect to non-financial methods, the driving factors of deforestation are largely used as a model to assess government forestry programme effectiveness by PE. Deforestation rates are used by many scholars as covariates or predicted outcomes of forestry programme effectiveness. Many studies have examined the driving factors of deforestation as outputs to be able to determine the deforestation rate. Infrastructure extension, agricultural expansion, wood extraction, and demographic, economic, technological, policy, institutional, cultural and other trends are considered as driving factors of deforestation. Currently in the forestry PE literature, population is widely regarded as one of the main driving forces of deforestation.

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2.5. An Overview of the Literature on Deforestation

Malthus (1789) thought that population growth would exceed food production, and that this explained the link between population and deforestation. He proposed a theory on exponential growth of population that would create social problems without the interference of war, drought and famine. The current substantial degradation of the environment is also caused by massive natural extraction to fulfil the increased needs of a growing population. Therefore, the link highlighted in the current study between deforestation, as one of the social problems, and population growth is inevitable.

Population growth holds as a main underlying determination of deforestation because high population will create agricultural intensification that leads to deforestation. The indirect causation has been extensively studied in light of rapid population growth. This model has been supported by studies of deforestation in tropical forests, which identify population growth as a major driver of extensive agriculture and shifting cultivation, which in turn is one of the main causes of tropical deforestation (Allen & Barnes 1985; Barbier et al. 1997; Benhin 2006; Carr 2004; Carr, Suter & Barbieri 2005; Deacon 1995; Etter et al. 2006; Fargione, Plevin & Hill 2010; Kim H., Kim S. & Dale 2009; Kobayashi 2004; Rudel 2009; Vandermeer & Perfecto 2007). Until recently, this idea dominated the research on causes of deforestation.

However, a necessarily devastating influence of population growth on deforestation rates was denied by Boserup (1965), who proposed an alternative , where population could shape either deforestation or reforestation. According to Boserup (1965), scarcity of land encourages increasing populations to expand and intensify agriculture, assuming

technological change takes place. Some researchers, such as Burger and Zaal (2012) and Pender (1998), support that theory. These pros and cons of population function with respect to food provision provide a basis for the unifying importance to deforestation of the growing population, which has been studied by economists, geographers, demographers, anthropologists and environmentalists.

The importance of population growth and environmental quality discourse initiated the IPAT theory. This theory, proposed by Commondor (1971), describes the influence of population (P), population affluence (A) and technology (T) on environmental impact (I). This theory not only takes hold of Malthus' (1789) and Boserup's (1965) ideas on population, but also provides a fuller explanation for population impact on deforestation.

Migration is one factor affecting deforestation that could not be separated from population as one of the factors most cited as a cause of deforestation. Carr (2009), Jargenson (2007) and Sunderlin and Resosudarmo (1999) proposed migration, along with rural and urban population, as influences on the rate of deforestation. Jargenson (2007) found that rural population growth contributed to higher deforestation, as rural people have the opportunity to perform forest encroachment.

Besides population, other factors may contribute to deforestation, which is a complex phenomenon with multiple causes. Other factors including infrastructure extension, agricultural expansion, wood extraction, and demographic, economic, technological, policy, institutional, cultural and other trends are believed to underlie deforestation rate.

Scholars may limit their study of deforestation to a small number of factors according to their needs.

Policy and institutional factors are indirect factors that dominate the causes of deforestation considered in the literature on developing countries. Arnold (2008) found that weak law enforcement does not support the legal framework in Indonesia's law and regulations that support sustainable management. Several studies found that government policy plays a crucial role in determining the (increasing) rate of deforestation (Andersson & Gibson 2007; Binswanger 1991; Deacon 1994; Deacon 2004; Klepeis 2003; Klepeis & Vance 2003; Sterner 2003). Several policies, such as 'general tax policies, special tax incentives, the rules of land allocation and the agricultural credit system' have led to accelerated deforestation in the Amazon (Binswanger 1991, p.821). Property right designations also lead to deforestation (Aurojo et al. 2009). Some researchers even state that the significance of institutional influences on deforestation overtakes population and microeconomic factors (Battharai & Hamming 2001). With respect to the factors that influence sustainable forest management, Coleman (2009) specifically argues that tight supervision between monitoring and sanctioning shapes the effectiveness of forest programmes. Coleman and Fleischman (2012) argue that the effectiveness of decentralisation in forest management is spatially different between countries.

Other factors influencing deforestation, such as infrastructure, are also studied. Laurance et al. (2002) and Swenson et al. (2011) found that road infrastructure significantly influenced the increase in deforestation. Road infrastructure creates forest fragmentation that is thought to promote an increase in deforestation rate.

Deforestation is also influenced by soil quality and climate. An et al. (2009), Bets, Sanderson and Woodward (2008), Islam and Weil (2000) and Islam et al. (2001) found that low soil quality and increase in temperature increases the likelihood of deforestation. Infertile soil restricts the regeneration of forest and increasing temperature elevates the likelihood of natural forest fires in drought seasons.

Wood extraction has been extensively studied as a direct key link with deforestation. The continuing massive worldwide timber loss this decade has contributed significantly to global warming. Arsen (2005), Burgess et al. (2012), Casson and Obidinzky (2002), Kato (2005) and Wright (2010) found that timber logging directly and significantly causes massive deforestation. Burgess et al. (2012) even proved that illegal logging causes more devastating impacts than legal logging. Bewonder (1982) found that wood for housing material in rural areas in India caused significant deforestation.

Other studies look at not only a single cause but also consider how multiple factors interact to influence deforestation. These studies generally fid that infrastructure extension, agricultural expansion, wood extraction, and demographic, economic, technological, policy, institutional, cultural and other trends have a combined effect stronger than any single cause considered in isolation (Allen & Barnes 1985; Angelsen & Kaimowitz 1999; Bewonder 1982; Burns et al. 1994; Defries 2010; Geist & Lambin 2002; Pfuff 1999). Geist and Lambin (2002) also reported that different regions or countries have different combinations of factors that drive deforestation.

In Indonesia, the study on causes of deforestation has been dominated by studies in timber-producing provinces. Arnold (2008), Burgess et al. (2012), Casson and Obidzinski (2002), Koh and Wilcove (2008), Murdiyarso (2002), Palmer (2001), Tomich et al. (2001) and Wicke (2012) link agricultural extension (of palm oil plantations, timber logging and mining) as the main cause of deforestation in Indonesia. Burgess (2012) considered that the corrupt behaviour of officials and weak law enforcement are the underlying factors for the severe illegal logging considered to be a major cause of deforestation in Indonesia. In addition, McCarthy (2000) proposed that the failure of the law to address property rights is considered as a fundamental obstacle in Indonesia's forest management. McCarthy (2004) also acknowledged that an absence of customary rights in the law contributes to the inefficiency of forest management.

2.6. An Overview of the Literature on Decentralised Forest Management

Decentralisation as a tool for redistributing or dispersing functions, powers, people or objects away from a central location or authority has been widely accepted since the 1970s. Efficiency, equity and bureaucratic responsiveness to citizens' needs are grounds for decentralisation (Musgrave 1956; Oates 1972; Tiebout 1959). This form of governance is being pervasively adopted in many natural-resource-developing countries. Decentralisation has been prescribed by institutions to promote accountability and transparency, public participation in policy making, and democratisation (McCarthy 2004).

Forest programme decentralisation is not without problems. First, the absence of well-defined decentralisation renders decentralisation as a policy, a combination of (1) bureaucratic movement from central locations to places closer to resources; (2) decision-making discretion to local-level government officials; and (3) decision-making authority to local users (Cohen & Peterson 1996). Second, there is an absence of consistent explanations of observed outcomes in relation to theoretical arguments relating to benefits and costs of decentralised governance (Andersson et al. 2008; Treisman 2007). Third, institutional change in decentralisation requires a complex approach to shape governance and forest use behaviour (Andersson et al. 2008). Finally, the success of forest management implementation is very limited due to 'an activity frequently undertaken in remote and politically marginal areas of poor countries' (Coleman 2012, p.836).

Institutional factors play an important role in forest programme decentralisation. Agrawal and Ribot's (1999) framework proposed a clear institutional influence of actors, powers, and accountability on governance. Most evaluation in this literature reveals worrying results where local actors gain political power, but change in forest conditions is also driven by the absence of local-level collective action around the forest (Andersson & Gibson 2007). Classifying institutional reforms in terms of the creation or change in local user group empowerment and accountability mechanisms is therefore central to an effective forest decentralisation mechanism.

Incomplete decentralisation in forest management has been adopted by many African, Asian and Latin American countries (Ribot, Agrawal & Larson 2006). These authors found that the transfer of decision making to local government is limited to certain types

of power, and central governments select local institutions to supply central needs, causing ineffectiveness in decentralised forest management. The inefficiency, inequity and unresponsiveness of bureaucracy are associated with incomplete decentralisation.

2.7. Conclusion

This chapter provides broad literature review on forestry program evaluation to back up this study. At first, definition and importance of programme evaluation is described. Discussion on government program evaluation is then presented. These literatures showed that program evaluation could not be separated from every government program. Forestry programme evaluation is also discussed and is followed with deforestation literature. The demand for forestry program evaluation is escalated and the deforestation outcome is enhanced to answer the need for proper evaluation. Finally, literature on decentralized forest management is presented. As one of the tool of governance, the use of decentralization will be more likely to improve the quality of service delivery and thus will increase effectiveness of programme evaluation.

In order to support theoretical literature the next chapter will present literature on forestry development in Indonesia. The first section will present how forest sector have an effect on economic growth and the next section described how decentralization influences institutional change in Indonesia.

Chapter 3: Forest Management in Indonesia

3.1. Introduction

To better capture implementation of sustainable forest management which was introduced to Indonesia in 1998, this chapter is devided into forest contribution and institutional change took place in Indonesia. At first, an in-depth discussion of forest management in Indonesia and outlines historical (institutional) changes in forest management from 1950 to the present is described. Elaboration on forests' contributions to government, business and individuals in Indonesia is discussed. The next section is followed with disscussion on new laws, regulations and policies that were introduced to increase the administrative, business and societal readiness for a better governance system. This chapter concludes by illustrating the changing laws, regulations and budgets and their impact on forest management.

3.2. Forests' Contributions to Economic Development

Historically, forest contributions are vital to Indonesian economic development. Even though the earliest official records on forest cover across total land uses in Indonesia showed that the largest proportion of cover consisted of forest, this percentage has drastically decreased in recent years. In 1950, a map created by Hannibal (1950) showed 84 per cent of the total of 193.6 million hectares of land was covered by forest and the remaining percentage was agriculture. This map showed that agricultural land uses dominated in Java and forest cover dominated in non-Javanese islands. Although

this forest cover estimate included crop plantations, the proportion of crop plantation was nonetheless small (Indonesia Forestry Division 1950).

A change in this situation was reported from around the 1970s to the 1990s, when massive rice and industrial palm oil plantations began to develop, though data on these changes was not comprehensive. Since then forest cover has shown a rapid decrease. The most comprehensive data on deforestation rates over the period 1985 to 1997 was for the three largest deforested islands in Indonesia—Sumatra, Kalimantan and Sulawesi—where deforestation during that period was 1.6 million ha per year (Baplan, 1998, in Ministry of Forestry 2003). Between 1985 and 1997, during the Soeharto period, unsustainable management caused a rapid loss of 17 per cent of forest cover.

From 1945 to 1998, management of forests was very unsustainable. Forests have an important role in economic growth through the extraction of timber, oil and gas. Almost 60 per cent of the economic output comes from oil and gas, while timber products are the third most important contributor to GDP (Statistics Indonesia 2002). Despite forests' contributions to economic development, the local forest user has received little financial return.

During the Soeharto presidency, governance was based on Java and non-Javanese islands, so the characteristics of forest contribution in Indonesia are classified accordingly. Different demands and policies shape forest contributions in Java and non-Javanese islands. Java terminology covers provinces in Java and Bali islands. In this region, the contribution was shaped by demand for fuel wood for domestic usage and land for rice. The massive rural population in these islands were heavily dependent on

forest for fuel wood because there were no modern stoves. The grass in forest areas also provides food for cows and goats, which belong to communities. The small area available for a very large population has influenced the community to have small-scale agricultural activities. The forest provides livelihoods on this heavily populated island.

In addition, the forest provides land for rice paddy plantations. In the 1980s, a rice cultivation policy was created to fulfil the national demand. Land and people suitable for rice cultivation initiated massive conversion of forest into paddy plantations. Despite official and non-official reports to the contrary, the evidence in the field showed that the forest was rapidly changing into agricultural land (Utari 2011). The agricultural revolution, known as the 'Green Revolution' movement, effected this land use change, which in Indonesia was executed during the Soeharto government (Utari 2011). The Green Revolution made Indonesia experience five years (1984–89) of self-sufficiency in rice production and provided a source of income for many farmers. However, the greatest economic benefit was for farmers with more than half a hectare of land and rich peasants in the countryside, as well as state officials at the village level (Utari 2011). The green revolution altered fundamental aspect of overall economic by limiting the people who gained the most economic benefits. The Green Revolution in Indonesia therefore created a situation where forest conversion into agriculture dominated the land use change.

The massive amount of land needed for rice cultivation is sufficient to indicate that this revolution caused rapid loss of forest cover in Java. Therefore, the direct economic contribution of forests has become less, except for in certain communities whose livelihoods rely on cultivating trees in forests. However, with only a small forest area

not having been converted into industrial or agricultural areas, only a small number of people are able to benefit from the government's tree plantation programme to regenerate the forest.

A direct forest contribution to overall local economic development is more obvious on non-Javanese islands. The populations on these islands are used to extracting forest products because these provinces have abundant timber, mining and non-timber forest products (e.g. honey, rattan and nuts). The forest's contribution to economic development is in the form of timber logging, mining (gold, coal, oil and gas) and palm oil plantation development. These parts of Indonesia have large quantities of good quality non-forest timber, natural timber and mining products, as well as suitable land and climate for palm oil plantations. Manning (1971) found the escalating and rapid timber exploitation during 1966 to 1971 was provided massive job opportunity to local people. The local people are used to extracting non-timber forest products very easily. People have direct but limited access to timber for extraction because the big timber industries are owned mostly by non-local people and local people are restricted in their access. Some limited numbers of local people receive substantial benefits from the high demand for, and high price of wood, mining and palm oil products at the international level. The high demand and price of palm oil has attracted major palm oil development, which converts forests into palm oil plantations. The forests provided sources of income in return for manual work because natural resource concessions and manufacturers, as well as the palm oil plantations and manufacturing, were owned by powerful people with a close relationship to the President (Barr 2010). The forests in these islands provide a ready source of income and housing materials. The significance contribution of forest to economic growth in non-Java Islands is also shown with the use of fire to

expand palm oil plantation. Gellert (1998) postulated that during Soeharto's government, the uncontrolled use of fire is obligatory for development.

The importance of forest is not only referred to large number of people but also to individual economic development. Some researchers are shown how individual with high political endowment took the biggest advantage from forest exploitation. Gellert (1998) and Brown (1999) strongly stated that the greatest economic benefit from forests has been limited to the people who had a close relationship with the President which involved massive number of local-forest-people to work on it.

After the Soeharto government fell in 1998, forests still played a crucial function in economic development. A definite and fairer forest contribution has been influenced by governance introduced recently in both timber-producing and non-timber-producing provinces, intended to overcome unfair policies of the past and expedite forest rehabilitation. This has resulted in reclassifications intended to rectify past inequities. Law 41/1999 on forestry stated that the levy from timber logging in the natural forests can only be used for forest and land rehabilitation. Moreover, the law states that the timber-producing provinces are entitled to 40 per cent of the levy. The rest of the levy is distributed nationally to support reforestation. The Ministry of Finance introduced revenue sharing in the year of 2002 for forestry revenues allocation as the means to finance reforestation and land rehabilitation in local governments. These policies are believed to be a crucial tool used to enhance effectiveness of reforestation program in all provinces.

In timber-producing provinces, local income from extracting timber, mining and cultivating palm oil plantations has contributed to the broader economic development of local forest users. Local people have greater access to involvement in cultivating palm oil, which means that palm oil plantations have contributed to the broader economic development of local forest users. This has caused palm oil plantations to proliferate rapidly. The decentralization has provide opportunity for misadministration where local bureaucrats have gained the power to issue mining, timber and plantation permits to local people (Resosudarmo 2005). The location of mining production in forests causes rapid land use change. According to Statistics Indonesia (2004–11), gold and coal are the dominant mining products. Therefore, these products are the dominant cause of mining forest conversion. Forests also provide revenue for local government by issuing conversions of forest areas for transmigration that is mainly used for palm oil plantations (Badan Koordinasi Penanaman Modal [a]). The export of palm oil contributes to local government revenue. The forest contribution to local people has broadened to a larger number of local people with high financial capacity. However, the poor locally dependent people have limited access to forests because the forest sources have been depleted.

The contribution of forests to economic development in non-timber-producing provinces is best described as community-owned tree plantations and re-planting in forest areas. These provinces are characterised by higher population density, smaller areas, intensive infrastructure and limited natural resources. The three most populated provinces of West Java, East Java and Central Java together account for 48 per cent of the total Indonesian population (109,225,285 people out of 226,587,447 people). Since 1950, community involvement in managing forests began to develop, but the

community contribution has increased since 1999 (Nawir, Murniati and Rumboko 2007). With a smaller land proportion (18,554,468 of the total 187,840,901 hectares) and larger portion in km of road (134,744 out of the 421,518 kilometre road), the population can more readily drive substantial community involvement in managing sustainable forest.

Although official data claim a decrease in the deforestation rate, evidence of land use change postulated elsewhere suggests otherwise. Failure to implement sustainable management is undermining the decrease in deforestation. The existence of timber concessionaires who hold political and economic power has perpetuated the structure of the industrial timber industry (Barr 2010). Current forestry rehabilitation has so far failed to achieve its goals because central government objectives continue to prioritise timber logging over forest rehabilitation (Barr 2010). The increased authority of local officials has led to misuse of timber permits for individual benefit (Barnes et al. 2013). Open access to forests provides greater opportunities for unlawful timber logging by large companies that produce substantial and devastating impacts on forests. The very large numbers of small legal and illegal timber and mining concessions will also have devastating impacts on forest cover and forest functions. Without tight control on timber logging and mining, and strong enforcement of re-planting by concession holders, deforestation will be more likely to continue.

The early government from 1945 to 1965 established transition from colonialism to independence which failed to establish fundamental sustainable forest management. The later government of centralisation regime that lasted for thirty-two years established

corrupt and inefficient government, which is not an easy situation to reverse and creates resistance to new governance (Barr 2010).

In order to support this thesis, it is important to describe the institutional change in decentralization era. The next section will discuss how policies, laws, regulations and budgets in the decentralisation era have been affected and are shaping the management of forests in Indonesia.

3.3. Forest Policy, Law, Budgets and Regulations

The 1950 Constitution established that forest were to be managed by the government, leaving the community right on managing their own land. In 1967, law on Principal provisions of the Forestry 'firmly established control of government over forest lands' (Gregeson 2005 p.51). Current government instituted law 41/1999 on forestry. This law adopted sustainable forest management but retain central government control over forest. The centralized government remains as central tool to govern forest management.

In 1965, centralised economic governance was introduced by President Soeharto replacing President Soekarno which concentrated on political stabilization but failed to establish economic development. President Soeharto acknowledged the need to direct all resources including law and regulations to establish economic development. However, the President over-reached his power by authorising to use of forest and its revenue from forestry for the benefit of his close relatives (Barr 2010). Timber related

policies brought mainly the economic benefit of the President and his close relatives' businesses (Gellert 1998).

The massive amount of natural resource extraction has caused huge levels of deforestation. The devastating impact of this has forced the government to control forest use and, in 1980, a mechanism for timber logging control was introduced. A forest fee was applied in the form of the DJR. Presidential Decree 35/1980 established the obligation of timber concessionaires to pay certain amounts of money for timber production to guarantee reforestation of their concession areas. However, the decree was not equipped with sanctions to be applied in case these reforestation obligations were not met. The deforestation and the misuse of power were unstoppable. These centralised economic benefits resulted in national protests that overthrew the 'New Era' regime in 1998. Since then, the country has experienced a decentralised system of government.

In 1998, President Soeharto fell, and the subsequent government introduced a decentralisation mechanism to expedite a decrease in the deforestation rate. Since 1999, fundamental changes in laws and regulations have been established. Decentralisation has moved policy decision making and policy discretion from the central government to local government. The first fundamental change took place when Law 25/1999, dealing with the fiscal balance between central and local government, was enacted in 1999. This move was made to ease the rage felt by people in natural-resource-rich regions where natural resources have been depleted but the people received no local economic contribution.

In forestry, several new laws and regulations regarding the management of forests, forest revenue and forest expenditure were introduced. With regard to forestry management, the foundation in law was established by enactment of Forestry Law 41/1999. This new regulation adopted a sustainable forest approach where forests are managed to provide versatile benefits for the human population as well as to sustain forest function. This law acknowledges community involvement in managing the forests. The current management of land and forest rehabilitation, along with the additional goal of economic development of local people, has been proven to contribute more to increasing the forest cover (Ministry of Forestry 2002-11 and National Statistics 2002-11). Several new policies and regulations have been endorsed to keep law and order and create institutional change in central and local governments and encourage them to adopt the new decentralisation process. Several regulations are made and departments are revised in accordance with the need to have more efficient service delivery (Table 3).

Table 3 Laws and regulations in forestry along with departments in charge

No	Laws and regulations	Departments in charge	Year made
1	Law 41/1999	Ministry of Forestry	1999
2	the Ministry of Forestry and Plantation Decree 284/1999, on watershed priority	Ministry of Forestry and Plantation	1999
3	Government decree 35/2002 on Reforestation Fund (Dana Reboisasi or DR)	Ministry of Finance and Ministry of Forestry	2002
4	Ministry of Forestry decree 128/2003	Ministry of Forestry	2003

The Ministry of Forestry and Plantation is empowered to back up the implementation of Forestry Law 41/1999. This ministry has been producing technical regulations to guide more effective land and forest rehabilitation and to strengthen proper forest use. For example, the Ministry of Forestry and Agriculture Decree 284/1999, on watershed priority, ranks and guides the land rehabilitation effort based on ranks made by this ministry. Further refinement come with the separation of this ministry into Ministry of Agriculture and Ministry of Forestry. The ministry provides yearly technical reforestation instructions procedures that aim to provide up to date guidance. This ministry also provides technical guidance for any big change in management of forest. For example, the introduction of revenue sharing for forestry in 2002 was followed by enactment of Ministry of Forestry decree 128/2003 on the technical instructions procedure on charging, collecting and depositing payments to the RF.

Decentralisation has also altered budgetary mechanisms. Several budget reporting changes have been made in response to a more transparent and accountable mechanism. In 2003, the first new budget report was established: Law 17/2003 made a particular change in the budgeting process. A medium-term budgeting framework was developed that integrated budgeting (unified budget) and the application of performance-based budgeting.

At the same time, a single government account was established. To better capture the decentralisation process, a new budget reporting style was then introduced in 2007 to create real accountability and transparency (Barr 2010). Two aspects distinguish the 2003 and 2007 budget reports, which offer a distinction in the coverage of the report. The first is that previous budget reports included 20 departments under 20 ministries

and one administrative function, while new reports acknowledge all government functions, including 14 administrative functions at the local government level (i.e. citizen records, statistics, land administration and spatial planning).

The second difference is style. The old-style report had one type of budget, which was sectoral. It covered 21 sectors where forestry was created in one sector, along with estate plantations. Further, the new report has two types of budget report: functions and affairs. Affairs reports cover all the revenue and expenditure of 35 ministries and departments. As one of the ministries and departments, forestry revenue and expenditure is reported in forestry affairs. Functions reports cover all the revenue and expenditure relating to nine major functions: general services, order and peace, economy, environment, housing and public facilities, health, tourism and culture, education and social protection. All of the operational (e.g. protection officers' wages, meetings and training) and non-operational costs (i.e. land and forest rehabilitation, and forest fire management) are funded. This new budget system, which reports the expenditure and revenue of each local government department and institution, establishes more accountability and transparency in each of the ministries and departments.

This budget change was backed by the Ministry of Forestry, which for the first time enacted technical guidance in land and forest rehabilitation and infusions of money from the central government. To overcome the confusion in performing rehabilitation of land and forests, the central government enacted Ministry of Forestry Decree 14/V/2008 on technical guidance in land and forest rehabilitation for the DR. As the previous schema of national forest and land rehabilitation, National Movement for Forest and Land

Rehabilitation (*Gerakan Nasional rehabilitasi hutan dan lahan* or GNRHL) ended in 2007, a new scheme in the form of DAK *kehutanan* (*Dana Alokasi Khusus kehutanan,* Special Allocation Fund in Forestry) was introduced in 2008. GNRHL and DAK *kehutanan* consistently allocate the funding directly from the central government, giving priority to non-timber-producing provinces.

The budget allocation for natural resources is also experiencing fundamental change. A revenue-sharing mechanism is now used for all natural resource revenue allocation. In 1999, a special change was made for timber fee sharing where allocation was based on the type of province. The money allocated to local-timber-producing and non-local-timber-producing provinces. The timber-producing provinces have been given permission to extract timber from natural forests within specific locations or regions in those provinces. Those with natural forest cover should at least meet the minimum specified forest cover. In these provinces the timber can be legally cut as a source of funds for land and forest rehabilitation in their provinces. The local-timber-producing provinces, as classified by the central government, are able to finance land and forest rehabilitation from extracting a certain volume and type of timber in their natural forests as a source of the DR. Therefore, these provinces are entitled to 40 per cent of the DR. The non-timber-producing provinces, on the other hand, have no timber in natural forests that can be legally cut. Therefore, these latter provinces are entitled to the remaining 60 per cent of DR, along with the timber-producing provinces, which includes priority for watersheds to be repaired.

The schema of fees for forest use has also changed. All provinces may enforce other types of levy besides the DR, such as one time forest use (royalty) and timber in non-

natural forests. The levy may be enforced on small and large concessionaires in non-protection and non-conservation forest areas. The small amount of forest cover in non-timber-producing provinces results in low reliance in these provinces on forest use levies for local revenue.

The change in forest extraction schema caused changes in forest expenditure. The huge forest cover in timber-producing provinces contributed to higher forest expenditure. These provinces are characterised by larger forest areas and land, and limited infrastructure and economic growth, compared to non-timber-producing provinces. This DR is the highest revenue source of forest expenditure. The amount of the DR is based on the number, type and diameter of trees in the areas of the forest concession companies selected by the government to log timber. The richer the value, the greater the tree diameter and the larger the amount of timber, the larger are the DR receipts. Therefore, the total value of the forest expenditure receipts in these provinces outweighs their alternatives. The timber concessions for natural forests, for which the companies have to pay the DR levy, are not the only timber concessions given. Other timber concessions are given to concessionaires, who have to pay other forest levies, such as the forest utilisation business permit fee (*Iuran izin usaha pemanfaatan hutan* or IIUPH), timber utilisation permit (*Izin Pemanfaatan Kayu* or IPK) and forest resources provision (*Provisi sumber daya hutan* or PSDH). Forest area size and utilisation has resulted in an increase in local government revenue and expenditure.

The development of palm oil plantations has also been influenced by the decentralisation mechanism. Local officials now have more authority to issue permits for forest use. As a result, many palm oil plantation developments have taken place in

areas that are classified as forest areas. The high and stable price of palm oil has driven a policy to increase palm oil plantation exploitation. Not only do local governments issue forest conversions for palm oil, but the central government issues palm oil transmigration in protected forests. For example, the Government of Indonesia created a policy that gave a subsidy to support the opening and managing of industrial palm oil plantations from 2000 to 2009 (US Department of Agriculture 2009). This policy clearly is increasing the deforestation rate. The rapid increase in large industrial palm oil plantations took place in Kalimantan Tengah and Riau, which has converted land and forest into palm oil plantations. Therefore, the greatest deforestation largely took place in these provinces.

The overall net effect of these contradictory set of reforms appears to be continuing deforestation but a decreasing rate overall. The government's official data on the deforestation rate showed a decreasing trend during the decentralisation era from 2001 to 2010. In this period, the official data used satellite images in all provinces in Indonesia. The data on forest cover are published every three years, beginning in 1997; the first edition in decentralization era was gathered from data in 2000 and published in 2002. This published land cover data covered the period 1997–2000. In 2000, the deforestation rate was 2.84 thousand hectares per year. Rates in 2003, 2006 and 2010 respectively were 1,906.1 thousand 1,174.1 thousand and 831.1 thousand hectares.

Caution in interpreting the data is needed because the quality of satellite images and ground analysis may cause different levels of data accuracy and coverage, though there has been improvement in coverage. The uncaptured data in 2000, 2003, 2006 and 2010 were respectively 22.5 (12 per cent of total land), 10.7 (5.7 per cent), 3.9 (1.9 per cent)

and 0.82 (<1 per cent) thousand hectares. This state of affairs has been blamed on various factors: improper forest management (including settlement, over-cutting and illegal logging), looting, encroachment, illegal land occupation, and forest fires, which are some of the reasons for massive deforestation.

3.4. Conclusion

Presence of decentralization does not guarantee existence of better forest management. Barr (2010), Burgess (2012), Casson and Obidinzky (2002) question the effectiveness of forest expenditures in Indonesia to combat deforestation. With decentralisation, local officials have the authority to rule on how to use the forest (Burgess et al. 2012). Without strict regulation, more authorisations for forest use have motivated more forest misuse for individual economic benefit. The failure to carry out strong law enforcement may present the biggest obstacle in improving forest management. Nonetheless, significant changes in forestry, law, regulations, budgets and policy have been introduced and expanded, so it is reasonable to ask whether this has achieved at least a modest slowing or reversal of deforestation trends in Indonesia.

In order to provide proper forestry program evaluation that will address Barr (2010), Burgess (2012), Casson and Obidinzky (2002) questions on influence of decentralization to forest management, the next chapter discusses data and methods applied to shed light on this question.

Chapter 4: Research Methodology

4.1. Introduction

This chapter will describe the implementation of evaluation methodology. This study begins with a quantitative analysis using the driving factors of deforestation as a framework for PE. However, as inadequate data on all 490 districts and cities prohibited use of the normal PE methods, a limited national quantitative analysis on deforestation is used as an initial framework for the current study. Then, due to absence of detailed national data, the evaluation focuses on inputs, outputs and outcomes of forestry programmes using detailed qualitative case studies of characteristic provinces.

The framework for the overall study is outlined in Figure 2. The quantitative method from 2007 to 2010 data is initially used to look at the broad picture how the expenditure may determine the rate given the different characteristics of other direct and indirect factors of deforestation. Initially, a simple linear regression across all provinces in Indonesia is conducted to reveal correlations among FE, key external factors identified in the literature (e.g. demography) and the deforestation rate. This examination can be represented by Figure 1 showing how the connectivity of expenditure and deforestation rate being affected by other factor. Using the same framework with additional decentralization framework, the qualitative method is implemented. This means we are going to analyse the reports on how these different factors have been recognized by in the mass media as well in different literature as the driver of deforestation/reforestation rate. Qualitative case studies (1999 to 2013) on five timber-producing and non-timber-

producing provinces (selected from among thirty provinces), are performed to more fully examine and evaluate the role of institutional and cultural factors that shape increases and decreases in deforestation. The time longer time frame is chosen for qualitative data to have better understanding on the factors causing effeceftiveness and ineffectiveness of land and forest rehabilitation. The results from those two analyses then are jointly discussed to provide a broader picture of the effect of government expenditure on reducing the scale of deforestation and demonstrate how other factors may play more important roles in deforestation.

This study concludes that the decentralisation implemented under current government policy influences deforestation rates in Indonesia to a certain degree, but is largely ineffective in reducing them because of a range of factors, only some of which are under government control. Finally the study confirms that assessing multiple factors in deforestation provides a comprehensive and accurate explanation on how to address the problem. Studying only a small number of factors will not result in a comprehensive understanding of the effectiveness of FE, and how this can be increased in the future. In this study, the model proposed by Geist and Lambin (2002) has been populated with data that were either available quantitatively, or were captured by qualitative analysis.

Overall framework

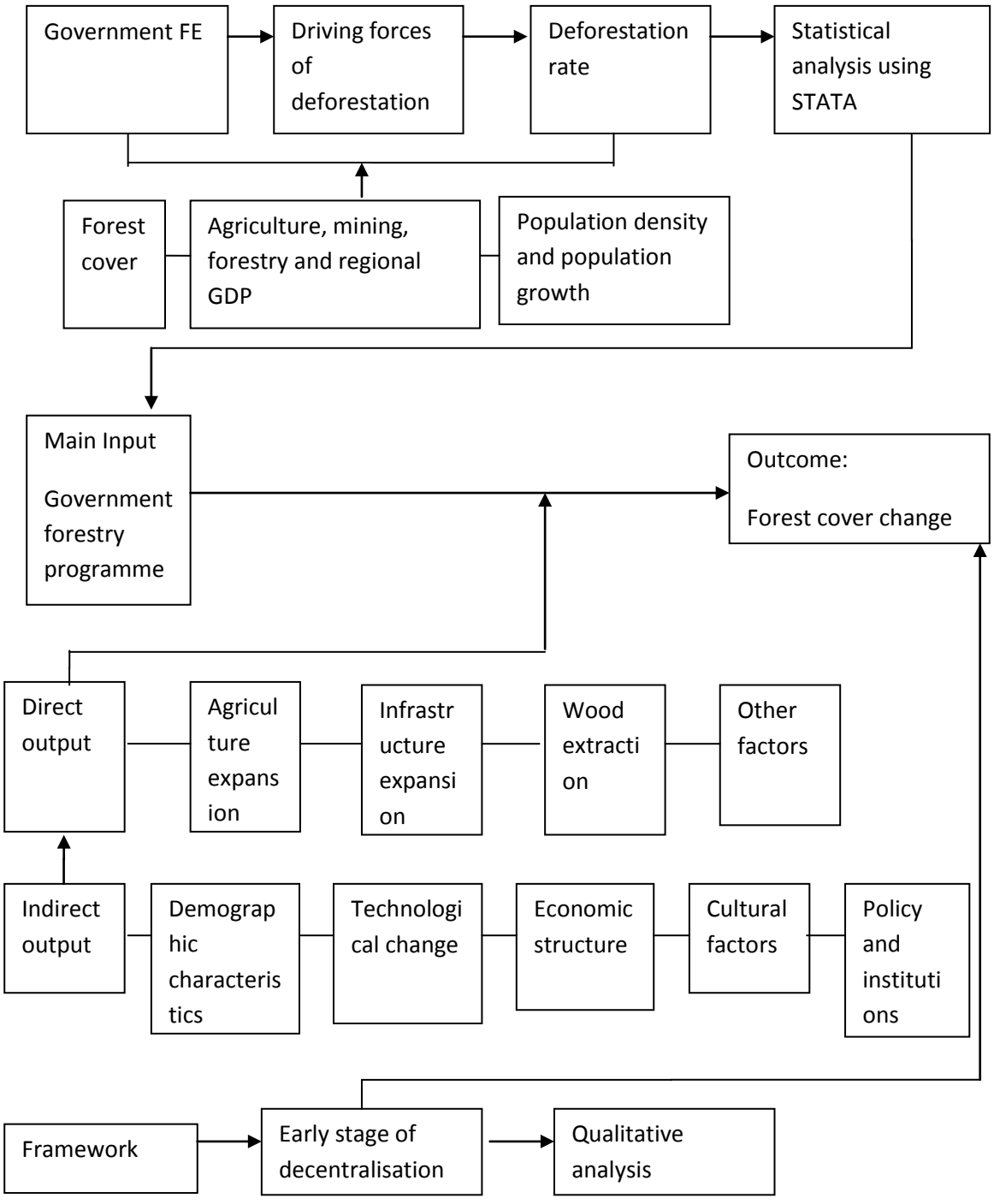

Figure 2: Overall framework of evaluation

The following sections describe the study components into two methods: quantitative and qualitative.

4.2. The Quantitative Method

The general aim of this study is to look at the effectiveness of forest expenditure, as an indicator of government reforestation programme, in reducing deforestation in Indonesia. The effectiveness of the forestry expenditure is affected by several variables such as forest cover, population, infrastructure expansion, wood extraction and institutional changes. It is important to establish a quantitative analysis on "Has the reforestation in Indonesia been effective? before establish qualitative analysis on why the reforestation is not effective and how to increase the effectiveness of FE. Therefore, this study looks at the relationship between Indonesian forest expenditure and its association with the trend of deforestation.

The majority of studies in deforestation literature are based on cross-national statistical analyses (Bilsborrow 1994; Brown & Pearce 1994; Fairhead & Leach 1998; Murali & Hedge 1997; Painter & Durham 1995; Rudel & Roper 1997; Sponsel et al. 1996; Williams 1994). This study focuses on one country, Indonesia, and conducts disaggregated analysis at the level of 30 provinces. Because all data are in continuous form, linear multiple regression is used as a means of drawing a relationship between the continuous dependent variable of deforestation and several independent variables (Pallant 2007).

Data limitations exist because a limited number of observations (30 provinces in 2007–10) prevented analysis with a large number of variables. Additionally, detailed data

availability was limited across all 490 districts and cities. Hence, the quantitative part of this study focuses on analyses of 11 variables across provinces. The selected variables are forest cover proportion, forest expenditure proportion to total expenditure, population density, population growth, mining output growth, forestry output growth, agriculture output growth, current critical land growth, current regional GDP at market price growth, DR proportion to the FE and DAK proportion to the FE.

The model proposed by Geist and Lambin (2002) introduced eight broad clusters: agricultural expansion, wood extraction, infrastructure extension, demographic, economic, technological, policy and institutional, and cultural and other factors. Each of the clusters consists of several variables. Infrastructure extension consists of transport, settlement, markets, private companies and public services variables. Agricultural expansion is divided into permanent cultivation, shifting cultivation, cattle ranching and colonisation variables. Wood extraction is limited to commercial, fuel wood, pole wood and charcoal production variables. Demographic factors consist of natural increments, migration, population density, population distribution and life cycle features variables. Economic factors are composed of market growth and commercialisation, economic structures, urbanisation and industrialisation, and special variables. Technological factors are made up of agro-technical change, application in the wood sectors and agricultural production sectors. Policy and institutional factors contain formal policies, policy climate and property rights. The cultural cluster is made up of public attitudes, values and beliefs, and individual or household behaviour variables. ‘Other factors’ include pre-disposing environmental factors, biophysical drivers and social trigger events, which include several variables such as soil quality, topography, war, droughts and fires.

Based on the adjusted variables from Geist and Lambin (2002) proposed model, regression was performed to figure out relationship between dependent and independent variables. The dependent variable is deforestation and the other ten variables are independent variables. Figure 3 illustrates the regression strategy used in this study. First, a bivariate regression between the change in FE and deforestation at a national level was examined. Next, a regression was established between the change in FE, forest cover proportion, FE proportion and deforestation. The initial condition of the forest and the FE proportion was suspected to influence change in the FE. Variables were then added to this simple model to examine how controlling other driving factors of deforestation affects the relationship between change in FE and deforestation rate.

The second endeavour was to establish similar regressions in timber-producing provinces. This further regression was initiated to investigate in more detail for provinces with rich timber and mining resources. As described in table 3, 22 provinces were determined by the central government as being permitted to cut timber in their natural forests.

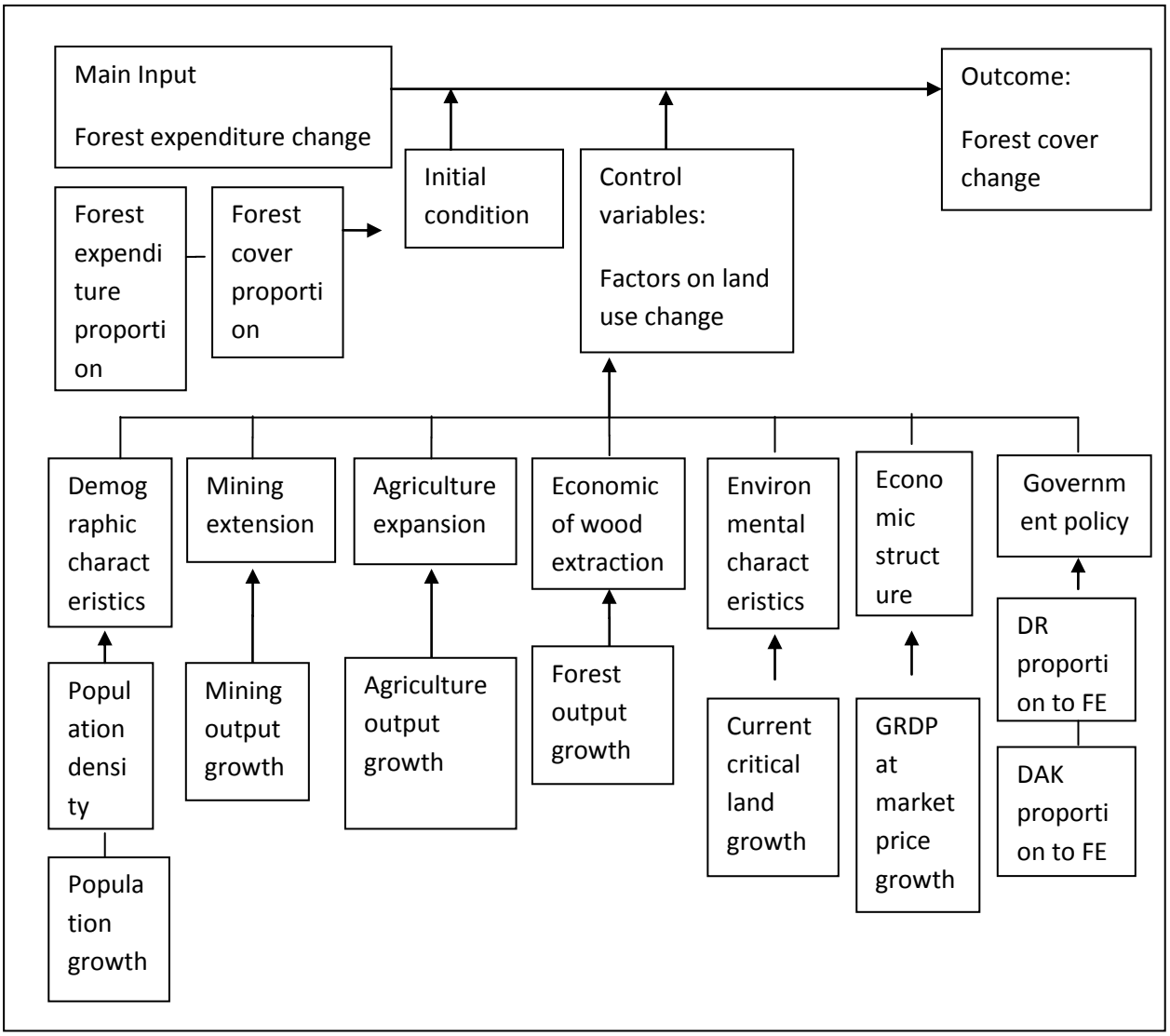

Figure 3: Framework for examining effectiveness of forest expenditure programme (quantitative evaluation)

Table 4: Indonesian timber-producing and non-local-timber-producing provinces

No	Province	Type of timber producer*
1	Nanggroe Aceh Darussalam (Aceh)	Timber
2	North Sumatra (Sumut)	Timber
3	West Sumatra (Sumbar)	Timber
4	South Sumatra (Sumsel)	Timber
5	Bangka Belitung (Babel)	Timber
6	Riau	Timber
7	Jambi	Timber
8	Bengkulu	Timber
9	Lampung	Timber
10	West Kalimantan (Kalbar)	Timber
11	South Kalimantan (Kalsel)	Timber
12	Central Kalimantan (Kalteng)	Timber
13	East Kalimantan (Kaltim)	Timber
14	South Sulawesi (Sulsel)	Timber
15	North Sulawesi (Sulut)	Timber
16	Gorontalo	Timber
17	Central Sulawesi (Sulteng)	Timber
18	South East Sulawesi (Sultengg)	Timber
19	Maluku	Timber
20	North Maluku Utara (Malut)	Timber
21	Papua	Timber
22	West Nusa tenggara (NTB)	Timber
23	Daerah Khusus Ibukota (DKI) Jakarta	Non-Timber
24	West Java (Jabar)	Non-Timber
25	Banten	Non-Timber
26	Central Java (Jateng)	Non-Timber
27	East Java (Jatim)	Non-Timber
28	Daerah Istimewa Yogyakarta (DIY)	Non-Timber
29	Bali	Non-Timber
30	East Nusa tenggara (NTT)	Non-Timber

***T**imber-producing provinces are allowed to issue permits in natural forests because their natural forest cover meets a specified forest cover to be extracted; non-timber-producing provinces are not allowed to issue permits in natural forests because their natural forest cover is below a specified forest cover to be extracted.

The control variables shown in Figure 3 are based on many previous studies. Rudel (2009) suggested that deforestation impact has mainly come from the increasing prominence of industrial or large farmer holders. Geist and Lambin (2002) pointed out the strong influence of government policy and population growth on deforestation. Defries et al. (2010) and Etter et al. (2006) supported the argument that population growth and agriculture have been the most significant factors in driving deforestation. Although Wright (2006) highlighted the close relationship between population growth and deforestation, another study done by Wright (2010) suggested that wood extraction is one of the most crucial factors affecting deforestation in tropical forests.

The development of infrastructure has also been identified as a driving factor in deforestation. This is especially apparent where infrastructure is related to mining activities (Swenson et al. 2011). Pfaff (1999) found that in Brazil, the significant effects of increased road density in a county on higher deforestation in that county and in neighbouring counties. Further, he concluded that greater distance from markets south of the Amazon is associated with less deforestation.

With respect to economic characteristics, the majority of research such as Cropper and Griffith (1994); Goklany (1999 in Bhattarai and Hummig 2001) and Bhattarai and Hammig (2001) that correlates income and deforestation has addressed the hypothesis that higher incomes are expected to slow deforestation rates. However, some scholars, such as Cole (2005), Culas (2007), Koop and Tole (2001) and Scrieciu (2007), have shown that this is not the case, even when institutional policies that support environmental management are employed. Koop and Tole (2001) have an interesting finding where higher inequality led to massive deforestation.

Government policy also affects deforestation. Pfaff (1999) provided strong evidence that government provision of subsidised credit for land and forest rehabilitation significantly decreased deforestation rates. Deacon (1995) found that all government policies on transportation improvement, taxes and royalties on timber harvest, controls on logging, agriculture, tax incentives and job enhancement affected the deforestation rate. Powerful local authorities, by legalising timber extraction permits without a specified legal framework on what can, and what should not, be done are encouraging deforestation (Barness et al. 2013). On the other hand, promoting simple but effective policies such as efficient cooking practices as one way of introducing alternative fuels subsidies is a proven factor in decreasing deforestation rates (Bluffstone 1998).

4.3. The Qualitative Research and Case Study Process

As quantitative data limitations exist, a qualitative analysis provides a deeper explanation of what aspects should be adjusted and improved to increase the effectiveness of FE in Indonesia. Use of case studies is an ideal approach when a holistic, in-depth investigation is needed (Feagin, Orum & Sjoberg, 1991). In addition, the need to triangulate between data, investigator, theory and methodology is often only satisfied when using case studies (Tellish 1997). In particular, the current study uses exploratory case studies to understand any causal relationship between driving factors of deforestation (including informal or institutional policy) and deforestation rates.

Early stage of decentralization is the framework of case study. The term early is used to distinguish immature decentralization in Indonesia context with mature decentralization in other countries. 14 years of forest decentralization is evaluated in this qualitative case

study. All driving factor of deforestation is evaluated using decentralization as a framework of study.

The case study provinces were selected based on the characteristics presented in Table 4. Five provinces were selected via three selection steps to minimise bias. The first step was to rank three provinces based on agricultural output, population density and forest cover criteria. These first two criteria reflected the two most dominant factors driving deforestation (Angelsen 1999; Defries et al. 2010; Kobayashi 2001; Wright & Muller-Landau 2006). The forest cover criteria were selected based on the notion that the higher the forest cover, the greater the deforestation. Application of the three criteria resulted in selection of two timber-producing (Kalimantan Timur and Sulawesi Selatan) and one non-timber-producing province (Jawa Barat). The province of Kalimantan Timur represents high forest cover, low population density and small agricultural output. The province of Sulawesi Selatan represents medium forest cover, medium population density and medium agricultural output. The province of Jawa Barat represents low forest cover, large population density and large agricultural output. The next stage was to establish two further criteria that also are considered factors that increase deforestation (Coffin 2007; Kuznet 1955; Wilkie et al. 2000)—low poverty gap and high infrastructure output—, represented by the province of Bali (non-timber-producing). The last criterion– as well as the last stage- was a large community-owned plantation (*Hutan tanaman rakyat* or HTR) forest, which lead to inclusion of the province of Jawa Tengah (non-timber-producing) as the largest HTR in Indonesia. These criteria are classified as factors that decrease deforestation (Kellert et al. 2000). In total, five provinces were singled out in the qualitative case study: two timber-producing and three non-timber-producing provinces.

Table 5: Province case studies and selection criteria

No	Criterion	Stages of selection	Theory supporting selection criteria	Selected provinces
1	Population density	First	Carr, Lopez & Bilsborrow 2009; Defries et al. 2010; Fearnside 1982; Wright & Muller-Landau 2006	• Jawa Barat, highest • Sulawesi Selatan, medium • Kalimantan Timur, lowest
2	Agricultural output	First	Defries et al. 2010; Kobayashi 2002	• Jawa Barat, highest • Sulawesi Selatan, medium • Kalimantan Timur, lowest
3	Forest cover	First	None	• Kalimantan Timur, highest • Sulawesi Selatan, medium • Jawa Barat, lowest
4	Poverty gap	Second	Kuznet 1955	• Bali
5	High infrastructure output	Second	Coffin 2007; Wilkie et al. 2000	• Bali
6	Community-owned forest	Third	Kellert et al. 2000	• Jawa Tengah

Socio-economic and geographic characteristics for the five provinces identified by the selection process (see Table 5) are provided in Table 6.

The next chapter elaborates on the quantitative analysis of the impact of FE on deforestation.

Table 6: Socio-economic characteristics of five selected provinces

Province	Province Type	Poverty (000 people)	Population (people)	Population distribution	Population density	Budget (000 RP)	Forest cover (000 ha)	Total land (000 ha)
Kalimantan Timur	Timber	243.00	3,553,143	0.04	182.15	28,486,228.81	13,423.8	19,506.2
Sulawesi Selatan	Timber	913.40	9,193,427	0.10	1,505.30	15,307,905.06	2,379.8	6,107.4
Jawa Barat	Non-timber	4,773.70	40,350,093	0.45	10,836.58	42,467,967.11	649.7	3,723.5
Jawa Tengah	Non-timber	5,369.20	32,382,528	0.36	9,361.59	35,060,538.78	1,118.0	3,459.1
Bali	Non-timber	174.90	3,890,757	0.04	6,854.50	8,429,796.54	103.4	567.6

Chapter 5: Quantitative Data Results and Analysis

5.1. Quantitative Data

This study selected 2007–10 as the time frame for analysis. This period represents consistent and comparable budget reporting for FE in Indonesia. Provinces are used as the basic spatial unit due to the availability of data at this administrative government level. The Ministry of Finance provides data on FE, Reforestation Fund or Dana reboisasi (DR) in the local government budget in provinces and districts level, the lower level of government. The FE of a province in this study is the accumulation of expenditure of that particular province and all the districts within the province. This study evaluates the FE in both local-producing and non-local-producing provinces because these provinces have different environmental, socio-economic and institutional characteristics.

5.2. Provincial data

This section provides basic descriptive illustration on each province from 2007 to 2010. Data on Forestry Expenditure (FE), forest cover, forestry output and agriculture output are provided to present big picture of Indonesian condition between 2007 and 2010.

Table 7 Forestry Expenditure (FE) and Forest cover in 2007 to 2010 (Source: Ministry of Finance and Ministry of Forestry 2007-2010)

No	Provinces	FE (000 Rp) 2007	FE (000 Rp) 2008	FE (000 Rp) 2009	FE (000 Rp) 2010	Forest cover (ha) 2007	Forest cover (ha) 2008	Forest cover (ha) 2009	Forest cover (ha) 2010
1	Aceh	85,854	498,042	296,055	356,644	3,356,372	3,294,343	3,232,315	3,170,286
2	Sumatra Utara	97,802	128,988	135,794	154,724	2,038,194	2,093,988	2,149,781	2,205,575
3	Sumatra Barat	75,072	68,052	70,927	68,174	2,038,894	2,016,288	1,993,682	1,971,076
4	Sumatra Selatan	54,506	59,124	70,077	74,732	1,531,173	1,404,646	1,278,119	1,151,592
5	Riau	228,368	238,107	230,536	231,732	313,467	298,034	282,602	267,169
6	Bangka Belitung	4,411	16,477	21,307	16,206	3,603,431	3,396,162	3,188,893	2,981,624
7	Jambi	67,475	95,128	86,715	79,660	1,515,310	1,458,821	1,402,331	1,345,841
8	Bengkulu	57,991	52,493	52,097	50,752	763,230	768,659	774,089	779,518
9	Lampung	62,253	74,351	58,445	72,638	270,322	304,244	338,167	372,089
10	Kalimantan Barat	79,335	138,717	102,378	105,405	6,632,099	6,628,098	6,624,097	6,620,097
11	Kalimantan Selatan	35,181	55,479	66,213	70,942	1,129,555	1,058,711	987,866	917,022
12	Kalimantan Tengah	310,046	357,247	380,531	363,617	8,780,269	8,461,938	8,143,606	7,825,275
13	Kalimantan Timur	297,072	367,603	390,383	411,304	13,491,981	13,469,261	13,446,542	13,423,823
14	Sulawesi Selatan	116,455	133,431	147,989	135,138	2,283,114	2,315,328	2,347,543	2,379,757
15	Sulawesi Utara	15,867	30,272	37,131	51,981	441,553	492,006	542,459	592,911
16	Gorontalo	7,804	19,382	22,085	26,563	726,001	727,601	729,202	730,802
17	Sulawesi Tengah	51,669	57,926	55,296	53,311	3,899,789	4,133,477	4,367,166	4,600,855
18	Sulawesi Tenggarra	46,608	55,797	72,274	68,929	1,743,311	1,809,522	1,875,733	1,941,945
19	Maluku	52,687	66,548	42,952	49,990	2,793,829	2,881,458	2,969,088	3,056,717
20	Maluku Utara	48,006	79,917	72,602	73,432	2,041,428	2,107,455	2,173,483	2,239,510
21	Papua	157,759	223,012	249,794	254,509	33,243,896	33,301,691	33,359,487	33,417,282
22	Nusa Tenggara Barat	45,822	61,885	54,340	58,648	762,033	773,166	784,299	795,433
23	DKI Jakarta	0	0	185,430	0	271	242	212	183
24	Jawa Barat	102,621	111,338	104,822	146,511	649,464	649,528	649,592	649,655
25	Banten	32,375	28,241	24,789	29,756	160,459	164,218	167,977	171,736
26	Jawa Tengah	78,510	85,595	80,949	96,146	811,860	913,920	1,015,980	1,118,039
27	Jawa Timur	87,693	122,320	150,098	167,647	1,703,666	1,810,932	1,918,198	2,025,464
28	DI Yogyakarta	20,651	30,722	44,759	38,120	36,444	37,188	37,933	38,677
29	Bali	40,066	53,026	43,312	49,958	90,512	94,824	99,137	103,449
30	Nusa Tenggara Timur	59,114	82,139	87,805	95,189	1,664,885	1,707,471	1,750,056	1,792,641

Table 7 above shows the FE and forest cover in each province. It depicts interesting information where decreasing forest cover is not supported with decreasing trend of FE is dominated in all provinces. For example, in Province of Aceh, a decrease of forest cover took place from 3,232,314.83 hectare in 2009 to 3,170,286.44 hectare in 2010 but an increase of FE took place from Rp. 296,054, 900 in 2009 to Rp. 356,643,790 in 2010. Only limited provinces experience decrease of FE and forest cover. For example, Province of Sulawesi Selatan decreased its FE from Rp 147,988,820 in 2009 to Rp. 135,138,060 in 2010 that results in decrease in its forest cover from 2,347,542.60 hectare in 2009 to 2,379,756.80 hectare in 2010.

Table 8 below shows the forestry output and agriculture output in all provinces from 2007 to 2010. This table also portrays interesting description where almost all provinces experienced an increase in those two outputs from 2007 to 2010. Only province of Maluku encountered decrease in agriculture output from 2007 to 2010. The agriculture output decrease from Rp. 297,350 in 2007 to Rp. 248,150 in 2010.

Table 9 below shows the mining output in all provinces from 2007 to 2010. This table also portrays interesting description where almost all provinces experienced an increase in this output from 2007 to 2010. Only province of Aceh and Maluku Utara encountered a decreasing trend in mining output from 2007 to 2010.

Table 8 Agriculture output and Forestry output in 2007 to 2010 (Source: Ministry of Finance and Ministry of Forestry 2007-2010)

No	Provinces	Agriculture Output (000 Rp) 2007	Agriculture Output (000 Rp 2008	Agriculture Output (000 Rp) 2009	Agriculture Output (000 Rp 2010	Forestry Output (000 Rp) 2007	Forestry Output (000 Rp) 2008	Forestry Output (000 Rp) 2009	Forestry Output (000 Rp) 2010
1	Aceh	18,136.00	19,398.00	20,416.00	21,968.00	1,925.80	1,879.30	1,786.00	1,780.40
2	Sumatra Utara	41,010.00	48,872.00	54,431.00	62,984.00	1,898.70	2,190.40	2,505.70	2,735.90
3	Sumatra Barat	14,755.00	17,380.00	18,382.00	20,885.00	934.18	1,099.00	1,143.80	1,244.80
4	Sumatra Selatan	20,080.00	22,966.00	23,825.00	27,665.00	1,868.40	2,258.40	2,739.60	2,897.60
5	Riau	3,340.50	3,958.00	4,302.10	4,977.90	68.70	78.63	81.19	87.01
6	Bangka Belitung	46,207.10	56,006.40	63,462.40	72,459.20	13,930.86	17,218.87	20,119.80	22,355.87
7	Jambi	8,366.90	9,792.00	12,113.00	15,815.00	727.15	810.60	933.82	1,036.70
8	Bengkulu	5,187.20	6,064.10	6,411.80	7,441.10	208.23	254.36	264.29	273.26
9	Lampung	22,733.00	28,802.00	34,591.00	39,917.00	389.45	436.12	488.81	539.39
10	Kalimantan Barat	11,437.00	12,835.00	13,955.00	15,168.00	1,400.40	1,469.90	1,532.40	1,584.00
11	Kalimantan Selatan	8,856.30	10,159.00	11,380.00	12,447.00	419.98	455.49	483.20	513.17
12	Kalimantan Tengah	9,292.70	9,664.20	10,461.00	12,138.00	830.22	790.91	724.83	718.58
13	Kalimantan Timur	12,865.00	15,523.00	16,956.00	19,216.00	4,308.90	4,840.60	4,716.50	4,940.50
14	Sulawesi Selatan	24,155.60	29,234.00	32,620.40	35,971.80	137.94	149.95	171.08	242.69
15	Sulawesi Utara	4,774.10	5,673.70	6,231.90	7,167.30	70.69	81.73	89.17	89.36
16	Gorontalo	1,452.70	1,847.60	2,093.40	2,332.20	38.35	40.08	58.86	67.11
17	Sulawesi Tengah	10,313.00	12,138.00	13,231.00	14,507.00	1,018.10	1,229.30	1,370.90	1,463.30
18	Sulawesi Tenggarra	6,843.00	8,091.30	8,985.30	9,419.20	248.18	297.11	341.27	359.39
19	Maluku	2,013.10	2,153.80	2,335.40	2,565.50	114.50	124.55	137.49	120.94
20	Maluku Utara	2,182.10	1,959.20	1,752.00	1,529.50	182.85	166.50	155.04	127.21
21	Papua	8,306.90	9,819.40	11,524.70	12,799.00	1,684.83	1,971.76	2,258.70	2,466.50
22	Nusa Tenggara Barat	6,376.15	7,428.38	8,162.77	8,939.69	21.69	23.74	24.72	26.79
23	DKI Jakarta	571.43	687.83	762.98	849.56	-	-	-	-
24	Jawa Barat	62,895.00	72,518.00	85,149.00	97,194.00	894.35	910.61	798.53	921.61
25	Banten	9,156.80	11,010.00	12,163.00	14,210.00	70.42	65.71	63.38	65.96
26	Jawa Tengah	63,832.00	72,863.00	79,343.00	86,668.00	1,433.40	1,903.20	2,033.00	2,354.60
27	Jawa Timur	89,628.00	102,816.00	112,234.00	122,624.00	1,305.50	1,795.40	1,976.60	2,559.20
28	DI Yogyakarta	4,941.80	5,993.80	6,366.80	6,644.70	350.34	385.21	419.46	430.73
29	Bali	8,711.10	9,884.80	11,326.00	12,099.00	3.20	3.87	4.10	4.78
30	Nusa Tenggara Timur	7,706.40	8,747.00	9,553.20	10,658.00	44.42	50.22	54.86	63.21

Table 9 Mining output 2007 to 2010 (source: National Statistic 2007-10)

No	Provinces	Mining Output (000 Rp) 2007	Mining Output (000 Rp) 2008	Mining Output (000 Rp) 2009	Mining Output (000 Rp) 2010
1	Aceh	19,624.00	15,984.00	13,879.00	8,254.60
2	Sumatra Utara	2,404.90	2,980.90	3,229.60	3,759.70
3	Sumatra Barat	2,059.90	2,356.20	2,556.10	2,763.90
4	Sumatra Selatan	27,412.00	34,008.00	28,898.00	34,226.00
5	Riau	96,178.50	129,226.10	119,805.70	131,984.00
6	Bangka Belitung	91,120.00	123,782.00	114,204.00	126,047.00
7	Jambi	6,080.20	10,526.00	8,078.60	9,817.30
8	Bengkulu	458.82	499.24	754.15	774.02
9	Lampung	2,190.10	2,306.70	1,860.40	2,161.80
10	Kalimantan Barat	785.53	919.72	1,048.40	1,205.60
11	Kalimantan Selatan	8,556.80	9,956.90	11,015.00	14,107.00
12	Kalimantan Tengah	1,947.60	2,535.60	3,328.90	3,821.10
13	Kalimantan Timur	95,606.00	145,013.00	130,835.00	152,977.00
14	Sulawesi Selatan	5,936.80	6,269.58	5,586.78	7,215.33
15	Sulawesi Utara	1,057.70	1,291.00	1,409.70	1,517.60
16	Gorontalo	53.24	63.85	81.26	94.98
17	Sulawesi Tengah	865.07	1,189.50	1,374.30	1,939.60
18	Sulawesi Tenggarra	862.31	1,020.50	1,099.20	1,391.30
19	Maluku	43.46	47.43	52.93	59.20
20	Maluku Utara	302.53	277.88	238.90	194.45
21	Papua	39,711.10	41,889.40	52,855.40	58,786.80
22	Nusa Tenggara Barat	12,669.00	10,871.00	15,851.00	18,048.00
23	DKI Jakarta	2,636.10	3,178.70	3,155.80	3,704.30
24	Jawa Barat	12,621.00	14,904.00	13,278.00	15,546.00
25	Banten	115.13	141.23	168.13	183.94
26	Jawa Tengah	3,109.60	3,514.50	3,852.80	4,302.60
27	Jawa Timur	11,652.00	13,812.00	15,276.00	17,031.00
28	DI Yogyakarta	258.76	280.11	293.98	304.66
29	Bali	278.60	345.12	387.92	471.15
30	Nusa Tenggara Timur	261.64	289.25	316.37	382.55

5.3. Variables

The independent variable representing deforestation in this study is the change in forest cover. Its value is generated by subtracting a current value from a previous value and dividing it by the current value. The data used in the recalculation of forest resources were obtained from satellite digital imagery, at 1:250,000 scale accuracy, in 2006 and 2010. These satellite data are available in the Forestry Inventory and Mapping Centre, at the Forestry Planning Agency, Ministry of Forestry.

The 2010 digital data were combined with the Forest and Water Designation Map for 30 provinces, including five new provinces (Banten, Bangka Belitung, Gorontalo, Sulawesi Barat and Maluku Utara) established between 1999 and 2005. Another combination of data for the provinces of Sumatra Utara, Kalimantan Tengah and Riau (in the Forest Land Use Agreement) was used for calculating the land cover.

Based on these three sources, the Ministry of Forestry has classified land cover into 23 uses, including forest, mining and agriculture. In the recalculations performed here, only the forest area is detailed in its classification into three functions, which consist of protection forest, conservation forest (which includes Hunting Parks) and production forest. Production forest is composed of permanent production forest, limited production forest (LPP) and LPP converted to full production forest. According to Ministry of Forestry (2008), in 2006, reconfirmation of the data calculation for several pilot sites had been done on each site before it was published. In 2010, data calculations were done on each site before they were circulated.

This study used an input–output–outcome framework to define policy variables. Input variables consist of all sources used to run a program, such as amount of time, personnel and resources invested in a project or task (Bowen & Riley 2003). Here, money spent for forestry, in terms of the FE proportion to the total budget, is used as an input. To measure particular actions in a programme, its output is crucial to determine its effectiveness (Bowen & Riley 2003). The programme outputs in this study are population density, population growth, mining output growth, forestry output growth, agriculture output growth, current critical land growth, current regional GDP at market price growth, DAK proportion to FE and DR proportion to FE. Finally, the programme outcome here is the deforestation rate. An outcome is the observed characteristics of the target population or the social conditions which are expected to have been changed by a programme (Rossi, Lipsey & Freeman 2004). The performance, complexity and cost of the outcome are affected by choice of inputs and outputs (Van-De-Wal & De-Jager 2001)

The data definitions for the three variables related to the inputs are FE change (fortexpch) and initial conditions of program: forest cover proportion (fortcovprop) and FE proportion (fortexpprop). Forest cover is defined as all the land area covered by forest (including natural and community forest plantation). This study does not differentiate between state forest and non-state forest. The value generated from forest cover is divided by total area for a province to give the proportion of forest cover in that province (fortcovprop). The FE proportion (fortexpprop) is budgeted government expenditure for forestry in a given province, generated by dividing government expenditure in forestry by total expenditure, in that province. The change in forest expenditure (fortexpch) represents the change in FE in each province. This value is

generated by subtracting the current value from the previous value and dividing it by the current value.

The next step is to define the control variables. As mentioned in the beginning of this chapter, the control variables here consist of other conditions that have been found to affect reforestation and deforestation in the previous studies. The definition of each variables is presented as follow. Mining output is the value in Indonesian Rupiah rate (IDR) of all mining output. Mining output growth (mioutgr) is the growth of mining output in each province. This value was extracted for a province by subtracting its current from its previous mining output value and dividing by its current value. The IDR value all agriculture output is represented by agriculture output. Agricultural output growth (agrinofortgr) represents agricultural expansion. As a proxy for the economic value of wood extraction, forest output growth (fortoutgr) was selected. The forest output is selected to represent the wood extraction because the main contribution of forest output comes from timber logging. There is special adjustment from original model proposed by Geist and Lambin (2002) applied for mining, agriculture and forestry, where output was used instead of hectares because technological advances decrease the significance of the hectare. A method similar to that for calculating the growth of mining was applied to calculate agriculture and forestry output. Current critical land growth (critlangr) is used as a proxy for environmental characteristics. Critical land is defined as land areas that are severely degraded because of drastic decreases in vegetation cover. With respect to demographic characteristics, population density (Popdenst) and population growth (popgr) were determined to be included in analysis. In order to analyse economic characteristics, growth of regional Gross Domestic Product (GDP) at market price (reggdpmgr) was selected. The regional GDP

is GDP in each province. In order to represent government policy in FE, DR (drpropfe) and DAK *kehutanan* (dakpropfe) proportions were selected. DR is the receipt from portion of levy from timber cutting in natural forest in each timber-producer province to be used for land forest rehabilitation only. DAK *kehutanan* is the special forestry revenue of each regions to be used only for land and forest rehabilitation activities. DR and DAK proportions were established for each province by dividing each source of revenue with total FE for that province.

5.4. Results and Expected Relationships

The results of direct regression for 30 provinces showed that FE negatively and significantly influenced forest cover change, which was the proxy for reforestation/deforestation in this study. This result indicated that the FE was not effective in reducing the deforestation rate; instead it may make it worse. Subsequently, adding forest cover proportion and FE change was done to measure whether the initial condition of a forest and FE influenced the deforestation rate. A similar result for this regression as for the direct regression suggested that all other factors of land use change combined may explain which factors influence the effectiveness of FE in increasing forest cover. The result of this regression indicated that FE is not effective in reducing deforestation, as the relationship between expenditure and the change in forest cover is still significantly negative even after controlling for all variables. The results in all provinces in Indonesia for all three regression steps are presented in Table 10.

Other control factors known to affect the deforestation rate were added progressively to the model to see whether the ineffectiveness of FE is due to the more ‘difficult’

conditions of one province compared to the others. The results illustrated that the negative coefficient of FE does change to become positive, but not significantly so. This indicated that various factors that may affect the deforestation rate have also affected the efficiency of the FE to reduce the deforestation rate. However, the lack of significance for the coefficient also indicated that even with all these conditions being controlled for, FE is still not as influential as expected.

This result suggests that increasing population growth and population density significantly decreases the forest cover or, in other words, increases deforestation rate in Indonesia. Although this result does not support Geist & Lambin (2002) finding on non-existence of population growth influence to increase deforestation, this result is supported to the common finding on population growth in increasing deforestation (Defries et al. 2010; Etter et al. 2006; Wright 2006). The correlation between population growth, population distribution and forest cover change in Indonesia is best described in table 11. This table does indicate that Indonesia may fit Boserup's (1965) theory that suggests higher population increases agricultural intensification. As one of the agricultural activities, forest plantation is supported by abundant and cheap labour. This plantation is a source of revenue for forest-dependent people.

Table 10: Results of regressions for all provinces

coefficient (*t*-value); see text for explanation of variables

Variable	1st regression	2nd regression	3rd regression
fortexpch	−0.000000699** (−2.39)	−0.000000625** (−2.11)	−0.0000000576 (−0.19)
fortexpprop	-	−0.80499 (−1.4)	−1.362613** (−2.57)
fortcovprop	-	0.0398887 (1.5)	0.0617849* (1.89)
popgr	-	-	−2.278214** (−5.1)
Popdenst	-	-	−0.0000893** (−3.22)
mioutgr	-	-	−0.0094402 (−0.35)
agrinofortgr	-	-	0.015522 (0.28)
fortoutgr	-	-	0.0470614 (1.03)
reggdpmgr	-	-	0.0015886 (0.68)
critlangr	-	-	−0.00000271 (-0.18)
drpropfe	-	-	0.0233224 (0.54)
dakpropfe	-	-	0.0063894 (0.11)
Year	−0.2591821 (−0.59)	−0.3394389 (−0.77)	−0.3712437 (−0.81)
(cons)	521.5647 (0.59)	682.0952 (0.77)	749.9906 (0.82)
R^2	**0.0501**	**0.0746**	**0.3766**

Note: The numbers in the column represent coefficient and t value in the bracket
* and ** indicate significance at the 10 and 5 per cent levels, respectively

Table 11: Population, forest cover and forest change between 2006 and 2010

(source: Ministry of Forestry 2006 to 2010 and National Statistic 2010)

Province	Population 2010	Population distribution 2010	Population density 2010	Population growth 2010	Forest cover (000 ha) 2006	Forest cover (000 ha) 2010	Forest Change 2010
Aceh	4,494,410	0.019	799	0.03	3,418.4	3,170.3	-0.019
Sumatra Utara	12,982,204	0.055	1,818	-0.02	1,982.4	2,205.6	0.026
Sumatra Barat	4,846,909	0.021	1,159	0.00	2,061.5	1,971.1	-0.011
Sumatra Selatan	7,450,394	0.032	889	0.03	1,657.7	1,151.6	-0.099
Bangka Belitung	1,223,296	0.005	735	0.07	328.9	267.2	-0.055
Riau	7,217,530	0.031	763	0.05	3,810.7	2,981.6	-0.065
Jambi	3,092,265	0.013	646	0.08	1,571.8	1,345.8	-0.040
Bengkulu	1,715,518	0.007	853	0.03	757.8	779.5	0.007
Lampung	7,608,405	0.032	2,274	0.02	236.4	372.1	0.100
Kalimantan Barat	4,395,983	0.019	302	0.02	6,636.1	6,620.1	-0.001
Kalimantan Selatan	3,626,616	0.015	980	0.04	1,200.4	917.0	-0.072
Kalimantan Tengah	2,212,089	0.009	145	0.06	9,098.6	7,825.3	-0.039
Kalimantan Timur	3,553,143	0.015	182	1.00	13,514.7	13,423.8	-0.002
Sulawesi Selatan	9,193,427	0.039	1,505	0.03	2,250.9	2,379.8	0.014
Sulawesi Utara	2,270,596	0.010	1,567	0.02	391.1	592.9	0.093
Gorontalo	1,040,164	0.004	868	0.05	724.4	730.8	0.002
Sulwesi Tengah	2,635,009	0.011	436	0.06	3,666.1	4,600.9	0.054
Sulawesi Tenggara	2,232,586	0.010	614	0.05	1,677.1	1,941.9	0.035
Maluku	1,533,506	0.007	356	0.13	2,706.2	3,056.7	0.030
Maluku Utara	1,038,087	0.004	299	0.06	1,975.4	2,239.5	0.030
Papua	3,593,803	0.015	87	0.15	33,186.1	33,417.3	0.002
Nusa Tenggara Barat	4,500,212	0.019	2,274	0.01	750.9	795.4	0.014
DKI Jakarta	9,607,079	0.041	136,112	0.04	0.3	0.2	-0.137
Jawa Barat	40,350,093	0.172	10,837	0.04	649.4	649.7	0.000
Banten	10,632,277	0.045	11,319	0.08	156.7	171.7	0.022
Jawa Tengah	32,382,528	0.138	9,362	-0.01	709.8	1,118.0	0.100
Jawa Timur	37,476,993	0.160	7,783	0.01	1,596.4	2,025.5	0.056
D.I. Yogyakarta	3,457,045	0.015	10,751	-0.01	35.7	38.7	0.020
Bali	3,890,757	0.017	6,854	0.09	86.2	103.4	0.043
Nusa Tenggara Timur	4,683,627	0.020	1,006	0.01	1,622.3	1,792.6	0.024

Since the timber-producing-provinces have higher timber fees as one of the sources of FE, it is important to have separate regressions in those particular provinces. Higher value of population growth and density are located in non-timber producer provinces, where its forest cover are lower compared to the timber-producer provinces (table 11). This table also describes that during 2006 to 2010, the deforestation took place mostly in timber-producer provinces and reforestation took place mostly in non-timber-producer provinces. The result of this regression (Table 12) supports our assessment that FE was not effective in reducing the deforestation rate event when the expenditure is assessed among the timber producing provinces only.

One important thing to note from the results in Table 12 is that the coefficient in the timber provinces is no longer significant. This means that the result for the overall province is somewhat biased because the timber-producing provinces have much higher rates of deforestation as well as much larger proportions of FE. The deforestation took place in the timber-producing provinces. The major value of deforestation in those provinces was 2.8 per cent, or 906.249 hectares, in 2007 alone (Ministry of Forestry data recalculated).

Table 12: Results of regressions for timber-producing provinces

coefficient (*t*-value); see text for explanation of variables

Variable	1st regression	2nd regression	3rd regression
fortexpch	−0.0050509 (−0.71)	−0.0052323 (−0.72)	−0.0045172 (−0.73)
fortexpprop		−0.4053155 (−0.67)	−0.796515 (−1.43)
fortcovprop		0.0425119 (1.41)	0.1630568** (4.52)
popgr			−0.8564962* (−1.7)
Popdenst			0.0056788** (5.19)
mioutgr			0.0014268 (0.05)
agrinofortgr			0.0510636 (0.86)
fortoutgr			−0.0205186 (−0.32)
reggdpmgr			−0.0171456 (−0.7)
critlangr			−0.0003796 (−0.94)
drpropfe			0.0429389 (1.04)
drpropfe			0.0755701 (1.03)
Year	−0.3561592 (-0.7)	-0.4186941 (-0.82)	-0.7287129 (-1.48)
(cons)	715.8817 (0.7)	840.1072 (0.82)	1453.516 (1.47)
R^2	**0.0091**	**0.0334**	**0.451**

Note: * and ** indicate significance at the 10 and 5 per cent levels, respectively

In addition, most provinces in Kalimantan are historically timber provinces due to the amount of land that is still covered by forest. Therefore, the governments in these provinces need to use a higher proportion of their expenditure not just to deal with the high coverage of forest but also to handle the effect of timber activity including reforestation and the illegal logging that often happens during timber-production activities. When this is compared with non-timber provinces in Java that only need to focus on low levels of forest area and less deforestation (because the forest is no longer able to support forestry activities), then the proportion of money that needs to be allocated to this activity is much lower than in the timber provinces. Forest loss in non-timber-producing provinces amounted to only 0.9 per cent, or 29 hectares, in 2007 (Ministry of Forestry data recalculated). The result in timber-producer provinces more adequately explains why the FE could not decrease the deforestation rate.

Although the results from timber provinces are more positive than the overall results, the results in Table 8 confirm that change in FE still did not decrease the rate of forest cover reduction—termed the deforestation rate in this study.

The results of the second regression for the national level provide contrasting evidence to the theory proposed by Defries et al. 2010, Etter et al. (2006), Geist and Lambin (2002), and Wright (2006), that increasing population is the main factor that increases deforestation. Similar results were found for timber-producing provinces, which show a significant and negative impacts of increasing population growth and population density on the decrease in deforestation. The most likely cause of this is the province of North Sumatra –as one of timber-producing-provinces- which is the fifth-highest-populated in Indonesia, but has effective reforestation. In addition, the province of Central Sulawesi,

which has the highest land and forest rehabilitation, may have biased the regression results for the timber-producing provinces. These facts may explain why increasing deforestation in local-timber producer-provinces is not positively affected by increasing population, in Indonesia.

Another interesting result from this exercise is that agricultural growth has not negatively influenced the change in forest cover rate. This is in contrast with the findings of Defries et al. (2010) and Etter et al. (2006) that point to agricultural expansion as the main source of deforestation in many countries. The likely explanation is that the increase in agricultural output in Indonesia has mostly been influenced by the implementation of more efficient agricultural tehniques (intensification), rather than putting more land into agricultural production (extension). Another reason is that although there have been many issues with palm oil development affecting forest cover, palm oil is not the highest agricultural activity. Advanced technology in palm oil production means that increases in output affect only a limited area. The majority of agricultural output in Indonesia comes from paddy farming, which is developed in non-forest areas. Consequently, although there has been a rapid increase in palm oil plantations, they still cover an area less than that of paddy plantations.

5.5. Summary

The results at the national level and from timber-producing provinces show that FE has not provided an effective input in reducing deforestation rate. The result may actually indicate that it may increase the rate but this indication is not statistically significant. Furthermore, population growth is found to have stronger impact in increasing

deforestation. The mechanism of why the government effort that represented by forestry expenditure is not effective requires further investigation, which is the subject of the next chapter.

Although the negative impact of FE on forest cover is not significant in timber producing, the impact is significant when all provinces are included. This suggests that there are considerable differences that separate the level as well as the impact of government expenditure on forestry between the two types of provinces. Therefore, the analysis between the two types of province will be separated in the qualitative case studies that follow. It is important to know that institutional change as the main aspect of qualitative case study will be discussed not only in chapter 6 but also in chapter 7.

Chapter 6: Qualitative analysis of the Ineffectiveness of Forestry Programme in Indonesia: Cases Studies of Five Provinces

6.1. Introduction

This chapter focuses on evaluating the factors influencing ineffectiveness of reforestation in five provinces in Indonesia, based on the model proposed by Geist and Lambin (2002). Qualitative analysis was used to understand why and how reforestation is ineffective. Province selection was based on several factors relating to ineffectiveness of reforestation found in the literature. To ensure a comprehensive selection process and to avoid bias, this research used three major categories as a basis for selection: a) population, agricultural output and forest cover, b) poverty and infrastructure, and c) provincial pilot projects in reforestation. Each province has different characteristics that influence the increase in the reforestation rate. This chapter conclude that institutional factor is the most significance issue to influence ineffectiveness of forestry programme in Indonesia. The analysis of the selected provinces assesses combinations of unique factors that may influence the effectiveness of forest expenditure to combat deforestation.

6.2. Process for Selecting Provinces

This sub-section focuses on describing the process of selecting provinces appropriate as case studies. This study conducted analysis based on eight variables. These selected variables describing the socio-economic characteristics of each province were framed based on the model proposed by Geist and Lambin (2002). The first step was to decide a proper time frame for the study. The years 1998 to 2013 were selected to encapsulate the decentralisation process from its establishment in 1998 until the present.

The next step was to establish criteria for selecting provinces, which involved three stages. The first stage was to identify the factors most cited as driving factors of deforestation, of which population growth and agricultural expansion were the two most cited (Angelsen 1999; Barbier 2004; Carr 2005; Defries et al. 2010; Kobayashi 2001; Tha & Bawa 2006; Tomich et al. 2001; Wright 2006). Quantitative data on population, forest cover and agricultural output were used to represent the factors in deforestation. An additional variable, forest cover, was selected to provide comparative information on the variety of forest cover. This variable is believed to be an important factor because the majority of previous studies proposed timber logging as a direct cause of deforestation. As timber is only found in forests, it is important to investigate the correlation between area of forest cover and deforestation. The selection also considered the type of province, as each type is subject to a particular forest policy. This consideration could provide appropriate data for comprehensive analysis.

The results from processing the first stage are as follows. Based on population, forest cover and agricultural criteria, provinces were ranked, which resulted in the selection of

two timber-producing provinces (Kalimantan Timur and Sulawesi Selatan) and one non-timber-producing province (Jawa Barat) for the study. The Province of Kalimantan Timur has low population density, low agricultural output and high forest cover. The Province of Sulawesi Selatan has medium population density, medium agricultural output and medium forest cover. The Province of Jawa Barat has high population density, high agriculture output and medium forest cover.

The second stage of study province selection was undertaken to establish the correlation between increasing wealth and deforestation. These criteria were based on studies that support the importance of economic development on decreasing deforestation (Kuznet 1955) and infrastructure development on increasing deforestation (Wilkie et al. 2000; Coffin 2007). After examining available quantitative data, poverty gap, number of poor people and infrastructure output were chosen to represent wealth and infrastructure. The Province of Bali has economic wealth and the highest infrastructure development.

The last stage in province selection involved the analysis of a government pilot project in reforestation. This project was based on the largest community-owned forest, the Province of Jawa Tengah. This province was added into the mix of case studies on the basis that community involvement determines the effectiveness of forest rehabilitation in the decentralisation process (Kellert et al. 2000).

Following these selection procedures, five provinces were selected from among all of the provinces in Indonesia to investigate the path to deforestation. Being based on the literature, the selection process avoided the subjectivity of the researcher and was considered sufficiently comprehensive to justify the inclusion of these five provinces.

6.3. Description of Provinces

Documenting the characteristics of each selected province was an important starting point for the analysis. This section provides a narrative of the provinces based on the secondary quantitative data available. Table 13 contrasts the social and economic characteristics of the provinces based on the year for which the most comprehensive and reliable data were available (2010).

The eight variables in Table 13 describe the socio-economic characteristics of each province. Larger land area and forest cover, and smaller population, are typical of and unique to timber-producing provinces. For example, the Province of Kalimantan Timur has the smallest population (3,553,143) among the selected provinces, and they inhabit a vast amount of land (19,506,200 hectares). This province has substantial forest cover (13,423,800 hectares) compared to the rest of the selected provinces, both as a proportion of total land area and in absolute terms. The Province of Sulawesi Selatan is similar, with a small number of people (9,193,427) living in a relatively large area (6,107.4 hectares) with high forest cover (2,379,800 hectares). Also, the level of poverty (expressed as number of poor people) in these two provinces is lower than in non-timber-producing provinces.

The smaller land areas and forest cover, and large population in the other three provinces are characteristics unique to non-timber-producing provinces. The highest population, population density, population distribution and local government budget characterises the Province of Jawa Barat. This province has a relatively small forest area and land area. The Province of Jawa Tengah has relatively high forest cover compared

Table 13: Socio-economic characteristics of the five selected provinces

source: Ministry of Finance 2010, Ministry of Forestry 2010, National Statistics 2010

Province	Province type	Poor (000 people)	Population (people)	Population distribution	Population density	Budget (000 RP)	Forest cover (000 ha)	Total land (000 Ha)
Kalimantan Timur	Timber	243.00	3,553,143	0.04	182.15	28,486,228.81	13,423.8	19,506.2
Sulawesi Selatan	Timber	913.40	9,193,427	0.10	1,505.30	15,307,905.06	2,379.8	6,107.4
Jawa Barat	Non-timber	4,773.70	40,350,093	0.45	10,836.58	42,467,967.11	649.7	3,723.5
Jawa Tengah	Non-timber	5,369.20	32,382,528	0.36	9,361.59	35,060,538.78	1,118.0	3,459.1
Bali	Non-timber	174.90	3,890,757	0.04	6,854.50	8,429,796.54	103.4	567.6

Table 14: Forestry expenditure (FE) and source of FE of the five selected provinces

source: Ministry of Finance 2010

Province	Province Type	Forest Expenditure (000 RP)	DR (000 RP)	PSDH (000 RP)	IIUPH (000 RP)	Total forest revenue (000 RP)	Forest cover change/ reforestation (000 hectare)
Kalimantan Timur	Timber	411,304.29	106,434,186	85,274,561	55,690,220	247,398,967	0.00
Sulawesi Selatan	Timber	110,540.17	2,125,790	1,676,121	400,000	4,201,911	0.01
Jawa Barat	Non-timber	146,511.11	0	10,848,526	0	10,848,526	0.00
Jawa Tengah	Non-timber	96,146.49	0	27,779,036	0	27,779,036	0.10
Bali	Non-timber	49,958.43	0	0	0	0	0.04

to its land area but also has high population density, population distribution and local government budget. In regards with population distribution, the value is obtained by divided population in each province with total population in Indonesia. Among the case study provinces, these two have the largest number of poor people. The Province of Bali has the lowest number of poor people, land area and forest cover. The population, forest cover and land area differentiates types of provinces.

The socio-economic characteristics of the five selected provinces result in different forestry-related outputs. At least eight unique forestry-related outputs may influence the reforestation rate in Indonesia. These outputs, which are represented by forest revenue, are justified for the importance of the selected case study as tool for program evaluation. Table 14 describes the forestry-related outputs in each of the five selected provinces in 2010.

Table 14 highlights the positive relationship between FE and source of FE. For example, if all sources of revenue such as the DR, PSDH and IIUPH are accumulated, the timber-producing provinces have significantly higher revenue than non-timber-producing provinces. This illustrates that a higher source of revenue leads to a higher local government FE. Since the largest contribution came from DR, which is collected from HPH in natural forest, this fact signifies the important role of cutting timber in natural forest, which may increase the deforestation rate. Imposing levies on timber logging without proper enforcement on re-planting and overcutting will only cause severe deforestation. In 2010, the importance of DR in influencing the deforestation rate in the Province of Kalimantan Timur is illustrated by the fact that this province could not increase its reforestation rate even though its forestry revenue was the highest in Indonesia (RP. 247,398,967,000.00). Meanwhile, with lower total forestry revenue (RP.

2,078,246,000.00), the Province of Sulawesi Selatan is able to perform reforestation. The most obvious relationship between forestry revenue and reforestation is apparent for the Province of Bali, where absence of forestry revenue has resulted in 40 hectares of reforested area. However, examining other factors that may influence forestry revenue could provide a better explanation for the unique characteristics of each province.

Table 15 describes the land use in each selected province, which illustrates a strong relationship between the availability of timber, mining and transmigration areas and reforestation in the timber-producing provinces. This table shows that a large proportion of mining, agriculture, transmigration and settlement areas play an important role in increasing the reforestation rate, especially in timber-producing provinces. For example, mining in the province of Kalimantan Timur, which occurs across 101,900 hectares of land (a significantly larger area than in other provinces), is accompanied by an absence of increase in forest cover. This largest area of mining indicates a higher economic contribution from mining, which is more likely to motivate forest conversion to mining.

This province also has large settlements, which may cause absence of reforestation. Furthermore, transmigration areas, which occur in the timber-producing provinces only, could drive the positive relationship between transmigration and reforestation in these provinces. Table 15 also demonstrates the lack of a relationship between road length and forest cover change in timber-producing provinces, and suggests that land use for agriculture and settlements are more influential in negative reforestation in non-timber-producing provinces. With smaller land area compared to timber-producing provinces, agriculture and settlement dominate land use in non-timber-producing provinces.

Table 15: Map of land use change

source: Ministry of Forestry 2010

Province	Province type	Settlement (000 Ha)	Trans-migration (000 Ha)	Mining (000 Ha)	Roads (Km)	Agriculture (000 Ha)	Forest cover change/ reforestation (000 hectare)
Kalimantan Timur	Timber	73.3	20.6	101.9	14,229	1,945.6	0.00
Sulawesi Selatan	Timber	25.9	5.5	2.4	39,372	2,177.7	0.01
Jawa Barat	Non-timber	307.9	0.0	0.8	25,494	2,636.7	0.00
Jawa Tengah	Non-timber	403.7	0.0	0.0	29,203	1,839.0	0.10
Bali	Non-timber	35.3	0.0	0.0	7,400	343.1	0.04

Table 16: Direct outputs that influence the ineffectiveness of FE

source: National Statistics 2010

Province	Province type	Mining output (000 RP)	Agricultural output (000 RP)	Forestry output (000 RP)	Oil & gas, petroleum and liquid manufacture output (000 RP)	Non-oil & gas manufacture output (000 RP)	Trade, hotel and restaurant output (000 RP)	GRDP at market price (RP)
Kalimantan Timur	Timber	152,977.0	14,275.5	4,940.5	132,428.0	14,458.0	26,372.0	321,090,818.42
Sulawesi Selatan	Timber	7,215.3	35,729.1	182.6	0.0	14,457.0	20,435.0	128,816,895.24
Jawa Barat	Non-timber	15,546.0	96,272.4	921.6	39,868.0	271,754.0	172,713.0	770,660,479.99
Jawa Tengah	Non-timber	4,302.6	84,313.4	2,354.6	107,188.0	92,539.0	86,996.0	444,396,468.19
Bali	Non-timber	471.2	12,094.2	4.8	0.0	6,151.8	20,196.0	66,690,598.13

Despite the absence of timber in natural forests and transmigration areas and the existence of very small mining areas, deforestation took place in the non-timber-producing provinces. Table 16 indicates that reforestation could be triggered by settlement, mining and timber logging in non-natural forests. The most obvious demonstration of this is that the massive need in settlement areas in the Province of Jawa Barat could play an important role in forest conversion. The degree of mining production also could contribute to the reforestation rate. For example, the Province of Jawa Barat has the largest mining area of all of the non-timber-producing provinces, which could lead to an absence of reforestation in these provinces. As the mining area data use satellite images, the actual mining areas may be misrepresented, that is, mining areas in forest areas may not be recorded. Further, as happens in timber-producing provinces, reforestation also could not be explained by the existence of roads.

To provide a comprehensive evaluation, the output related to the variables in Table 13 is described in Table 14. These additional direct aspects in the form of outputs were included to enable a more reliable analysis: the satellite data may be unreliable because actual contributions and actual areas of each variable may not be well recorded. Six individual outputs and one aggregate output are presented in Table 14.

Table 12 provides additional direct outputs that influence the ineffectiveness of FE and illustrates how all seven outputs influence reforestation in the five selected provinces, which represent timber-producing and non-timber-producing provinces. The highest mining output, in the Province of Kalimantan Timur, clearly mirrors the real value of the largest mining area shown in Table 11. Even with limited mining area in the Province of Sulawesi Selatan (captured in satellite data in 2010), there is a relatively

high mining output in this province. This is supported by the province having the highest gas, oil, liquid and petroleum outputs. These two highest outputs may explain the higher incentive to perform reforestation in timber-producing provinces. The use of gas, oil, liquid and petroleum gas, and mining outputs is more appropriate because these much better represent how the land use change in mining areas fundamentally influences the reforestation rate in timber-producing provinces.

Agriculture, non-oil and gas manufacture and trade, hotel and restaurant outputs much more appropriately explain the absence or low rate of reforestation in non-timber-producing provinces. For example, as shown in Table 16, in 2010 the Province of Jawa Barat had the highest agricultural area, at 2,636,700 hectares, which corresponds with it having the highest agriculture output, at RP. 96,272,400. This higher agriculture output indicates a large incentive to convert land into agriculture-related uses than for reforestation activities. Similarly, relatively higher non-oil and gas manufacture and trade, and hotel and restaurant outputs in 2010 indicate that these industries may contribute to the absence or low rate of reforestation in non-timber-producing provinces.

Based on the direct and indirect factors that decrease the reforestation rate as discussed above, the following section describes in detail how several factors play their role in decreasing the reforestation rate in each selected case study province.

6.4. Qualitative data – the five provincial case studies

In order to be able to analyze the deeper institutional and contextual factors that might be causing ineffectiveness of reforestation program, the driving forces of deforestation in the five provinces is described and discursively assessed in this section. The section starts with the timber-producing provinces followed by the non-timber-producing provinces.

6.4.1. Province of Kalimantan Timur

Among the selected provinces, this province is the perfect case to represent the analysis of how and why FE is not effective in influencing reforestation programmes. The Province of Kalimantan Timur has the highest FE in Indonesia, yet according to deforestation data (Ministry of Forestry 2011), it is the most deforested province in Indonesia. The fact that the province has rich natural resources (including economic wood and mining products, and large fertile areas) within its legal boundary and extensive policies in using these resources could prove the theory that commercial agriculture is the main cause of massive reforestation in developing countries (Honosuma et al. 2012). However, analysing agricultural expansion only will not give a comprehensive evaluation. Its demographic, infrastructure extension, economic structure, wood extraction, technological use, agricultural expansion and government and institutional policy also should contribute to influencing the reforestation rate.

In order to get better information on specific characteristic of this province, table 17 describes physical indirect and direct factors only, disregarding institutional and cultural factors. These last two factors are not unique to this province.

The Province of Kalimantan Timur exemplifies one of the direct leading factors in absence of reforestation, which is massive availability of good-quality timber in natural forests. Since natural forest cover consists of naturally grown forest, having a large proportion of natural forest cover indicates massive availability of giant-sized timber. Timber in industrial areas is allowed to be legally cut. Even though the number is decreasing, which is shown by comparing figures for forest cover in 2010 and 2006, this province still has the largest portion of industrial areas in natural forest cover in Indonesia.

Table 17: Specific characteristics of the Province of Kalimantan Timur

source: summarised from Ministry of Forestry 2010, National Statistics 2010 and Province of Kalimantan Timur's official capital investment agency 2010

No	Characteristics
1	Mountains, hilly, terrain and long and wide rivers
2	Fertile soil quality domination
3	Large total land area (second highest in Indonesia)
4	Peat swamp areas that are prone to trigger fires
5	Second largest natural forest cover in Indonesia
6	Massive availability of the best-quality timber in natural forest areas
7	Large palm oil plantations
8	Massive availability of the best-quality coal in Indonesia
9	Massive availability of petroleum
10	Second lowest population density
11	Fourth highest urban and rural poverty gap

In 2006, the total forest cover in the Province of Kalimantan Timur was 13,514,700 hectares (Ministry of Forestry 2008). In 2006, forest cover consisted of a large amount of natural forest cover (6,217,100 hectares) with a large proportion (2,752,400 hectares) categorised as industrial forest area. This province also has high secondary forest cover. Secondary forest cover is self-regeneration forest cover, which indicates the availability of smaller sizes of timber. In total, there was only 4,141.9 thousand hectares of protection forest, while the production forest amounted to 7,476.2 thousand hectares, in 2006.

In 2010, the total forest cover in the Province of Kalimantan Timur had decreased by 90,900 hectares compared with 2006. In 2010, there was 13,423,800 hectares of forest (Ministry of Forestry 2011). This cover consisted of large areas of natural forest cover: 6,003.3 thousand hectares, with a large proportion (2,752.4 thousand hectares) categorised as industrial forest. This province had high secondary forest cover: 4,850.4 thousand hectares with almost all (4.016.4 thousand hectares), as industrial forest. In total, in 2010 there was less protection forest, with only 4,367.5 thousand hectares of protection forest, while the production forest amounted to 7,276.2 thousand hectares.

The government administered a substantial incentive for logging, which is shown by the outsized amount of the industrial forest portion compared to protection forest. This suggests that the focus of the policy is to exploit the resources and the policy has resulted in massive deforestation in this province. According to Ministry of Forestry data, from 2006 to 2010 there was a total of 90,900 hectares of forest loss, or 22,750 hectares of forest cover loss, each year in the Province of Kalimantan Timur. However, it is important to note that these data were collected by satellite, which has only low

resolution. Hence, the real loss in forest cover may be higher than these official data would suggest.

The factors that motivate deforestation are highlighted by the existence of the Province of Kalimantan Timur's highest annual allowance cut report. Since 2003, the Indonesian government has established a mechanism of an annual cut allowance, which determines how much logging in natural forest is allowed each year in each province (based on Ministry of Forestry data). The annual allowance cut is the annual logging allowance report published by the Ministry of Forestry. This report is a government mechanism to manage logging, by recording permits issued for specified timber cutting in natural forest. The annual cut is based on the government's annual assessment of timber that is ready to cut in each concession area of each province. The certified types, amount and size of timber are legalised by the head of the district or mayor as a base for concessionaires to pay their levy obligations.

Between 2003 and 2010, this province had the largest annual cut, with an increasing trend (Ministry of Forestry 2011). Its annual allowance cut is confirmed as higher even than the Province of Papua, which has the largest area of forest cover in Indonesia, ten times that of the Province of Kalimantan Timur. This immense annual cut allowance in the Province of Kalimantan Timur suggests that its massive source of economic timber provides the highest leverage for legal and illegal logging, which severely threatens reforestation efforts. This highest annual cut indicates a huge potential stored in the forest in this province. Therefore, it is highly likely that the annual allowance cut represents only a small proportion of actual logging.

The threat of timber logging to reforestation programmes is also shown by the number of large-scale timber concessionaires (*Hak pengusahaan hutan* or HPH) and the production of timber in this province. The Province of Kalimantan Timur, between 2001 and 2011, had 69 large-scale HPHs on average each year. This largest large-scale HPH in Indonesia presents a real threat to the reforestation in this province. This threat is exacerbated by unreliable data on timber production that indicates a lower transparency in managing timber. A study on timber production and annual cut allowance data in the Ministry of Forestry report between 2002 and 2010 showed inconsistency between those two data sources. This suggested that timber production management data may be unreliable because of un-provided production data. The actual HPH may be higher than the official data because the majority of the non-official data on forest destruction is increasing over time. This suggests that illegal logging is prevailing over legal logging. Massive legal and illegal logging is believed to be a leading cause of substantial forest degradation.

The province has a highly attractive level of mining resources, which presents another major potential threat to reforestation. With respect to mining products, this province has superior quality petroleum, ore, gold and coal, the latter of which is the highest quality in Indonesia (Badan Koordinasi Penanaman Modal [a]). This high-quality and plentiful coal resource poses a real risk to reforestation programmes. The threat is exacerbated by increasing domestic demand for coal because the current government requires state-owned power companies to use coal as a source of electricity, replacing petroleum. This policy increases the incentive of the Province of Kalimantan Timur to produce more coal. Reforestation is predicted to be lower in this province because the majority of mines are scattered and situated in forest protection areas, with the largest

centralised at Berau River, Samarinda City and another 65 coal mines (Wibisono 2010. 166 *Perusahaan Pertambangan Ancam Hutan* Kalimantan).

Even though there is awareness of the severe impact caused by uncontrolled mining development, local administrators support the extraction of mining products. The high prices and huge demand for mining undermine the need to preserve the forest. The preservation of forest is harder due to the location of petroleum mining, which is spread throughout the province, such as in Bunyu Island, Tarakan Island and Mahakam River. The substantial and devastating impact of coal mining was reported in many open coal mining sites that used to be conservation and protection forests (Hickman 2010). The immediate benefit from these rich mining resources, especially petroleum and coal mining, which are located in forest areas, has produced a substantial temptation to convert forest to legal and illegal mining, as well as legal and illegal timber concessions.

The policy on palm oil land use changes also indicates a threat to reforestation in the Province of Kalimantan Timur. This province has huge fertile areas suitable for agriculture, including large-scale industrial palm oil plantations. There has been 492,942,790 hectares of forest conversion to agriculture areas from 2000 to 2011 (*Menteri Kehutanan* 2011). Palm oil plantations have been an increasingly crucial factor in land use change in this province, which has a suitable climate and large areas for palm oil plantations. The trend for land use change to palm oil plantations is rapidly increasing. Many scholars, such as Varkkey (2012) and Wicke et al. (2011), believe that palm oil plantations provide local government with a mechanism to negotiate between conservation and economic aspects of land and forest rehabilitation. For example, local government includes small-scale palm oil plantations as one of the activities in

rehabilitating degraded land and forest, as one goal of land and forest rehabilitation programmes aims to improve the income of local people. This small-scale industry is legal in government programmes. However, local government may take further steps to fund large-scale industrial palm oil plantations, provided that they are an effective tool for restoring degraded land and providing income for larger numbers of local people. Therefore, it is difficult to escape land use changes due to the economic aspects of palm oil plantation. According to National Statistics (2002–12), the crude palm oil industry provides a large income for this province.

Local governments have established policies that are highly supportive of the development of the palm oil industry in this province. Palm oil plantations and their supporting industries have converted large areas of forest to plantations (processed data from the Province of Kalimantan Timur Statistics and National Statistics 2007–10). The decreasing forest cover of production forest of 199.8 thousand hectares and the non-forest areas of 116.8 thousand hectares might also be converted into palm oil plantations. Production forest decreased from 7,476.2 thousand hectares in 2006 to 7,276.4 thousand hectares in 2010. Forest cover in non-forest areas decreased from 7,476.2 to 4,367.5 thousand hectares over the same period.

The policy of transmigration also contributes to the increase in the deforestation rate. Up to 2011, there have been 60,832 hectares of forest areas released for transmigration (Ministry of Forestry 2011). Many authors, including Mujayatno (2013), state that some transmigration areas are built in protection forest areas. Local economic development is believed to be the main reason for these developments. These transmigration areas are developed with a focus on agricultural expansion, especially palm oil plantation

development (*Potensi provinsi* Kalimantan Timur 2010). As the need for extensive transmigration areas is growing over time, particularly with the increasing population in several highly populated provinces, there is an escalating need to have flexible transmigration programmes that secure the long-term economic needs of the transmigrant. Palm oil plantations provide an answer to this economic problem, because demand for palm oil is predicted to increase in the future. Therefore, palm oil transmigration programmes are maintained to fulfil economic needs regardless of the impact on the forests.

Negative institutional factors in this province also cause unrealised reforestation. The majority of programmes are run on a short-term-programme-based mechanism. The majority of transmigrants were reported to be suffering from the inconsistency of government support and lack of co-ordination of government institutions. A related economic problem that drives reforestation came from the failures of transmigration programmes to achieve economic success for transmigrants. Transmigration is a long-term programme type, while government financial support is short term and there is an absence of continuing support. According to the Department of Transmigration (2010), the transmigrant is provided only with a certain area of land, which includes a house, and one year's financial support for basic daily needs such as food and fertiliser. One year of financing extension is provided to anticipate failure in farming. The government focus is only to provide basic public needs (schools, small clinics, mosques and road infrastructure) for transmigrants, but no continuing support is given. The absence of agriculture and marketing technique training and intermediary policy for market destinations is held to be responsible in cases of unsuccessful transmigration (Riady 1994). Riady also found that failed transmigration was the norm in transmigration areas

in this province. These unsuccessful people could provide cheap and abundant sources of labour to convert forests to legal and illegal palm oil plantations, logging and mining. As a province with rich natural resources, this province has a long history as a favourite destiny for transmigration (*Direktorat Jenderal Pemberdayaan Sumberdaya Kawasan Transmigrasi* 2005). Massive and continuous numbers of transmigrants arrive in the Province of Kalimantan Timur, to provide a labour force for illegal and legal logging and mining in this province, which could jeopardise the reforestation effort.

Increased powers in decision making have motivated the misuse of power in the interpretation of the law. The larger local authorities generate incentives to use natural resources for individual benefit and local economic development in this province (Burgess et al. 2012). The obligation to be self-sufficient in revenue is usually referred to by the local officials, through issuing small timber and mining concessions to increase timber levies, regardless of the spatial plan (Indonesian Corruption Watch 2004). The 80 per cent right of PSDH and IIUPH timber levies has motivated the rapid issuance of PSDH in this province (Burgess et al. 2012). The use of Government Regulation 22/1967, which provides for fees for forest concessions and contribution of forest products, combined with increasing local authority, has promoted an increase in local levies on forest use in all provinces, including this province (Burgess et al. 2012). Local officers have responded improperly in utilising the large potential of mining and timber in this province, which can be seen in the sharp increase in small- and large-scale timber and mining concessions every year (Burgess et al. 2012; Casson & Obidzinsky 2002). For example, in 2007 and 2011 respectively, 7,558.8 and 29,390.5 hectares of forest were converted into mining areas (Ministry of Forestry 2011). The number of forest areas released for mining exploitation with temporary permits issued is even more

surprising. In 2007, there were 15,854 hectares of forest converted into mining areas with temporary permits; this figure was 123,867.08 hectares in 2011 (Ministry of Forestry 2011).

The misuse of power by local administrators increases with the issuance of permits prior to local elections. The immediate cash benefit from these rich mining sources, especially for petroleum and coal mining, has resulted in higher legal and illegal timber and mining concessions being granted. The local officer candidatures disregard destruction in forests and their functions. Their actions based on the employment opportunities that may be provided to their close endorsers. The Ministry of Forestry found that in East Kalimantan and South Kalimantan, there are 1,900 mining concessions (*kuasa pertambangan* or KP) granted in protection forests. These KP are situated in conservation forests, in which mining is prohibited (1 February 2010, *Hutan Lindung Tak Bisa Dijadikan Lahan Tambang*, http://www.hukumonline.com).

The government may emphasise the job benefits offered by mining, but in reality only limited jobs are provided. For example, in 2007 there were only a total of 1,002 people working in timber concessions in this province (Ministry of Forestry 2007). The immediate job benefits promised to their constituents have been overlooked, because in reality, unless timber and mining processing industries grow large in scale, not many people work in these industries. The over-attraction of good-quality and abundant availability of mining in this province clearly supported the Ministry of Forestry statement that the largest percentage of deforestation is caused by mining, especially illegal mining (Hudoyo, 8 August 2012). Further, data on massive deforestation indicate

that government officials disregard the obligations of concessionaires to provide compensation for any pieces of forest that have been converted into coal mining sites.

The misuse of power is aggravated by the absence of acknowledgement of the obligation to provide better public services. By law, local and central governments are obliged to maintain at least 30 per cent of the forest areas of watersheds and/or islands, with proportional distribution to provide for environmental, social and local peoples' benefits. In reality, bureaucrats favour issuing concessions that convert forest and land into illegal or legal palm oil plantations, and timber and mining concessions that are mainly aimed at individual administrators' benefits.

In 2003, at least two coal mining companies (Westralian Atan Minerals, Kelian Equatorial Mining) in this province were proven by the Ministry of Forestry to be established in protection forests (2003, *Ijin Operasi Pertambangan di Areal Hutan Masih Kontroversi*, http://www.hukumonline.com). However, the Ministry of Forestry, who has the responsibility to regulate the use of forests, has not issued a decree to stop these companies from their operations. The rich timber and mining resources are the reasons for a significant increase in concessions issued each year.

In addition, among the legal logging and mining concessions, which are issued legally by local officials, large numbers of concessionaires with large areas of concession disregard their obligation to rehabilitate the felled and extracted areas, which leads to an increase in degraded forest (Wibisono 2010). The central bureaucracy even contributes to devastating policies by issuing mining concessions in protection forests. The Financial Supervisory Agency found that the Minister of Energy and Mineral Resources

gave land concessions for coal mining business working agreements (*Perjanjian Karya Pengusahaan Pertambangan Batu Bara* or PKP2B) to three contractors who were holders of KP covering total area of 238,962 hectares, with part of this concession area covering 98,548 hectares located in the Kutai National Park (*Taman Nasional Kutai*r) and 130 hectares in protected forest areas located in East Kutai district (22 April 2009, Bawah Hutan Lindung Diizinkan Ditambang).

The majority of local administrators choose to disregard their power to impose on the concessionaires their obligation to manage concession sites. For example, in 2005, the Ministry of Environment reported that 56 per cent of the mined areas in East Kalimantan had not been restored (Greenpeace 2010). Forestry Law 41/1999 clearly states that any conversion of forest is permitted under the lend use (five year) terms only if the concessionaires agree to perform their obligations. These obligations include paying compensation stumpage value, submitting land compensation, paying the costs of surveying, mapping and demarcation of land leases, land compensation and reforestation, reclamation of mined lands, maintaining the security of the forest area, and submitting periodic reports. This absence of effective government law suggests that power transfer only establishes power for local administrators and candidates to prioritise individual benefit and local economic development, and disregards negative impacts on forests and land.

The required institutional change could not be seen in poverty eradication policy. According to National Statistics (2000–12), a huge gap in the poverty severity index between rural and urban people in this province has not shown a significant decrease. This indicates that government achieves little in reducing poverty. This poverty

increases the incentive of local forest people in rural areas to perform illegal logging and illegal mining for low wages. At the national level, the Province of Kalimantan Timur has the highest per capita income (National Statistics 2000–12). However, the fact that the number of poor people is higher and the gap between poor and rich is also high suggests that many rich people in the Province of Kalimantan Timur are able to pay poor people to log the timber and mine the mines illegally. This notion is supported by the fact that this province is considered as having high levels of corruption (Corruption Perception Index 2010). This province is also considered as a province with a high inflation rate (National Statistics 2000–10). High living costs combined with high levels of corruption may increase the incentive of local forest people in rural areas to perform illegal logging and illegal mining, even for low wages.

Unfinished institutional change evident in the high level of corruption can also be seen in the absence of empowerment policies. Local government has discouraged traditional tribe and community involvement in land and forest conservation. There are many non-official reports on the efforts of traditional tribes to maintain and preserve sustainable land and forest use, but these efforts are not supported by the government. Warren and McCarthy (2009) found that traditional tribes are usually located in remote and steep areas, suggesting that remoteness is a natural prevention to intruders, who usually perform massive logging and destruction. These researchers have described that whenever too much intervention prevents them from protecting an area, they move to degraded areas that often used to be concession land, but where concessionaires have ignored their obligation to rehabilitate the areas. Warren and McCarthy (2009) state that local governments favour more land conversion for transmigration, palm oil plantations,

logging and mining. The absence of community empowerment policies may increase illegal logging and illegal mining and slow the rate of land and forest rehabilitation.

The unfinished institutional change can also be seen in the absence of forest protection from deforestation. The lack of focus in forest protection is highlighted by the low number of skilled forest rangers and limited equipment for forest protection. Data from 2003 to 2008 show that the number and capacity of forest rangers and equipment were inadequate for the abundant forests and low forest fragmentation (data processed from the Ministry of Forestry 2003–08). Some reports, such as Mujayatno (26 September 2013), indicate that a lack of forest rangers and a minimum budget leads to nonexistence of proper forest protection programmes. The absence of these programmes has meant that many processed logging products are from protection forests (Mujayanto 2013).

Another problem is inappropriate land use policies and fire practices, meaning that the government 'paid scant attention to forest management, including the need to detect, control, and suppress unwanted fires' (Aiken 2004, p. 55). Fire has commonly been used as a tool to clear the land for industrial palm oil plantations. This practice caused dense smoke throughout Kalimantan and Sumatra in Indonesia, and in neighbouring cities in Malaysia and Singapore in 2006 (World Health Organization 2006). Organic content in peat swamps triggers larger fires and dense smoke (Aiken 2004). Therefore, a high amount of slash-and-burn agriculture in peat swamps increases the difficulty of rehabilitating land and forest. Up to the end of 2013, the researcher could not find reports on charges applied for the use of fires in land clearing for industrial palm oil

plantations. This absence of sanctions presents a barrier to efforts in rehabilitating land and forest.

Another inappropriate land use policy is the absence of sanctions for illegal miners and illegal loggers. There are numbers of illegal and legal concessionaires that perform their activities in watersheds, and conservation and protected forests, where no mining is allowed (12 February 2003, *Ijin Operasi Pertambangan di Areal Hutan Masih Kontroversi*). This report evaluated all small- and large-scale improper mining companies. The inappropriate land use policy can also be seen in the Ministry of Forestry's decision to abort only three among a total of 16 firms that illegally established mining in protected forest areas (12 February 2003, *Ijin Operasi Pertambangan di Areal Hutan Masih Kontroversi*). This report showed that the Ministry only annulled small-scale mining but left large-scale mining companies alone.

The impact of absence of sanctions is believed to be even more severe. The opportunity for large-scale legal mining and timber concessionaires to perform illegal activities is high. These illegal activities can be done by extending their activities beyond their concession areas. More severe impacts will be created if central and local administrators issue permits to open-mining activities in protected forest areas. In order to establish open mining, the companies must clear all timber before they are able to extract mining products. Furthermore, absence of sanctions will extend the number of degraded areas. There are a large number of unofficial reports (e.g. Walhi & Jatam 2010), on expansion of degraded forest caused by abandoned mined areas. These concessionaires disregarded their obligations to restore land function after they extracted mining

products. Whenever a government uses inappropriate land use policies to strengthen sustainable management, it is assumed that the reforestation will be ineffective.

Lastly, besides the absence of comprehensive institutional change, land characteristics, including mountains, terrain, long and wide rivers, and soil quality of this province are also believed to contribute to the absence of effective reforestation. Several reports, including Warren and McCarthy (2009), found that logging and mining activities in many remote areas are well hidden by the domination of low forest fragmentation, with hilly and sloping area cover. These researchers also found that ineffective reforestation is believed to be caused by increasing timber logging, which is made possible by the presence of long and wide rivers. Land characteristics combined with the second lowest population density may lead to illegal logging. This fact could indicate that the amount of illegal logging far outweighs legal logging in the Province of Kalimantan Timur.

6.4.2. Province of Sulawesi Selatan

The Province of Sulawesi Selatan represents a case of reforestation effectiveness. This province has a relatively large amount of natural forest cover but has been able to increase its forest cover. However, it still amongst the leaest successful provinces in Indonesia in terms of reforestation. The province has rich natural resources, including economic wood and mining products, but these are of significantly lower quality and quantity than those in the Province of Kalimantan Timur, which supports large tree plantation areas within its legal border lines. These combined factors suggest that agricultural expansion and policy may be the main cause of low reforestation in the Province of Sulawesi Selatan.

In order to analyse this issue in more depth, the characteristics of the Province of Sulawesi Selatan that are likely to play an important role in the ineffectiveness of its reforestation rate are described in Table 18.

Table 18: Special characteristics of Province of Sulawesi Selatan

No	Characteristics
1	Highest rice and other agricultural production in eastern Indonesia
2	Relative high availability of timber in natural forest

With total forest cover in 2006 of 2,250.9 thousand hectares, this province experienced an increase of 140 thousand hectares of forest cover in 2010. An increase of 73.1 thousand hectares occurred as protected forest, which expanded from 1,436.6 thousand hectares in 2006 to 1,509.7 thousand hectares in 2010. An increase of 93 thousand hectares also occurred in production forest, which in 2006 covered 307.1 thousand hectares, and in 2010, 400.1 thousand hectares. Forest cover in non-forest areas in 2006 was 153.6 thousand hectares while in 2010, it was 127.6 thousand hectares, representing a decrease of 26 thousand hectares. The main reforestation took place in industrial forest, while forest cover decrease took place in non- forest areas. The current Indonesian government makes an administrative distinction between 'forest' and 'non-forest' areas. The forest areas are state-owned forest which include piece of land not covered by forest. The latter sometimes have forest cover but not included as state-owned forest. The deforestation took place in non-forest areas is located in non-designated-government forest or private forest areas. In these areas forest cover changed into non-forest. This makes the accomplishment questionable because reforestation in

protection forests should be higher than in production forests, as the former is the anchor of sustainable functions of forests. Logging in this forest should not be allowed and thus natural restoration of degraded forest in the protection forest should be easier.

A moderate threat to the effectiveness of reforestation in the Province of Sulawesi Selatan is illustrated by the limited or small amounts of natural forest cover and relatively high forest fragmentation, compared to the Province of Kalimantan Timur. This province had only five large-scale HPH on average during 2001 and 2011 (National Statistics 2001–11). Smaller portions of industrial forest best describe the higher forest fragmentation compared to the Province of Kalimantan Timur. In 2010, only 181,500 hectares were categorised as industrial forest, while total natural forest cover was 781,300 hectares (Ministry of Forestry 2010). Considering the low portion of industrial areas in the natural forest, this province is believed to have low quality and quantity of timber in its natural forest.

Even though reforestation has occurred in this province, the required institutional change has not yet been achieved. In fact, reforestation in this province is largely threatened by the distribution of forest tenure through tree plantation conversions, legal timber concessions and illegal logging (Mahdi n.d. *Bedah masalah perambahan hutan*; Walhi 27 November 2012, *Kondisi hutan di Sulawesi Selatan semakin kritis*, <http://nasional.kompas.com/> and Multi-stakeholder forestry programme 13 June 2012). Therefore, it is important to understand the role of intensified local authorisation in the decentralisation era in exploiting land and forest, which may result in its low rate of land and forest restoration.

Similar with the Province of Kalimantan Timur, the transfer of power to lower levels of government, which is evident by the existence of larger local authorities, generates incentives to over-exploit natural resources for . Even though limited timber and mining resources limit the issuance of legal timber and mining concessions in each year, issuance of forest and land conversions for forest conversion into other areas (including small-scale timber and mining concessions, illegal or legal paddy areas, horticulture areas and tree—e.g. palm oil, cacao and coffee—plantations) is increasing. The over-exploitation is best illustrated by the increase in land use change, especially in the non-forest areas or non-state-owned areas. Even with the smaller potential of mining and timber in this province, compared to richer provinces, there has been a sharp increase in forest use change towards timber logging and mining every year. For example, in 2007, 105.50 hectares of forest was approved for mining use and in 2011, 1,505.21 hectares of forest areas were approved for conversion to mining use (Ministry of Forestry 2011).

In addition, the awareness of larger local administrative power has induced negative responses through an increase of converted forest and land into agriculture activities, including transmigration. In province of Sulawesi Selatan, from 2004 to 2011, 4,584,500 hectares of forest was converted into agricultural areas, predominantly horticulture plantations (Ministry of Forestry 2011). These plantations make up the highest percentage of land use in this province (National Statistics 2010). Even though the area of conversion into rice paddies is smaller than that for horticulture, the Province of Sulawesi Selatan is the biggest rice producer in eastern Indonesia (data processed from National Statistics 2002–10). The increasing price of palm oil has driven an increase in land use changes for palm oil plantations at a lower rate than horticulture plantation and paddy plantation land use conversions. Suitable climate and soils for

paddy, horticulture, cacao and coffee plantations are dominating local government programmes in negotiating the conservation and economic aspects of land and forest rehabilitation. With more than 60 per cent of the tree plantations being community-owned, local economic development is highly negotiated regarding land and forest rehabilitation. As a result, this province has the largest loss of forest cover in non-state-owned forest which have been converted into tree plantations (*Badan Koordinasi Penanaman Modal* Sulawesi Selatan 2011).

The development of transmigration is considered to be another factor that prevents higher levels of reforestation. Up to 2011 there were 7,448 hectares of forest area converted into transmigration areas (Ministry of Forestry 2011). However, actual conversion is believed to be higher than this figure: many reports (e.g. Daniel 2012) suggest that some transmigration areas are wrongly built in protection forest areas. The agriculture demands and transmigration needs are considered the main reason for this development. Even though it is not reported by the government how much of the official area of transmigration is in the forest protection area, this violation is carried out by the local administration (Daniel 2012). As the need for extensive transmigration areas is growing over time, especially with increasing population in several populated provinces, there is an escalating need to have flexible transmigration programmes that secure the long-term economic needs of the transmigrant. The threat to reforestation from transmigration is much more apparent because transmigration has become a government tool to fulfil agriculture needs in southern Indonesian (BKPM Sulawesi Selatan 2011). Development of the entire transmigration area in Sulawesi Selatan is focused on agricultural expansion, including palm oil plantations. Although palm oil production comes far behind cocoa and coffee products, the high palm oil price has

motivated land and forest conversion into palm oil plantations. There is an increasing trend for greater business investment interest in palm oil transmigration (Badan Koordinasi Penanaman Modal [b]).

A related economic problem that drives deforestation comes from the failure of transmigration programmes to create economic independence for transmigrants. Even though the number of transmigrants arriving in this province is smaller than in the Province of Kalimantan Timur, the continuity of transmigration programmes leads to increases in population from immigrants or transmigrants. However, the likelihood of success is low because the majority of transmigrants have no appropriate agriculture skills or experience, and high motivation for success (Hoey 2003). In addition, the government in this province has not provided technical and non-technical support for the transmigrant, to enable them to cope with resistance from local people, and the demands of agricultural work in the transmigration area (Hoey 2003). These unsuccessful people, who dominate the poverty statistics and have no specific working skills, are likely to provide a cheap and abundant source of labour to convert forests for agricultural purposes, including illegal and legal timber logging and mining.

With respect to mining products, this province has medium-quality petroleum, ore, coal and gold (BKPM Sulawesi Selatan 2011). As one of the nickel mining producers in Indonesia, this mining extraction results in land and forest conversion (BKPM Sulawesi Selatan 2011). Ore is one of the mining products reported to convert protection land into mining activities (5 July 2013, *Bupati Polman Diperiksa Terkait Izin Tambang*, http://www.kemendagri.go.id). Sand and gold are usually extracted by small-scale producers. Fortunately, there has been no forest conversion for petroleum because

petroleum mining in several places, such as Bone Bay and Sengkang district, is not located in forest areas (18 March 2011, *Potensi Minyak dan Gas Sulawesi-Maluku Dipetakan*, www.antara.sulawesi-selatan.com). The existence of mining resources also threatens reforestation effectiveness in this province, which has converted forest areas into legal and illegal mining.

The lower level of reforestation is also due to many projects being based on a short-term philosophy. Poor coordination between institutions at the local and central level means that several reforestation programmes, such as HTR, are not successful. Inadequate training and education for land and forest rehabilitation management are also reported as factors in failures for many HTR programmes. Inadequate financial support from government and financial institutions, and inconsistent funding are dominant in the failure of HTR programmes. Local officially initiated land use changes may cause 'illegal' timber and mining concessions, which may best be described as examples of short-term policy. Changes in the status of forest areas should have permission from the Minister of Forestry through the Forestry Planning Agency. However, since the realisation of regional autonomy, both provincial city and district spatial plans are issued by the council. The 'illegal' concessions in the Province of Sulawesi Selatan are usually given in protection and conservation forests (19 April 2005, *Perubahan Status Hutan Lindung Diduga Menggunakan Data Manipulatif*, http://www.hukumonline.com). As a result, many devastating and long-lasting natural disasters take place. In addition, an official Indonesian Forum for the Environment, which reports on spatial management (January–February 2010, *Province tercepat pengesahan Perda Rukun Tetangga Rukun Warga*, <http://bulletin.penataanruang.net>), states that the depletion of forest can be seen in the decreasing capacity of the watershed

area to cope with floods, landslides and drought protection. In 2010, approximately 17,900 hectares of critical land existed in forest areas, which were supported by only 60.27% wooded vegetation. This is causing an increase in floods and landslides and prolonging the drought season, all of which contribute to loss of forest cover. This mechanism might result from the high degree of corruption occurring in the Province of Sulawesi (Corruption Perception Index 2010).

In order to maintain local economic growth and individual or bureaucratic benefits, local authorities in this province have not sufficiently encouraged traditional tribe and community involvement in land and forest conservation. Even though official data in 2011 posits that the HTR was encouraged in this province (BKPM Sulawesi Selatan 2011), the number of HTRs and customary forests is still low compared to other provinces in Indonesia. This suggests that the government does not give direct support to the efforts of traditional villages to maintain and preserve the sustainable land and forest. Therefore, these community institutions have to fight for sustainable land and forest management and this is reported to result in more failures than successes.

Even though some reforestation effectiveness has been achieved by many traditional tribes, the government is also not able to provide proper policy to support traditional tribes. For example, the Konjo tribe is able to safeguard its cover of 331.7 hectares of customary forest and to maintain the fertility of its agricultural areas (Suku Konjo, Sulawesi Selatan, http://kebudayaanindonesia.net). Davidson and Henley (2007) found that government infiltration even caused difficulties for this traditional tribe in continuing its forest conservation effort. Little benefit to local economic development and individuals or bureaucrats may cause this absence of government support for many

local efforts aimed to restore forest and land functions. This negative policy is likely to decrease the rate of land and forest rehabilitation.

Reforestation could have been more effective if there were sanctions for illegal miners and illegal loggers. Absence of sanctions for illegal activities has been reported by Zulkarnaen, the head of the Indonesian Forum for the Environment, and has included many unlawful forest conversions into mines and plantations (27 November 2012, *Kondisi hutan di Sulawesi Selatan semakin kritis*, www.kompas.com). Zulkarnaen found that uncontrolled mining is rapidly increasing, especially in the Luwu district, with the emergence of small-scale nickel mines in recent years. These small scale mining enterprises have been experiencing privileges in their mining activities, without any control from the government. Severe forest conversion has taken place in mangrove forest areas. For example, during 2003–07, a large portion of mangrove forests along coastal areas in the district of Pangkep experienced conversion into ponds (Mahyudin 2012). In this district, an extensive coastal area that amounted to 781.13 square kilometres, has dominated 70 per cent of its land area. This conversion caused economic deterioration. These outcomes clearly demonstrate undermining of the rate of reforestation due to the absence of sanctions for unsustainable activities.

Finally, the threat to reforestation is demonstrated by the absence of proper government policy to reduce poverty in this province. Even though the poverty gap is lower than in the Province of Kalimantan Timur, the number of poor people is higher in the Province of Sulawesi Selatan. In terms of the number of poor people, the gap in this province is far higher than in the Province of Kalimantan Timur, as the number of poor people in rural areas between 2007 and 2012 was seven times higher than in urban areas over the

same period (data processed from National Statistics 2007–12). This province also has larger values in terms of the poverty severity and poverty gap indexes, compared to the Province of Kalimantan Timur. This indicates that the poor in this province have an average higher expenditure but a bigger disparity expenditure gap than in the Province of Kalimantan Timur. The larger percentage of poor people and deeper poverty could be considered as predictive factors for higher deforestation, through an abundance of cheap labour supply for illegal timber, mining and plantations.

6.4.3. Province of Jawa Barat

The Province of Jawa Barat is one of the non-timber-producing provinces, which means there is no production forest in its natural forest cover. This province has been unsuccessful in increasing its forest cover and is included among the poor natural resources provinces. However, it is the second most populated province, has higher developed infrastructure than other provinces and has become the second highest rice producer. It has limited amounts of economic wood, which are supported with relatively large tree plantation areas within its legal areas. Its mining areas are considered large compared to its total land. The second highest population, advanced infrastructure and high level of agricultural development suggest that demography, technological use, agricultural expansion, culture, economic structure, wood extraction and policy, and other factors may be the driving reasons for this absence of land and forest restoration.

Before starting with a comprehensive analysis of all factors that drive deforestation, it is important to describe the special physical characteristics of the Province of Jawa Barat

(Table 19). The table does not include the non-physical factors that play an important role in the increase in the deforestation rate.

Table 19: Special characteristics of the Province of Jawa Barat

No	Characteristics
1	High agriculture reliance: third highest agricultural production, including of rice, in Indonesia
2	The rice producer for the two most densely populated provinces (DKI Jakarta and Province of Jawa Barat) in Indonesia
3	Highest industrial manufacturing area in Indonesia
4	Support area for the metropolitan city that is also the capital city of Indonesia
5	Third highest number of poor people in Indonesia
6	Highest migration (both in and out) rates in Indonesia

The evidence for the inability of this province to increase its forest cover between 2006 and 2010 is as follows. A decrease of 4.4 thousand hectares took place in protected forests between 2006 and 2010, from 272.5 to 268.1 thousand hectares. An increase of 19.3 thousand hectares took place in production forest, from 187.4 to 206.7 thousand hectares. Forest cover in non-forest areas decreased from 649.4 to 174.6 thousand hectares, that is, a decrease of 14.9 thousand hectares. Reforestation took place only in industrial forests. The greatest decrease was in non-forest areas. This suggests that the absence of forest cover increase is because protection forests and non-forest areas have been changed to other uses. There is a strong implication that local government discourages a policy of logging in protection forests to meet the demand for timber. Therefore, rapid destruction of forest cover would be expected.

The threat to restructuring forest cover is best exemplified by the policy of maintaining the rapid boost in the industrial profile of the province. The industrial profile is evident

in Jawa Barat having the second highest industrial output in Indonesia. For example, in 2010 this province was able to produce RP. 484,335,000.00 from oil and gas, petroleum and liquid manufactures, non-oil and gas manufacture and trade, hotels and restaurants (Table 11). The province has been successful in maintaining its large portion (60 per cent) of industry in Indonesia. This performance began in the 1990s when four new cities (*Tangerang* in 1993, *Bekasi* in 1996, *Depok* in 1999 and *Cilegon* in 1999) and one new district (*Banten* in 2000) were established (BKPM Jawa Barat 2009). These cities and districts have been developed to accommodate settlement in the rapidly developing capital city, Jakarta. The centralised economy mechanism has created an overheated economic boom and overcapacity in Jakarta, as the capital city. The Province of DKI Jakarta has a very limited area, yet supports the densest population in Indonesia. In 2010 it was reported that 9,588,200 people live in this 70,582.0 hectare capital city, which means that one hectare was inhabited by 136 people (National Statistics 2010).

The availability of jobs and advances in infrastructure has been the main attraction for migration to this province. The province has an immediate support function for the high migration to the capital city. For example in 2005, 3,764,889 people immigrated to this province, but fewer people (1,984,620) migrated out. In 2010, 5,225,271 citizens immigrated to the province, but fewer than half of this number (2,514,344) emigrated residents. The Province of Jawa Barat, as the neighbouring province and with a larger land area, has to provide support for industrial development, such as agricultural areas, housing, industrial areas, entertainment, health and education. This urgent need was met by unplanned development in these new regions, evident in overcrowding in industrial, settlement and agriculture areas.

The devastating impact of this development on forest and land is most evident in the rapid and uncontrollable increase of industrial, settlement and agriculture areas. National Statistics (2010) reported that more than 60 per cent of industry, which includes around 90 per cent of automotive manufacturing in Indonesia, is located in this province (Zachra 2011). Industrial land sales were dominated by 80 per cent industrial zone sales (Fajar, 27 July 2012). Even though limited land use is available for activities other than forest area development, the development of the industrial zone policy is still a priority for this government (Hidayat, 1 November 2011). The increase in housing areas has also occurred at a rapid rate to meet the obligation to provide housing for local people and migrants who work in the province of DKI Jakarta. Sanusi (13 February 2013) reported that the demand for housing in this province is growing at 20 per cent per year.

The high demand for rice also drives agricultural land use change. This province was Indonesia's second highest rice producer from 1999 to 2013 (National Statistics 2013), and has the third highest use of irrigation techniques at the national level (Jawa Barat Statistics 2011). Rice production is the dominant land use in farming or agricultural areas because this province is perfectly suited for paddy plantations. Between 2008 and 2012, the average paddy land use was 2,000 hectares per year (*Dinas Pertanian Tanaman Pangan Provinsi Jawa Barat* n.d). The paddy land use is predicted to be constant because rice remains the main staple of Indonesia's population. Therefore, no report predicts a decrease in rice demand. In addition, the threat of land use change is shown by large proportions of land being used for tea and coconut production (*Dinas Pertanian Tanaman Pangan Provinsi Jawa Barat* n.d). The absence of land and forest

rehabilitation is clearly explained by the prioritised policy of land use changes for industrial use, settlement and agriculture.

The threat to the effectiveness of reforestation is also due to the availability of some sources of mining (medium quality of petroleum, ore, coal and gold) (BKPM Province of Jawa Barat 2011). The limited and lower quality of mining has been encouraging small-scale illegal mining activities (Sule 2012; Kesra, 2010 Arman, 2013; Riswan, 2013). In addition, these reports stated that this illegal mining brought destructive impacts to reforestation. This devastating impact is exacerbated by the absence of sanctions on illegal concessionaires. Although large and modern petroleum mining is located off-shore (BKPM Jawa Barat 2011), the abundance of small-scale timber and mining significantly influences the reforestation rate (Riswan 2011).

These illegal activities have shown an increasing trend because of higher demand (Kesra 2010). Higher demand for timber and mining has been motivated by the limited amount of mining and timber resources available in this province. The impact of higher demand on forest loss can be seen in the absence of forest cover increase. These facts indicate that local government chooses to use timber concessionaires and mining concessionaires over sustainable use of forest to manage land use in the Province of Jawa Barat. This policy might be explained by the high corruption perception of the Province of Jawa Barat (Corruption Perception Index 2010).

The absence of controls on the high demand for timber for development of industry and settlement is also worsening the deforestation in this province. The government has included HTR and community garden plantations (*penanaman pekarangan masyarakat*

or PPM) as part of it reforestation activities (Ministry of Forestry 2011). However, the majority of HTRs aim to serve the demand for timber (Hakim Dwiprabowo & Effendi 2009). Wood from HTR and PPM in Jawa Barat has become an alternative for raw materials to fulfil demand from households and wood industries in DKI and its surrounding suburbs, as wood supply from natural forests and *Perhutani* (state-owned forest) have decreased (Hakim Dwiprabowo & Effendi 2009). Kartodihardjo (2012) found both PPM and HTR plantations in non-forest areas are more appealing because of the certainty of property rights with respect to privately owned land. In addition, Sukardarwati (2010) found that extensive timber logging caused destruction in HTR and PPM because their management was based on timber demand. These facts indicate that government ignores the control of timber logging. This policy will increase the likelihood of reforestation failures and represents a short-term philosophy that may also threaten reforestation effectiveness.

Reforestation effectiveness would also be influenced by misuse of the larger local authorisation in the decentralisation era. Arman (2013) found that local authorities use small- and medium-scale illegal logging and mining for personal economic gain by imposing illegal levies. The demand for settlement, tourism and industrial areas was believed to cause the rapid loss in forest cover (Didi, 2013; Ramdan 2011). The structural incentive to manage land use change for individual benefit has been motivated by the larger transfer of power in the decentralisation era. This poor policy is also in line with high corruption in the province (Corruption Perception Index 2010).

Another barrier to reforestation has been the failure of industrialisation and rural development to create individual economic development. The number of poor people,

especially in rural areas (as this province is an object of industrialised migration) has not shown a significant decrease from 2007 to 2013 (National Statistics 2013). This could be related to the massive and continuous numbers of immigrants arriving in the Province of Jawa Barat (National Statistics 2013). The abundance of marginalised people in urban and rural areas would influence reforestation efforts, as these poor provide cheap and abundant sources of labour to convert forests to illegal tree plantations, logging and mining.

The policy to maintain local economic growth as a source of economic development and individual or bureaucratic benefits is very prominent in this province. Local authorities have discouraged traditional tribes and community involvement in land and forest conservation. The government establishes HTR as one of the tools to increase forest cover (Ministry of Forestry 2011). However, the absence of the right to harvest timber in HTRs is reported to lower the effectiveness of reforestation (Nawir 2007). Limited efforts to involve the community in forest and land rehabilitation are confirmed by the low number of HTR plantations and customary forests. For example, in 2007 there were 6,069 hectares of HTR, which represents 0.02 per cent of the total land, while in 2012, there were 2,188 hectares of HTR area, which represents 0.006 per cent of the total land (processed data from National Statistics 2012). This low and declining proportion indicates inappropriate prioritisation of efforts in rehabilitating land and forest.

The threat to reforestation effectiveness is also shown by an absence of government acknowledgement of customary forests. Some media report the absence of government assistance in several traditional tribes' efforts in protecting standing forests (Asdhiana

2012). It was found that *Kampung Naga*, a traditional village in the Province of Jawa Barat has been able to conserve 2.5 hectares of what they claimed as customary forest without any assistance from government. However, government has not acknowledged customary forests (Kartodihardjo 2012; Thantowi et al. 2012). This absence of policy support to community-initiated forest conservation will be more likely to decrease the effectiveness of reforestation.

The larger local authorities but limited controls generate incentives to use natural resources for individual benefit and local economic development in this province. Even though limited timber and mining resources limit the issuance of legal timber and mining concessions in each year, there is an opportunity to issue forest and land conversions, for forest conversions into other uses including small timber and mining concessions, illegal or legal rice paddies, and horticulture and tree (i.e. palm oil, cacao and coffee) plantations. The obligation to be self-sufficient in revenue is usually cited by local officials as justification for issuing small timber and mining concessions to increase timber levies, regardless of the spatial plan (Indonesian Corruption Watch 2004).

The current government in Indonesia still exercises the same regulations, which state that local government is entitled to 80 per cent of the PSDH and IIUPH timber levies. The findings show that the use of Government Regulation 22/1967, combined with increasing local authority, has initiated a process of increasing local levies on forest use in all provinces, including this one. Even with the smaller potential for mining and timber in this, compared to richer provinces, there has been a sharp increase in small timber and mining concessions every year.

In addition, forest and land conversions into settlement, manufacturing industries and agricultural activities are increasing. The conversion into manufacturing industries, which is the highest percentage of land use in this province, is increasing (National Statistics 2001–10). The conversion into paddy, as the main agricultural product in this province (the Province of Jawa Barat being the third highest paddy producer in Indonesia; data processed from National Statistics 2001–10), is also increasing. The increasing price of palm oil has motivated an increase in land use change for palm oil plantations. However, a suitable climate and soil for paddy, horticulture, and cacao and coffee plantations dominates local government programmes in negotiating the conservation and economic aspects of land and forest rehabilitation. With a relatively large percentage of the tree plantations being community-owned, local economic development is highly negotiated against land and forest rehabilitation. As a result, this province has the largest loss of forest cover in non-forest areas.

In summary, this province has a high incentive to perform deforestation, which is exacerbated by the devolution of power that has motivated the use of local institutions to increase individual economic benefit. A huge institutional change will be required to form an effective reforestation programme.

6.4.4. Province of Jawa Tengah

The Province of Jawa Tengah is one of the non-timber-producing provinces, which means it has no production forest in its natural forest cover. This province has a highly successful story of increasing its forest cover and is regarded as a province with poor

natural resources. However, it is the fourth most populated province, and has a relatively higher degree of infrastructure development than all other provinces, which could be considered as factors to increase deforestation.

The Province of Jawa Tengah was the third biggest producer of rice between 1999 and 2013 (National Statistics 2013), and also had the third highest use of irrigation techniques at the national level (Jawa Tengah Statistics 2011). The province has a moderate industrialised profile and a quite extensive proportion (30 per cent) of Indonesian industries is located there. This province has relatively good mining resources (medium quality of petroleum, ore, coal and gold) and agricultural opportunities (Badan Koordinasi Penanaman Modal [c]). Based on the notion that government policies heavily shape the industry, agriculture, demographic, agriculture and wood extraction in this province, analysing these multiple factors could provide a comprehensive evaluation of the main influences in reforestation. Table 18 describes the special physical characteristics of the Province of Jawa Tengah that play an important role in the increase in the deforestation rate.

Table 20: Special characteristics of the Province of Jawa Tengah

No	Characteristic
1	High agriculture reliance: second highest rice and other agricultural production in Indonesia
2	Infertile soil, which restrains tree regeneration
3	Large poverty gap
4	Second highest poverty level in Indonesia
5	Highest emigration in Indonesia

This province has a long history of reforestation success, which is demonstrated by a 408.2 thousand hectare increase in forest cover between 2006 and 2010, when total

forest cover increased from 709.8 to 1,118.0 thousand hectares. The success of this province in increasing its forest cover from 2006 to 2010 can be demonstrated as follows. An increase of 14.8 thousand hectares took place in protected forests from 2006 to 2010, when the area increased from 63.5 to 78.3 thousand hectares. At the same time, production forest area increased by 30.4 thousand hectares, from 398.5 to 428.9 thousand hectares. Forest cover in non-forest areas in 2006 was 247.9 thousand hectares, while in 2010 it was 610.9 thousand hectares, an increase of 363 thousand hectares. Reforestation took place in all forest areas. The highest and most significant increase occurred in non-forest areas, which indicates that there was a strong message from local government encouraging land rehabilitation in all forest areas, to expedite land and forest rehabilitation.

With limited timber sources, timber logging combined with timber demand could reduce reforestation effectiveness. Due to the dominance of HTR as a timber source in the Province of Jawa Tengah, higher HTR timber production could decrease reforestation effectiveness. The low costs and simpler management associated with community-owned forest concessions could intensify uncontrolled motivation to log the timber. For example, in 2008, the actual HTR timber production was 15,050.273 m^3, which was far above the forecast production of 1,248,140 m^3. On the other hand, the real timber production from industrial forests was 161.776 m^3, which only slightly exceeded the target production of 155.924 m^3. The higher actual community timber production indicates that deforestation took place in community-owned forests.

Besides timber demand, the attraction of mining products could reduce the effectiveness of reforestation. With respect to mining products, this province has medium-quality

petroleum, ore, coal and gold (Badan Koordinasi Penanaman Modal [d]). Unmanaged illegal and legal sand mining is reported to be the main activity that causes rigorous destruction in watersheds and protection forest areas (Andrianto, 2013; Olies, 2013; Iswinanrno, 2013). Current petroleum extraction is not considered a threat to reforestation because it is situated off-shore. Old, small petroleum sites in Cepu, and limestone quarries, as well as Cepu petroleum processing do not cause land conversion because these sites have not expanded (Badan Koordinasi Penanaman Modal [d]). The local government in this province has been working to develop this industry. For example, government planned to develop a new airport to support petroleum industries (Infoblora, 21 July 2013). Even though this province is not a destination for the mining industry due to its limited area, land and forest conversions would be influenced by the limited quality and potency, and the availability, of mining products.

Other than the mining industry, oil and gas, petroleum and liquid manufacture, non-oil and gas manufacture and trade, as well as hotel and restaurant industries may influence the effectiveness of reforestation. According to National Statistics in 2010, this province has a total of RP. 286,723,000.00 industrial output. Even though this value amounts to only half of the equivalent output from the Province of Jawa Barat, this province is not free of the possibility of forest conversion for these industries, which provide economic growth opportunities for local people. Therefore, the industrial zone expansion for these industries is included in the Province of Jawa Tengah letter of intent (Widodo 2013). This expansion could take place in forest areas due to the limited amount of land in this province. This possibility is multifaceted, because the province has the third highest population in Indonesia.

The limited industrial jobs available compared to population size could lead to higher forest encroachment in this province, which would hamper the reforestation effort. Poor people in villages surrounding the forests are reported to convert forest into swidden agriculture to sustain themselves (Nawir 2007). Large, poor populations that depend on forest products such as firewood also contribute to a decrease in reforestation. The limited job opportunities are evident in the high emigration from this province. For example, in 2005, 741,588 people immigrated to this province but a massive number of 5,538,952 residents emigrated. In 2010, the respective figures were 902,711 immigrants and 6,829,637 emigrants.

The danger to the effectiveness of reforestation is also influenced by a short-term philosophy in government programmes, which is evident from inadequate training, education and financial support from government and financial institutions for land and forest rehabilitation management for HTR farmers (Ministry of Forestry 2011). Therefore, the success of HTRs as the most effective means of land and forest rehabilitation is limited. This short-term philosophy is compounded by long and complex bureaucratic processes to establish HTRs, which has led to limited HTR development. This inappropriate government mechanism restricts community initiatives to re-plant degraded land and forest and increases illegal logging and mining.

Another barrier in the reforestation effort is posed by the absence of sanctions for illegal miners. Sand mining is the most common mining activity performed by small-scale mining operations, and can cause severe impacts because it takes place in mountain slopes and in protection forest areas (Saptono, 17 November 2009). Saptono (17 November 2009) also found that in 2009, illegal logging and mining converted at least

five hectares of protection forest area and 50 hectares of Gunung Merapi National Park in this province. However, the government fails to impose sanctions on these illegal activities (Saptono, 17 November 2009). This policy is a symptom of the high corruption perception of the Province of Jawa Tengah (Corruption Perception Index 2010).

In summary, the larger local authorities but limited control generates incentives to use the natural resources for individual benefit and local economic development in this province. Even though this province has limited timber and mining resources, which limits the issuance of legal timber and mining concessions in each year, the government has chosen to issue forest and land conversions for forest conversion into other areas, including small timber and mining concessions, illegal or legal paddy, horticulture and tree plantations (palm oil, cacao and coffee). Further, the increasing trend of land conversion into HTR as a tool of local economic development as well as reforestation could pose a risk to reforestation effectiveness if the issuance and management of HTR is not properly addressed. The overall institutional change in the Province of Jawa Tengah during 14 years of decentralisation has not been adequate to increase reforestation effectiveness.

6.4.5. Province of Bali

The Province of Bali is considered to be a non-timber-producing province, because it has no production forest in its natural forest cover. It has had low success in increasing its forest cover and is included here as a province with poor natural resources. However, this province has some mining resources of medium quality, including petroleum, ore,

coal and gold (*Potensi investasi* Province of Bali 2011). High trade and tourism infrastructure characterises this province. Therefore, it is important to study what factors cause the low reforestation in this province.

The low reforestation in the Province of Bali is evident by the small increase in its forest cover, of 4,300 hectares from 2006 to 2010. During this time, there was an increase of 27.9 thousand hectares in protected forest, from 55.5 to 83.2 thousand hectares. Production forest area increased by only 1.0 thousand hectares, from 2.4 to 3.4 thousand hectares. Forest cover in non-forest areas in 2006 was 11.4 thousand hectares, while in 2010, this was 16.6 thousand hectares, which showed an increase of 5.2 thousand hectares. Reforestation took place in all forest areas, but the highest increase was in protection areas. This implies strongly that local government supports the conservation of forest functions. However, it is crucial to have a comprehensive analysis of all factors that influence reforestation, due to the low reforestation result compared to other reforested provinces.

Special characteristics of the Province of Bali that play an important role in the increase in the reforestation rate are described in Table 21.

Table 21: Special characteristics of the Province of Bali

No	Characteristics
1	Highest tourism industry in Indonesia
2	Higher immigration compared to emigration

Despite the absence of threat from timber logging in this province, the negative institutional changes that could contribute to low reforestation should be considered. Local authorities prioritise local economic growth, and individual or bureaucratic benefits, over support for effective community-initiated reforestation. Local officers in

this province discourage the involvement of the traditional institutions and communities in land and forest conservation. Many reports, such as Wiguna (12 January 2012) and Suryadama (n.d), describe the effective efforts of traditional villages to maintain and preserve sustainable land and forest. However, these positive and effective efforts are not supported by the government (Masuki, 05 December 2009). The local government is reported to favour more land conversions for recreation, accommodation and shopping centres regardless of location, which may decrease the protected areas of these customary villages. These traditional institutions have to fight for sustainable land and forest management, with an eco-tourism approach, reportedly resulting in more failures than successes. Limited efforts to involve the community in forest and land rehabilitation are confirmed by the limited areas of HTR plantations and customary forests. On average, 3,014 hectares of HTR each year between 2004 and 2008 were established in this province (National Statistics 2011). The local government favours land use management over supporting proven, effective land and forest conservation. For example, local government has chosen to expand large tourism developments that are reflected in the province having the largest output from trade, hotels and restaurants (Table 11). This policy is reducing the effectiveness of land and forest rehabilitation.

Another risk to reforestation effectiveness has come from failures of industrialisation and rural development to create economic development. Immigrants may contribute numbers of poor people, because this province has been a very attractive place for the tourism industry. For example, in 2005, 249,951 people immigrated to this province and 248,007 people emigrated. However, by 2010, the number of immigrating people had almost doubled (406,921 people), while emigration was similar to previously (269,245).

Marginalised people in the cities and villages provide cheap and abundant sources of labour to perform illegal logging and mining in forest areas.

The absence of sanctions for unplanned tourism sites also threatens the effectiveness of reforestation. The high dependence on tourism in this province attracts many small-scale illegal or unplanned tourism sites. As the tourism industry is rapidly growing, the amount of recreation accommodation is greatly increasing. Some accommodation in new tourism sites is reported to be built in protection forests (Bram 2005). The absence of sanctions for illegal activities significantly increases the number and area of illegal tourism sites, which in turn increases the deforestation rate.

In summary, larger local authorities but limited controls generate incentives to use the natural resources for individual benefit and local economic development in this province. Even though limited timber and mining resources limit the annual issuance of legal timber and mining concessions, there are opportunities to issue forest and land conversions, for forest conversions into other areas, including small timber and mining concessions, illegal or legal paddy, horticulture and tree plantations (palm oil, cacao and coffee). The conversion into tourism industries that is dominating land use in this province (Province of Bali Statistics 2007–12) has been sharply increasing. Therefore, reforestation is very low, because forest protection is not the main policy in this province.

6.5. Discussion

The land and forest rehabilitation program ineffectiveness could not be determined by limited factors. All driving factors of deforestation could influence the effectiveness (table 20). This study confirms Geist & Lambin (2002) notion on special result should be expected in different regions.

The data presented in this chapter confirms the importance of institutional change in local governments in shaping public outcomes (Agrawal & Gupta 2005; Agrawal & Ribot 1999; Andersson et al. 2010). This study explains how change in political power outlines change in forest cover. The most important finding is that incomplete institutional change has caused severe deforestation in provinces with richer natural resources.

Institutional policies play an important role in shaping deforestation rates. Several important institutional, policy and cultural aspects that contribute to the increase in the deforestation rate in these provinces are outlined in Table 22.

The change in distribution of power in lower levels of government has motivated the rapid issuance of timber, mining and plantation permits in forest areas. This finding supports the notion that agriculture expansion is the main direct cause of deforestation (DeFries 2010; Kobayashi 2002; Morton et al. 2006). Further, this study confirms Agrawal's (1999) finding: there is an absence of proper transfer of administrative and fiscal power to lower levels of government and community levels from local administrators, as well as checks and balances of power between government institutions, which drives failures in sustainable forest decentralisation.

Table 22: Institutional, policy and cultural factors increasing deforestation rates

No	Factors	Direct output	Long-term impact
Institutional and policy factors			
1	Weak laws and regulations imposed	• Uncontrollable issue of forest use permits • Forest area conversion	Embedded bureaucratic culture in misuse of power
2	Low administrative capacity to deliver authorisation to lower levels of local officers	• First stage in preventing maladministration of forest use is absent	
3	Low administrative capacity to empower local people	• Low reforestation success	
4	Absence of effective reward and punishment system	• Higher level of maladministration of local officers	Unstoppable deforestation
5	Short term economic rent seekers	• Uncontrollable increase of small- and large-scale and legal and illegal permits on forest use	
Cultural factors			
1	Land cleared used fire	• Loss of forest cover	
2	Swidden farming	• Loss of forest cover	

This section discusses why demographic factors, such as population density, contribute significantly to public outcomes. Population pressure shapes the policy on land use change to fulfil a demand, especially for agricultural products. However, administrators have the authority to control the price and production, and even the population who are in command of agriculture are within their jurisdiction. The opportunity to use power to manage sustainable land use changes is absent in many provinces. The larger authority

delegated to local administrators without close and strong law enforcement creates opportunity of the administrators in the selected provinces chose to use their power to exploit the forests for their individual benefit. This finding verifies the concept that population is the underlying factor in deforestation (Barbier 2005; Carr 2004; Carr 2009; DeFries 2010).

The existence of population density in the non-producer provinces best illustrates how population is the main driving factor in deforestation in developing countries. The results of government policies to tackle population density are a strong indicator that population is the main underlying cause of deforestation (Wright & Mueller-Landau 2006). The data from this study illustrated that governments choose to develop agriculture, manufacture and tourism industries to provide jobs for the huge population. This policy results in massive conversion of forest areas for these industries. These forest conversions are very evident in the early stage paddy plantation revolution in Java. The conversion is continuing to a lesser degree because the development of industry attracts more people and therefore governments have to continue converting forest for the expansion of these industries. On the other hand, governments can choose to provide reforestation jobs for the massively high population density, as exemplified in the Province of Jawa Tengah. This policy works well if there is low availability of jobs for the dense population.

The data also demonstrate that the increasing population in non-timber-producing provinces leads to the massive expansion of settlements that require the development of infrastructure. Governments choose to do very little to manage the settlement and infrastructure development, which indicates the greater economic benefits that are gained from ignoring the issuance of settlement permits. This policy results in increases

in uncontrolled settlements that also convert forest areas. As implied by the data presented in the previous section, uncontrolled settlement by wealthy people is more dangerous to reforestation efforts because they larger land areas are allotted to each house buyer. The higher purchasing ability motivates these people to consider buying in the most convenient location, regardless of the impact on larger forest conversions.

Population also shapes the development of the tourism industry to accommodate a massive need for leisure activities. Governments also decide to disregard their obligation to manage the use of forest areas for recreational areas. This policy causes over-development of accommodation in forest areas.

On top of the needs of a growing population, local government policy to prioritise fulfilling timber needs over forest conservation crucially drives increases in natural resource extraction, including wood extraction. The most obvious misuse of power is shown in natural resource extraction policy, including wood extraction. Local administrators have prioritised utilisation of wood for industrial use. This policy was aimed to increase the chance of gaining individual economic benefit. In timber-producing provinces, the misuse of power in wood extraction policy is very apparent.

The opportunity for misuse of power is increased when larger areas of forest are designated as industrial forest areas. Local officers have a greater opportunity to issue legal and illegal timber logging permits because deforestation should be expected with these large portions of industrial forest because of the legal option to cut timber in these areas. This potential misuse is even more intensified if the largest percentage of the production forest area is located in natural forest. These huge areas imply that these

provinces are experiencing massive legal logging impacts. The density of vegetation in natural forest cover suggests that this naturally grown vegetation provides the best quality and quantity of timber.

The density of natural forest cover increases the difficulty of counting the real loss of forest. The chance, however, is lessened when industrial forest areas are situated in secondary forest cover. This secondary forest is self-regenerated forest cover, which exhibits less forest fragmentation and smaller timber size than natural forest, so its loss is much easier to calculate. The massive and uncontrolled timber logging in large areas of forest cover with large portions of industrial forest clearly implicates timber logging as a direct cause of deforestation (Burgess et al. 2012; Casson & Obidinzky 2002; Kobayashi 2002). In non-timber provinces where less forest cover dominates, governments still choose to manage the use of timber less and prioritise timber logging to supply immediate timber needs. Nonetheless, the delegation of power to local officers should contribute to better control of timber logging, in a manageable way. Local administrators' knowledge of the direct negative impacts of deforestation to their local communities should prevent severe deforestation.

Another type of natural resource extraction is mining extraction. The abundant availability of good quality mining products could influence local administrative policy, or *vice versa*. The richer quality and quantity of mining determines the government policy on the issue of permits for mining activities. This over-issuing of mining permits is very obvious in timber-producing provinces in which superior quality and quantity mining exists. The probability of over-issuing mining permits is higher when the number of people is low. Low population density gives larger room for mining

expansion, which does not compete with settlement areas. The illegal small-scale mining production is more apparent in non-timber-producing provinces due to limited sources of mining and limited quality of mining products. Nonetheless, the knowledge of local administrators about the local unfair distribution of economic wealth could influence the extraction of mining products for the enhanced distribution of wealth among its residents.

Palm oil plantations are also considered as natural resources because oil palms have particular growth requirements (hence can only be grown in particular locations) and are financially viable only if they are extensively produced. The majority of local governments establish policies that support the existence of a rapid increase in palm oil plantations whenever it is possible to develop them. The result of this policy implicates agricultural expansion as the direct cause of deforestation (Kobayashi 2002; Sayer et al. 2012; Susanti & Burger 2012; Varkkey 2012; Wicke et al. 2011). Some current researchers point to palm oil as the main factor in deforestation that will continue to dominate land use changes in the future (Sayer et al. 2012; Susanti & Burger 2012; Varkkey 2012; Wicke et al. 2011). The larger decision-making transfer enables the government to decide on palm oil land use changes by issuing palm oil plantation and palm oil transmigration permits. Gaining larger economic benefit is more likely because of the high price of palm oil products. This high price is motivated local administrators to ignore the obligation to manage the use of fire to clear the land for palm oil plantation development. This chance is exacerbated by the availability of large areas and low population density. The focus on local economic development as well as degrading forest conservation into plantations means that palm oil plantations are believed to be

the appropriate policy for land and forest rehabilitation. The government is more likely to opt for easy way of maximizing the economic benefit rather than forest conservation.

Better policy is also influenced by environment. This evaluation also confirms Islam and Weil's (2000) and Gong et al.'s (2007) proposed theory that land characteristics such as fertile areas, low forest fragmentation, large areas and long and wide rivers all influence the deforestation rate. Those factors could also conceal the legal and illegal logging, mining and palm oil plantation activities that are believed to inflict more massive deforestation. Forest density reflects both soil fertility and degree of forest fragmentation. Fertile soils combined with the appropriate climate are very attractive for developing high-priced agricultural products such as palm oil. Large forest areas and low population density also exacerbate deforestation. The data showed that massive logging and mining is supported by wide and long rivers, which provide cost-effective transportation for logging products. The data also illustrated that land characteristics such as steep, hilly areas and mountains also contribute to massive deforestation. These land characteristics can provide camouflage for illegal activities. However, administrators can imitate traditional village or tribal policies or norms to control the use of timber, mining, water and land, as even the forest-dependent people are surrounded by large forests and wide and long rivers, which are located in steep, hilly country and mountains. Local governments may also choose to delegate more power to these effective forest conservation efforts by acknowledging the local villagers' and tribes' possession of land. However, the majority of administrators choose to protect the illegal and legal mining, timber and plantations that bring short-term economic benefits.

Further findings in this research have shown that population pressure influences policy in economic structure and technological uses that can also influence the deforestation rate. Bureaucrats are prone to use short-term policy, such as extracting or over-using natural resources, to create noticeable economic structures during their term of governance. Such policies aim to create immediate jobs for civilians. Therefore, the use of technology will adjust to the needs in the dominant industry in each region. For example, bureaucrats in several provinces in Java have introduced irrigation for the purposes of developing effective paddy plantations. In other provinces, lower use technology is selected because palm oil plantations, mining and timber logging do not require advanced technology. These companies or institutions can make use of wide and long rivers for transportation.

Besides population, policy is influenced by effective cultures in delivering services. The power delegation to lower levels of government has not successfully brought real institutional change. Local administrators hold the same philosophy in perceiving their power. They are prone to maintaining large-scale illegal activities, suggesting that the larger individual benefit prevents local administrators from acting objectively. They are more likely to stamp out the illegal use of timber in small-scale community timber logging, which is evident from the reported closing down of only small-scale illegal logging and mining. Governments also ignore their responsibility to nurture the unfortunate transmigrants who cannot realise their dreams because of the location of transmigration in forest areas. These illegal transmigration policies have contributed to the increase in poverty.

6.6. Summary

This section provide summary on unique characteristic of each province. The special characteristics of each province determine the unique and important driving factors for deforestation that influence the ineffectiveness of government programmes in land and forest rehabilitation.

Table 23 Summary of findings and compare the findings in each province

No	Province	Major drawback	Minor drawback	Result
1	Kalimantan Timur	Availability of natural resources (i.e. mining, timber and palm oil), large areas and natural transportation (i.e. big river)	Institutionalized need to keep and exploit the natural resources for the good of local economic growth.	The largest and massive deforestation
2	Sulawesi Selatan	Small-scale mining is used to secure need to increase the local revenue.	The need to maintain its current position as paddy and fruit provider for eastern part of Indonesia	Relative small deforestation
3	Jawa Barat	The obligation to maintain its position as the largest industrial provider in Indonesia.	Increasing demand for settlement and timber for industry and household needs.	Relatively large deforestation
4	Jawa Tengah	Small-scale mining is used to secure need to increase the local revenue.	Increasing demand to provide area for industry and settlement.	Relatively small deforestation.
5	Bali	Increasing demand of land for tourism industry.		Relatively small deforestation.

The government policy has been shaping the development of land and forest rehabilitation by directly promoting negative policy. This negative policy is aggravated by the existence of rich natural resources, and settlement, industrial and tourism needs. The decision-making process has been decentralised in each province, resulting in similar institutional changes, where the greater authority is perceived as providing the power to use natural and non-natural resources for local and individual benefits.

In summary, this study verifies Geist and Lambin's (2002) model of multiple factors influencing reforestation, in that government policy shapes other factors, such as economic structure, wood extraction, technological use, agricultural expansion, and environment and culture, which also influence the reforestation rate. This evaluation confirms Ribot, Agrawal and Larson's (2006) findings that institutional change to decentralised forestry is not adequate to support effective forestry programmes.

Despite being identified as one of the factors that negatively influence the reforestation effort, there are many changes due to decentralisation that are found to be the factors that can drive the increase in land and forest rehabilitation effort. Therefore, the next chapter will look at various institutional factors that have increased forest rehabilitation effort.

Chapter 7: Enhancing Land and Forest rehabilitation in Reforestation Effort: Further finding from the Case Studies

7.1. Introduction

The prior chapter focused on five provinces and their current deforestation status as it might relate to key causal factors. This chapter focuses on specifically evaluating factors that help to improve the effectiveness of reforestation in the five provinces selected as case studies. Qualitative analysis is used to present evidence on how the reforestation was effective. The analysis considers unique factors that may influence the effectiveness of FE in performing reforestation in each province.A particular focus of this analysis will be on the decentralisation that has been a centrepiece of Indonesian policy. An overview of the fundamental institutional changes that have taken place at a national scale will be provided. The programme on land and forest rehabilitation is then described. Later sections identify common patterns and regularities across the five provinces. The discussion contributes to a more informed theoretical discussion of the reasons for the success of decentralisation initiatives.

To frame the presentation of the case studies, this chapter examines the main features of decentralisation of forestry policy in the five cases: the provinces of Kalimantan Timur, Sulawesi Selatan, Jawa Barat, Jawa Tengah and Bali. In each case, articulated justifications of decentralisation are reviewed. The extent to which governments have actually decentralised decision making and other powers regarding the environment and natural resources is reviewed. The actors who have gained new powers and some

observable social and environmental outcomes are also evaluated. The chapter concludes by focusing on key factors that would make decentralisation reforms more effective.

7.2. Fundamental Institutional Change at the National Scale

Despite the domination of factors that motivate deforestation, the central government has been working on establishing culture and policy foundations that enhance forest conservation at the national and local level. These foundations, which are based on a power devolution philosophy, are summarised in Table 24.

The Indonesian government has made some fundamental changes in institutional culture and policy. These have been established in laws, regulations, budgets, governance and corruption eradication systems. Even though the very short term (four years) for establishing fundamental change indicates a bottom-up approach, the Government of Indonesia has introduced profound fundamental changes that rapidly established stabilisation throughout the country.

Forestry Law 41/1999 fundamentally changed the culture and policy in managing forests. This law changed the previous forest management from exploiting forests for immediate and maximum benefits to managing forests for everlasting benefits. The new law clearly defines the management of forests to provide sustainable benefits for all Indonesian population, using forest-dependent people empowerment.

Table 24: Foundations that enhance forest conservation initiated by the central government

Factors	Fundamental change	Legal framework	Institutional change
Law and regulations	Sustainable management	• Forestry Law 41/ 1999	• Local-forest-dependent empowerment • Power devolved to local level in issuing land and forest permits
		• Government Regulation 35/2002 on the reforestation fund (LRF)	• Natural-resource revenue sharing • Required the use of the RF for reforestation purposes
	Decentralisation	• Law 25/199 on fiscal balancing between central and local government	• Balancing power between actors in central and local government
		• Law 22/1999 on authority of local government.	• Accountable governance synergy (community, business and government)
		• Law 32/2004 local government.	• Additional chapter on new regions formation is added.
		• Law 33/2004 on fiscal balancing between central and local government.	• Detail on local portion of revenue-sharing is detailed.
Budget system	Transparency and accountability	• Programme-based budgeting imposed in 2003 • Single government account in 2003 • Performance-based budgeting in 2007	• Budgeting skills and capacities • Accountable governance synergy (community, business and government)
Empowering ministerial performance		• Technical guidance on land forest rehabilitation	• Accountable governance synergy (community, business and government)
Corruption eradication	Corruption Eradication	• Law No.30/2002 on the Corruption Eradication	• Support to all levels of government to

	Commission (*Komisi Pemberantasan Korupsi* or KPK)	Commission as a legal basis for the establishment of the KPK	expedite the increase of accountability processes

The new forestry law has been well legislated, with Government Regulation 35/2002 introducing the RF. This regulation has clearly defined general and comprehensive guidance on how to perform effective reforestation. These kinds of clear and well-defined obligations and authorisations for each of the actors involved in the RF demonstrate a strong intention to avoid unjust forest management.

The use of balance of power, devolution of power and revenue sharing also contradict the centralistic approach of the previous government. The establishment of Law 25/1999 on fiscal balancing between central and local government and Law 22/1999 on authority of local government has undoubtedly defined the financial and political power devolution to lower levels of government. This approach presents major opportunities for better services for civilians, which was counterproductive in the previous government approach. The government revised these regulations in 2004 by proposing law 32/2004 on local government and law 33/2004 on fiscal balancing between central and local government. A chapter on new regions formation is included in the law 32/2004 on local government. Detail of local portion of revenue-sharing is presented in law 33/2004 on fiscal balancing between central and local government.

Accountability, represented by change in the budgeting-based system and government account management, is also included in the very critical change. The previous government acknowledged only the use of budgets to fulfil a specific number of

bureaucrats' needs, and thus did not recognise any obligation to manage the budget and account to the citizens.

The awareness of the uncontrolled corruption created by the previous governance has been the main reason for the establishment of KPK. However, this effort is considered as an extraordinary achievement because the massive euphoria on decentralisation and democracy established a misuse of power at almost every level of government. These efforts have been initiated at the national level to expedite stabilisation of the new government. These changes aim to strengthen accountability and transparency efforts.

The following section presents specific efforts to accelerate land and forest rehabilitation to support the sustainability of the fundamental changes in governance.

7.3. Types of National- and Local-level Programmes in Land and Forest Rehabilitation

Land and forest rehabilitation is a legal term used by the Government of Indonesia for all government programmes that address efforts to decrease deforestation. Limited secondary data sources prohibited analysis of all programmes included in the land and forest rehabilitation, but programmes for which data were available are described in Table 25.

Table 25: Land and forest rehabilitation 2003–13

source: Ministry of Finance 2003–13, Ministry of Forestry 2003–11

No	Programme	Period of programme implementation	Scope of program
1	National Movement in Land and Forest Rehabilitation (*Gerakan Nasional rehabilitasi hutan dan lahan* or Gerhan)	2003–07	National (priority to non-timber-producing provinces)
2	Special Allocation Fund in Forestry (*Dana Alokasi Khusus kehutanan or DAK Kehutanan)*	2008–present	National
3	1 billion trees planted (*penanaman 1 juta pohon* or 1BTP)	2010–present	National
4	Revenue Sharing from Reforestation Fund (*Dana bagi Hasil dari Dana Reboisasi* or DBH-DR)	2003–present	Specific (timber-producing provinces)

The first central government programme in land and forest rehabilitation was released in 2003. This first programme under the decentralisation approach was named the National Movement in Land and Forest Rehabilitation (*Gerakan Nasional rehabilitasi hutan dan lahan* or Gerhan) for the period 2003–07. Although Gerhan funded the land and forest rehabilitation for all provinces, this is the main programme for reforestation in the non-timber-producing provinces, because they have no specific financial source to fund their land and forest rehabilitation. This programme aimed to enrich HTR plantations in the non-timber-producing provinces, while forest re-planting is the main scheme in timber-producing provinces (data processed from Ministry of Forestry 2008). As this programme ended in 2007, the remaining programmes funded under the 2007 budget were implemented in 2008.

In 2008, the central government declared the DAK to replace Gerhan. The programme aims to restore large number and significant levels the critical land in provinces

especially in government prioritized watersheds to be restored. Three central government institutions, the Ministry of Forestry, the Ministry of Public Works and the Ministry of Agriculture, decide the provinces to be included, as those with the most critical watersheds (Rosalina, 31 October 2012).

In 2010, the central government established 1BTP, which aims to plant one billion trees across all provinces, as part of efforts to fulfil the nation's obligation of 26 per cent carbon emissions reduction, which was signed in 2009 at the Climate Change Summit in Copenhagen (Rosalina, 31 October 2012).

Besides national-scale programmes, land and forest rehabilitation is also performed in specific provinces. Revenue sharing from the DBH-DR (Revenue Sharing from Reforestation Fund, *Dana bagi Hasil dari Dana Reboisasi*) is performed only in timber-producing provinces. The need to guarantee land and forest rehabilitation is leglisated by the use of the DBH-DR in these specific provinces. The RF is collected by issuing timber concessions in natural forest in these provinces. The value of the RF represents 40 per cent of all the RF collected in each of these provinces (Government Regulation 35/2002 Article 10 Clause 1 on the RF). This DR revenue-sharing mechanism demonstrates the elementary intention of the new government to devolve financial support for the effectiveness of land and forest rehabilitation in timber-producing provinces. The larger the number of timber concessions, the larger the DR to be given to restore the forests.

The following section discusses how the local government in the five case study provinces response to the positive fundamental changes in law, regulations, budgets and governance.

7.4. Qualitative data in Factors that Enhance Land and Forest Rehabilitation

This section presents the positive local government reactions to land and forest rehabilitation program in each five provinces. The detail reaction of each actor who contributes to enhance the effectiveness of land and forest rehabilitation is presented to guard the following discussion section.

7.4.1. Province of Kalimantan Timur

The Province of Kalimantan Timur represents the most difficult situation for performing institutional changes for effective land and forest rehabilitation. Resentment over past exploitation of its natural resources for the greater development of Java has greatly enhanced the current policy of exploiting natural resources for local benefit, which increases deforestation. This situation is exacerbated by topography, in that steep hills and mountains, and long, wide rivers camouflage illegal forest conversion activities. These facts are supported by the KPK findings on the number of power misuse reports compiled that showed the Province of Kalimantan Timur as having the highest number of power misuse reports, with 1,234 cases (Wibisono 2010). However, efforts in managing land and forest in this province have begun, using a decentralisation approach. A small number of government officials, communities and private institutions

have started to guard forests and rehabilitate degraded land. The chance of effectiveness is determined by several characteristics, as described below.

The power to decide what is an appropriate use of natural resources and to implement and ensure compliance has been devolved to the executive. The heads of districts, or mayors, and heads of local government institutions have larger and more decisive powers to revoke or issue permits for forest use. For example, these powers resulted in revoking of mining permits by the heads of the local Department of Public Works and the district of Penajam Paser Utara (Arifin & Hasibuan 2013). The revocation of the licence of *Pasir Prima* Coal Indonesia Limited by these two officers was described as a legal tool to force this company to rehabilitate their abandoned mining site and was an effective means to retrieve the land and forest functions.

Consistently low forest re-planting achievements funded under Gerhan in this province are further evidence of inadequate institutional change. This province was only able to perform forest re-planting in two years (2004 and 2006) during the period 2003–08 (Ministry of Forestry 2008). This minimum performance leads to minimum effectiveness of the land and forest rehabilitation in this province.

The minimum effectiveness achieved in the early years of land and forest rehabilitation in this province is likely to affect subsequent programmes. The province was able to meet its minimum obligation to perform forest re-planting and land rehabilitation only during the launching of the DAK programme (Ministry of Forestry 2008). It was able to provide records of its performance to the Ministry of Forestry only during 2008 and 2010 (Ministry of Forestry 2010).

The low performance of this province in 1BTP is further evidence of the minimum effort by local administrators in this province to perform reforestation programmes. Notwithstanding the massive timber logging, mining and palm oil plantations in this province, there were only 93,650,507 trees planted in 2010 and even fewer (53,659,932) in 2011 (Ministry of Forestry 2012). Therefore, it is important that other institutions help officials in this province to increase accountability in land and forest rehabilitation programmes.

Remarkably, the KPK is helping the executive to perform their powers more effectively. The dominance of misuse of power in judicial institutions has been circumvented by the establishment of KPK. This institution has been helping to uphold accountability by making uncompromising legal decisions and tough verdicts on major impact cases, such as those involving governors, heads of central government institutions, national-scale projects and illegal large-scale activities. The conviction of the former governor of the Province of Kalimantan Timur, Suwarna *Abdul Fatah,* on 19 June 2006 by KPK has spread the fear of prosecution for power misuse among local administrators in this province (Laluhu, 25 July 2013). Suwarna was found guilty of issuing timber logging permits that in reality were used for palm oil plantations (Febrida, 22 March 2007). Further, the KPK verdict on Suwarna motivated judicial corruption institutions to restore their function by punishing Suwarna. These institutions were failing in their function before the KPK work was effective in bringing cases to be viewed by these institutions. These efforts have been proven to be an effective tool to balance the authority assigned to local bureaucrats.

The obvious strong accountability of traditional tribes, as the forefront of sustainable management in this province, has been helping the forest conservation effort. The likelihood of participation by traditional tribes is greater for those whose leaders hold a sustainable management philosophy. The presence of strong sustainable leadership is one of the prerequisite aspects to guarantee sustainable management. Traditional tribes have long been preserving the functions of land and forest. Although there was no official government report on sustainable leadership initiatives, several researchers such as Bakker (2010, cited in Warren & McCarthy 2010), Samsoedin & Sukiman (2010) and Walhi (n.d. Pernyataan Oslo) found that leadership initiatives by heads of traditional tribes in sustainable land and forest management leads to a significant decrease in the rate of deforestation in their designated protected areas. These researchers indicate that several sustainable policies exercised by leaders, such as no-tree-cut zones without the permission of the whole membership of the tribe, triple numbers of trees planted for each tree cut and limited water use, have successfully preserved land and forest functions.

The international pressure also comes in form of recognition and funding. Several customary lands and forests that have been acknowledged by local officials as its conservation efforts in protection forests receive funds from international organisations to continue their efforts in preserving the forest. For example, the *Wehea* tribe, who were fighting to preserve their custodial forest, finally received local recognition in form of international funding and acknowledgment. This tribe has consistently conserved 38,000 hectare of forest which in 2007 was acknowledged internationally as *Wehea* protection forest (Djoka 2013). According to Djoka (2013), this effort received the third place for the Schooner prize in 2007 from the Nature Conservancy which

contributed more to their conservation effort as this prize also came with funding to continue their conservation effort. Crevello (2003) found that awareness of the direct impact of land and forest destruction on their livelihood is the main reason for the *Benuaq* traditional tribes in the Province of Kalimantan Timur to continuously practise sustainable forest and land management. By passing their conservation efforts onto future generations, traditional tribes create an ongoing source of people to fight for sustainable land and forest management (Mujayanto 2013). Therefore, accommodating these traditional tribes and customary norms has proven to increase successful sustainable land, water and forest management.

Pressure from international organisations also contributes to efforts to increase sustainable land and forest management initiatives. The international pressure comes because of the forest density in the Province of Kalimantan Timur, which is believed by many researchers to be an important global reservoir for oxygen and water. As the massive degradation in this dense tropical forest province contributes to decreases in rainfall and increases in temperature around the world, international organisations are pushing the local government to decrease carbon emissions. The agreement in 2005 to ratify the 1997 Kyoto Protocol has influenced the increase in internationally funded carbon-reduction programmes in this province and has caused massive international pressure for implementing effective carbon reduction programmes.

To enhance institutional change for improved forest decentralisation in the Province of Kalimantan Timur, non-government organisations (NGOs) play an important role, especially through increasing networking and skills. The effectiveness of these NGOs is influenced by financial and skill resources. The NGOs with direct funding from

international organisations have more bargaining power. These organisations, such as the Center for International Forestry Research, Forest Watch Indonesia and the Indigenous People's Alliance of the Archipelago (*Aliansi Masyarakat Adat Nusantara* or AMAN), which have been equipped with specific skills needed for land and forest rehabilitation, are effectively influencing the reforestation rate. The type of education, monitoring and evaluation, the major activities of these organisations, differs among NGOs. For example, because of the many sustainable indigenous tribes in this province, AMAN has been working on providing education, monitoring and evaluation of land and forest rehabilitation by indigenous tribes. The dissemination of sustainable customary norms leads to better and more comprehensive knowledge of sustainable land and forest management for bureaucrats and communities. The monitoring and evaluation of forest conversions in customary forests leads to decreases in conversions. The whole NGO effort has contributed to the decrease in the deforestation rate.

7.4.2. Province of Sulawesi Selatan

Institutional changes in the Province of Sulawesi Selatan are more adequate for effective land and forest rehabilitation than are those in Kalimantan Timur. The relatively rich natural resources, combined with uncontrolled high demand for agricultural products, greatly enhanced deforestation rather than reforestation. However, the executives, private institutions, the community and NGOs have been creating institutional change to establish effective land and forest rehabilitation in the province. The higher chances of effectiveness are illustrated by several features, as described below.

The executive has been exercising power to perform better public services to enhance community involvement. The policy to prioritise community-owned forests is one example of government institutional action for better land and forest rehabilitation. This province has 223,428 HTRs, which is ~17 per cent of HTRs nationally (Mae 2012). In several districts, such as Bulukumba, Barru and Sidrap, HTR amounts to more than 70 per cent of the total forest (Mae 2012). The awareness of the importance of HTR has motivated several heads of districts, such as those in Mamuju and Bulukumba, to use HTR as a tool to eliminate illegal community logging and increase the welfare of the people (Kabar Makassar 13 November 2013, *Kamboja belajar pengelolaan hutan Bulukumba*). This indicates that local officers perceive the devolution of power in the form of community empowerment as an effective policy for reducing deforestation.

Local power delegation has promoted local bureaucratic initiatives to enhance the effectiveness of service delivery to local people. This power devolution has enabled the executive to use their authority in forestry functions by issuing local regulations in customary forests. For example, in 2003, the Governor of Sulawesi Selatan refused to grant permission to Citra Palu Minerals Limited to continue their mining, which was located in forest parks (Tachrir 2003). The withdrawal of permission from old mining companies is one example of the positive exercise of power by a local bureaucrat to serve the people. Another example is efforts by the head of the province's forestry agency in 2011 to ensure aerial seeding was carried out (*Dinas Kehutanan Kabupaten Enrengkang* 16 January 2012, *Dishut Rencanakan Areal seedling).* This effort is outstanding because it required consideration of a more efficient way of forest rehabilitation in the face of budget constraints. The minimum number of corruption cases in the Province of Sulawesi Selatan's governance shows that it has been

successful in creating leadership for heads of regional governments to practise sustainable leadership.

The consistently high forest re-planting achievements funded under GNRHL in this province also demonstrate the adequacy of the institutional change. This province was able to perform forest re-planting in all years from 2003 to 2008 (Ministry of Forestry 2008). This achievement supports the continuity of reforestation. In subsequent years, the province was able to maintain its adequate performance in reducing deforestation through the DAK *kehutanan* programme. The available data on DAK *kehutanan* shows that the province maintains its submission of reports on the activities performed over three years (Ministry of Forestry 2008–10). Despite the absence of law enforcement on institutions' unreported activities, the province applies transparency in its budgeting report. This detail indicates that the power devolution has driven the accountability of local bureaucrats to their citizens.

The performance of the Province of Sulawesi Selatan in 1BTP indicates that change in institutional policy and culture has been achieved. On the national scale, it was one of the few provinces to plant adequate numbers of trees in 2010 and 2011 (Ministry of Forestry 2012). The increase in trees planted should contribute to the effectiveness of reforestation.

Traditional tribes also engage in performing sustainable management that increases the effectiveness of land and forest rehabilitation. Although there was no official government report on sustainable initiatives in leadership, several anonymous archives show that traditional tribes' sustainable leadership initiatives led to preservation of

customary forest. The well-known traditional tribe, the Kanjo, has been managing the use of land and forest in sustainable ways for generations, where property rights are not an issue (Candra 2012). The exercising of purely customary norms, such as planting one tree for one tree cut and community rice cultivation, has been effective in preserving the 331.7 hectares of limited production forest cover located close to a city (*Suku Konjo, Sulawesi Selatan* <http://kebudayaanindonesia.net>). This effort is a result of an extended battle to protect forest cover from forest conversion to large-scale industrial plantations (Christopel 2013). Therefore, this traditional tribe must continue its customary norms and keep fighting for continuing efforts on sustainable land, water and forest management.

The NGOs also play an important role in strengthening government efforts to increase land and forest rehabilitation. They have been involved in educating citizens on how to form effective plantations and mediating government and community partnerships (Hadijah n.d). They have also helped traditional tribes to restore their rights to their customary forests (*Kemendagri* 20 June 2013, *Bulukumba buat perda untuk pelestarian hutan*). The NGOs work much more effectively when there is government acknowledgement of their role.

Finally, topography and limited good-quality natural resources may also contribute to the increase of reforestation. The domination of infertile land and limited quality timber may also contribute to the minimum levels of deforestation. The low quality of timber may trigger low real-log production, which could also be the reason for higher reforestation in industrial forests. In this province, from 2007 to 2010, the recorded level of planned timber log production was smaller than the expected production (Ministry of

Forestry 2010). For example, in 2008, planned production was 56,284.27 m^3, while real production was 20,945.28 m^3 (Ministry of Forestry 2008). With limited log production, management of forest restoration should be relatively painless.

7.4.3. Province of Jawa Barat

The Province of Jawa Barat is another province that exemplifies inadequate institutional changes in local government that hamper effective land and forest rehabilitation. The local administrators have retained their role in supporting their subordinates but disregard their role in performing better service for their citizens. The culture of prioritising short-term economic benefits for a small number of high-ranking administrators has been greatly enhancing deforestation rather than reforestation. As a result, the majority of people living in this province imitate these policies to exercise rent-seeking behaviour that causes massive deforestation. However, a minority of actors have begun the preservation of forest and rehabilitation of land. These efforts have shown similar institutional changes, to establish effective land and forest rehabilitation, which will be discussed in the following section.

Limited local government policy to focus on land and forest rehabilitation indicates the low level of institutional change in this province. The Province of Jawa Barat was unable to perform its community forest planting in any year during period 2000 to 2006 (Ministry of Forestry 2008). Another example is that in 2005, the province was not able to perform any forest restoration or HTR plantation. This low performance influences the effectiveness of government programmes (Ministry of Forestry 2008). The province also exhibited inadequate performance in reducing deforestation during the DAK

programme. The absence of reports on its DAK-funded activities indicates its minimum efforts to impose institutional changes in the local government.

The adequate performance of this province in 1BTP may increase the effectiveness of the reforestation programme. On the national scale, this province was among those that showed adequate performance in tree planting. In 2010, 83,319,255 trees were planted in this province, although fewer (62,280,027) were planted in 2011 (Ministry of Forestry 2012).

Even though local officials provide little assistance, many traditional tribes in the Province of Jawa Barat have been effectively maintaining sustainable use of their lands and forests. In this province, the majority of efforts of land and forest rehabilitation reported in this study indicate that they are individual- and community-initiated efforts. For example, the efforts of the *Kampung Naga* traditional tribe in exercising their customary rights has been effective in conserving the remaining forest within their designated protected areas (29 November 2011, *Kampung Naga*, <http://disparbud.jabarprov.go.id/> and Kusuma 2013). By making use of their customary norms and living apart from other communities, these indigenous communities have been able to keep the forest intact and preserve the water and land surrounding the forest. Despite their efforts, with the absence of local government assistance, this conservation site is difficult to protect from land use changes. The close location of the forest to the city adds to the community's burden of protecting it from illegal and legal forest conversion.

However, the number of community-owned tree nurseries is reported to be higher than government nurseries. The success of these community nurseries is also reported to be better than that of government nurseries. The community seedling nursery in the Province of Jawa Barat is the dominant seedling provider at the national level (Ministry of Forestry 2010).

Finally, as one of the actors in land and forest rehabilitation, NGOs also take part in increasing the effectiveness of reforestation programmes. They provide the communities with skills for sustainable HTR plantation, from proposing a plantation to marketing skills (Mercado 2007). The NGOs always initiate their involvement by providing knowledge on the economic and non-economic benefits of community involvement in reforestation, to maximise involvement and maintain the continuity of the programme into the future. NGOs also help in providing capacity building that will ensure the sustainability of community forest institutions.

7.4.4. Province of Jawa Tengah

The Province of Jawa Tengah is the province with institutional changes that are the most adequate for effective land and forest rehabilitation. Community-owned forests have been highly enhancing reforestation. Many actors, including traditional villagers, choose to guard the preservation of forest and rehabilitation of land. The following discussion will outline the changes in institutional capacity for effective land and forest rehabilitation in the Province of Jawa Tengah.

The adoption of sustainable management as a result of the transfer of power to local authorities has increased the effectiveness of the reforestation programme. For example, three state-owned companies in forestry (*Perusahaan umum Perhutani* or *Perum Perhutani*) have established programmes that use sustainable management before and after receiving green certification from international organisations. These companies have received certificates from the Smartwood organisation, whose headquarters are in the US. The programmes of these three *Perum Perhutani*, which cover 60,000 hectares in Cepu, Kebonhardjo and Mantingan in the Province of Jawa Tengah, are concerned with all programmes that support land and forest rehabilitation. As a result, the programmes at the local level embrace the same philosophy.

The continuity of reforestation indicates adequate institutional change in this province. The Province of Jawa Tengah was able to plant community forest plantations in any year during period of 2000 to 2006 (Ministry of Forestry 2008). The high rate of reforestation indicates that local administrators have maximised land and forest rehabilitation programmes in this province.

The performance of this province in 1BTP should also increase the effectiveness of the reforestation programme. In the national context, the province ranked fourth highest in number of trees planted between 2010 and 2011 (Ministry of Forestry 2012). At a local level, one of the districts in this province had the best achievement in 2012: with 10,489,285 trees planted in its jurisdiction, the district of *Grobokan* was acknowledged as the best performer in a national competition (Hakim & Khotimah, 27 February 2013). The high number and high success of trees planted in three consecutive years was one

of the achievements that helped this district to receive this reward (Hakim & Khotimah, 27 February 2013).

This province has been able to maintain its adequate performance in reducing deforestation during the DAK programme. It provided records of its performance to the Ministry of Forestry every year from 2008 to 2010, despite absence of law enforcement from the Ministry for any unreported activities. Even though data from the Ministry of Forestry (2010) showed minimum DAK received, the effort to always perform land and forest rehabilitation indicates the change in institutions in this province.

Proper management of small-scale forest plantations increases the effectiveness of land and forest rehabilitation and forest sustainability management. Although there are no official reports on physical supports such as nurseries, seedlings and land ownership, or non-physical supports such as training and education, and financing for small-scale forest plantations, the large number of HTRs indicate the existence of proper management. This community tree plantation provides huge incentives for forest conservation as well as local economic development. The HTRs are developed by local forest-dependent people who are at the front line and feel the direct impact of land and forest destruction.

Power devolution to local bureaucrats has also been successful in motivating community empowerment. According to Nawir, Murniati and Rumboko (2007), the success of land and forest rehabilitation since 1999 in the Province of Jawa Tengah is mainly evident in the community-dependent forest empowerment to develop more effective community-owned forests. This province has the largest number of

community-owned forest HTRs. On average, 41,344.4 hectares of HTR areas from 2004 to 2008 were planted in this province (National Statistics 2010). The institutional changes that have empowered local authorities to help these forest-dependent people to develop a sustainable traditional village approach to increase the effectiveness of land and forest management in the form of HTRs. The empowerment comes in from of combining the impacts of individual learning, community wisdom, NGO education and training, and the government's education, training and financial support (Nawir, Murniati & Rumboko 2007; Setkab, 27 February 2013). This indicates that local officials in the province are focusing on increasing forest cover and at the same time increasing the economic welfare of local people.

High community involvement is the main factor that contributes to higher reforestation in this province. Communities take the development of HTRs seriously. The long engagement with HTR has been promoting their relationship with degraded forest and land and has led to the development and expansion of sustainable HTR plantations (Nawir 2007).

NGOs also play a crucial role in helping local officials and communities to perform effective reforestation. NGOs help communities to master certain skills and knowledge in developing plantations because of the limited access to information on government policy in forest management among villagers around the forests (Wollenberg et al. 2004). The NGOs assist with the spread of information to communities that will increase the likelihood of reforestation success.

The transfer of authorisation has apparently not led to larger forest use change to agriculture. Even though the Province of Sulawesi Selatan has a suitable climate for paddy, cloves, coconuts, pepper, mangoes, hazelnuts, avocadoes, cacao, coffee, cashew nuts and nutmeg, there are no reports of forest conversion into these activities. This suggests that local government is heading in the right direction in combating deforestation.

7.4.5. Province of Bali

The Province of Bali represents a province with the institutional changes required to develop effective land and forest rehabilitation. The tourism industry has been greatly enhancing reforestation. Many actors, including traditional villagers, choose to defend the preservation of forest and rehabilitation of land, due to awareness of their responsibility and accountability, as part of their lives. These actors have shown similar characteristics and efforts in building the required institutional change to establish effective land and forest rehabilitation.

The local bureaucrats in this province have been adequately responsive regarding their obligation to provide better services to their clients. The province was able to perform the required effort to plant community forest plantations in all years as part of GNRHL from 2003 to 2007 (Ministry of Forestry 2008). This province also maintained its adequate performance in reducing deforestation during the DAK *kehutanan* programme. This province is included as one that always reports the use of DAK *kehutanan* received from 2008 to 2010 to the Ministry of Forestry. (Ministry of Forestry 2010).

However, the low performance of this province in 1BTP indicates the minimum institutional change that has been made in this province. On the national scale, the province was among those that planted the lowest number of trees between 2010 and 2011 (Ministry of Forestry 2011).

Traditional tribes offer comprehensive sustainable land and forest management. The *Adat* and *Naga* are two well-known tribes in this province that are successfully exercising sustainable land and forest management. By making use of their customary norms, these two tribes have been able to keep the forest intact and preserve the water and land surrounding the forest.

Community-dependent forest empowerment in the Province of Bali, especially for people in traditional villages, plays a crucial role in conserving forests. Many authors, such as Muliartha (2010) and Masuki (2009), demonstrate that preserving customary norms in customary villages increases land and forest conservation. These researchers showed that traditional institutions have a deep understanding of eco-tourism, and manage their land, water and forests sustainably, using effective tools for sustainable land and forest management. People in traditional villages believe that proper use of this approach creates more economic and conservation benefits. The empowerment of traditional villagers who have developed traditional customary norms, with sustainable management, is effectively increasing land and forest rehabilitation.

Accountability and responsibility are relatively transparent in the province, where the local officials are able to set responsive policies in reducing deforestation, as illustrated by it having the second lowest timber production from 2002 to 2010. Reforestation has

taken place in all forest areas. The highest increase has been in protection areas. The awareness of accountability and responsible governance as part of a tourism package may bring about more transparent and accountable governance. For example, an area of 1,343.5 hectares of mangrove forests in Ngurah Rai Forest Park, Bali, which are believed to be the best mangrove forests in Asia, has attracted many tourists. According to the Head of the Bali Provincial Forestry, *Anak Agung Ngurah Buana,* management at this site is successfully developing and preserving various types of plants that grow fast and dense, making this site a reference for comparative study by foreign experts (http://indosmarin.com, November 2012). Accountability and responsible governance is also represented by its low corruption perception index (Transparency International 2010). This is a strong indicator that local government supports the conservation of forest functions.

The transfer of authorisation has apparently not led to forest use change to agriculture. Even though the Province of Bali has a suitable climate for paddy, cloves, coconuts, pepper, mangoes, hazelnuts, avocadoes, cacao, coffee, cashew nuts and nutmeg, there are no reports of forest conversion into these activities. This suggests that local government is heading in the right direction in combating deforestation.

7.5. Discussion

The dominance of factors that driven an increase in deforestation has greatly hampered efforts to increase land and forest rehabilitation. However, decentralisation since 1999 has established fundamental institutional changes that will influence the future success of this programme.

The current study confirms McCarthy's (2004) proposed theory that decentralisation promotes fundamental institutional change, such as government accountability and transparency, public participation in policy making, and democratisation. However, this is only a beginning. Even though new laws, regulations, budgets, governance and programmes have been fundamentally changed to support the use of decentralisation in sustainable forest management, Agrawal and Ribot (1999) proposed that the appropriate local government responses play an important role in the effectiveness of better service delivery to local citizens. In order to have effective land and forest rehabilitation on a larger scale, local government bureaucrats should lead the change. This study shows that forest conservation actions from local bureaucrats have a more powerful impact on decreasing the deforestation rate. Also, local bureaucrats that utilise their power to support land and forest rehabilitation programmes will increase the effectiveness of these programmes. For example, continuous support from the head of the district of Grobogan, Province of Jawa Tengah, has determined the effectiveness of sustainable 1BTP management in this district. The local administrative support can be seen in the high success rate of trees planted and tree life, which has been secured within the three years from 2010 to 2012 (Hakim and Khotimah, 27 February 2013).

The power checks and balances between government institutions are also imperative to achieve sustainable decentralised forest management (Agrawal & Ribot 1999). This study shows that without the KPK effort in establishing checks and balances in power, the local executive will not be able to strengthen their capacity for performing better land and forest management. For example, the verdict on the previous governor of the

Province of Kalimantan Timur by KPK motivated the re-establishment of judicial corruption institutions.

Community-based forest management and NGOs have been crucial in shaping field implementation of land and forest rehabilitation, but without government assistance these efforts can only produce small-scale impacts. The investigation of five provincial cases reveals that the increase in community-forest-dependent involvement determined the success of land and forest rehabilitation in the early stages of decentralised forest management. Effectiveness increases when local traditional tribes or villages exercising sustainable forest and land management are able to increase their institutional capacity. In timber-producing provinces, the increase in institutional capacity is strongly shown by funding and acknowledgement received from international institutions. In the non-timber-producing provinces, the empowered communities in HTR management and sustainable traditional villages determine the effectiveness. The well-established existence of the accountability of heads of traditional tribes or of modern community organisations to their community members has confirmed the role of accountability in determining the success of decentralised forestry, as proposed by Agrawal and Ribot (1999). Acknowledgement from government institutions can increase the effectiveness by granting distinct property rights to customary land.

In all provinces, the effectiveness of sustainability in customary land and forests has been crucial in conservation efforts and is greater than modern community-based forest management, such as HTR. The traditional institutions were initiated by indigenous people and handed down for generations. The modern institutions have just learnt to develop a similar structure that prioritises land and forest conservation. Therefore, it is

imperative that the longer the institutions implement a certain philosophy, the higher their implementation success will be.

Further, pressure and funding from international institutions will only work efficiently and effectively if government administrators implement sustainable forest policy. Rapid loss of forest density in the timber-producing provinces is crucially contributing to global warming. Therefore, international organisations and developed countries agree to direct policy and to finance aid on sustainable development in these provinces. The pressure for effectiveness in internationally funded programmes has influenced the increase of such sustainable programmes.

7.6. Summary

At the local level, the transfer of decision making to local people has an important contribution in forming effective decentralised forest management. In the early stages, representation and accountability are critical to enhance the devolved powers that are to serve local needs efficiently and equitably. Analysing five case studies, this research concludes that the presumed benefits of early decentralisation are not available to all local populations. The prerequisite for effective and sustainable forestry is having local actors who are empowered and are downwardly accountable, but are not always present. Actors, powers and accountability emerge as the essential elements of a framework that can improve the effectiveness of decentralisation. However, in the absence of power and fiscal delegation, citizens and local bureaucratic empowerment will not result in an effective forestry programme.

Decentralisation has been driving institutional change. Community empowerment has been crucial as an aspect in expediting the effectiveness of the decentralisation of forest management. Institutional change in local government official perception over power to serve people also determines the effectiveness in reforestation programme. It is important to further the application of good decentralization mechanism to prosper the future of land and forest rehabilitation. Drastic change to an established corrupt system should not be expected. As the analysis of incentive factors to increase reforestation is presented, the next chapter will present the conclusion and finding.

Chapter 8: Conclusions and Findings

8.1. Introduction

This thesis has investigated the use of FE in reducing deforestation rate in the early stages of the decentralisation era. The research also examines how authority has been transferred from central to local government. This study enriches current understanding of the driving forces of deforestation and of how to evaluate the effectiveness of government expenditure on land and forest rehabilitation. Given the importance of the role of rainforests in controlling global climate increases, it is important to have proper PE.

In response to massive deforestation, Indonesia's government has allocated a huge amount of money in the form of FE to local governments. This renewed FE only began in 1998, when a large flow of FE to local government was allocated annually under the new decentralisation process that replaced 32 years of centralisation. Despite decentralisation, Indonesia has remained heavily dependent on forest industries. Therefore, this study has evaluated how the country has managed its forests via decentralisation and a sustainable approach.

8.2. Limitations of the Current Study

As this study focuses on analysing government forestry programmes in reducing deforestation, a number of caveats must be noted regarding the present study. The most

crucial limitation is that the objective of the study is limited to one outcome of the programme, which is deforestation rate. Increases in local economic welfare, another Indonesian's government forestry programme outcome, are not analysed. Also, the original model proposed by Geist and Lambin (2002) has had to be adjusted relative to the available data used in the output of the forestry programme, which are the driving forces of deforestation.

The absence of valid forestry output metrics inhibits research in this area. The government has failed to record all activities and expenses in comprehensive records. Certain activities are recorded at the provincial level in only some years and records can be insufficient or too premature to be analysed. Local government does not record all activities performed. As a result, when merging data from all provinces for all activities, much data are reported as zero because no activities have been recorded. Therefore, adjustments are shaped by the availability and characteristics of secondary data. The level of quantitative secondary data even further limits the analysis. The secondary data outlines time frames in the qualitative and quantitative data.

This quantitative study is limited to four years (2007–10) only. Originally, the dominance of quantitative data with 11-year (2000–10) time frame was proposed for the study. However, incomplete data available from 2000 to 2002 precluded the extended analysis. Further, the different budget styles in 2003 and 2007 prohibited comparative analysis. Analysis beyond 2010 is also not possible, because forest cover for that year is the most recently available: (land and forest cover data are provided every four years, starting in 2000). Comparative and comprehensive data at a provincial level are only available from 2007 to 2010.

Additionally, the quantitative portion of this study includes only 30 of the 33 provinces, because complete data on forest cover is unavailable for the other three provinces, which were only recently created. For the new three provinces, data were used provinces that existed prior to creation of the new provinces. With limited data available, two regressions were carried out: all provinces and the 22 timber-producing provinces.

The qualitative analysis in this study also has several limitations. The case study is limited to five of 30 provinces, and absence of information for districts and cities prevents a detailed level of analysis. The time span of this case study is limited to 15 years (1999–2013) and only includes the decentralisation era. The case studies are presented at the provincial level using only secondary data (i.e. media, NGO and government reports).

Since the sample covers only the provincial level, the results can only be interpreted in the context of a similar level of governance. Ideally, analysis should be performed at the district and city levels, where funds are spent for forest and land rehabilitation. The broad scope offered by the provincial level may fail to capture details and comprehensive explanations for districts and cities. Information at the provincial level may also undermine factors of enhancement and de-motivation of reforestation in districts and cities.

As minimal data exist, this research was framed using both quantitative and qualitative methods, but predominantly the latter. The qualitative method gives a comprehensive explanation of how government policy influences reforestation.

For the quantitative data, this study uses regressions to investigate the impact of FE on reforestation in two types of provinces. The timber-producing provinces are determined by central government to be able to issue logging concessions in natural forest within their legal areas. In contrast, the non-timber-producing provinces have no right to issue logging concessions in their natural forest. The timber-producing provinces are required to use the levy from natural timber concessions, the DR, to finance land and forest rehabilitation in all provinces. Timber-producing provinces receive 40 per cent of the national DR funds to finance land and forest rehabilitation in their areas. The other 60 per cent is used to finance land and forest rehabilitation in all provinces, but with priority given to non-timber-producing provinces.

Due to different data being available, the quantitative and qualitative approaches have different time frames. Quantitative data are for the period 2007–10: 2007 was selected due to changes in budget reporting with regard to the FE and 2010 was selected due to the recent available data on forest cover. This study used linear regressions for four years of data from 2007 to 2010 at the provincial level.

Despite these limitations, this study provides useful information for researchers, particularly in new institutional economics and public choices on how forest decentralisation works with limited people skills, accountability and representation, and unlimited conflict of interest.

8.3. Findings on Forestry Expenditure and Deforestation

8.3.1. Is Forestry Expenditure (FE) Reducing Deforestation?

Thirty provinces were selected to study the relationship between FE and all other factors driving reforestation, with reforestation consistent with those factors put forward by Geist and Lambin (2002). The variables were chosen in relation to the availability of relevant data in Indonesia. Contrary to expectation, the regression analysis revealed a significant negative relationship between FE and reduction in forest cover; in other words, an increase in FE was associated with a significant increase in deforestation rate. Population density and population growth showed as the other negative factor that can increase deforestation. The imbalance of population density and population growth between provinces could contribute to this negative result. Data input errors, especially for forest cover data, may be responsible for these findings, which conflict with the literature. There is massive population density and growth, and a small amount of forest cover in non-timber-producing provinces compared to the timber-producing provinces. This may alter the result of the analysis as population density is shown to contribute to an increase in reforestation in timber-producing provinces only that have low population density and massive forest cover. The province with higher population density among these provinces have low transmigration developments in forest areas and stable forest use changes for agriculture, which may explain the low deforestation rate associated with high population density.

In order to develop a more comprehensive explanation, another regression was performed on the 22 timber-producing provinces alone, using the adjusted variables proposed by Geist and Lambin (2002). This regression was performed because these provinces have higher FE and massive deforestation rates. This analysis resulted in only a slight difference in the level of significance compared with the previous regression. The FE still shows a negative effect on the change in forest cover, but this is no longer significant. The absence of the effectiveness of FE in reducing deforestation triggered the researcher to search for further explanation via a qualitative approach, to examine the factors that might be enhancing or limiting the effort to reduce deforestation rate.

The first finding of this study from the linear regression indicates that FE may increase the deforestation rate. This result may be caused by the allocation mechanism of government spending in forestry. The logging control mechanism, which works by imposing a fee to be used for land and forest rehabilitation, seems to fail. This finding indicates that a larger forest expenditure proportion leads to higher deforestation.

8.3.2. Factors leading towards deforestation

With respect to the qualitative analysis, a different time frame was used to provide a better understanding on what is causing the ineffectiveness of FE. The years 1998 to 2013 were selected as the time frame to capture the decentralisation process since the beginning of its establishment in 1998, until 2013, when this thesis was written. Five provinces were selected, via a three-stage process, from among all the provinces in Indonesia, to investigate trends in reforestation. The selection process considered the types of provinces that could provide data for comprehensive analysis.

The first step was to select the most important variables cited in the literature. Based on the quantitative results, population, forest cover and agricultural output were selected as the criteria for case selection. These criteria are based on the belief that population and agriculture dominate among the driving forces of deforestation (Angelsen 1999; Barbier 2004; Carr 2005; Defries et al. 2010; Kobayashi 2001; Tha & Bawa 2006; Tomich et al. 2001; Wright 2006). Forest cover was selected as an additional criterion due to timber logging being cited in the literature as a primary direct cause of deforestation (Burgess et al. 2012; Kobayashi 2001; Yossi, Keenan & Fox 2011). Based on population, forest cover and agricultural criteria, provinces were ranked, which resulted in the selection of two timber-producing provinces (Kalimantan Timur and Sulawesi Selatan) and one non-timber-producing province (Jawa Barat) to study. The Province of Kalimantan Timur represents low population density, low agricultural output and high forest cover. The Province of Sulawesi Selatan represents medium population density, medium agricultural output and medium forest cover. The Province of Jawa Barat represents high population density, high agricultural output and medium forest cover.

The second step was included to avoid the possibility of bias. The Province of Bali reflected the lowest poverty level and highest infrastructure output. These criteria were based on studies that support the importance of economic development in decreasing deforestation (Kuznet 1955) and of infrastructure development in increasing reforestation (Coffin 2007; Wilkie et al. 2000).

Finally, the Province of Jawa Tengah was included as a case study. This province contains the largest community-owned forest in Indonesia and was chosen because

community involvement determines the effectiveness of forest rehabilitation in the decentralisation process (Kellert et al. 2000).

Qualitative analysis provides an explanation for why FE was ineffective in reducing deforestation. The findings are as follows:

1. Decentralization drives maladministration. The local administrators and powered (rich) local people perceived the new power to exploit the natural resource within their legal border. Although, no strong evidence on who get the most benefits from the use of natural resources, there is tendency that the powerless or poor people get the least benefits.
2. Forest and land conservation is not an essential concern in government policy, especially at the local level. The rapid increase in number of permits issued indicates that decentralisation gives increased authorisation to large numbers of local officials, which leads to massive deforestation Short-term economic development is more attractive than long-term benefit. This short-term view triggers the issue of more timber and mining concessions by central and local government. Issuing IPK, IIUPHH and non-timber concessions are believed by local government as their rights (not requiring central government approval). Therefore, this trend is rapidly increasing because it becomes a source of local revenue. Concessions are also given for large-scale and small-scale mining, timber, palm oil plantations and transmigration in timber-producing provinces, and are causing deforestation. This fact is common to the provinces rich in natural resources and with large forest cover, where massive degradation is caused by converting forests into non-forest areas. In non-timber-producing provinces, government policy drives an increase in deforestation rate by

allowing forest conversions into large- and small scale plantations, and industrial and tourism areas. Local authorities do not consider the devastation resulting from massive and rapid forest conversions.

3. This condition is exacerbated by an absence of checks and balances to power. The large number of permits being given in protection forest areas where no open mining and only selected and limited timber logging are permitted, indicates an absence of checks and balances to power. Small-scale concessions usually increase when local elections are about to be held. The election candidates, typically government officials, issue more concessions. In timber-producing provinces, checks and balances are more difficult because higher profits from coal mining and cheaper levies from timber logging concessions cause intense issuing of logging permits. Selected timber concessions can be used to conceal coal mining and palm oil plantations. The timber on the surface is logged and then coal is extracted. The condition is exacerbated with the fact that logging permits have been issued by officials who are not qualified to issue permits, such as the governor of the Province of Kalimantan Timur.
4. The high price of palm oil also adds to the difficult decision to conserve current forests. The conversion into palm oil plantations has not only happened in timber-production provinces where land is still largely available: in non-timber-production provinces, some of the remaining protection forests have been converted into palm oil plantations. In addition, old and unproductive tea and rubber plantations have been increasingly converted into palm oil plantations. The negative impact of this conversion is due to the roots of the oil palm trees having a less supportive function to prevent soil erosion, compared to rubber and tea trees. This characteristic leads to landslides in many areas, including in the

surrounding forest, adding to the difficulty of effective reforestation in these areas.

5. The absence of checks and balances is also evident in the uncontrolled use of fire. The uncontrolled use of fire as a plantation land clearing method is an increasing trend that causes severe impacts on forest cover loss and the reforestation rate. Peat swamps are characterised by soil that is easy to ignite, creating big fires and dense smoke. The massive fires cause forest cover loss and prolong the dry season. The long dry season leads to water scarcity to water young forest plantations or for young forest regeneration.
6. Both central and local governments have chosen to prioritise political matters over forest conservation. A policy in special transmigration has strong support from several government institutions, including the Department of Defence and the Ministry of Internal Affairs. Transmigration across the whole country is believed to be an effective tool for protecting the borders from annexation by other countries. The government prefers to have transmigration near the borders as a means of protecting their political agenda and disregards the impact of transmigration in border areas on the increase in deforestation.
7. The deforestation is also influenced by political preferences: central and local government choose to preserve their power rather than provide better services to citizens. The nature of government mapping areas creates ambiguity in forest protection. The central government determines forest areas without cross-checking with on-ground conditions. Conflicts arise between communities living in long-established settlement areas and local government that supports resettlement. Local governments are still issuing certificates of settlement regardless of forest area. Therefore, deforestation is increasing. Conflict also

comes to pass with traditional tribes who have long been practising forest protection in forest areas identified by the government as industrial.

8. In the presence of wide and long rivers, the reforestation effort is more difficult to perform. In timber-producing provinces, such rivers have been used as an effects means of transporting timber and mining products extracted nearby. In addition, much deforestation has taken place in remote areas, which increases the difficulty of monitoring forest conversions. Therefore, whenever government does not perform strong law enforcement, wide and long rivers, distance from cities and limited infrastructure increase the possibility of deforestation.
9. The absence of population control policies also intensifies difficulties in performing reforestation efforts. The government has chosen to extend massive settlements and industrial and tourism areas, which are very obvious in non-timber-producing provinces, to serve dense populations. The policy is exacerbated in provinces that function as a support region for a densely populated region. For example, the proximity of the Province of Jawa Barat to the metropolitan city DKI Jakarta has caused this province to bear the burdens associated with being a settlement provider. With limited land available, these settlement areas convert some forest areas into settlements. The need for roads to support industry and tourism has frequently enhanced deforestation because roads are established in forest areas. The construction of roads that convert long-established inner-city-forest plantations (in non-timber-producing provinces) and natural forests also decreases the reforestation rate.

8.3.3. Factors that Enhance Land and Forest Rehabilitation

Besides factors that enhance deforestation and decrease effectiveness of reforestation programme, there are some factors that enhance reforestation. Those factors are as follow:

1. Frequent natural disasters have put pressure on local officials to adopt more sustainable policies. Massive human-caused natural disasters, which take place especially in provinces with massive deforestation, call for an immediate response to reduce their impact.
2. Decentralisation drives the establishment of new laws, regulations, budgets and programmes that assure accountability is performed. Laws and regulations in forestry need to adopt sustainable management (e.g. no mining concessions allowed in protection and conservation forests). Forestry Law 41/1999, as the fundamental regulation, adopted the management of forests to sustain their functions as well as community forest economic development. This law acknowledges the importance of forest contributions to economic development, which can be performed by wise forest extraction.
3. These changes led to more fundamental change in institutions that provide services to local people. Power, finance and administration have been transferred to local administrators and people.
4. Decentralisation also gives people the power to force more forest protection in current government policies. Local people, especially those who live near forests, are in a position to be involved in decision making. As a result, many who directly experience the impact of reforestation are actively involved in more sustainable approaches to forest management of community-owned forests. The

effectiveness of land and forest rehabilitation in non-timber-producing provinces has been increased by the existence of long-established local wisdom in traditional and modern villages. The same could be said for local wisdom in traditional tribes, as the leading actors in land and forest rehabilitation in timber-producing provinces. This local wisdom has been able to strictly restrain the overuse of forest products, water and land.

5. The presence of eco-tourism indirectly affects sustainable land and forest development. The effective management of this industry requires sustaining forest functions to attract non-human-made tourism. The awareness of future trends in this kind of tourism has been shaping the development of sustainable management of forests.
6. Efforts in reforestation are supported by international institutions, which place both indirect and direct pressure on governments to perform sustainable forest management. The developed countries and international organisations who fund sustainable programmes in local government areas demand reports that show effective results from the programmes. Anti-palm oil campaigns initiated against this industry use the palm oil products of Indonesia and Malaysia (as the first and largest palm oil producers) to increase awareness within Indonesia's government of the need to manage palm oil plantation development in a sustainable way. These campaigns deliver a message that if palm oil plantation development is not managed sustainably, there will be no companies to buy this product (Jowit 2007).
7. International aid for land and forest conservation creates pressure that works faster than central government aid and programmes. For example, international

experience and networks have been able to shape carbon emission reduction in Kalimantan.

8. NGOs also actively take part in the effort to increase reforestation. Aid and pressure from NGOs enhances land and forest conservation efforts. These NGOs have more flexibility and skill than governments in identifying useful education methods and material that can be presented to enhance community awareness of sustainable land and forest management.

8.3.4. Underlying Patterns in Quantitative and Qualitative Data

This study suggests that, in general, multiple factors drive increases in deforestation. Based on the quantitative and qualitative results, the underlying reasons for the negative correlation between FE and reforestation include the following:

1. The results from the quantitative analysis reveal that deforestation took place despite the increase in allocated FE. However, there was a slight decrease in the significance of the effect of increase in FE on increase in reforestation when multiple factors—such as population, GDP, forestry output, revenue proportion to FE and agricultural output—were added to the regressions. The limited availability of data in 30 provinces could contribute to such limited significance.
2. The current local governments have restrained policies the use natural resources outside their local boundaries. The previous government extracted almost all natural resources for the benefit of several people with close relationships to the president and infrastructural development for their businesses. The regions from which natural resources were extracted did not receive any benefit from these

resources. Therefore, decentralisation is perceived as an opportunity to create benefits for local people, which often leads to massive misadministration.

3. Loopholes in laws and regulations leverage opportunities for misadministration. For example, Forestry Law 41/1999 allows extraction of timber from natural forests within specific locations or regions in these provinces with approval from the central government in the form of industrial forest areas. The recent transfer of authority to local government provides a chance to use this industrial forest area at the maximum level. Maximum use (i.e. logging regardless of re-planting obligations and log diameter) leads to more destruction of forests.
4. Institutional change is incorrectly perceived. Local governments perceive that they have more authority, but refuse to acknowledge that they have more obligations to perform in their areas. In all provinces, local governments may issue small-scale timber concessions, such as timber forest utilisation business concession permits (IIUPHH) and PSDH. Local governments usually give permission regardless of location in forest areas, to increase local revenue. This issuance creates more forest logging, which causes deforestation. Therefore, external (international) pressure on land and forest conservation, without proper money and mechanisms allocated, has only a small impact on decreasing deforestation.
5. Uncontrolled transfer of power to local authorities reduces political willingness to preserve the forest. In timber-producing provinces, several concessions in mining and transmigration areas, with no regard for forest areas (which are issued by the central government, that is, the Ministry of Natural Resources and Energy and the Ministry of Labour and Transmigration) have worsened the deforestation rate in timber-producing provinces. The central government is

allowed by law to issue transmigration concessions where transmigration areas are designated in protection or conservation forests.

6. The demand to provide settlement for transmigrants in densely populated provinces has exacerbated the development of uncontrolled transmigration areas. In timber-producing provinces, palm oil plantation development is a leading factor driving transmigration programmes. Many large palm oil companies are involved directly in financing transmigration development. The economic benefits from forest conversion into palm oil plantations trigger more deforestation. Palm oil plantation development indirectly drives deforestation because these plantations convert many old tea and rubber plantations, which formed dense vegetation cover and required less water, in non-timber-producing provinces. This conversion causes landslides because the young oil palms cannot support the soil against erosion. The forest surrounding the plantations is degraded as a result of resulting landslides.
7. Poverty of local forest-dependent people creates a source of cheap labour for illegal logging and mining. Without the strong law enforcement and adequate jobs for the poor and local-forest-dependent people the low wage and high-risk (illegal) logging and mining work will always attractive to poor people which in turn increases deforestation.

Further, the overall factors that tend to generate deforestation are supported by unchanged governance mechanisms. The 52 years of centralised and poorly administered government have been preserved by the current government. The sudden change to decentralisation is not well supported by changes to the current institutional culture and policies.

8.4. Implications for Theory

Many studies have revisited this issue because the fact that forests fail to be self-regenerating has motivated the development of various types of restoration programmes (Putz et al. 2001). Many institutions have focused on monitoring and evaluating the uses of money for forest conservation (Ferraro & Pattanayak 2006). Some evaluations focus on improvements in programme design (Harrison 2004) and wider environmental aspects (Harrison & Harrison 2004), even though a particular programme might not necessarily consider these as explicit goals. Many other evaluations focus on the indirect financial incentives method of payment, because many researchers believe that this method positively affects outcomes and institutional capacity as leverage to increase effectiveness, although Ferraro (2002) provided strong evidence that direct payment significantly increases the area of conservation.

Despite the growing literature, information on how effectively the Indonesian government spends its money to reduce the level of deforestation is still lacking. Some studies, such as Arnold (2008), Burgess et al. (2012), Casson and Obidzinski (2002) and Tomich et al. (2001), described deforestation as being associated with the exclusive characteristics of Indonesia, but did not evaluate all the factors that influence deforestation.

This study confirms the value of forestry PE, which is now used extensively due to awareness of the extent of depletion of forest resources and pressure from donors—both of which affect the implementation of many government programmes in forestry

(Ferraro & Pattanayak 2006). In Indonesia, the government acknowledges its obligation to reduce deforestation, partly because it has received international pressure to do so.

This study contributes to PE in forestry. Forestry expenditure and forestry cover are introduced as input. Driving forces of deforestation are use as output of this study Deforestation and reforestation rate are proposed as outcome of study. This study proposed more appropriate covariates of forestry PE because restoration alone is becoming difficult to measure for the variety of reasons, such as social and economic conditions, that determine its effectiveness.

The driving factors of reforestation have been extensively used as covariate factors in assessing forestry programme effectiveness (Allen & Barnes 1985; Angelsen 1999; Burns et al. 1994; Defries 2010; Geist & Lambin 2002; Pfuff 1999). According to this model, agricultural expansion combined with other factors such as demography, infrastructure expansion, wood extraction, economic structure and technological, policy, institutional, cultural and other factors have a combined effect stronger than any single cause considered in isolation. This study validates findings on agriculture expansion as a major cause in deforestation, but this single cause alone could not be responsible for all deforestation. The study of the driving factors of reforestation could enrich understanding of the factors that cause the effectiveness or ineffectiveness of government programmes.

This study adds to previous studies done by Arnold (2008), Burgess et al. (2012), Casson and Obidzinski (2002) and Kobayashi (2001), which described government-made causes of deforestation associated with timber logging. The government has

considered population pressure as a legal reason to prioritise uncontrolled forest or land use change. This study uncovered some early evidence of the absence of institutional policy and culture, which chooses not to control the demographic factors (including natural increment, migration, population growth and population density), economic factors and technological factors that expand agriculture policy and bring benefits to local administrators. Policy that uses population as a basis for agricultural expansion is demonstrated by over-issued land use permits for large-scale paddy and palm oil plantations, and transmigrations. Uncontrolled settlement development strengthens the evidence that agricultural policy causes deforestation by prioritising serving the population rather than controlling it.

The dominant use of wood for industrial purposes has shown that policy in economic wood extraction is also designed to serve the demand of the population for industrial wood. The dominance and over-issuing of large-scale mining and timber logging permits has been demonstrated by the nonexistence of institutional and cultural change that results in massive deforestation. Similar to wood extraction, infrastructure development is also addressed to support industrial development that serves the demand of the population for jobs. The roads, settlements and mining exploration aim to support short-term industrial growth that brings benefits to only a small number of people. Finally, the policy on wood extraction also illustrates the unchanged institutional culture of local administrators. The over-issuing of timber logging permits that only bring major benefits to local administrators is still happening during this early stage.

Since representation and accountability are critical to forming devolved powers, which are to serve local needs efficiently and equitably, this study has drawn explanations

from five case studies. Analysis of the five case studies revealed that the presumed benefits of early decentralisation are not available to all local populations. The prerequisite of empowered local actors who are downwardly accountable is generally not yet available. However, actors, powers and accountability emerge as essential elements of a framework that can improve the effectiveness of decentralisation.

8.5. Implications for Policy

In regard to the reforestation rate, government policy plays a central role in shaping its increase or decrease (Binswanger 1991; Deacon 1994; Deacon 2004). This study corroborates Binswanger's (1991) findings on government policy that shapes reforestation: general tax policies and the rules of land allocation in Indonesia clearly contribute to the increase in reforestation. For example, the government set up the DR in the form of a levy to finance land and forest rehabilitation, but at the same time allowed smaller scale levies on forest use to finance non-forestry purposes. Another example is weak law enforcement in land allocation in Indonesia. This improper law enforcement encourages applications for short-term economic benefit. Many local governments are still able to issue certificates for mining, logging, plantation, settlement or transmigration in forest areas without any sanctions being given. Permissions to establish transmigration areas in forest areas are frequently given by central and local governments. The current government grants old open-mining operations in the forest areas that are clearly prohibited by the new laws. Government policies that prioritise economic benefit over law enforcement clearly determine massive deforestation.

In addition, this study demonstrates that government policies to subsidise forest conversion activities result in deforestation. The Indonesian government gave subsidies for industrial palm oil plantation development. The government may also increase the deforestation rate by imposing loose forest tax and royalty systems. For example, lower restrictions on small-scale timber concessions to pay IIUPH and PSDH create devastating effects on forests.

Good government policy is supported by proper institutions, local community involvement and smaller community plantations. These will increase the effectiveness of government restoration programmes. Brenchin (1997) found that government effectiveness in restoration programmes increases with the use of NGOs to facilitate planting. Moreover, effectiveness increases when governments pay local people to guard reforestation activities (Mukherjee 1997). This study supports Rudel et al. (2005) in finding that government initiatives to involve more small community plantations increase forestry programme effectiveness.

More incentives to implement sustainable government policies will increase the effectiveness of government restoration programmes. Overall, the government has the legal right to determine what policies may work to control population density, infrastructure extension, economic structures, wood extraction, technological uses, agricultural expansion, and individual and institutional policies that will determine the decrease in deforestation.

8.6. Significance of the Findings and Research Contribution

Although the current study is based on a small sample of provinces, the findings suggest that FE in the early stage of the decentralisation mechanism is not significant in reducing deforestation. These findings are framed by the different socio-economic and land characteristics that contribute to a comprehensive analysis.

This work contributes to the existing knowledge of government forestry PE by providing evidence of the significant role of government policy to influence reforestation. The research explains the factors that characterise forest management in the early stages of decentralisation and how these drive a decrease in the reforestation effort. The framework of the study is an analysis of changes in rates of forest cover in Indonesia and their association with FE spent by local governments, and other factors that directly and indirectly contribute to the effectiveness of FE. The study depicts fundamental changes in laws, regulations and budgets to accelerate sustainable management in the first 15 years of the decentralisation framework. The changes are not backed up by the readiness of the whole of the institutions and culture of government, business and individuals.

The current institutional policy and culture are characterised by insubordination against most of the laws and regulations made by central government. Awareness of its devastating impacts no longer restricts people from carrying out deforestation. This bitterness is formed by long-term unfair economic distribution to the local people who live and reside in the natural forests. In the past, forest extraction paid massive returns only to people with close relationships to former President Soeharto and the regions in

Java where this president lived, such as DKI Jakarta and its surrounding areas. Current local administrators often choose to grant unsustainable land use change through uncontrolled logging, mining and plantation development regardless of laws and regulations around sustainable land use. The majority of individuals in a government position, who have gained more authority in the decentralisation era, pay no attention to their role in improving public services, and promote forest conversions to non-forest uses.

The government has been increasing unsustainable transmigration programmes, palm oil plantation developments, mining, and timber logging. In addition, there is no policy on controlling population density, infrastructure extension, rural and urban poverty gaps, GDP, technological uses, land use allocations, lack of concern about forests and rent-seeking domination of the individual and public culture, and there is a climate of corruption and an absence of land titles. Even though several new laws and regulations have been equipped with sustainable management of forestry approaches—including written sanctions and mechanisms of forest use—the current government has failed to establish strong laws.

8.7. Recommendations for Further Research

These findings provide insights for future research. District and city levels of analysis for quantitative data analysis, with a longer time span and pre- and post-measurement will result in a well-organised analysis. In the absence of quantitative data, which is typical in the Indonesian context, interview data collection for qualitative analysis at a combined district, city and province level should also be considered. Moreover, deep

investigation of laws and regulations should enrich the information collected from secondary sources.

Adaptive governance of social–ecological systems is highly recommended as a framework for a further study. The domination of conflict of benefits creates abrupt changes or crises that prevent effective programme performance. A key person in adaptive governance should provide effective mediation between individuals, institutions, agencies and multiple organisational levels.

Process evaluation is important to address the effectiveness of restoration programmes. The restoration programme is the heart of the forestry programme because forests cannot be self-regenerating, which has motivated the development of various types of restoration programmes (Putz et al. 2001).

8.8. Summary

The research reveals what aspects characterise forest management in the early stage of the decentralisation era in Indonesia, in shaping a decrease in reforestation efforts. The framework of the study is to analyse changes in rates of forest cover in Indonesia and their association with FE by local governments and other factors that directly and indirectly contribute to its effectiveness.

The qualitative study shows that concentrated transmigration programmes, palm oil plantation developments, mining and timber logging, combined with low population density, low infrastructure extension, a high rural and urban poverty gap, low GDP, low

technological use and the short-term economic benefits of individuals, culture and government programmes are causing such provinces to have higher deforestation rates than their counterpart provinces. In timber-producing provinces, the richer natural resources are associated with higher deforestation.

On the other hand, densely populated areas combined with intense manufacturing development and high community wood extraction, tree plantation expansion, paddy plantation expansion, and forest fragmentation, along with short-term economic benefits for individuals, culture and government programmes are responsible for the deforestation rates of non-timber-producing provinces. The higher industrial development has resulted in higher deforestation in non-timber-producing provinces.

Overall, this study demonstrates that in all provinces, the richer the provinces are in natural resources (including soil fertility) the higher the deforestation rate when there is a very short-term economic mindset of officials and individuals. The government creates a larger scale of deforestation by imposing only weak law enforcement on land titles or land use.

Among factors that increase the effectiveness of reforestation programmes, the destruction of public facilities caused by natural disasters and the deforestation effect on global warming is leading to national and international pressure to have proper land and forest management. However, the main actors in sustainable management are still limited to community institutions, with help from NGOs. In timber-producing provinces, the traditional tribes are the sustainable management keepers; while in non-timber-producing provinces, community villages perform land and forest rehabilitation.

Deforestation is more likely to increase because government officials usually take the opposite direction to community institutions in sustaining the functions of forests.

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