THE UNIVERSITY OF QUEENSLAND

AUSTRALIA

Reconciling Conservation and Development: The Case of Coffee Producers in Bukit Barisan Selatan National Park, Indonesia

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A thesis submitted for the degree of Doctor of Philosophy at

The University of Queensland in 2018

School of Agriculture and Food Sciences

Abstract

Agricultural land use on the fringe of protected areas has significant impacts on the conservation of wildlife and biodiversity in the core zone. The Bukit Barisan Selatan National Park (BBSNP) in Lampung Province, Indonesia, is a UNESCO World Heritage Site, providing habitat to endangered Sumatran tigers, rhinoceroses, and elephants. The government, conservation NGOs, and the private sector have tried to support the development of villages that border the Park, while increasing control over access to land and natural resources inside the Park. A major concern is that sections of the Park are occupied by thousands of squatters, mainly producing coffee for the international market. The purpose of this research was to explore the feasibility of a reward mechanism for farmers bordering the Park (namely, coffee certification) and to compare this with more conventional coercive measures such as fines and evictions. The research was conducted at multiple scales, from the household to the village and landscape levels. A case-study approach was used with two main cases: (1) coffee certification in West Lampung District and (2) enforcement of exclusion from Park resources in various districts. The research methods included document reviews, observation of farming systems, a livelihood survey of around 700 villagers in 20 villages near the Park boundary, and key informant interviews with village and district officials and Park management. Data were collected in two stages: an initial period of fieldwork in 2008-2010 and a follow-up visit in September 2014. Both qualitative and quantitative analyses were undertaken. Key findings were: (1) despite some positive economic and social impact, coffee certification did not appear to be preventing Park encroachment; (2) enforcement was not implemented uniformly through the Park but targeted in specific zones, and the frequency and intensity of enforcement were not significant predictors of illegal land use; (3) enforcement was more effective when there were established local institutions and support was given by local leaders, but less effective when population pressure on the land was high and encroachment was backed by local elites who did not support Park protection. Policy makers need to find ways to integrate incentives with enforcement as these two are not alternatives but both are needed as minimal requirements.

Declaration by author

This thesis is composed of my original work, and contains no material previously published or written by another person except where due reference has been made in the text. I have clearly stated the contribution by others to jointly-authored works that I have included in my thesis.

I have clearly stated the contribution of others to my thesis as a whole, including statistical assistance, survey design, data analysis, significant technical procedures, professional editorial advice, financial support and any other original research work used or reported in my thesis. The content of my thesis is the result of work I have carried out since the commencement of my higher degree by research candidature and does not include a substantial part of work that has been submitted to qualify for the award of any other degree or diploma in any university or other tertiary institution. I have clearly stated which parts of my thesis, if any, have been submitted to qualify for another award.

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Publications included in this thesis

No publications included.

Submitted manuscripts included in this thesis

No manuscripts submitted for publication.

Other publications during candidature

Fitriana, Y.R., Cai, H., & Levang, P. (2009). Contribution of illegal coffee plantations to household economies: A case study in the Bukit Barisan Selatan National Park, Indonesia. Poster presented on "Diversitas OSC2 (Biodiversity and society: Understanding connections adapting to change)", Cape Town, South Africa, 15-16 October, 2009.

Fitriana, Y.R., & Levang, P. (2009). Coffee certification: an incentive to protect or deforest the National Park? A case study at Bukit Barisan Selatan National Park, Sumatera, Indonesia. Oral presentation on "Engaging Southeast Asia: Centres and Peripheries" at University of British Columbia, Vancouver, Canada, 15-17 October, 2009.

Fitriana, Y.R., & Levang, P. (2010), When local practices oppose conservation policies: the role of local elites in preventing encroachments in National Parks. Oral presentation on "Taking stock of smallholder and community forestry: Where do we go from here?" in Montpellier, France, 24-26 March, 2010.

Fitriana, Y.R., & Levang, P. (2010). Why partnership doesn't work in National Park Management? A case study in Bukit Barisan Selatan National Park, Sumatera, Indonesia. Oral presentation at the 2010 International Meeting of the Association for Tropical Biology and Conservation (ATBC), "Tropical biodiversity: surviving the food, energy and climate crisis", in Bali, Indonesia, 19-23 July 2010.

Fitriana, Y.R., & Levang, P. (2010). Carrots and sermons don't work without a baton: Economic incentives fail to protect the Bukit Barisan Selatan National Park in Indonesia from encroachers. Oral presentation at XXIII International Union of Forest Research Organization Worlds Congress 2010, in Seoul, South Korea, 23-28 August 2010.

Contributions by others to the thesis

Dr Jean-Christophe Castella, as former principal supervisor in The Paul Valéry Montpellier 3 University, France, contributed to the initial writing plan and revising early drafts of the thesis.

Dr Patrice Levang, as former co-supervisor in The Paul Valéry Montpellier 3 University, France, contributed to the conception and design of the project, preliminary analysis and interpretation of research data, technical support during the first phase of fieldwork (2009-2010) with CIFOR and IRD, and also as a co-author in conference presentations.

Statement of parts of the thesis submitted to qualify for the award of another degree

The thesis plan, the first phase of data collection in 2009 and 2010, and some preliminary analysis and conference presentations were undertaken while enrolled in the PhD program in The Paul Valéry Montpellier 3 University. However, no part of the thesis was submitted for the award of any degree at The Paul Valéry Montpellier 3 or any other university. The candidate withdrew from The Paul Valéry Montpellier 3 in 2011 and enrolled in the PhD program in the School of Agriculture and Food Sciences, The University of Queensland, in July 2014, with approval to build on the work already commenced at The Paul Valéry Montpellier 3 University.

Research Involving Human or Animal Subjects

The main data collection involving questionnaire surveys of rural households and interviews with key informants in villages, government agencies, and the private sector, and the plans for data analysis, were conducted while enrolled in the School of Geography and Land Use Planning, Doctoral School of Territories, Time, Societies and Development, in The Paul Valéry Montpellier 3 University. Ethical approval was obtained and oversight maintained according to the procedures of that university as part of the supervisory process under the direction of Dr Patrice Levang and Dr Jean-Christophe Castella, and of the Centre for International Forest Research (CIFOR) as the host institution during fieldwork. As advised by the Human Ethics Coordinator in the Office of Research Ethics at The University of Queensland, Dr Michael Tse, the thesis research did not require additional ethical approval through the UQ process as the data collection and analysis were conceived and implemented through The Paul Valéry Montpellier 3 University before enrolling at UQ.

Acknowledgements

Ever since I was a young girl, I have always been inspired by my father, who taught me how to chase my dreams with passion whilst being the best I can be in the process. In pursuit of my goals, I have studied abroad, away from my family. Many sacrifices have been made and I have been blessed with a helpful and supportive network, continuously motivating me throughout this journey. Receiving my Doctorate is my dream and the completion of this thesis marks the light setting on the horizon. I would like to take this opportunity to acknowledge the people who have contributed to making this thesis a reality.

Firstly, to Rob Cramb, it has been a great honour to have you as my principal thesis supervisor. I am grateful for your tireless support and dedication, throughout this entire process, from synthesising and writing until the final version of this dissertation. I have learnt so much from you.

Enormous respect and appreciation for Jean-Christophe Castella and Patrice Levang, as my former thesis supervisors in The Paul Valéry Montpellier 3 University, France. Your guidance and support during the initial stages of data collection was invaluable. Without you both, this research would not be realised.

My sincere thanks to the members of my thesis Milestone Chair Committee, Collin Brown as also my second supervisor, Bob Beaton, and Ammar Abdul Aziz, for the input and suggestions during confirmation, mid-candidature, and thesis review milestones.

I wish to acknowledge the Center for International Forestry Research (CIFOR) for taking me in as an Intern at its headquarters office in Bogor, Indonesia. It was such a privilege and brought me much joy to be among such world-class scientists. Special thanks to Claude Garcia for mentoring and offering advice about technical writing, and David Gaveau for the discussions and map data for this research.

This research was facilitated by the University of Lampung (Unila) through providing local administration letters and permits. I have been blessed to be a part of the teaching staff as a Lecturer at this university. My sincere appreciation to my colleagues in the Agricultural Faculty, especially in the Forestry Department; your patience and understanding has allowed me to take the time I needed to finish my degree.

I wish to acknowledge SupAgro Montpellier, France, the institution from which I graduated with my Masters degree, for its support for two field study courses in West Lampung District. Thank you to Masters students from Unila, class of 2010, who participated in field studies in farming systems and coffee certification, whom I have lectured at the research area.

Thanks to Handuo Cai, Masters student from SupAgro Motpellier in 2009, for our fieldwork together at the beginning of my data collection.

I would like to express my appreciation to the Indo Cafco Indonesia Company, especially Eduard Bault, as Manager of Sustainable Management Services Indonesia, and his local agronomists (Marwan, Rully, and Effendi) for facilitating my research and sharing a wonderful friendship during my period of understanding the coffee industry in West Lampung District. I would like to thank also Reka Desa Indonesian Rural Finance Consultancy, especially Mr. Hadipurnama Chandra, for facilitating my data collection about micro-finance and coffee certification in 2010.

Secondary data, support, and advice given by the *Dinas Pekebunan, Dinas Kehutanan,* and *Bappeda* of West Lampung District, and the Bureau of BBSNP in Kota Agung have been a great help. I would like to offer special thanks to Rahman Pasha and Andree Ekadinata from ICRAF Bogor for sharing their experiences of the projects in West Lampung District and map data.Thank you Iska Gushilman for your help in map compilation and map layout for some illusrations in this thesis.

I also would like to acknowledge the two main NGOs patnering with BBSNP, the WWF and RPU. The WWF Lampung, especially Job Charles, provided me valuable information, maps, and data for this research. Thank you RPU in Kota Agung office for discussion and information about law enforcement. Thank you to the villagers and coffee farmers groups in West Lampung and Pesisir Lampung District, especially at the villages of Trimulyo and Gunung Terang.

I would like to thank my field assistants for accompanying me during data collection in 2009-2010. Thank you to Jhon Roy Sirait, Wiyono from CIFOR, and also Wagianto from Unila, who helped by accompanying me to collect the data in several data collection periods. Wiyono provided me with great sketches and illustrations for this thesis. I also thank my close doctorate friends who supported me and shared their valuable experiences, Laurene Fentreinie from France, Elizabeth, Dinah Joesoef, Liana Williams, and Trie Mahendri from UQ. Thank you to my all friends in Brisbane for the friendship, support, and great time during this thesis completion.

Lastly, for the closest persons in my life, I would like to give my deep appreciation and love for my husband and two lovely children, my parents, and my three younger brothers for the support, wish for my happiness, and their prayers for my success.

Financial support

This research was supported by an Indonesian Government Scholarship for Higher Education through the Indonesian Ministry of Education – Directorate General of Higher Education (Dikti), during the first period of data collection, 2008-2010.

The Center for International Forestry Research (CIFOR) financed fieldwork and gave assistance to participate in conferences during the first phase of data collection in 2008-2010.

The Reka Desa Indonesian Rural Finance Consultancy financed the local cost of transport and accommodation during the livelihood survey of 600 respondents in West Lampung District in 2010, as a part of an initial study of agricultural financing in Lampung Province with collaboration between Reka Desa and Bank Rabobank International Indonesia.

The University of Queensland through School of Agriculture and Food Sciences (SAFS) financed the updating of data in 2014.

Keywords

national park, coffee smallholders, coffee certification, migration, enforcement

Australian and New Zealand Standard Research Classifications (ANZSRC)

ANZSRC code: 050209 Natural Resource Management, 50%

ANZSRC code: 160403 Social and Cultural Geography, 50%

Fields of Research (FoR) Classification

FoR code: 0502 Environmental Science and Management, 50%

FoR code: 1604 Human Geography, 50%

I dedicate this work to

My husband, Yulius, who always inspires and encourages me.

My daughter, Sashenka, who gives me strength in life and makes me very proud.

My son, Elmarty, who is very brave and is the main motivation for me doing this thesis.

My beloved parents, who always pray for me and believe in me no matter what happens.

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List of Abbreviations

4C	Common Code for the Coffee Community
AREAS	Asian Rhino and Elephant Action Strategy
ARSG	Asian Rhino Specialis Group
BBSNP	Bukit Barisan Selatan National Park
CDM	Clean Development Mechanism
CES	Compensation for Environmental Services
CIFOR	Center for International Forestry Research
CITES	Convention on International Trade in Endangered Specieses of Wild Fauna and Flora
FAO	Food and Agriculture Organization
FWI	Forest Watch Indonesia
GAP	Good Agricultural Practices
GEN	Global Ecolabelling Network
GFW	Global Forest Watch
GMP	Good Management Practices
IAD	Institutional Analysis and Development
ICA	International Coffee Agreement
ICDP	Integrated Conservation Projects and Development
ICEA	Indonesian Coffee Exporters Association
ICO	International Coffee Organization
ICRAF	World Agroforestry Center
IDR	Indonesian Rupiah
IFOAM	International Federation of Organic Agriculture Movements
IRCP	Indonesian Rhino Conservation Program
IRF	International Rhino Foundation
ITC	International Trade Center
MAB	Man and the Biosphere
MoF	Ministry of Forestry
NEPIS	New Environmental Policy Instruments
NGO	Non-Governmental Organization
PES	Payment for Environmental Services
REDD	Reducing Emissions from Deforestation and Forest Degradation
RES	Rewards for Environmental Services
RPU	Rhino Protection Unit
RUPES	Rewarding Upland Poor for Environmental Services

SAN	Sustainable Agriculture Network
SES	Social-Ecological System
WCS-IP	Wildlife Conservation Society -Indonesia Program
WWF	World Wide Fund for Nature

List of Abbreviations in Indonesian Language

APBN	*Anggaran Belanja Negara*, the Indonesian Budget
BBTNBBS	*Balai Besar Taman Nasional Bukit Barisan Selatan*, Bureau of Bukit Barisan Selatan National Park
BP	*Bidang Pengelolaan*, Management Division
BPD	Badan Permusyawarahan Desa, the village representative advise
BPS	*Badan Pusat Statistik*, central statistical board
BRI	*Bank Rakyat Indonesia*, the Bank of Indonesian People (state owned bank)
BRN	*Badan Rekonstruksi Nasional*, Bureau of National Reconstruction
CA	*Cagar Alam*, strict nature reserves
DPR	*Dewan Perwakilan Rakyat*, Parliament the people's representative
DPD	*Perwakilan Daerah*, Parliament of regions representative
DPRD Kabupaten	*Dewan Perwakilan Rakyat Daerah Kabupaten*, the District representative
DPRD Propinsi	*Dewan Perwakilan Rakyat Propinsi*, the Provincial representative
HKm	*Hutan kemasyarakatan*, Social Forestry Program
HPHH	*Hak Pengusahaan Hasil Hutan*, Forest Product Management Right
KPA	*Kawasan Pelestarian Alam*, Area of Nature Conservation
KSA	*Kawasan Suaka Alam*, Sanctuary Nature Reserve
KSP	*Koperasi Simpan Pinjam*, Savings and loan cooperative
KSU	*Koperasi Serba Usaha*, Multi-purpose cooperative
KUT	*Kredit Usaha Tani*, Credit for farmer business
KWT	*Kelompok Wanita Tani*, Farmer women group
LKM	*Lembaga Keuangan Mikro*, micro finance institution
MPR	*Majelis Rakyat Permusyawaratan*, The National Assembly
PHKA	*Perlindungan Hutan dan Konservasi Alam,* The Directorate General ofForest Protection anf Natura Conservation
PLN	*Perusahaan Listrik Negara*
PT	*Perseroan Terbatas*, limited company
RAT	*Rapat Anggota Tahunan,* annual member meeting
RT	*Rukun Tetangga*, Heads of hamlets
SD	*Sekolah Dasar*, elementary school

SHU	*Sisa Hasil Usaha,* nett income in cooperation
SK	*Surat Keputusan*, Decree
SM	*Suaka Margasatwa*, wildlife reserves
SMA	*Sekolah Menengah Atas*, senior high school
SMP	*Sekolah Menengah Pertama,* junior high school
TB	*Taman Buru*, Game reserve
THR	*Taman Hutan Raya*, Grand Forest Park
TN	*Taman Nasional*, National Park
TWA	*Taman Wisata Alam*, leisure park
UUD	*Undang-undang Dasar*, the fundamental law
YMR	*Yayasan* Mitra Rhino, Mitra Rhino Foundation

CHAPTER 1
INTRODUCTION

1.1 Research Problem

Conservation policies have long focused on the creation of protected areas such as national parks, forest reserves, and biological reserves, designed, by definition, to exclude people. The intention of these policies is to isolate areas and species from local populations and protect them from any human impact. Bruner *et al.* (2001) assessed anthropogenic threats to 93 national parks encompassing 18 million ha in 22 tropical countries and argued that the creation of national parks is an effective way to protect tropical biodiversity. Such protected areas require strong regulatory systems, including rules and mechanisms for their implementation (Swallow *et al.*, 2007), such that human activities like farming and hunting are made illegal. Yet WWF (2004) found that legal status was not protecting natural areas in 200 forest areas studied in 37 countries in Europe, Asia, Africa, and Latin America. The gap between the intended role of a protected area as a conservation tool and the reality of widespread illegal activities needs to be studied.

In particular, conversion of rainforest to agricultural land use has had significant impacts on the conservation of wildlife and biodiversity in and around protected areas. Although the drivers of deforestation are many, studies indicate that the agricultural sector has contributed to rainforest loss through the permanent conversion of forest to agricultural settlements (Didia, 1997; Geist & Lambin, 2002; McNeely & Scherr, 2001; World Bank, 1992; WRI, 1990). Hence it is now widely recognised that conservation exclusively focused on the establishment of protected areas is not enough to solve the problem of environmental degradation and biodiversity loss (IUCN, 1980; Swallow *et al.*, 2007; WCED, 1987).

In the influential report of the Brundtland Commission in 1987 (WCED, 1987), the link between poverty and environmental problems was highlighted. The environment was considered to be overused in order to fulfil the basic needs of poor people worldwide. The concept of sustainable development, first articulated in the Global Strategy for Nature (IUCN, 1980) and central to the Brundtland Report, emphasized the idea that it was possible to align the goals of economic development and conservation through the choice of appropriate policies, including those based on market instruments (Swallow *et al.*, 2007).

In Indonesia, the conservation of forest and biodiversity is based on key legislation – Indonesian Law No. 5/1990 on the Conservation of Resources and Ecosystems, the ratification of the Convention on Biological Diversity in 1994, and the Forest Act No. 41/1999. The status of forest areas is determined by the Forest Department under ministerial decrees and ranges from conservation forest to protection forest to production forest, as defined in the 1999 Forest Act. The definition of the categories of conservation forest in Indonesia largely follows the categorization by the International Union for the Conservation of Nature (IUCN), with the primary role of protected areas being to "protect" and "preserve" (Hartono, 2008).[1] Thus an exclusionary approach has been the main method of biodiversity conservation in Indonesia, whereby human activities inside the boundaries of National Parks are declared illegal. Yet Nellemann *et al.* (2007) found that illicit actions happen in 37 of the 41 protected areas in Indonesia.

With valuable biodiversity richness, the Indonesian Government has allocated resources to conserving biodiversity by creating protected areas and by taking into consideration local economic development by implementing incentive-based approaches. The Integrated Conservation and Development Project (ICDP) was adopted as the main strategy for conservation in the 1980s, aiming to protect biodiversity while providing local benefits (Wells *et al.*, 1999). Criticism of the ICDP has meant that, since the 2000s, conservation strategy has become broader, including market-based approaches to environmental management (Adhikari, 2009).

This study examined the relative effectiveness of a conventional law-enforcement or exclusionary approach and an incentive-based approach linked to international markets in achieving a better trade-off between conservation and development in the tropical rainforests of Indonesia. This was pursued through a case study of the Bukit Barisan Selatan National Park (BBSNP) in Lampung Province in the southern part of the island of Sumatra. The BBSNP is part of a UNESCO World Heritage Site as the habitat of the endangered Sumatran tiger, rhinoceros, and elephant, as well as other important plant and animal species. However, the Park has been encroached on by thousands of squatters, clearing patches of forest mainly to produce coffee for the international market. Thus it is a biodiversity hotspot in the sense of possessing high conservation value which is under serious threat. The Indonesian Government has worked with BBSNP management, non-

[1] Yet National Parks in Indonesia do not always correspond to the IUCN's Class II but may belong to Class Ib, II, III, IV, or V depending on whether the Park was previously declared as a Nature Reserve or Wildlife Sanctuary (Hartono, 2008).

government organisations (NGOs), and the private sector, both to increase effective control over access to natural resources inside the Park and to support the development of villages that border the park. In particular, the introduction of private coffee certification schemes for smallholders in the vicinity of the Park has been a major market-based approach to improving rural livelihoods while reducing negative human impacts on wildlife habitat.

1.2 Aim and Objectives

The overall aim of the research was to improve our understanding of how to minimise the trade-offs between conservation and development in and around protected forest areas in Indonesia. There were four specific research objectives:

1) Explore the extent and dynamics of the problem of encroachment and deforestation in the BBSNP;
2) Assess the effectiveness of the conventional coercive or law-enforcement approach to solving the problem;
3) Assess the effectiveness of incentive- or market-based mechanisms, in particular through coffee certification;
4) Consider the feasibility of some potential solutions to the problem based on the research findings.

1.3 Scope and Methods

The scope of the research was limited to BBSNP and surrounding farming communities in West Lampung and West Coast Districts in Lampung Province. The research focused on understanding the potential for sustainable development in the vicinity of the Park. This involved examining changes in population, infrastructure, and land use over a 40-50 year period, based on historical records, maps, and informant recall. The actors included in the research were indigenous farmers, migrant farmers, community leaders, Park authorities, government officials, NGO personnel, traders, and agribusiness firms.

The study used mixed methods to answer the four research questions, including structured household surveys, semi-structured key informant interviews, analysis of statistical records, documents, and maps, and direct interaction and observation. The main fieldwork was undertaken in 2009-2010, with a second period of fieldwork to update data and assess changes in October 2014. The focus was on understanding the dynamics of resource-use decisions at the household and community levels in response to the two main strategies under consideration – the coercive and incentives-based strategies. The study was intended

to contribute to a better understanding of the specific circumstances in which these strategies, singly or in combination, can minimise the trade-off between conservation and development goals in a site where both goals are especially urgent.

1.4 Outline

The research is presented in nine chapters. In Chapter 2 I review the literature about reconciling conservation and development within tropical forest areas. I begin by reviewing the theory of the forest ecosystem as a common pool resource, with the attributes of high subtractability (one person's use of the resource reduces its availability to others) and a high degree of difficulty in enforcing exclusion. These attributes increase the risks of over-exploitation. The two potential approaches to managing such resources involve the imposition of public property rights (as in the declaration and enforcement of a National Park) and the strengthening of common property rights (through community enforcement or incentives). The chapter reviews the various ways these two institutional regimes have been applied to forest conservation globally.

The context of the research is explained in Chapter 3. This includes an overview of Indonesian law and policy regarding forest and land access, a description of West Lampung District, Bukit Barisan Selatan National Park, and the coffee sector in Lampung Province, and an outline of the pressures facing Park management.

In Chapter 4 I explain the overall research strategy as a case-study approach using a multiple-case design with multiple units of analysis. Each of the approaches to sustainable development were treated as cases, with data collected at multiple levels, including household, sub-village, village, and the Park and Province as a whole. The mixed methods of data collection and analysis are described and evaluated, and ethical issues arising in the research are discussed.

The specific context of the case studies is described in Chapter 5. The evolution of land use over half a century and the resultant systems of agricultural production in the study villages are described. The chapter also outlines the management approach of the BBSNP Agency, including measures for community development and targeted law enforcement.

The two case studies are presented in Chapters 6 and 7. In Chapter 6 I examine the use of coffee certification as an incentive-based approach to Park conservation and community development. The development and operation of the coffee certification scheme is described and its effectiveness in both Park protection and improving livelihoods is evaluated. In Chapter 7 the implementation of law enforcement is described, involving park rangers,

special teams provided by NGOs, and both the police and military. The effectiveness of enforcement is analysed in relation to the frequency of monitoring and the severity of sanctions, with varying outcomes depending on community-specific factors.

In Chapter 8 I conduct a cross-case analysis and draw conclusions in Chapter 9 for each approach to conservation and development. I find that neither approach is sufficient in itself and that, even when implemented in combination, further interventions may be needed. Some of these additional options are briefly evaluated.

CHAPTER 2
RECONCILING CONSERVATION AND DEVELOPMENT WITHIN A FOREST ECOSYSTEM: A REVIEW

The aim of the research was to understand the trade-offs between conservation and development in and around protected forest ecosystems. In this chapter I review the general literature relevant to this aim. The review is arranged around three central questions: (1) How do humans interact with tropical forest ecosystems and what management regimes are available to conserve them? (2) How effective is a state-managed approach whereby rules are implemented to regulate the forest ecosystem and exclude incompatible land uses, notably agriculture? (3) How effective is a community-based management approach, with various incentives and mechanisms to guide individual behavior towards conservation outcomes?

2.1 Forest and Community

2.1.1 Forest use by communities

Forest ecosystems have great value to rural communities. Forestry activities provide an opportunity to escape the cycle of poverty for many rural populations through trade in timber and non-timber products (Falconer & Arnold, 1991; Michon, 2005). Forest ecosystems also provides environmental services – benefits derived directly from the forest that support the life of rural communities (Turner, 2010). These benefits are defined by the Millennium Ecosystem Assessment (2005) as the material and non-material benefits derived from natural ecosystems or ecosystems that are altered by human practices. The connection between the forest and community livelihoods can be divided into three phases. The first phase is hunting and gathering, including extractive activities; the second is shifting cultivation and agroforestry systems; the third is intensive agriculture.

The hunting-and-gathering phase of forest use dominated for many thousands of years. This mode of resource use is known not to cause damage to the forest ecosystem as long as it involves low-intensity harvesting of natural products spread over a large area and in a traditional manner, respecting rules and beliefs that help to conserve the resource (Aulong, 2000). According to Feer (1993), hunting is the best way to get animal protein when breeding is difficult and obtaining meat from outside is not economic.

When the collection of natural products of animal or vegetable origin is undertaken for commercial purposes it is called “extractive”. Traditionally this is also based on conservative resource management, ensuring natural regeneration (Emperaire & Lescure, 1994). Lescure and Pinton (1993) argue extractive use is “undeniably consistent with the preservation of humid tropical forest ecosystems.” Their study showed that several scarce species or resources develop through extraction, such as Brazil nuts or Indonesian resins (*damar*), provided the extraction is controlled by limited quotas. Thus extraction can be useful in the protection of forests, especially in the creation of buffer zones around protected areas that allow commercial activities (Emperaire & Lescure, 1994).

However, extractive use of the forest ecosystem has grown rapidly in recent decades and has proved very destructive in many cases. The activities of hunting and gathering are now seen as a threat to the forest ecosystem and to the economic sustainability of the activities themselves. According to Robinson and Bennett (2000), hunting in tropical forests is unsustainable even among traditional cultures. Ludwig, Hilborn, and Walters (1993) also conclude that hunting activities can lead to overexploitation, often to the point of collapse or extinction of the target species. The pressure of extractive resource use is seen as a cause of species extinction, although it is not the main cause; it is the disappearance of the original ecosystem or of key breeding species that is the real threat to biodiversity (Emperaire & Lescure, 1994).

The second phase of community forest-use is shifting cultivation. This is considered the earliest form of agricultural activity and is still practised by indigenous populations in many developing countries. The practice is based on the use of axe and fire to clear a forest plot prior to establishing food crops. After a few years of cultivation, when soil fertility is reduced and weeds are proliferating, the plot is left fallow for many years to allow the forest to regrow and restore soil fertility before another cycle of cropping occurs (Ducourtieux, 2006). With the appropriate fallow period, the practice is considered sustainable in terms of productivity and food security, as well as forest conservation (Mazoyer & Roudart, 1997). This traditional type of shifting cultivation, in which farmers are aiming only to meet their subsistence needs using an extensive forest area, is termed the “subsistence model” (Angelsen, 1995).

The system works when population pressure is low but, with increased population, the system changes: the fallow period becomes shorter and it becomes increasingly difficult to maintain the regeneration of soil fertility and regrowth of vegetation (Mazoyer & Roudart, 1997). To solve the problem of declining productivity due to decreased fertility, the practice of agroforestry has been advocated to improve weed control and enrich the secondary forest

with useful species such as nitrogen-fixing legumes (Weemaes, 1995). Agroforestry systems can be a good way to conserve the forest through reforestation of degraded fallows while generating income for rural families (Falconer & Arnold, 1991).

The third phase of forest-use by rural communities is intensification. Intensive farming emerges in response to the needs of a growing population and the lack of agricultural land or suitable agroforestry crops. The intensification process begins by reducing the fallow period in the shifting cultivation system and increasing the cropping period until annual or multiple cropping is attained. This is typically accompanied by the intensification of work and increased land productivity (Mazoyer & Roudart, 1997). Alternatively, intensification may involve the planting of permanent crops or perennials. Where there is an open land frontier, the intensive or permanent cropping may expand to a wider area, such as the extensive rubber agroforests in Sumatra (Levang & Gouyon, 1993).

2.1.2 Forest degradation and agricultural activities

According to the FAO, the rate of tropical deforestation has continued to rise over recent decades (FAO, 1982, 1993, 1997, 2006). The total area of tropical forest was 2.1 billion hectares in 1980. From 1980 to 1990 the annual rate of forest loss was about 9.9 million hectares but this increased to 14.2 million hectares from 1990 to 2000. Achard *et al.* (2002) showed that the rate of deforestation and forest degradation was highest in Southeast Asia, followed by Africa and South America, especially during 1990-1997. Indonesia is the major contributor to this high rate in Southeast Asia.

Human intervention transforms tropical forest landscapes as populations and economies grow (Barraclough & Ghimire, 2000; Wright, 2005). The relation between human activity and biodiversity is a function of forest conversion for human activity, especially agriculture (Brown & Pearce, 1994). Deforestation is thus inevitable given the constant expansion of population that is not absorbed by the industry or service sectors in urban areas (Levang & Gouyon, 1993; Michon, 2005). Bruner *et al.* (2001) found that deforestation is more likely to occur where the land has high potential productivity due to favourable agro-climatic conditions and good market access, and the forest stands themselves have high market value.

Nevertheless, because of the great number of services that intact forest ecosystems can provide, deforestation and forest degradation can be very costly from economic, social, and environmental perspectives, with impacts including soil erosion, the extinction of species, and contributions to global warming (Bryant *et al.*, 1997; Didia, 1997; Houghton, 2009;

Wilson, 1994). The main global issue in the protection of tropical forests is the preservation of biodiversity, defined as “the unity of life in all its manifestations and at every level of organization” (Caillon & Degeorges, 2007, p. 2920).

Agricultural expansion is widely considered as the main cause of deforestation (Chomitz, 2007; Didia, 1997; Geist & Lambin, 2002; World Bank, 1992; WRI, 1990). The agricultural sector is estimated to contribute 50-60% of the annual rate of tropical deforestation (Barraclough & Ghimire, 2000; World Bank, 1992), including the expansion of tree crop plantations in Indonesia (Miyamoto, 2006). Geist and Lambin (2002) project that agriculture will continue to replace large areas of rainforest as the population in the tropics increases to over two billion by 2020.

According to Angelsen (1995), agricultural intensification through improved technology should contribute to reducing forest clearing because of the smaller area required to meet the household’s basic needs. On the other hand, the improved productivity could attract more people from outside the area, adding to forest clearing. Byerlee, Stevenson, and Villoria (2014) specify two different types of intensification: market- and technology-driven intensification. They consider market-driven intensification as the main cause of deforestation through crop expansion on the forest frontier. Barraclough and Ghimire (2000) and Chomitz (2007) find that the expansion of export commodity production is positively correlated with the rate of deforestation and attracts more people to the forest frontier.

Another key factor is the construction of roads and other infrastructure on the forest frontier. While this can enhance rural development (Chomitz, 2007), it can also promote deforestation by reducing the cost of transportation and thus increasing the land rent or net income generated from deforested land (Angelsen, 1995; Angelsen & Kaimowitz, 1999; Chomitz, 2007; Kaimowitz, 1996a; Maeda *et al.*, 2010; Miyamoto, 2006; Tomich & van Noordwijk, 1995). On the other hand, improved access to off-farm and non-farm activities may reduce dependence on agriculture and hence the incentive for deforestation (Angelsen, 1995, 1999; Angelsen & Kaimowitz, 1999; Bluffstone, 1995; Chomitz, 2007).

2.1.3 Conceptualising forest-community relations

Hardin (1968) theory of “the tragedy of the commons” argued that “common property”, which he associated with uncontrolled resource access, would lead to overuse and destruction of the resource. He emphasised government ownership or privatisation as solutions to this tragedy. Although Hardin’s study has been referenced by many studies, his concept of the

commons is considered defective and his solutions too simple because he considered only state and private ownership (Dietz, Ostrom, & Stern, 2003).

Ostrom *et al.* (1999) developed the theory of Common Pool Resources (CPRs) in response to the deficiencies of Hardin's theory. Their analysis classifies resources based on the characteristics of excludability and subractability (Ostrom, 2009, 2010). Excludability refers to the degree of difficulty in restricting others from using the resource, while subtractability refers to whether the use of the resource by one person reduces its availability to other potential beneficiaries. Table 2.1 shows the four types of resource based on these two characteristics: common-pool resources, public goods, private goods, and toll goods.

Ostrom *et al.* (1999) emphasise that a CPR is a "resource system" regardless of the property rights governing its use. The CPR resource system has the characteristics (1) that the physical or institutional cost of excluding other users is high and (2) that exploitation by one user will reduce the availability of the resource to other users. However, the property rights that could be applied to a CPR system include: open access (corresponding to Hardin's view of "the commons"), group property, individual property, and government property (Table 2.2).

Table 2.1. Four types of resource

		Subractability of use	
		High	Low
Difficulty of excluding beneficiaries	High	Common-pool resource	Public good
	Low	Private good	Toll good

Source: Ostrom (2010, p. 645)

Table 2.2. Types of property system used to regulate CPR

Property rights	Characteristics
Open acces	Absence of enforced property rights
Group property	Resource rights held a group of users who can exclude others
Individual property	Resource rights held by individuals (or firms) who can exclude others
Government property	Resource rights held by government that can regulate or subsidize use

Source: Ostrom *et al.* (1999, p.279)

A tropical forest ecosystem is considered a CPR because of the difficulty of excluding individuals and the subtractability of many of the goods and services the forest can provide (e.g., land, timber, non-timber products, and game) (Ostrom, 1999). According to Ostrom (1999), forest degradation and deforestation mostly occur in circumstances in which the individuals who benefit from extractive uses of the forest do not have an incentive to contribute to forest sustainability, especially in an open-access forest without effective management.

Ostrom (1990) argues that the overexploitation of CPRs can be avoided by collective resource management involving rules and institutions that guide and limit individual use. This proposition has been supported through systematic analysis of many local case studies worldwide, showing that many social groups have succeeded to avoid CPR degradation by applying a range of management practices within self-governing institutions (Baland & Platteau, 1996; Dietz *et al.*, 2003; Ostrom, 1990). Based on these studies, Ostrom and her colleagues identified eight principles for successful self-governance (Ostrom, 1990, 2009):

1) The CPR has clearly-defined user and resource boundaries, facilitating effective exclusion of unentitled groups.
2) The rules for governing the CPR are adapted to local needs and conditions.
3) Decisions are made through collective choice arrangements and can be modified by the individuals who are affected by the rules.
4) Monitoring of users and of the resource is effective and recognised by other authorities.
5) Violations are punished with graduated sanctions from very low to strong.
6) Resolution of conflicts and issues can be achieved through effective and low-cost mechanisms.
7) There is at least minimal recognition of rights by the government, including the local right for the group to make its own regulations.
8) For larger CPRs, “nested systems” of rule enforcement and organisation are in place.

In the same way, Dietz *et al.* (2003, p. 1908) state that effective management of the commons is easier to achieve where “…resources and the use of the resources by humans can be monitored, and the information can be verified and understood at relatively low cost; rates of change in resources, resource-user populations, technology, and economic and social conditions are moderate; communities maintain frequent face-to-face communication and dense social networks; outsiders can be excluded at relatively low cost from using the

resource; and users support effective monitoring and rule enforcement." On the other hand, problems in CPR management arise when there is difficulty in developing arrangements, norms, and sanctions between individuals because of lack of effective communication and personal networks (Ostrom, Gardner, & Walker, 1994).

While Ostrom and colleagues have focused on the common (or group) property solution to CPR problems, they acknowledge that where such regimes are not sustainable, the imposition of state property rights to the resource may be necessary. Forest ecosystem management using a "government property" system is still widely applied in the form of declaring and enforcing protected areas using the resources of the state to exclude unauthorised users and manage the forest (which was one of Hardin's two options). In the next two sections, the use of state-imposed management regimes and group or community-based regimes are considered in turn.

2.2 State-Imposed Institutions for Forest Conservation

2.2.1 Creation of protected areas by central government

To maintain biodiversity, two strategies can be distinguished – in situ conservation and ex situ conservation (UNCED, 1992). An ex situ approach preserves components of biodiversity outside their natural habitat. By conserving genetic resources of wild and cultivated species, ex situ conservation provides insurance against their extinction in their natural setting (Cohen *et al.*, 1991). In situ conservation is defined by Dudley *et al.* (2005) as conservation in the natural habitat that aims to create the basic conditions for maintaining biodiversity. One form of in situ conservation is the creation of protected areas. Local attempts to institutionalize the protection of forests began in the eighteenth century and, since then, protected areas have become a cornerstone of conservation efforts worldwide (WWF, 2004).

Creation by the state of protected areas for the sustainable use of natural resources and the restoration of already-degraded areas are the pillars of national strategies for biodiversity conservation in most countries of the world (Dudley *et al.*, 2005). The primary management objective of these national parks and nature reserves is in situ conservation rather than extractive resource use. They represent the last refuge for endangered species by preserving their natural habitat (Dudley *et al.*, 2014; Dudley *et al.*, 2005). Thus protected areas normally aim to maintain or increase the degree of naturalness of the ecosystem. Consequently, management of protected areas must also prevent or, if necessary, remove human activities that could undermine the conservation objectives (Chape *et al.*, 2003;

Dudley, 2008). Conservation policies have long considered protected areas like national parks, forest reserves, and biological reserves as (by definition) “people empty areas” (Swallow *et al.*, 2007). Natural areas and species are isolated from the local population and protected against any human impact. This requires strong regulatory systems, including the rules, mechanisms, and resources needed for their implementation (Swallow *et al.*, 2007).

As defined by the IUCN, a protected area is “a well-defined geographical space, recognized, dedicated and managed, through legal or other effective means, to ensure the conservation of nature long term with associated ecosystem services and cultural values” (Dudley, 2008, p. 8). New categories of protected area were approved by the General Assembly of IUCN in Buenos Aires in January 1994. According to Dudley (2008) and Dudley and Stolton (1998), the IUCN has six protected area classifications based on the conservation goals. Creation of protected areas and the augmentation of their area are indicators of the priority givern to biodiversity conservation. The management of areas bordering protected areas (e.g., in a “buffer zone”) and providing links between preserved habitats (e.g. through wildlife corridors) are also important to achieving the conservation goals of protected areas (Brandon, 1995). IUCN standardization of protected areas demonstrates the level of regulatory protection that has been adopted as a basis for the management of protected areas worldwide. However, this categorization is not interpreted uniformly. Leroux *et al.* (2010) state that the IUCN categories do not always correspond in practice to the expected gradient of naturalness.

2.2.2 Effectiveness of protected areas

Increasing the extent of protected areas is generally regarded as the key instrument in the protection of biodiversity, even if deforestation continues in surrounding areas (Naughton-Treves, Holland, & Brandon, 2005). Up to 2008, more than 120,000 protected areas had been created, equivalent to 21 million square kilometres (UNEP-WCMC, 2008). However, there are ongoing debates about the effectiveness of protected areas in biodiversity conservation, both in terms of preventing deforestation and preventing poaching and other illegal activities.

Table 2.3. Categorization of protected areas by IUCN

Category	Name	Definition
Ia	Strict Nature Reserve: managed mainly for science	Area of land and/or sea possessing some ecosystems, geological or physiological features and/or outstanding or representative species, available primarily for scientific research and/or monitoring continuing environmental change
Ib	Wilderness Area: managed mainly for protection of wildlife resources	Extensive area of land and/or sea, intact, retaining its natural character and influence, without permanent or significant property, protected and managed so as to preserve its natural condition
II	National Park: managed mainly for ecosystem protection and recreational use	Natural area of land and/or sea, designated to a) protect the ecological integrity of one or more ecosystems for present and future generations, (b) exclude exploitation or occupation inimical to the purposes of designation and (c) provide opportunities for scientific, educational, recreational and visitor opportunities, with respect for the natural environment and culture of local communities
III	Natural Monument: managed mainly for conservation of specific area of natural elements	Area containing one or more specific natural and/or cultural features of outstanding or unique value, deserving to be protected because of its rarity, representativeness, aesthetic qualities or cultural significance
IV	Management Areas: managed mainly for conservation of habitats or species through intervention	Area of land and/or sea subject to active intervention for management to ensure maintenance of habitats and/or to meet the requirements of specific species
V	Protected Landscape or Seascape: managed mainly for ensuring conservation of land and seascapes for recreational use	Land area, with coast and sea as appropriate, where the interaction between man and nature, over time, has shaped a landscape of exceptional aesthetic, ecological, and/or cultural qualities, and often with high biological diversity. Preserving the integrity of this traditional interaction is vital to the protection, maintenance, and evolution of such an area
VI	Protected Area Managed Resource	Area containing natural systems, largely unmodified, managed in order to ensure the long-term maintenance of biological diversity, while ensuring the sustainability of natural products and services necessary for the wellbeing of the community

Adapted from Dudley (2008)

One approach is to compare the rate of deforestation in areas with and without protected status (Brandon, 1995). Studies in Costa Rica (Andam *et al.*, 2008) and South Sumatra, Indonesia, (Gaveau, Wandono, & Setiabudi, 2007) found lower rates of deforestation and forest activities in protected areas. This was largely explained by their relative inaccessibility. In central India, Nagendra, Pareeth, and Ghate (2006) found the deforestation rate was higher in areas of high population density area surrounding a park than in other isolated villages inside the park. The higher deforestation was related to the better market access and accessibility of the outside villages. This result is supported by Nagendra (2008), who found that protected areas have less forest clearing than surrounding areas. Others have concluded that protected areas are not effective in conserving forest vegetation as the extent and density of forest cover is not significantly different between protected and non-protected areas (Brandon, 1995; Wells, Brandon, & Hannah, 1995). Porter-Bolland *et al.* (2011), based on a study of 40 protected areas and 33 community-managed forests, found that the rate of deforestation was in fact lower in community-managed forests (common property) than in protected areas (state property).

The empirical evidence has shown that the mere legal designation of an area as “protected” does not guarantee the protection of biodiversity values. Enforcement of the laws regulating protected areas to prevent poaching or encroachment is essential if the state property regime is to be effective. Studies on law enforcement in protected areas have focused on illegal harvesting and the illegal wildlife market (Naylor, 2005; Pires & Moreto, 2011). More recently, studies have examined the law enforcers themselves, or forest rangers (Moreto, 2016; Warchol & Kapla, 2012). Evaluation of law enforcement requires multiple approaches related to human behaviour and criminal justice (Gore, 2011; Moreto, Lemieux, & Nobles, 2016). Gibbs *et al.* (2009) and Gore (2011) term this “conservation criminology”, defined as “the multi- and inter-disciplinary approach to understanding environmental crime and danger.” This approach combines the study of “green crime”, criminology, and decision science.

WWF (2004) found that, in 76 of the 206 protected areas evaluated, the main problem facing management was enforcement. Enforcement was found to be the key factor in effective protection of a reserve. Well-trained, well-equipped teams and seasoned rangers were fundamental to enforcement, along with an adequate budget and good levels of education. A wider environment of good governance and appropriate sanctions was also required to support local efforts at law enforcement. Nellemann *et al.* (2007) found that illegal activities such as poaching occurred in 37 of 41 protected areas in Indonesia. Kaimowitz (1996b)

proposed the involvement of the military to augment the human resources and budget available for enforcement, an approach that is now used in Indonesia.

A study of protected areas in Sulawesi, Indonesia, by Lee, Sodhi, and Prawiradilaga (2009) found that illegal harvesting was influenced by a negative attitude to conservation among locals and previous conflict when the protected area was being established, making enforcement difficult. (Olupot, Barigyira, & Chapman, 2009) found that establishing national parks when combined with adequate enforcement was effective in decreasing illegal harvesting. Hilborn *et al.* (2006) emphasise the importance of providing economic benefits to the local population as an incentive to enforcing the protection of wildlife. Pires and Moreto (2011) found that involvement of local people in preventing illegal activity was an essential component of effective enforcement.

The limited effectiveness of many protected areas is not an argument to abandon state-imposed regimes but points to the need for inclusion of indigenous communities, private landowners, and industrialists in the overall management of the area (Dudley & Stolton, 1998). These integrated or community-based programs are discussed in the following section.

2.3 Community-Based Approaches to Forest Conservation

It has been argued above that tropical forest ecosystems have great value to the livelihoods of local communities and hence that state-creation of protected areas as “people-empty areas” makes it difficult to achieve forest conservation. In this section I focus on the alternative of community-based approaches to forest management.

2.3.1 Emergence of community integration in forest conservation

Reconciling conservation and development is central to achieving the goal of sustainable development (WCED 1987). Forests provide food, game, and incomes for rural populations throughout the tropics. According to Feer (1993), forest communities are among the poorest rural communities, relying on the forest to meet most of their basic needs. Hence the exclusion of populations from protected areas is considered by some to be a denial of the right to use resources in support of livelihoods (Brown, 2002). The urgency of environmental conservation motivated the earliest and best-known environmental organizations such as IUCN, WWF, and the Sierra Club, giving rise to an abundance of conservation projects (Swallow *et al.*, 2007). However, many of these failed because local communities and authorities felt robbed of their rights. In many places, illegal activities were observed, such as intensive extraction of forest resources or the clearing and burning of forest to convert

the land in and around protected areas to agricultural use (Brandon, 1995; Downing *et al.*, 1992). It became clear that creating protected areas without local participation required a large and on-going investment in enforcement to restrict access. Hence, as Swallow *et al.* (2007) observe, integrated conservation programs, combining measures to both reduce poverty and promote resource protection, have become the norm, at least in principle.

Blaikie and Jeanrenaud (1997) distinguish three conservation paradigms, conceiving the link between conservation and development in different ways. First, the conventional approach views the local population as a direct threat to biodiversity, as described above. Second, the populist approach considers that the participation of local people is the key to sustaining biodiversity. Third, the neo-liberal approach sees the failure of government as compromising biodiversity, the solution being to add economic value to conservation. The populist and neo-liberal perspectives have converged on the view that exclusionary protected areas are not effective in achieving conservation goals. These approaches alienate local resource users on the one hand and are seen as a burden on the limited resources of the state on the other (Brown, 2002). This has led to the emergence of new approaches to the designation and management of protected areas involving the integration of protected areas with their social and economic context. This paradigm shift has often been called the “new conservation” (Blaikie & Jeanrenaud, 1997; Brown, 2002).

Five types of integrated conservation-development program have been identified in the “new conservation” literature: integrated programs of conservation and development (Swallow *et al.*, 2007; Wells *et al.*, 1999); market-based instruments for conservation (Jordan, Wurzel, & Zito, 2005); payments, compensation, and rewards for environmental services (Pagiola, 2002; Swallow *et al.*, 2007; Wunder, 2005); eco-certification (Swallow *et al.*, 2007) and eco-labelling (GEN, 2004); and payment of compensation for environmental damage (Burgin, 2008; Crocker, 1966; Dales, 1968; Engel & Palmer, 2008; Swallow *et al.*, 2007; Tomich *et al.*, 2002). These are reviewed in turn.

2.3.2 Integrated programs of conservation and development

Brandon (1995) suggests that the new approach to managing protected areas should meet conservation objectives and the needs of communities around protected areas. A key program of integrated conservation and development is the Man and the Biosphere (MAB) Program established by UNESCO in 1971. The establishment of Biosphere Reserves, based on both ecological and humanistic principles, aims at the conservation of both nature and human well-being. A biosphere reserve is organized into three parts: (i) the core protected area, free from exploitation and closed to access, (ii) a restricted area, usually

dedicated to research and education, and (iii) a transition zone with free access but restrictions on the use of resources. Creating a park means the interdiction of settlement in the core zone of the protected area and re-settling any people in the core zone to the buffer zone, where development projects are generally implemented (Puig, 2001). Access to the park is restricted to members of the local community pursuing approved activities (beyond tourism and scientific research). Up to 2007, the MAB Program established 368 biosphere reserves in 91 countries, and the list was continuing to grow (Swallow *et al.*, 2007).

A related approach is Integrated Conservation and Development Projects (ICDPs), supported by the World Wide Fund for Nature (WWF) and the World Bank. ICDPs were designed to pursue three objectives of sustainable development: biodiversity conservation, community participation, and economic development (Wells *et al.*, 1999). ICDPs provided some examples of successful community-based conservation. For example, Abbot *et al.* (2001), in their study of an ICDP in Cameroon, found that subsistence-related activities had a positive impact on conservation. However, the plans were often difficult to maintain financially and their impact on conservation has rarely met expectations. In most cases, the development part of the project has been effective, but only locally, and the demands on the protected resource have not decreased sufficiently (Swallow *et al.*, 2007).

The concept of buffers is used in both the MAB Program and the ICDPs. The buffer zone is seen as a peripheral area of a national park or reserve area with restrictions on the use of resources to create additional protection for the nature reserve itself and to compensate farmers for the loss of access to the strictly reserved area. Buffers are designed to ensure the development of rural communities outside of protected areas. However, many projects to establish buffer zones represent a territorial expansion of state power and alienation of land in the name of conservation. Displacement and evictions, termed “elimination of incompatible land uses”, are key management strategies of the buffer zone, even though local land tenure security is presented as a significant benefit to adjacent communities. In general, buffer zones suffer from an inability to recognize the unequal power relations and how they relate to access to land and resources, ultimately diminishing the effectiveness of conservation policies (Neumann, 2000).

Integrated conservation and development programs are ongoing. However, though their principles and objectives are worthy, their implementation has always been difficult for the reasons enumerated above. Moreover, communities have experienced unfair land compensation. The programs have reduced communitys’ production capacity, income, and tenure security (Neumann, 1996; Peluso, 1993). New tools for environmental conservation

and improvement of livelihoods were sought in response to this problem. Among them, market-based instruments have seemed promising and have been the most discussed.

2.4 Market based instruments for conservation

The idea of market-based instruments for conservation is based on the observation that most of the efforts to protect and conserve natural resources are not paid for by the beneficiaries of this conservation. In addition, conservation efforts can be expensive or unproductive. Thus, market-based instruments are seen as a way to reward or compensate people, industries, governments, and organizations whose actions are needed to preserve the environment.

Jordan *et al.* (2005) describes four types of "New Environmental Policy Instruments" (NEPIS) introduced since the 1990s: (1) market-based instruments, (2) eco-labels, (3) certification systems, and (4) voluntary industry-government agreements. The NEPIS could all be seen as instruments for developing a conservation market as they all imply placing an economic valuation on environmental effort. They have been tested since the late 1990s in a variety of contexts, often as part of integrated development and conservation programs.

2.4.1 Payments, compensation, and rewards for environmental services

Environmental or ecosystem services provided by a well-managed forest can include watershed protection, conservation of biodiversity, air regulation including mitigation of greenhouse gas emissions, and scenery (Pagiola, 2002). A specific conservation activity in one location undertaken by an economic agent can have a positive impact on other consumers or producers, without them having to pay. However, there is often scope to organise for payment for the services of the environment (Swallow *et al.*, 2007). Payment for Environmental Services (PES) can be defined as "a voluntary transaction where a well-defined environmental service (or a land use likely to provide this service) is purchased by a buyer from a seller, if and only if the provider secures the provision of the environmental service" (Wunder, 2005, p. 3). Other terms used are Compensation for Environmental Services (CES) and Rewards for Environmental Services (RES). All constitute the incentives provided to the stewards of ecosystems to improve or continue to maintain environmental services (Swallow *et al.*, 2007).

Views about PES, CES, and RES vary from optimistic to pessimistic. Unlike traditional approaches to conservation, PES, CES, and RES consist of a direct payment for services provided (Ferraro and Kiss 2002). Some observers are very optimistic, thinking that these systems will lead to "win-win solutions", promoting both environmental conservation and

development of local livelihoods. Others feel that these mechanisms will either improve the condition of poor people or help the environment but not both. Pessimists believe that both the environment and the poor will suffer from these systems, which will benefit only the corrupt governments or multinational companies in forestry and agro-industry (Swallow *et al.*, 2007).

The implementation of these mechanisms is very difficult and requires a huge investment in preliminary work. However, Latin America countries such as Costa Rica, Colombia, Ecuador, and Mexico have had some successful experience (Locatelli, Rojas, & Salinas, 2008; Pagiola, 2002). In some cases, the system is managed nationally, while in others, agreements or conventions are implemented locally.

2.4.2 Eco-certification and eco-labelling

Eco-certification, such as the ISO14000 series of environmental management systems required in the European Union, involves management processes that require businesses to audit their environmental impacts, establish internal audit systems, and publish regular reports. Companies participating in these plans receive authority to use logos in their advertisements to attract consumers, investors, and employees (Swallow *et al.*, 2007). These schemes can be applied to agribusinesses, including small farms. Hence they can help preserve the forests and biodiversity.

An eco-label is a label that identifies environmental practices based on lifecycle considerations (GEN, 2004). It has been categorised as a market-based instrument through incorporating the sustainability of a production system, for example, a forest certification scheme (Cashore, Auld, & Newsom, 2004; Viana, 1996). It has been categorized as “soft law governance” involving voluntary standards and informal institutions (Crawford, 2006). Both eco-certification and eco-labelling provide information to consumers on the process of production of goods or services and the environmental impact of the products they buy.

While farmers and other producers may improve their performance and efficiency by following voluntary codes of conduct such as Good Agricultural Practices (GAP) and Good Management Practices (GMP), they have no means of guaranteeing or verifying their practices. However, the demand from consumers who want to have some confidence in producers’ claims has led to the emergence of various product warranties (a form of eco-certification and labelling) for agricultural goods based on third-party certification schemes (International Trade Center, 2011). Certification takes the form of issuing a certificate that the product has conformed to the rules and regulations of the voluntary standards in place

in a given setting. The certification must be confirmed by a third party – in this case, a certified auditor. Certification is frequently undertaken on an annual basis and needs to be periodically renewed (International Trade Center, 2011).

As a commodity produced mainly in developing countries and widely-consumed in developed countries, coffee is considered an object for ethical consumption globally. The "sustainable coffee" movement aims to incorporate the concept of conservation in the coffee value chain (Conservation International, 2012). The movement also intends to give a competitive advantage to smallholders through price premiums as a form of compensation (Lewis & Tomich, 2002). Conservation International with other related organizations defined the principles of sustainable coffee production in 2001 to assist the sustainable coffee movement (Conservation International *et al.*, 2001). In analysing the implementation of these principles, Gereffi, Garcia-Johnson, and Sasser (2001) outline four broad categories of voluntary regulation of coffee production and trade, according to who produces the guidelines and conducts the monitoring: (1) initiatives by producers, or first-party certification, (2) initiatives by a trade association or an industry, or second-party certification, (3) third-party certification or involvement an external stakeholder such as a NGO, and (4) multi-party certification of the process by involving government or multilateral agencies.

Certification has been considered a good approach to protect biodiversity through recognising farmers as stakeholders in the conservation of biodiversity (Harvey *et al.*, 2008; Scherr & McNeely, 2008). From the environmental perspective, there have been two different levels of assessment of coffee certification. On the one hand, the biodiversity impact has been assessed at the farm level, for example, by counting species diversity of butterflies and forest birds in coffee agroforests in Mexico (Mas & Dietsch, 2004), by counting ant and bird species in Fair Trade coffee plantations in Mexico (Philpott *et al.*, 2007), or by comparing coffee yield, species richness, and coffee shade elsewhere in Latin America (Perfecto *et al.*, 2005). From these studies, certification was found to have a positive impact on species diversity, especially through encouraging planting of shade trees in coffee plantations (Mas & Dietsch, 2004; Perfecto *et al.*, 2005), or to be not significantly correlated with biodiversity status (Philpott *et al.*, 2007).

On the other hand, assessments at the landscape level go beyond measurement of species richness in small habitat patches (Fahrig, 2013; Hanski, 2011). Research on coffee certification in Brazil focused on the importance of biodiversity impact at the landscape level, finding that coffee certification was important to control deforestation and slow the conversion of forest to agricultural land (Hardt *et al.*, 2015). Other studies also found that

tree cover increased significantly in certified land compared with non-certified land (Rueda & Lambin, 2013; Takahashi & Todo, 2013).

Coffee certification has also had an impact from the economic point of view. Kilian *et al.* (2004) found price increases due to higher quality in several coffee certification schemes initiated by private-sector actors in Latin America. Several studies have found that coffee certification has made an important contribution to the differentiation of farmers' product and the creation of wider markets for the commodity (Kilian *et al.*, 2004; Méndez *et al.*, 2010; Parrish, Luzadis, & Bentley, 2005).

2.4.3 Compensation for environmental damage

The theory of market approaches to environmental management was first elaborated in the 1960s (Crocker, 1966; Dales, 1968). At this time, the theory was applied to establishing markets to allow trade in the quantity of pollution or the right to harvest a natural resource (Swallow *et al.*, 2007). This approach was then developed for other environmental services such as water allocation for the environment, sequestering carbon emissions, and biodiversity conservation.

The Clean Development Mechanism (CDM) for carbon offsets is one of the flexible mechanisms under the Kyoto Protocol based on the idea that the opportunity cost of reducing carbon emissions in developing countries is lower than in developed countries, creating opportunities for mutually beneficial trade (Tomich *et al.*, 2002). Essentially, developed countries such as the US could pay less-developed countries such as Indonesia to preserve their forests, thus avoiding carbon emissions that would otherwise have occurred. Several studies have been made to estimate the opportunity costs of implementing such offsets and the on-going management costs. It seems that the main challenge is uncertainty over the definition and enforcement of property rights to land and trees in many developing countries. Moreover, it is very difficult to control long-term conservation and to share the compensation equitably between stakeholders. The risk is that governments will sell offsets based on the assumption of state ownership of forests, while removing the access rights of local people and investing little in improving their livelihoods. In response, Tomich *et al.* (2002) have suggested the use of carbon offsets via "agro-forestry" in Indonesia. This proposal is to reward people for establishing and maintaining agroforestry systems based on the observation that property rights to trees planted on farms would be easier to establish and enforce than rights to the timber from natural forests. Nevertheless, they conclude that there is still much to learn about the costs of implementation, even using agro-forestry (Engel & Palmer, 2008; Tomich *et al.*, 2002).

As well as carbon offsets, biodiversity offsets have been considered as a method to encourage governments under the Millennium Development Goals and the Convention on Biological Diversity. This system is based on the same principles and methods as carbon offsets and therefore has the same advantages and difficulties in implementation. Biodiversity offsets can strengthen the legitimacy of corporate activities and provide governments with a way to encourage developers to contribute to conservation. Conservation groups may be able to use the incentive of compensation to promote the conservation of biodiversity, and local communities may benefit from access to rehabilitated conservation sites for eco-related activities such as tourism (Burgin, 2008).

The UN program for “Reducing Emissions from Deforestation and Forest Degradation” (REDD) is also based on compensation for forest conservation. The REDD Program assumes that endangered forest areas can be protected by entering into agreements with governments and local communities to preserve the forest in return for compensation. REDD in fact uses a number of the tools of the “new conservation”, including biodiversity offsets and carbon offsets in a joint project. A REDD project can involve payment for environmental services, funding for programs to prevent wildfires, improvements to land tenure security, enforcement against illegal logging, promoting off-farm employment, supporting agricultural intensification in favourable areas, strategic planning of road improvements, supporting community forestry, and introducing a range of restrictions on the use of forest resources and incentives for forest conservation.

Many questions have been raised about REDD (Burgin, 2008). There is the risk of simply moving the pressure of deforestation to other regions or even unintentionally encouraging deforestation. Indeed, if companies are offered a reward to conserve forest, they may buy more land to develop in order to obtain more money from REDD. Another question concerns the difficulty of assessing the real danger of deforestation. Companies or communities may offer to preserve inaccessible forest on land of low fertility that would never be developed or cultivated. Otherwise the gains from compensation are unlikely to offset the costs of foregoing development. In addition, the compensation could be used to develop infrastructure such as roads, which may make exclusion from the REDD forest more difficult and endanger other forest areas in the long term. Another problem is that the preserved region may have different ecological characteristics to the region that is being exploited, making a perfect offset difficult to achieve. Finally, these mechanisms could promote fragmentation of ecosystems and in this way have a negative impact on biodiversity.

Many of the same difficulties faced by the CDM are also present with REDD. Is the designated forest secure against natural and human threats? Are the payments reliable? How long will they run? How should payments be updated as the opportunity costs change? Should REDD be integrated into existing carbon markets? What are the potential impacts of the mechanism on the rural poor?

2.5 Conclusion

Forest ecosystems in areas of high conservation value can be regarded as a common pool resource. This resource can be overexploited if there are no institutional constraints to prevent a “tragedy of the commons”. Two broad solutions to this dilemma have been debated and implemented. One is the imposition of a state property regime through the declaration and enforcement of protected areas (with varying degrees of exclusion). Another is the creation of a common property regime whereby local communities manage the resource according to established institutions. The first policy of establishing exclusive, “people-empty” protected areas has a long tradition. However, this may be less effective in achieving conservation goals because of its impact on the livelihoods and incentives of forest-dependent communities. Thus policies have shifted towards the integration of conservation of protected areas with the participation and development of local communities.

This study is about how to reconcile conservation and development on the fringes of a national park in Indonesia – the Bukit Barisan Selatan National Park in Lampung Province. The Park has been managed as exclusive state property with resources devoted to enforcing exclusion. This regime is supported in some instances by community institutions which effectively uphold the rules of access specified by the state. However, neither state nor community property regimes have been able to prevent encroachment by smallholder coffee producers, particularly in some sectors of the Park. This has promoted the use of an incentive-based mechanism – coffee certification – as an alternative to relying on enforcement alone. The study examines these two main approaches, their interaction, and the circumstances affecting their impact on conservation and development goals.

CHAPTER 3
THE STUDY CONTEXT

To understand the interplay of conservation and development on the fringes of the Bukit Barisan Selatan National Park (BBSNP) it is necessary first to outline the historical, environmental, and institutional context of the study area. In this chapter, I first give an historical overview of Indonesian forest policy and tenure from the colonial era to the current era of political reform and decentralization. I then describe the classification of protected areas, especially National Parks, in Indonesia in comparison with the widely-used IUCN classification. Following this I focus on the district level in terms of the natural environment, human occupancy, and the evolution of land use. I focus in particular on the smallholder coffee sector as coffee cultivation is the main source of income for rural households and the main motivation for encroachment on the National Park. Finally, I describe the Park itself in terms of its establishment, biophysical characteristics, biodiversity richness, human occupancy, and management.

3.1 Historical Overview of Indonesian Forest Policy and Tenure

Indonesia is an archipelagic country in Southeast Asia with over 17,000 islands lying between the Indian and Pacific Oceans. Indonesia's rainforest, found predominantly in the islands of Papua, Sumatra, Kalimantan, Sulawesi, and Java, is the third largest tropical forest in the world after that of Brazil and the Democratic Republic of Congo (Barber & Matthews, 2002). The biodiversity and richness of the tropical forest ecosystem is indicated by the fact that Indonesia has just over 1% of the earth's surface but 10 per cent of the world's mammal species, 11% of plant species, and 16% of bird species. However, about 40% of the Indonesian forest has disappeared since the 1950s due mainly to logging, mining, and agricultural expansion. According to Barber and Matthews (2002), Indonesia was losing 1 million hectares of forest per year in the 1980s, rising to 1.7 million hectares in the 1990s. They attribute this excessive rate of deforestation to the corrupt political and economic system in place. Nevertheless, according to satellite imagery for 2005-2006, forest still occupied 98.5 million ha or 52.4% of Indonesia's total land area (Ministry of Forestry, 2009).

Forest policy has evolved from the precolonial era through the periods of Dutch colonial rule, the Japanese occupation, the first decades of independence, the "New Order" under

President Suharto, and the post-Suharto period of political reform and partial decentralisation (Henley, 2008; Henley & Davidson, 2008; Peluso, 1992). Forest management in the precolonial and colonial periods had a strong influence on subsequent forest policy and access (Peluso, 1992). In particular, forest management was very centralized until the current era of decentralisation.

Forest management has also differed historically between Java and the so-called “outer” islands based on different demographic, ecological, and political conditions (Peluso, 1992). Forest management in Java was governed according to principles of European forest science from the Dutch era. Similar management for commercial logging was initiated in the outer islands (especially Sumatra and Kalimantan) in the “New Order” period and was a major cause of deforestation and forest degradation in that period (Peluso, 1992). The current forest situation still depends largely on central government policy as most of the forest area is considered state land, divided into three categories – production forest, protection forest, and conservation forest, based on the Act No. 41/1999 on Forestry.

3.1.1 Dutch colonial period

Before the colonial era, political organization in most of Indonesia was based on localised states ruled by sultans or rajas. Centralization began with the activities in the archipelago of the Dutch East India Company (*Vereenigde Oostindische Compagnie,* VOC) and intensified with the transfer of power to the Dutch Crown in 1799 (Patriat, 2007; Peluso, 1992). The Netherlands East Indies (NEI) Government made Java the centre of its commercial activities and Batavia (later Jakarta) its capital. The VOC had been governing through local regents (*bupati)* who headed a regency or district (*kabupaten*) since at least the early 18th century when coffee was introduced (Breman, 2015). In 1903, the regencies were allowed to have their own government and autonomous financing. In 1905, municipalities were created, but municipal boards had no authority and were dominated by central government representatives. This devolution was actually intended to increase the effectiveness of central government. In 1922, a regional hierarchy was established, from the provincial level to the local community (Patriat, 2007), foreshadowing the current multi-tiered government structure.

The elements of contemporary forest policy in Indonesia were laid down during the colonial period. For more than 200 years, the VOC and then the NEI Government managed the teak forests of Java for building boats (Nurjaya, 2005). Forest management on the outer islands was not established until the early 1920s through the Ordinance on Forest Protection

(Lindayati, 2000). By the end of seventeenth century, over-exploitation of forests in Java was already threatening supply to the boat-building industry. In the early nineteenth century, the NEI Government under Governor-General Daendels (1808-1811) decided to address this problem by implementing a reforestation plan for forest areas and drafting regulations for harvesting permits, with sanctions for non-compliance (Nurjaya, 2005). This was the beginning of forest management in Indonesia using science, modern forest technology, and government regulation (Lindayati, 2000). However, the reforestation program was unsuccessful because knowledge of how to manage Java's forests was limited. Moreover, the introduction of the forced cultivation system (*Culturstelsel*) under Governor-General Van Den Bosch (1830-1833) that prevailed from 1830 to 1870, resulted in extensive conversion of forest lands to export crops such as coffee (Lindayati, 2000).

Under the Dutch, forest concessions were granted to private companies and, in 1865, the government promulgated a basic forestry law which set out the conditions for logging operations (Lindayati, 2000; Nurjaya, 2005). Reserve sanctuaries were also created but in relatively small areas (Bellocq & Chaponnière, 2008; Santosa, 2008). However, in 1934 a 400,000-hectare reserve was established in what is now the Leuser National Park in Sumatra.

Forest policy under the Dutch was highly centralized and managed by the colonial government. Although the situation has since changed, many of the ideas of Daendels on absolute state control over forest management have continued to be applied (Santosa, 2008). The colonial laws and regulations for forest management were not adapted to local social, cultural, and eoclogical conditions and so were not effective as a basic law for forest management (Ministry of Forestry, 1986). Moreover, centralised control of forest management was difficult to achieve in practice (Poffenberger, 1997).

3.1.2 Japanese occupation

In March 1942, the Dutch surrendered unconditionally to the Japanese, before following a tactical destruction of productive assets such as transport, telecommunications, and agricultural and forestry infrastructure. The Japanese established a hierarchy from the governor of the province, to the district chief, to the householder, in order to exercise full control (Patriat, 2007). This organization was later adopted by the leaders of the Indonesian military. When the Japanese were on the verge of losing the war, they decided to promote the independence of the country to prevent the return of Western colonial powers.

The occupying Japanese requested former forestry officials to continue working to manage the forest throughout the archipelago (Nurjaya, 2005). However, the teak forests on Java were degraded due to the activities of the Indonesian resistance and the lack of competent forestry personnel. In addition, the occupying forces massively exploited the teak forests to help fund the war effort. At the same time, the forest areas outside Java suffered from the development of mining and logging (Poffenberger, 1997).

3.1.3 Independence under Sukarno

Sukarno, the first Indonesian president, proclaimed the independence of Indonesia on 17 August 1945, enunciating the Five Principles (*Pancasila*), which included popular sovereignty based on consultation and representation. After fighting the nationalists for four years, the Dutch recognized the Indonesian Republic on 30 December 1949. The constitution of 1954 enshrines the “unitary Republic of Indonesia.”

According to Lindayati (2000), the period of Sukarno’s presidency was marked by socio-political instability. Some forest areas were occupied and taken over by villagers, despite the resistance of forestry officers. Indeed, some foresters, particularly members of the Communist Party of Indonesia (*Partai Komunis Indonesia, PKI*) supported the idea of redistributing forest land to the peasants. The Land Act of 1960 provided for land reform, including agricultural and forest land (Fauzi, 2005). Many farmers demanded the immediate implementation of this reform, but their request was not fulfilled before the end of the Sukarno regime and the annihilation of the PKI (Lindayati, 2000).

3.1.4 New Order

The attempted coup of 1965, which was officially blamed on the PKI, brought to power General Suharto who held the presidency for over three decades. Under his “New Order” regime, he focused on strengthening central power to assert control by establishing two parallel structures of political organization: (1) centralised representative government throughout the archipelago (from Jakarta to the provinces, districts, and sub-districts) and (2) the Indonesian armed forces that exercised control down to the village level (Patriat, 2007).

The period of the New Order was characterised by the central government and the armed forces taking control of resources, including forest resources (Durand, 1999). Law 5/1967 on Principles of Forestry states that “any forest in the territory of the Republic of Indonesia and the natural resources they contain, are controlled by the State.” According to Durand

(1999), by the time the Ministry of Forestry was established in 1983, the forest area under its jurisdiction was assessed and mapped at 144 million hectares (compared with the estimated total forest area in 1930 of 120 million hectares). Forest land was zoned into protected areas, areas designated for conversion to agriculture, and production forest, and forest management was delegated to concessionaires, apart from the creation or expansion of arable areas (Michon, 2003).

The operating system set up under the 1967 Law gave exclusive logging concessions, termed the Right to Exploit the Forest (*Hak Pengusahaan Hutan,* HPH) to large private companies – except in Java, where forests remained under the control of state companies. The number of concessions increased from 71 in 1970 to 298 in 1976 and 580 in 1980. Most were located in Sumatra and Kalimantan. Many forest concessions were awarded by the government to the military and to business associates of President Suharto, particularly Indonesian Chinese. The granting of these concessions led to an explosion in the volume of timber production and exports between 1965 and 1980 (Poffenberger, 1997). Durand (1999) considers the management of forests in Indonesia during the New Order as "three decades of risky experiment." He attributes widespread forest degradation and the severe fires that have occurred in Sumatra and Kalimantan since 1982 as due to the mismanagement of Indonesia's forest through policies favouring short-term profits.

Nevertheless, during the New Order period, the government modified the rules in 1970 to limit the issuance of HPH in protected areas, which is considered the starting point for the designation, establishment, and management of conservation areas in the country's forests (Santosa, 2008). Indonesia also joined the Convention on International Trade in Endangered Species (CITES) in 1978. The concept of the National Park was introduced two years later, starting with five parks and increasing to 11 parks after the Second Congress on National Parks in Bali in 1982. Although CITES was adopted and National Parks created in the 1970s and 1980s, it was not until 1990 that the Law on the Conservation of Natural Resources and Ecosystems (Law No. 5/1990) was promulgated.

The rights of local communities to forest lands were deleted by a 1970 decree which cited the superiority of the public interest, thus inadvertently encouraging local people to convert forest into farmland (Durand, 1999, 2000). Although the PKI was banned, the conflict between farmers and the government over the forest was not yet settled and farmers continued their "illegal" activities in the forest (Lindayati, 2000; Peluso, 1992). As an attempt to resolve the conflict, the government initiated various forest management programs with civil society using three approaches (Lindayati, 2000):

1) The “Mamalu” approach was introduced in 1970. Considering that encroachment on the forest was due to poverty, these programs sought to improve the prosperity (*makmur*) of farmers living near the forest through the forest rangers (*mantri*) and village heads (*lurah*) – hence “ma-ma-lu”. However, the approach failed because the forest field staff and village heads were not equipped to implement central government programs.
2) The development of “forest-village” companies began in 1982 and was funded by the Ford Foundation in 1986 to improve farm incomes through the implementation of rural development programs.
3) The “social forestry” approach was introduced in the late 1980s for degraded forests owned by the state. This program will be explained further in Section 3.1.6.

3.1.5 Reform and decentralisation

The 1997-1998 Asian financial crisis greatly affected the economy, society, and political situation of Indonesia (Bellocq & Chaponnière, 2008). After the fall of the Suharto regime in 1998, all aspects of government have been subject to a process of reform (*Reformasi*). In particular, decentralization was seen as a solution to the challenges facing the country. Decentralisation was also a condition for access to international aid from both multilateral lenders (the International Monetary Fund, the World Bank, and the Asian Development Bank) and bilateral donors (Suporahardjo & Setyowati, 2008). In reaction to the extreme centralism under Suharto, the radical decentralization that was introduced from 2001 left the centre with fewer prerogatives (Peluso, 2007; Suporahardjo & Setyowati, 2008). As Patriat (2007, p. 2) observes, “from a centralized and omnipotent state, the country became overnight, on 1 January 2001, one of the most decentralized countries in the world.”

Decentralization was initially based on Law 22/1999 on authority and responsibility and Law 25/1999 on fiscal balance between the centre and regions. They provided for the district (*kabupaten*) to be the main functional unit of decentralized government. The district enjoyed considerable autonomy except in areas reserved for the central government, namely, defence and security, foreign affairs, fiscal and monetary affairs, justice, religion, strategic technologies, conservation, and national standardization. These laws represented a compromise between the “introduction of a federal system in which power would be transferred to the provinces, and the perpetuation of a highly-centralized system” (Patriat, 2007, p. 3).

However, the decentralisation laws posed a number of problems. For example, there was no clear hierarchy between provinces and districts. Moreover, by giving broad powers (except for those specifically assigned to the centre) to the district, instead of defining its specific functions, Law 22/1999 created an unclear situation and led to different practices between districts (Patriat, 2007). Hence these laws were superseded by Law 32/2004 on the clarification of the hierarchy of laws enacted by the various institutions, and Law 33/2004, revising the arrangements for fiscal balance. These new laws changed the concept of decentralization (Cahyat, 2005). However, by continuing to grant the same status to the laws and regulations promulgated at each level of government, they did not resolve the problem of legislative ambiguity.

The new political institutions are depicted in Figure 3.1 and Figure 3.2. The President and his ministers head the central government. The regional government is divided into two levels: the provincial government, headed by a governor, and the district or municipal government headed by a regent (*bupati*) or mayor. The village is the lowest level in the system of government. The village head (*kepala desa*) is directly elected or nominated by the villagers and has executive authority at the village level. The village is divided into several sub-villages, each headed by a *ketua pemangku,* in coordination with the heads of smaller hamlets. At the village level, the legislature is the village consultative council (*Badan Permusyawarahan Desa*, BPD). The laws and regulations passed at each level are shown in Figure 3.2.

Regarding forest management, the decentralization laws are vague and sometimes contradictory. Article 7 of Law 22/1999 included the use and conservation of natural resources in the powers retained centrally, while Article 10 conferred on the regions the authority to manage the natural resources under their jurisdiction and the responsibility for maintaining the environment (Resosudarmo, 2005). The Framework Law on the Forest (Law 41/1999) seeks to balance maintaining central control over the forest resource and the allocation of concession rights with recognizing the existence of traditional (*adat*) and community forests. This law states that the Department of Forestry is empowered to manage “forest land” (*Kawasan Hutan*), which means “designated surfaces set by the Government to be retained as forest.” The law distinguishes two areas: (1) State forest (*Kawasan Hutan Negara*), in which the Department of Forestry has established that there are no private rights to the land; (2) Private forests (*Hutan Hak*), in which the land is classified as forest but there are private rights attached to the land.

The area of Forest Land in 2008 comprised 114 million ha of Permanent Forest and 23 million ha of Convertible Production Forest (Ministry of Forestry, 2009). Only 12 million hectares, or 10% of the total area of Forest Land, were clearly identified as belonging to the State (Forest Trends and ICRAF, 2005). For other areas, the rights attached to the forest were uncertain.

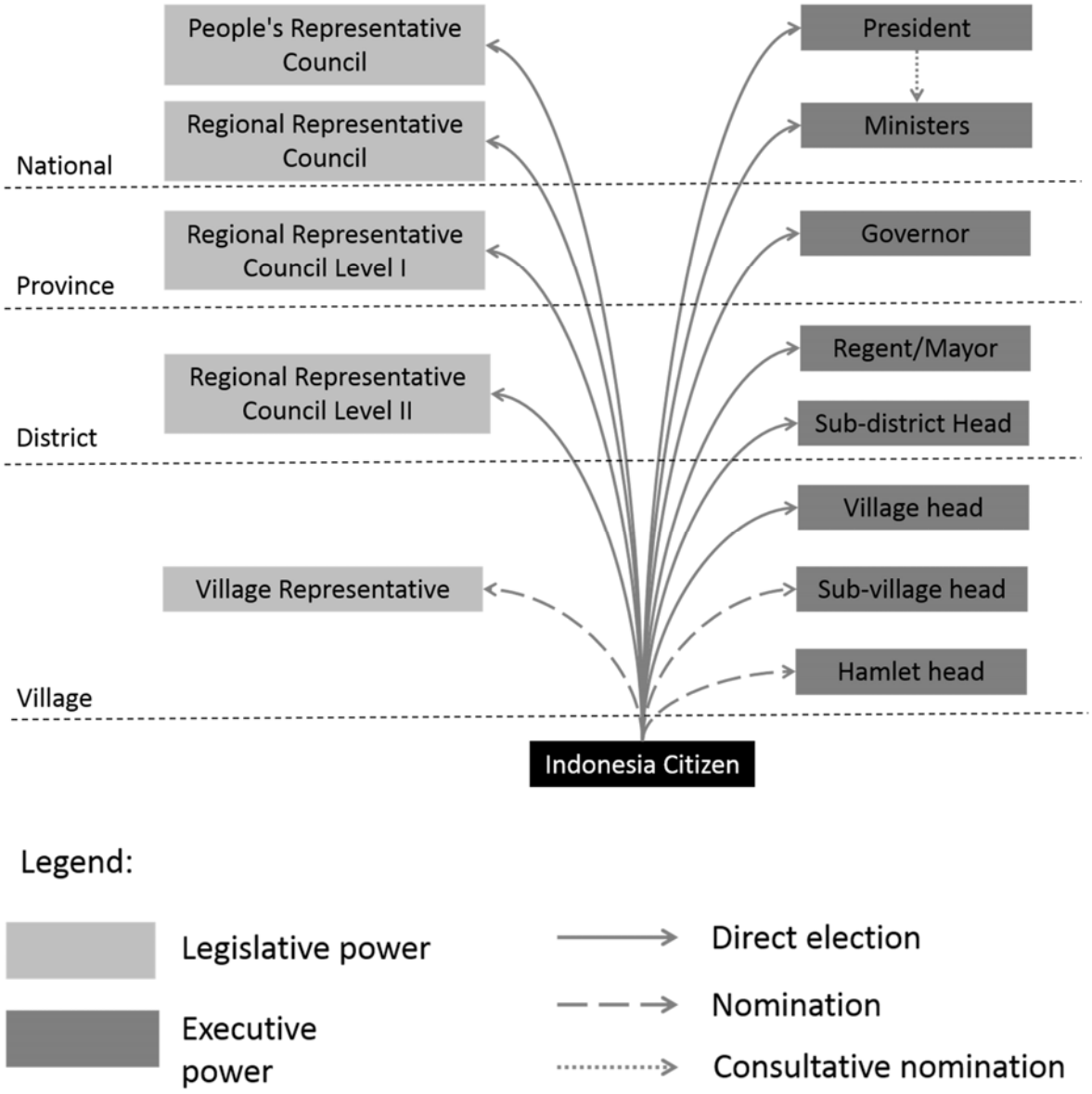

Figure 3.1. The electoral system and the distribution of power in Indonesia

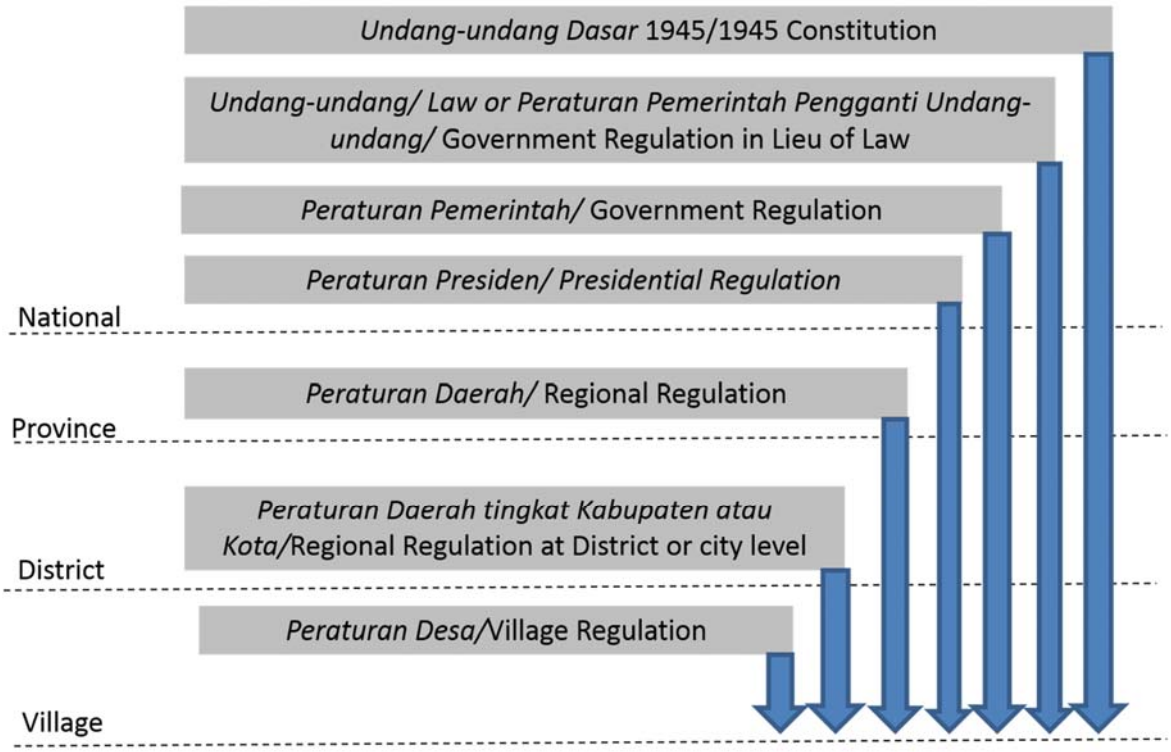

Figure 3.2. Levels of regulation in Indonesia and their scope

Also in 1999, specific decrees were issued transferring the management of the forest from the central government to the provinces and districts (PP No. 6, SK Menhutbun No. 310/KPTS II). The district heads (*bupati*) could now issue permits for small concessions (less than 100 ha) of two types: (1) a right to exploit forest resources (*Hak Penggunaan Hasil Hutan*, HPHH) for the extraction of non-timber forest products; and (2) a right to use timber (Izin Pemanfaatan Kayu, IPK), renamed the right to extract and use timber (*Izin Pemungutan dan Pemanfaatan Kayu*, IPPK), for the temporary operation (12 months) of small blocks of forest (Levang et al. 2005). The government also began implementing "Joint Forest Management" in 1999, in collaboration with NGOs. This approach was particularly intended for the collective rehabilitation of degraded forest areas by planting trees and promoting agroforestry. The first category was People's Forest (*Hutan Rakyat*, HR) on private lands, and the second was Community (or Social) Forest (*Hutan Kemasyarakatan*, HKm) on protection forests and production forests (whether convertible or protected), but not on nature reserves.

In practice, the fall of the New Order led to the temporary disappearance of any form of supervisory authority over resource exploitation at a time when the fall of the rupiah meant export prices were booming, hence illegal logging reached a high level (Bellocq &

Chaponnière, 2008). After decentralization, the *bupati* issued many operating licences, not only to small areas of conversion and production forests as the law allowed, but also as large concessions (HPH), regardless of previous commitments by the central government. HPH are more heavily taxed but the operations could be reorganised as a series of smaller IPK or IPPK concessions. An order was made in 1998 allowing village communities living in or near the forest to get involved in logging by creating cooperatives, farmer groups, or associations. This decree was mainly to legalize access to the exploitation of non-timber forest products, but local communities demanded recognition of their "traditional rights" over what they regarded as their forests, including the right to exploit all forest resources. In 2013 the Constitutional Court gave stronger recognition to customary forest rights. It eliminated the word "state" from Article 1f of the 1999 Law on Forestry, which previously declared that "customary forests are state forests located in the areas of custom-based communities." It also revised Article 5, which said that state forests include customary forests. The implementation of this ruling is only now being worked out.

Some observers had expected that devolving resource ownership to "local people", who were argued to have a vested interest in preserving their environment, would promote resource conservation (Patriat, 2007). In general, however, the decentralization of natural resource management has had a negative impact on the Indonesian forestry sector, resulting in increased deforestation, illegal logging, degradation of conservation areas, and unsustainable forest management (Patriat, 2007). Even with the decentralization policy, however, all categories of conservation forest remained under the control of the central state, except Forest Parks (Damayanti & Masuda, 2008). I now focus on the creation of protected areas in Indonesian forest lands.

3.1.6 Protected areas and community forestry in Indonesia

As noted above, Indonesia had nearly 100 million hectares of forested land in 2005/2006, accounting for just over half the total land area. A significant part of this forest is included in protected areas: conservation forest, protection forest, and production forest. These were originally "nature monuments" and wildlife sanctuaries during the colonial era and were given the status of National Parks during the New Order when government authority was very centralized (Jepson & Whittaker, 2002).

The first protected area was the Cibodas Nature Reserve in West Java, inaugurated in 1889. The identification of protected areas was aided by the establishment in 1912 of the Netherlands Indies Nature Protection Association (*Nederlandsch Indische Vereeniging Tot*

Natuurbescherming), which urged the government to protect certain types of habitat and species (Direktorat Jenderal Perlindungan dan Konservasi Alam, 2010). In the 1960s, the Research Centre for Nature Preservation was established under the management of the Bogor Botanical Gardens. At the same time, the Ministry of Forestry had a section for Nature Protection. These institutions were then combined into the Section for the Protection and Preservation of Nature (*Perlindungan dan Pengawetan Alam,* PPA) under the Ministry of Forestry (Direktorat Jenderal Perlindungan dan Konservasi Alam, 2010).

From 1974 to 1983, the FAO supported Indonesia to implement the National Parks Development Program. Indonesia joined the Convention on International Trade in Endangered Species (CITES) in 1978. The first five National Parks were established in 1980. This number had risen to ten by the time of the International Congress on National Parks in Bali in 1982. Although these measures were taken in the early 1980s, the key legislation was promulgated in 1990 (Law 5/1990 on Conservation of Natural Resources and Ecosystems). The Convention on Biological Diversity was ratified in 1994. By 2007, Indonesia had 50 National Parks with an area of 16.4 million hectares, or about 17% of the forested area (Direktorat Jenderal Perlindungan dan Konservasi Alam, 2010).

Conservation of biodiversity in Indonesia is thus based primarily on the Forest Law (41/1999) and the Conservation Law (5/1990). The allocation of forest areas to different categories is determined by the Forestry Department following ministerial decrees. The forest is divided into three categories according to the functions it provides: (1) Conservation Forest, (2) Protection Forest, and (3) Production Forest. Conservation Forest itself is divided into three sub-categories: (1) Sanctuary Nature Reserves, (2) Conservation Areas, and (3) Game Reserves. These three categories are defined in Article 1 of the Forest Law. A Sanctuary Nature Reserve (*Kawasan Suaka Alam*, KSA) is defined as “a specific area of land or water with specific criteria for the preservation of plant and animal biodiversity and the ecosystem, and allows some use by local people.” This category includes Strict Nature Reserves (*Cagar Alam*, CA) and Wildlife Reserves (*Suaka Margasatwa*, SM). A Nature Conservation Area (*Kawasan Pelestarian Alam*, KPA) is “a land or water area whose main functions are to meet the needs of local people and preserve the diversity of plant and animal species. They should allow sustainable use of biological resources and ecosystems.” This category includes National Parks (*Taman Nasional*, TN), Leisure Parks (*Taman Wisata Alam*, TWA), and Forest Parks (*Taman Hutan Raya*, THR). The third major category, Game Reserves (*Taman Buru*, TB), are forest areas devoted to recreational hunting. The area within each category is shown in Table 3.1.

Table 3.1. Area of each type of forest reserve in Indonesia, 2009

Type of Reserve	Category	No.	Area (ha)	IUCN Category
Sanctuary Nature Reserve	Strict Nature Reserve	238	4,586,665	Ia
	Wildlife Reserve	74	5,099,849	IV
Conservation Area	National Park	43	12,298,216	II
	Leisure Park	105	257,348	Not a PA
	Forest Park	22	344,175	Not a PA
Game Reserve		14	224,816	Not a PA

Source: Ministry of Forestry (2009), based on Law 5/1990 on the Conservation of Biological Resources and Ecosystems. Excludes marine conservation areas. IUCN categories adapted from Hartono (2008). PA = Protected Area.

The categories of conservation forest in Indonesia have been influenced by the IUCN categorisation, although there is not complete correspondence. The similarity is based on the leading role of protected areas to “protect” and “preserve” (Hartono, 2008). However, according to Santosa (2008), the IUCN categorization is not suitable for developing countries like Indonesia. Two of the main differences are that the Indonesian categorization allows the introduction of exotic species in Forest Parks as well as the sustainable use of wildlife in Game Reserves. Because of such differences, these two categories are not recognized as protected areas by the IUCN (Hartono, 2008). The comparison between the Indonesian and IUCN categorisations is shown in the final column of Table 3.1 above. Note, however, that National Parks in Indonesia are not always recognized as belonging to Category II. It is possible that a National Park could be classified as Category Ib, II, III, IV, or V if the area was previously known as a Wildlife Sanctuary or Nature Reserve (Hartono, 2008).

In Indonesia, there are some agreements for use of forest land by a local community. As mentioned in Section 3.1.4, social forestry was one of the approaches used to resolve the conflict between forest management and the economic improvement of local communities (Lindayati, 2000; Pender *et al.*, 2008), including in West Lampung. Community forestry (*Hutan Kemasyarakatan, HKm*) provides 35-year forest-use concessions to forest farmer groups in Protection Forest or Production Forest (Pender *et al.*, 2008).

3.2 The Study Area in Lampung Province

Lampung Province is located at the southern end of the island of Sumatra, the sixth largest island in the world and the third largest in the Indonesian Archipelago (after New Guinea and Borneo), with a length of 1,700 km and a maximum width of 350 km (Laumonier, 2012). Sumatra and much of western Indonesia falls within the Sundaland Biodiversity Hotspot, with rich but highly-threatened biodiversity. The study area comprised two districts in the west of Lampung Province – West Lampung District and its recent offshoot, West Coast District. West Lampung District (*Kabupaten Lampung Barat*) was established through Law No. 6/1991 with its capital at Liwa. It bordered Bengkulu and Oku Districts in the north, North Lampung, Central Lampung, and Tanggamus Districts in the east, and the Indian Ocean and the Sunda Strait in the south (Figure 3.3). It had an area of 4,950 km^2, representing 14% of the total area of the Province, and consisted of 17 sub-districts and 201 villages (Bureau Statistics of West Lampung Regency, 2009). Since 2012, based on Decree No. 22/2012, the original West Lampung District became two separate districts. The western part became West Coast District (*Kabupaten Pesisir Barat*) with Krui as its capital. This new district covers an area of 2,907 km^2 in 11 sub-districts and 118 villages. Since West Coast District is relatively new, official data were still integrated with West Lampung District at the time of the research. Hence secondary data reported here refer to the original West Lampung District.

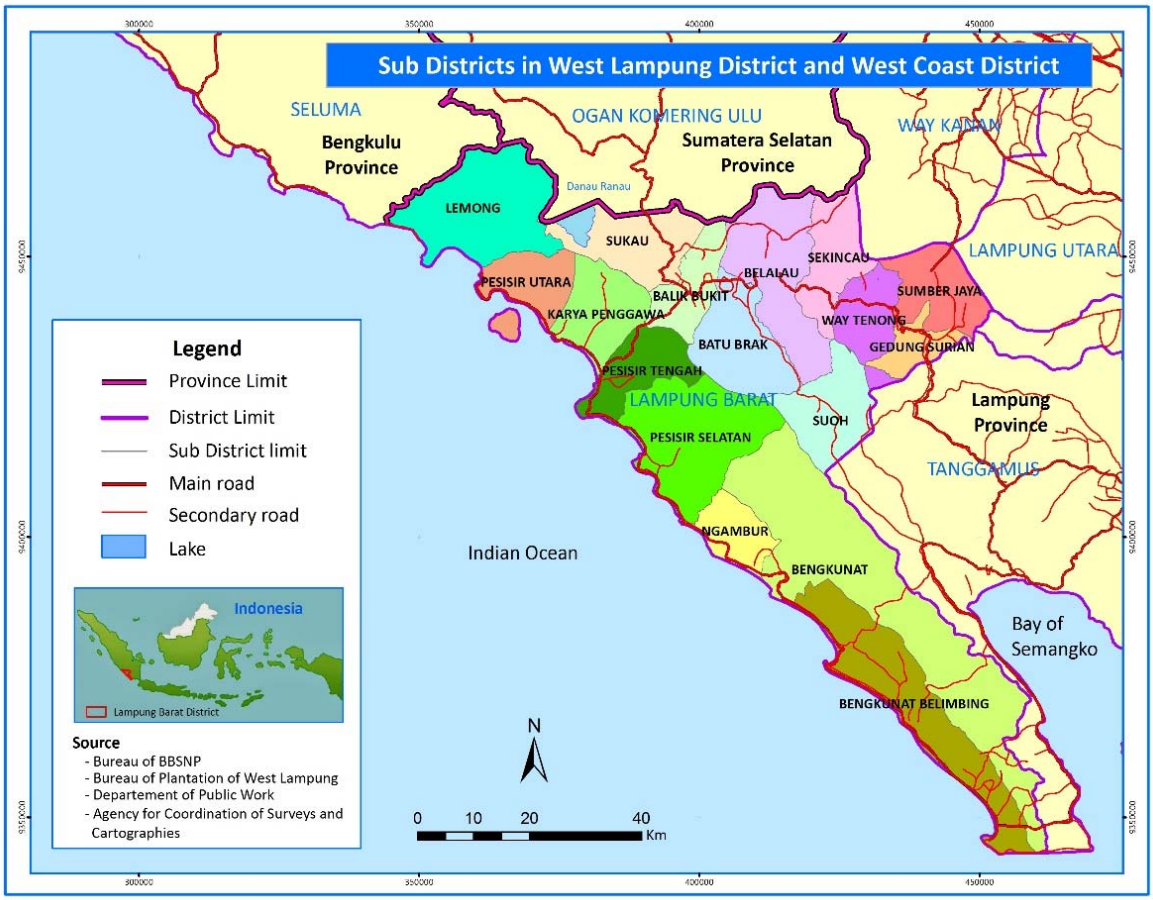

Figure 3.3. West Lampung District before the separation of West Coast District

Source: Bureau of BBSNP, Bureau of Plantations West Lampung, Department of Public Works, Agency for Coordination of Services and Cartography. Map compiled by Iska Gushilman, 2014.

3.2.1 Terrain and soils

West Lampung and West Coast Districts can be divided into three main land types based on altitude and relief – lowlands, hills, and mountains (Bureau Statistics of Lampung Province, 2010). These land types correspond to the coastal zone in the west, the Bukit Barisan mountain range in the east, and the transition zone between the two. The three land types are characterised as follows:

(a) Lowlands – flat to undulating land along the western part of the district with slopes of 0-15% and elevations of 0-600 metres above sea level (masl). This incorporates alluvial geological units in an elongated shape along the coast at elevations of less than 50 m, including marine alluvial land (68,812 ha) and riverine alluvial land (21,862 ha).

(b) Hills – relatively steep terrain in the west-central part the district with slopes of 15-40% and elevations of 600-1,000 masl. The dominant lithology here is basaltic andesite.
(c) Mountains – corrugated terrain, constituting the southern part of the Bukit Barisan range in the eastern part of the district, with slopes of 2-40% and elevations of 1,000-2,000 masl. There are 11 peaks in the district with altitudes of between 1,658 and 2,127 masl, including a number of volcanoes, and a tectonic depression in Suoh Sub-district has accumulated volcanic sediments (Basmar, 2008).

There are six types of soil system in West Lampung and West Coast Lampung Districts. These are: (1) alluvial systems on gently sloping land at 0-100 masl, (2) marine deposits at 0-200 masl, (3) marine terraces at 0-20 masl with slight slopes of 3-5%, (4) volcanic systems with slopes of 16-30% at elevations of 25-200 masl, (5) hill systems with developed soil on volcanic mountain slopes, and (6) mountain and plateau systems with slopes of more than 30% at elevations of up to 1,350 masl (Bureau Statistics of West Lampung Regency, 2013).

3.2.2 Climate

The climate of the district is influenced by the Bukit Barisan range in the interior and its exposure to the Indian Ocean. Much of the district receives 2,500-3,000 mm per year, with even higher rainfall (3,000-3,500 mm) in the most mountainous part of the district in the east (Figure 3.4). Rainfall is lowest (2,000-2,500 mm) in the southern part of the district (Manik, Rosadi, & Nurhayati, 2014). The distribution of rainfall is monsoonal, with the maximum monthly totals in January and the minimum in July (Manik *et al.*, 2014). The period from July to September is relatively dry but rainfall begins to increase from October.

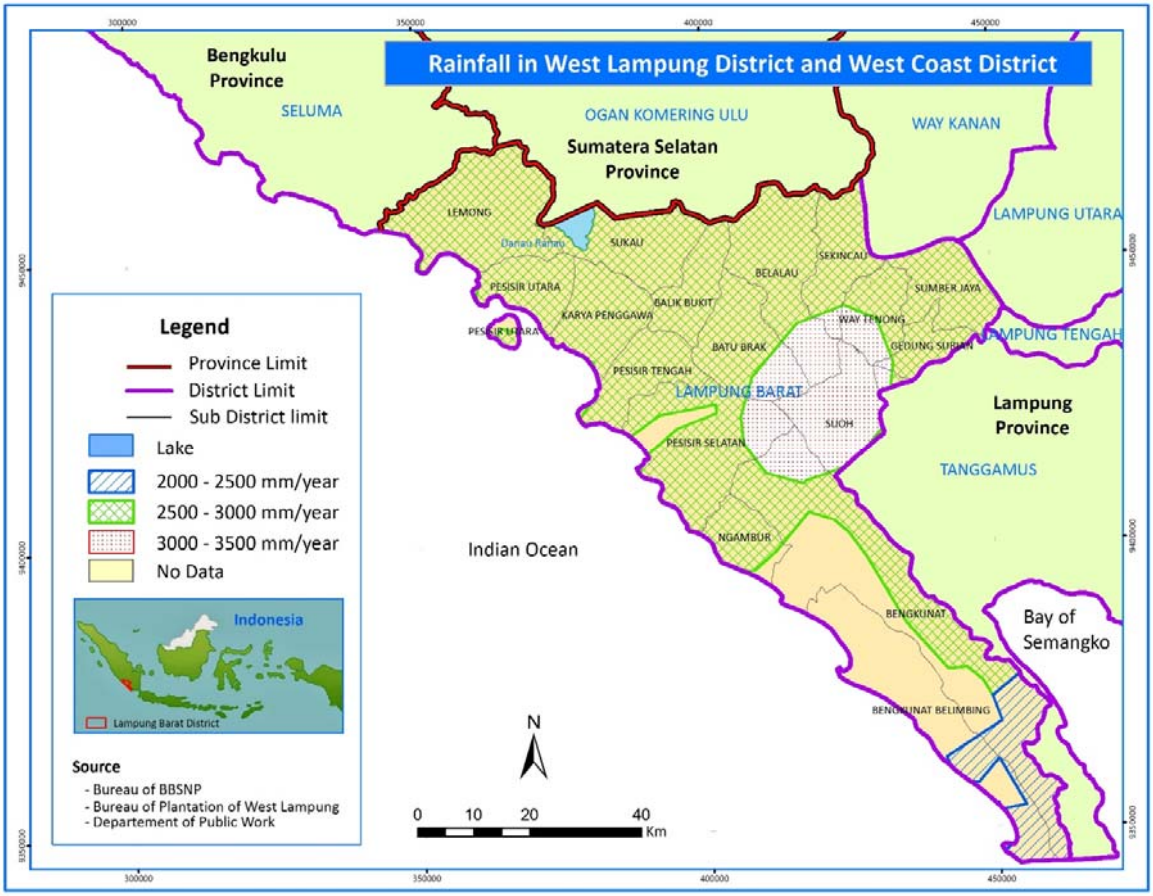

Figure 3.4. Rainfall in West Lampung and West Coast Districts

Source: Bureau of BBSNP, Bureau of Plantations West Lampung, and Department of Public Works. Map compiled by Iska Gushilman, 2014

3.2.3 Human settlement

Human settlement in West Lampung can be considered in three phases – before the government's transmigration program, during transmigration, and during the period of increased spontaneous migration that followed. Before transmigration, indigenous ethnic groups, descended from the ancient Kingdom of Skala Brak, occupied the western coastal area of the district. The central and eastern parts of the district were occupied by the same ethnic groups and also the Semendo Ogan, who originated in South Sumatra and Bengkulu Provinces (Verbist & Pasya, 2004). The Government of Lampung identifies these groups as 16 indigenous communities (*marga*) (Table 3.2). In 1920, the population density in Lampung was only 8 persons/km^2 and in 1930, 12 persons/km^2. At this time, indigenous groups made up 58% of the population (Charras & Pain, 1993).

Table 3.2. Identification of indigenous communities in West Lampung District

Indigenous community	Village	Sub-district
Belimbing	Bandar Dalam	Bengkunat
Bengkunat	Sukamarga	Bengkunat
Ngaras	Negeri Ratu Ngaras	Bengkunat
Ngambur	Negeri Ratu Ngambur	Pesisir Selatan
Tenumbang	Negeri Rati Tenumbang	Pesisir Selatan
Way Kapal	Way Napal	Pesisir Tengah
Pasar Krui	Krui	Pesisir Tengah
Ulu Krui	Gunung Kemala	Pesisir Tengah
Pedada (Penggawa V Ilir)	Pedada	Pesisir Tengah
Bandar (Penggawa V Tengah)	Bandar	Pesisir Tengah
Laay (Penggawa V Ulu)	Laay	Karya Penggawa
Way Sindi	Way Sindi	Karya Penggawa
Pulau Pisang	Pulau Pisang	Pesisir Utara
Pugung Tampak	Pugung Tampak	Pesisir Utara
Pugung Penengahan	Pugung Penengahan	Lemong
Pugung Malaya	Malaya	Lemong

Source: Decree of the Governor of Lampung No. G/362/B.II/HK/1996

In the first half of the 20th century, in-migration occurred, both spontaneously and through the colonial government's transmigration program. This program involved the resettlement of population from the densely-populated islands of Java and Bali from the early 1900s until 1986. Lampung Province became the first destination of the transmigration program (Verbist & Pasya, 2004), with the first Javanese settlement established in 1905 (Charras and Pain (1993). This movement of population contributed to the increase in Lampung's population from 300,000 in 1930 (Benoit *et al.*, 1989) to 2.8 million in 1971 (Hugo *et al.*, 1987), 4.6 million in 1980, and 6.0 million in 1985 (Bureau Statistics of Lampung Province, 1995). In 2013, the population of Lampung Province was 9.9 million (Bureau Statistics of Lampung Province, 2013).

After the transmigration program was officially discontinued in 1986, there was continuing spontaneous migration from Java, with Lampung as the entry point from Java to Sumatra. According to Benoit *et al.* (1989), 60% of immigrants in Lampung are classified as

spontaneous immigrants. Many of these migrants settled in hilly areas suitable for coffee growing (Verbist & Pasya, 2004). From the transmigration program to the present, the province has become the major destination for Javanese and Balinese spontaneous migrants as well as the descendants of the first wave of government-sponsored migrants.

Focusing on West Lampung and West Coast Districts, the total population was 427,773 in 2012 (Bureau Statistics of Lampung Province, 2013), giving an average population density of 86 persons/km^2, considerably less than the average for Lampung Province as a whole of 216 persons/km^2. The population of the district increased 35.6% in the two decades between 1990 and 2010, with an annual rate of increase of 1.5%. The distribution of the population varied between sub-districts (Table 3.3). The highest population density was about 1,307 persons/km^2 in Kebun Tebu Sub-district, while 14 sub-districts had 100-300 persons/km^2, and another 11 sub-districts had less than 100 persons/km^2.

3.2.4 Land use transformation

The vegetation of West Lampung District is typical of the Bukit Barisan Range and can be differentiated into four types (Basmar, 2008):

1) Coastal forest in the western part of the district at elevations of 0-2 m.
2) Rainforest on flat land in the southern part of the district at 2-500 m.
3) Rainforest in the northern part of the district at low elevations of 500-1,000 m.
4) Rainforest at intermediate elevations of 1,000-1,500 m.

In the early 20th century, forest accounted for 90% of the total area of Lampung Province (Benoit *et al.*, 1989; Durand, 1999, 2000; Verbist & Pasya, 2004). In the 1930s, Lampung was still undeveloped, access was difficult, and population density was low. The majority of the population depended on swidden farming (*ladang*) to grow upland rice for subsistence (Durand, 1999, 2000). Hence modification of forest cover in the province was relatively slight until the 1950s (Benoit *et al.*, 1989).

Human occupation had a greater impact on the forest in West Lampung District with the establishment of the transmigration centre in Sumberjaya Sub-district and the improvement of accessibility between 1951 and 1957 when the main road was built between Bukit Kemuning and Liwa, the district capital (Benoit *et al.*, 1989). In the 1970s, the two main sources of deforestation in the district were logging operations conducted by the military and the wave of spontaneous immigration triggered by the high world price of coffee (Benoit *et al.*, 1989; Gaveau *et al.*, 2009).

Table 3.3. Total area, population, population density, percentage of area and percentage of population in each sub-district of West Lampung District in 2012

Sub-District	Area (km^2)	Population	Population density (persons/ km^2)	No. of villages	No. of sub-villages
Pesisir Selatan	409.17	21,762	53.19	15	70
Bengkunat	215.03	7,620	35.44	9	32
Bengkunat Belimbing	943.7	24,009	25.44	14	109
Ngambur	327.17	17,953	54.87	9	43
Pesisir Tengah	120.64	18,358	152.17	8	30
Karya Penggawa	211.13	14,292	67.69	12	57
Way Krui	40.92	8,328	203.52	10	35
Krui Selatan	36.25	8,531	235.34	10	39
Pesisir Utara	84.27	8,202	97.33	12	42
Lemong	454.99	14,365	31.57	13	42
Pulau Pisang	43.61	1,343	30.80	6	16
Balik Bukit	175.63	35,901	204.41	12	81
Sukau	223.1	20,564	92.17	11	93
Lumbok Seminung	22.4	6,792	303.21	10	62
Belalau	217.93	12,103	55.54	10	37
Sekincau	118.28	17,736	149.95	5	45
Suoh	170.77	17,791	104.18	7	72
Batu Brak	261.6	12,952	49.51	11	62
Pagar Dewa	110.19	19,754	179.27	10	59
Batu Ketulis	103.7	14,279	137.70	10	60
Bandar Negeri Suoh	170.85	25,666	150.23	10	90
Sumberjaya	195.38	23,007	117.76	6	42
Way Tenong	116.67	31,374	268.91	9	49
Gedung Surian	87.14	14,424	165.53	5	56
Kebun Tebu	14.58	19,060	1,307.27	10	44
Air Hitam	76.23	11,607	152.26	10	52
TOTAL	4951.33	427,773	86.40	254	1419

Source: Bureau Statistics of West Lampung Regency (2013)

The official forest area in West Lampung District in the 2000s was 73% of the total area (Basmar, 2008). However, Verbist, Putra, and Budidarsono (2005) found that only 40% of the total area was actually forested. Their study identified various land uses: forest (40%), *damar* (*Shorea javanica*) agroforests (10%), coffee agroforests (9%), intensive coffee plantations (24%), coconut (5%), oil palm (3%), and rice-fields (1%). By this time, deforestation had occurred in all accessible forest areas within and around the BBSNP (Gaveau *et al.*, 2009). Verbist *et al.* (2005) found that the forest area decreased by 9% just over the five-year period from 1997 to 2002, of which 55% was converted to coffee plantations. Deforestation within BBSNP from 1972 to 2006 is shown in Figure 3.5.

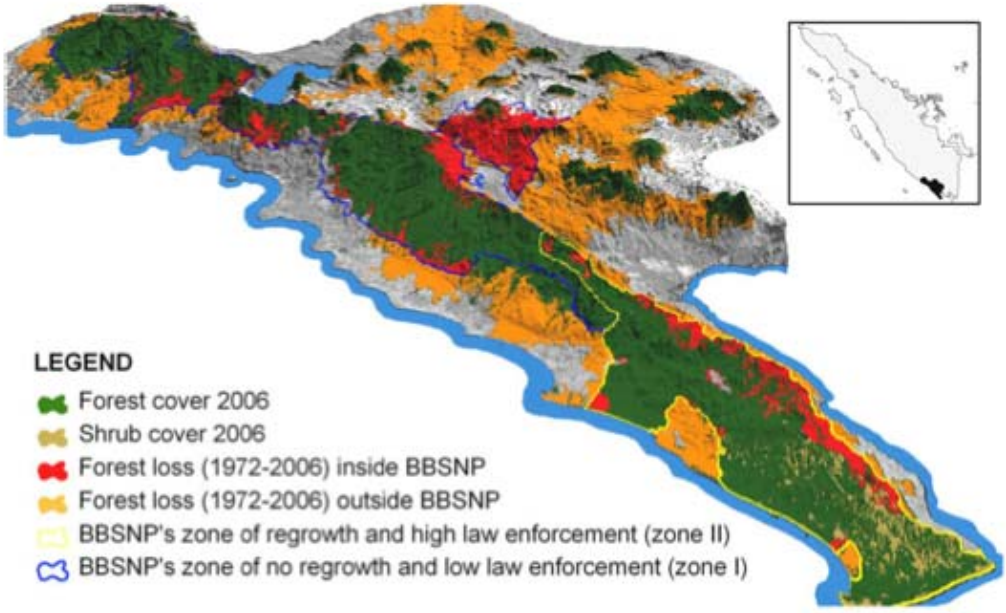

Figure 3.5. Deforestation in West Lampung District from 1972 to 2006

Source: Gaveau *et al.* (2009)

3.3 The Coffee Sector in Lampung Province

Coffee is one the crops introduced to Sumatra by the VOC at the beginning of the 19th century and adopted as a commercial crop by local and Java-born migrant peasants (Pelzer, 1945). In the south of Sumatra, the main coffee species is *Coffea canephora*, which produces Robusta coffee. This species has wider geographic distribution and adaptability than Arabica coffee *(Coffea arabica).* Robusta coffee can be grown at elevations ranging from lowlands up to 1,500 masl (Herrera & Lambot, 2017) and in a variety of soils, including sandy soils, clays, and gravelly loams (Wrigley, 1988). Indonesia is the fourth largest producer of coffee and the third largest producer of Robusta coffee after Vietnam and Brazil (Panhuysen & Pierrot, 2018). Robusta coffee represents 81% of national production, Arabica coffee 17%, and processed coffee 2% (Association of Coffee Exporters of Lampung, 2012a). Indonesia exports coffee to Germany, the USA, Japan, Italy, and Malaysia (Association of Coffee Exporters of Lampung, 2012a). Local coffee consumption has risen since 2010-2014, but is still low at 1 kg per capita (Anwar, 2014).

Table 3.4. Area and output of coffee in each district of Lampung Province, 2010

District	Area (ha)	Production (tons)	Yield (kg/ha)
Tanggamus	54,256	45,342	986
West Lampung	59,357	61,201	1,095
Way Kanan	22,456	19,292	959
Lampung Utara	15,865	12,130	876
Tulang Bawang	663	383	751
Lampung Timur	1,445	670	528
Lampung Tengah	1,705	907	634
Pesawaran	5,470	4,335	836
Lampung Selatan	1,649	922	794

Source: Association of Coffee Exporters of Lampung (2012a)

The coffee sector in Indonesia is dominated by smallholders rather than state-owned or private companies, accounting for 96% of planted area in 2011 (Table 3.5). This is also the case in Lampung. In 2009 there were about 232,664 coffee farmers in Lampung, most in West Lampung (37%) and Tanggamus Districts (33%) (Association of Coffee Exporters of Lampung, 2012a).

The agricultural sector plays an important role in the economy of Lampung Province, contributing 39% to gross regional product in 2009 (rising to 58% in West Lampung District), largely due to the importance of coffee (Bureau Statistics of Lampung Province, 2013). During 2003-2011, coffee exported from Bandar Lampung City contributed on average 70% of Indonesian coffee exports by volume (Association of Coffee Exporters of Lampung, 2012b), this volume including production from Lampung, Bengkulu, and South Sumatra Provinces. Coffee production in Lampung itself contributes about 145,182 tons or 40% of the domestic production of Robusta, with an average productivity of 829 kg of coffee beans per ha, varying between 528 and 1,095 kg/ha (Association of Coffee Exporters of Lampung, 2012a). West Lampung and Tanggamus Districts contribute the most coffee production in Lampung, especially of Robusta coffee (Table 3.4).

Table 3.5. Growth of coffee area in Indonesia by ownership category, 1996-2011

Year	Area (ha)		
	Smallholders	State-owned companies	Private companies
1996	1,103,615	24,169	31,295
1997	1,105,114	32,232	32,682
1998	1,068,064	39,139	46,166
1999	1,059,245	39,316	28,710
2000	1,192,322	40,645	27,720
2001	1,258,628	26,954	27,801
2002	1,318,020	26,954	27,210
2003	1,240,222	16,597	25,091
2004	1,251,326	26,597	26,020
2005	1,202,392	26,641	26,239
2006	1,255,104	26,644	26,983
2007	1,243,429	23,721	28,761
2008	1,236,842	22,442	35,826
2009	1,217,506	22,794	25,935
2010	1,219,802	22,738	25,936
2011	1,254,921	23,167	29,912

Source: Association of Coffee Exporters of Lampung (2012a)

Lampung Province has exceptional environmental value, especially the biodiversity within the BBSNP in the west and the Way Kambas National Park in the east. However, the coffee sector is threatening this biodiversity. The official data from The Bureau of BBSNP estimated that, by 2008, an area of just over 57,000 ha was illegally occupied by more than 16,000 households, accounting for 16% of the Park area[2].

3.4 Bukit Barisan Selatan National Park

3.4.1 Legal framework

The BBSNP was originally a wildlife sanctuary established under Dutch colonial rule in 1935. The sanctuary became a Nature Conservation Area (*Kawasan Pelestarian Alam*, KPA) – an

[2] O'Brien &Kinnaird (1996) claimed that about 70% of coffee production in Lampung came from areas inside or adjacent to the BBSNP and that coffee occupied about 28% of the total area of the Park. Based on extrapolation of trends in the 1990s, Kinnaird *et al.* (2003) projected that 70% of the Park would be agricultural by 2010. However, these estimates seem to be excessive when compared with the Bureau's assessments.

area intended for a National Park – in 1979 and was finally declared a National Park with the same boundaries in 1982 (Figure 3.6). The founding texts of the BBSNP are:

1) The statement of the Minister of Agriculture (*Surat Pernyataan Menteri Pertanian* No.736/Mentan/X/1982) on 14 October 1982.
2) The decree of the Minister of Forestry (*Surat Keputusan Menhut* No.71/Kpts-II/1990) on 15 February 1990, to bring the Marine Reserve (*Cagar Alam Laut*) under Park management.
3) The decree of the Minister of Forestry (*Surat Keputusan Menteri Kehutanan* No.185/Kpts-II/1997) on 31 March 1997 to establish the Bureau of the BBSNP (*Balai Taman Nasional Bukit Barisan Selatan*).

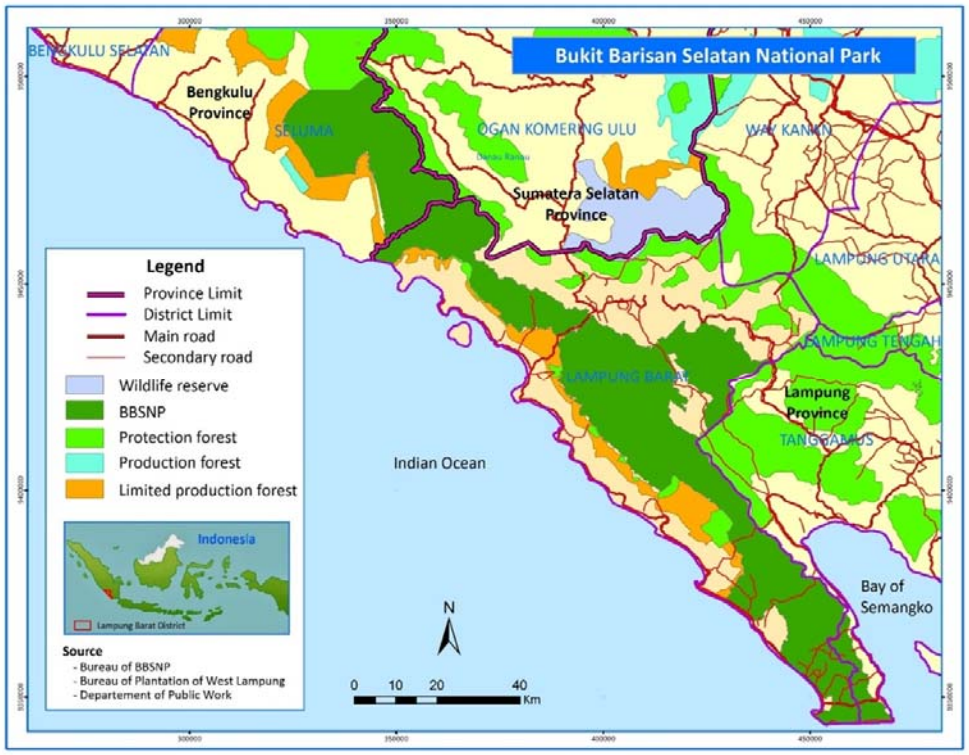

Figure 3.6. Extent of the Bukit Barisan Selatan National Park

Source: Bureau of BBSNP, Bureau of Plantations West Lampung, and Department of Public Works. Map compiled by Iska Gushilman, 2014.

As discussed above, since 1990 the creation of National Parks in Indonesia has been based on the Law on the Conservation of Natural Resources and Ecosystems (*Undang-undang Republik Indonesia No.5/1990*). In this law, a National Park is defined as an area reserved and managed with zoning for the purposes of research, science education, support of

culture, tourism, and leisure. In managing the BBSNP, the Park is zoned into six areas based on their function: (1) core zone (*inti*), (2) utilisation zone (*pemanfaatan*), (3) rehabilitation zone (*rehabilitasi*), (4) religious zone (*religi*); (5) forest zone (*rimba*); and (6) traditional zone (*tradisional*) (Figure 3.7). Since 2002, the BBSNP Bureau has been responsible for the technical management of the Park and is directly responsible to the Ministry of Forestry in Jakarta. The office is located in the city of Kota Agung in Tanggamus District.

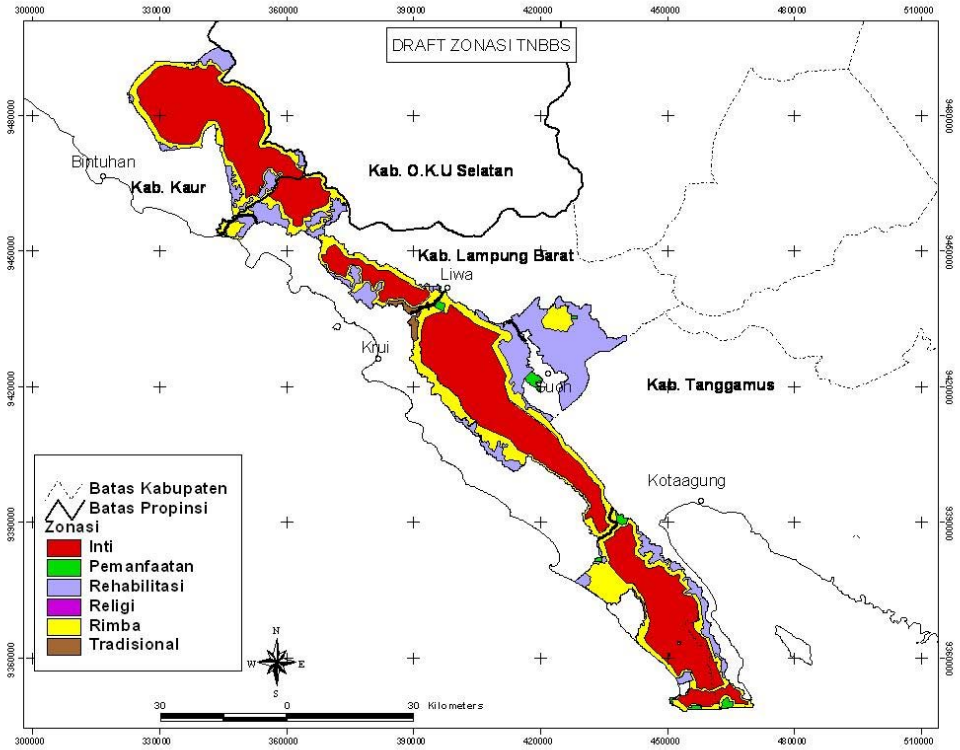

Figure 3.7. Zoning in BBSNP

Source: Bureau of BBSNP (2010a)

3.4.2 Physical environment

The BBSNP is spread across two provinces in the southern part of Sumatra. Most of the area (81.4%) is located in Lampung Province in West Lampung and Tanggamus Districts, whilst the rest is in Bengkulu Province to the north (Table 3.6). The total area of 347,856 ha makes it the third largest park in Sumatra after Sebelat Kerinci National Park and Gunung Leuser National Park.

Table 3.6. BBSNP area by administrative unit

Province	District	Area (ha)	% of Park area	% of District area
Lampung	Tanggamus	10,500	3.0	3
	West Lampung	272,645	78.4	55
Bengkulu	Kaur	64,711	18.6	30

Source: (Bureau of BBSNP, 2008)

The Park covers a large part of the southern section of the Bukit Barisan mountain chain. The terrain is mountainous in the north (80% slopes), less steep on the western side facing the Indian Ocean (20-40% slopes), and becomes gently sloping (3-5%) in the south. The elevation increases from the coastal plain (below 600 m) to the hills of the southern peninsula up to the mountains of the northern and central parts (2,000 m and above). The park is bounded by the sea in the south, from Semangka Bay around Cape China to the Indian Ocean.

Based on the Oldeman climate classification, the climate in the BBSNP falls into two types (Ministry of Forestry, 2003). The western part of the Park is in Type A, with at least nine months of rainy weather and an annual average rainfall of 3,000-4,000 mm. The eastern part experiences a Type B climate with seven to nine months of rainy weather and an average annual rainfall of 2,500-3,000 mm. Several Rivers cross the BBSNP. Most flow south-west towards the Indian Ocean and join the larger rivers, Teluk Semangka and Way Samuang. The Park thus plays the role of a water reservoir for the region (Ministry of Forestry, 2003).

3.4.3 Biodiversity

Due to its ecological richness, the BBSNP is one of six national parks in Indonesia (among a total of 45) classified as “World Natural Heritage Sites” by UNESCO since 2004. WWF includes the Park in its “200 Ecoregions”, defined as areas with exceptional levels of biodiversity. WWF gives priority to the conservation of populations of rhinoceros and elephant through the Asian Rhino and Elephant Action Strategy (AREAS) program.

Based on the BBSNP Bureau’s inventory, flora types in the Park include 514 species of trees and shrubs, 26 extinct species, 25 bamboo species, 137 medicinal plant species, and 2 rare plant species. According to the Ministry of Forestry (2003), the floristic composition of the Park varies with five forest types: coastal forest; lowland forest; highland forest; sub-

montane forest; and montane forest. The five types of forest and the dominant flora are shown in Table 3.7.

Table 3.7. Forest types and dominant flora in BBSNP

Forest Type	Elevation (m)	Area (ha)	Dominant Flora
Coastal	0-2	3,568	*Terminalia cattapa, Hibiscus* sp.*, Baringtonia asiatica, Callophyllum inophyllum, Casuarina* sp.*, Pandanus* sp., *Ficus septica*
Lowland	0-600	160,560	*Shorea* sp.*, Dipterocarpus* sp.*, Hopea* sp., *Urophyllum* sp.*, Phyrnium* sp.*, Korthalsi* sp.*, Calamus* sp., *Sargassum gracillum, Acanthopora specisfesa, Hypnea musciformis, Sargassum echinocarpum, Turbinaria ornata, Thallasis* sp.
Highland	600-1,000	121,312	Flora of the families Dipterocarpceae, Lauraceae, Myrtaceae, and Annonaceae*. Neolotsia cassianeforia, Psycotria rhinoceritos, Areca* sp., *Globba pendella*
Sub-montane	1,000-1,500	60,656	Flora of the families Lauraceae, Myrtaceae, Dipterocarpceae, and Fagaceae (e.g., *Magnolia* sp.*, Quercus* sp., and *Garcinia* sp.)
Montane	>1,500	10,704	*Eugenia* sp. and *Castanopsis* sp.

Source: (Ministry of Forestry, 2003)

Table 3.8. Numbers of fauna species and number threatened in the BBSNP

Type of fauna	No. of species[1]	No. threatened[2]
Mammals	122	25
Amphibians and reptiles	123	4
Birds	450	67
Fish	53	
Insects	221	
Molluscs	7	
Crustaceans	2	

Source: (1) (Bureau of BBSNP, 2010b); (2) IUCN Red List (Ministry of Forestry, 2003)

The Bureau of BBSNP (2010b) identified about 978 wildlife species in the Park, many of which are threatened (Table 3.8). In particular, the Park is the natural habitat of several

endemic and endangered large mammals, notably the Sumatran rhinoceros (*Dicerorhinus sumatrensis*), the Sumatran elephant (*Elephas maximus sumatranus*), and the Sumatran tiger (*Panthera tigris sumatrae*).

3.4.4 Communities around the Park

In 2009 the BBSNP management identified 221 villages in the vicinity of the Park, with 1,660,676 inhabitants in 24 sub-districts (Figure 3.8 and Table 3.9). Of these, 53 villages were located on the border of the Park (Bureau of BBSNP, 2010b), including four enclave villages in West Lampung District that had existed in their current location before the creation of the Park: Way Haru (4,900 ha), Pengekahan (671 ha), Kubu Perahu (100 ha), and Suoh (15,000 ha). Migrant communities represent about 85% of the population in the vicinity of the Park, including ethnic Javanese, Sundanese, Balinese, Minangkabau, Madurese, and Bugis. Sundanese and Javanese migrants in particular have spread out from the original transmigration villages. The remaining 15% of the surrounding population comprises indigenous Lampungese communities (Ministry of Forestry, 2003).

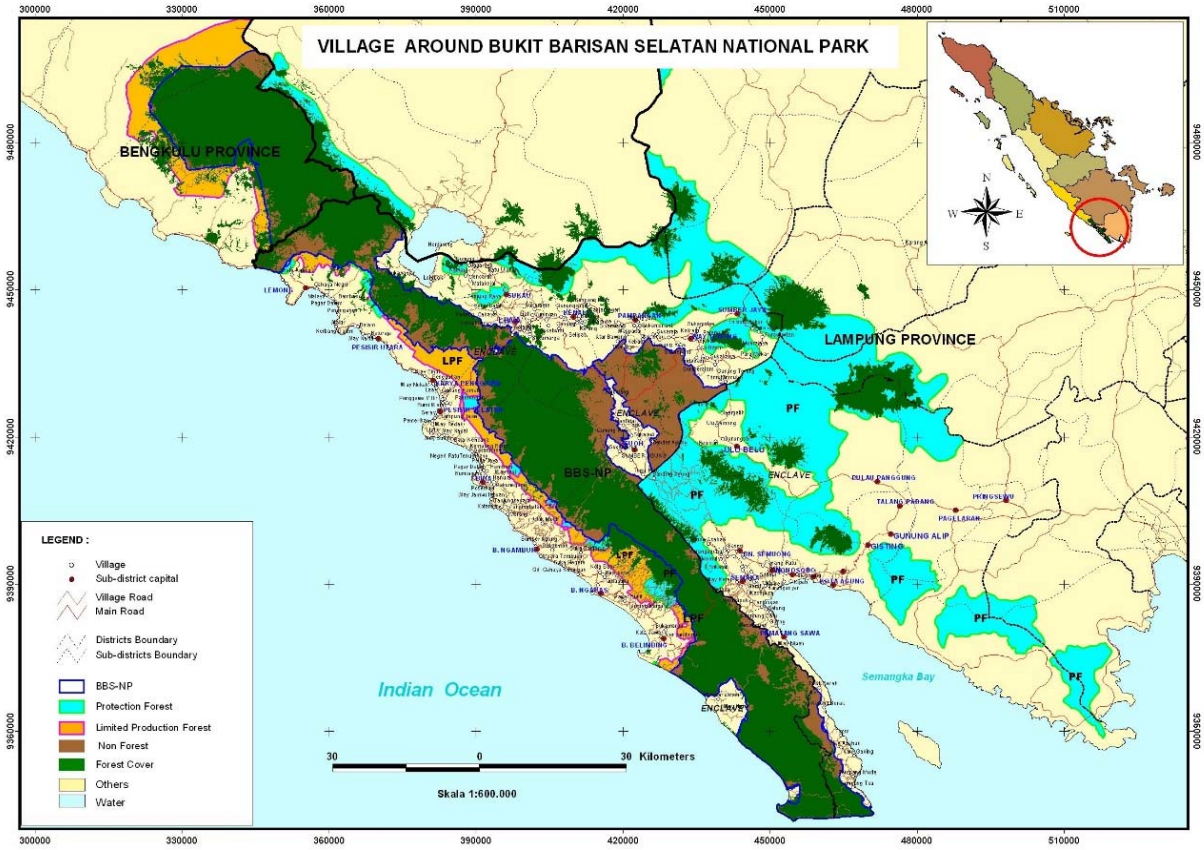

Figure 3.8. Location of villages around the BBSNP, showing enclaves

Source: World Wildlife Fund, Lampung Office, 2009

3.4.5 Human pressures affecting management of the BBSNP

The BBSNP is under severe pressure from human activities. Gaveau *et al.* (2009) show that 52% of the forest in around the BBSNP was lost during a period of just over three decades, from 6,928 km^2 in 1972 to 3,595 km^2 in 2006. Within the Park itself the rate of deforestation was 21% over the same period, or 0.62% per year. The rate of deforestation within the Park has not been even. It was lower from 1982 to 1985, immediately after the Park was declared, and has increased during periods of high coffee prices (Gaveau *et al.,* 2009).

The BBSNP Bureau is charged with managing the Park. It derives its management authority from the Ministry of Forestry at the central level but is located in Kota Agung, the capital of Tanggamus District. Locally, management is undertaken in four working units (Figure 3.9), with a total 57 of police rangers for the entire Park (Bureau of BBSNP, 2010b). The Park has a narrow, elongated configuration, stretching for more than 700 km across two provinces, and is bordered by villages, agricultural fields, and plantations (Kinnaird *et al.*, 2003). The Bureau has thus identified a series of interrelated problems affecting management – illegal occupation, illegal logging, poaching, habitat fragmentation, and conflicts with wildlife.

Table 3.9. Population in vicinity of the BBSNP

Province	District	No. of sub-districts	No. of villages with indirect access	No. of villages bordering park	Population
Lampung	Tanggamus	4	22	16	871,263
	West Lampung	15	114	36	414,953
Bengkulu	Kaur	3	18	1	115,168
Sumatera Selatan	Ogan Kemring Ulu	2	14	-	259,292

Source: (Bureau of BBSNP, 2010b)

Illegal occupation is considered the most serious threat to the Park because of the total area converted and the number of people involved. The Park's forest is being converted mostly into coffee plantations that create significant disturbance patches (Ministry of Forestry,

2003). The BBSNP Bureau (2008) estimates that, up to 2008, an area of 57,089 ha was illegally occupied by 16,312 families. Figure 3.10 shows the illegal occupation zone in red.

As illustrated from Figure 3.7 and 3.8, the main illegal land occupation were located surrounding Suoh enclave area and eastern edge of the park area. Those area were identified as being “non-forest” (Figure 3.8) and as being “rehabilitation” zone (Figure 3.7) which currently heavily planted with long-established coffee farms.

Illegal occupation was driven by the wave of immigration to the Park surrounds which resulted in illegal deforestation to expand the area of cultivated land (Verbist & Pasya, 2004). As noted above, Sumatra has been the main destination for sponsored and spontaneous migration from Java from colonial times. Although official transmigration to Lampung ceased in 1986, waves of spontaneous migration have continued (Benoit *et al.*, 1989). The majority of spontaneous migrants are seeking vacant land for agriculture, not hesitating to search for land within the BBSNP (Verbist & Pasya, 2004).

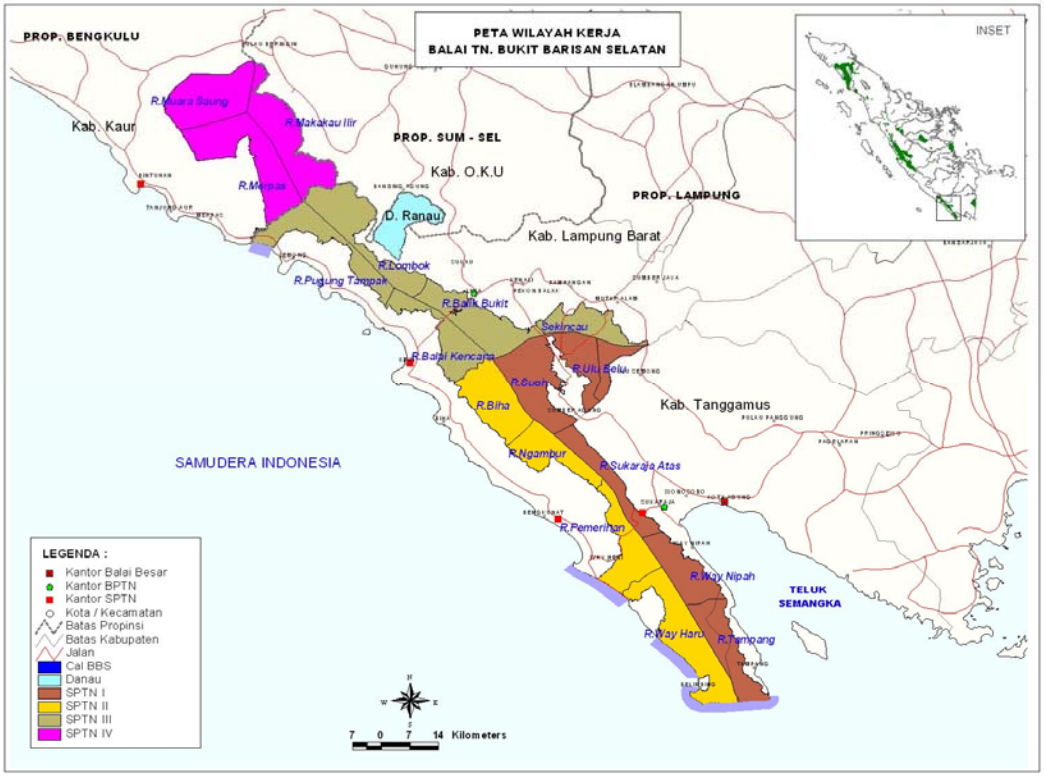

Figure 3.9. Working Units for management of the BBSNP

Source: (Bureau of BBSNP, 2010b)

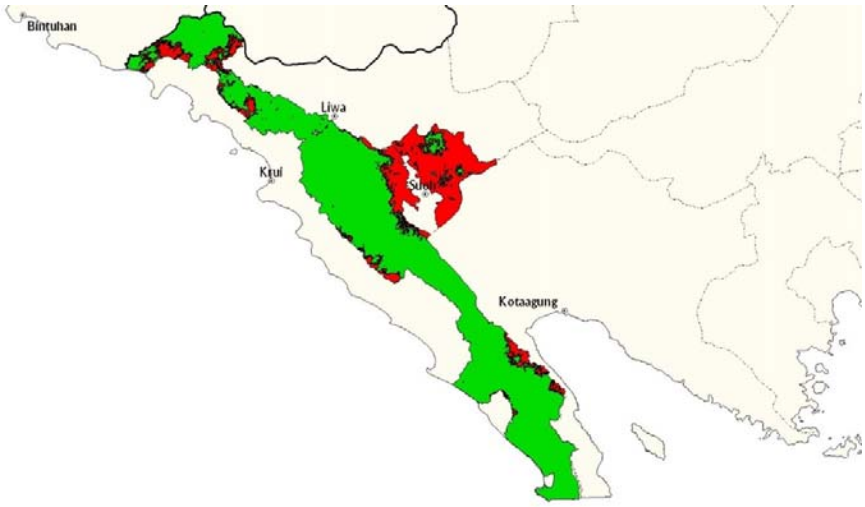

Figure 3.10. Illegal occupation in the Park area

Source: Bureau of BBSNP (2008)

The illegal occupation of the park is exacerbated by the accessibility created by numerous small logging concessions (*Hak Pengusahaan Hasil Hutan*) around the park between 1970 and 1980. The development of forest roads has caused the destruction of forest and triggered illegal settlements (Ministry of Forestry, 2003). Logging in the area of the Park began in 1952, but increased considerably after 1998 (WWF, 2007). This issue remains a severe problem for Park management because illegal logging is undertaken through strong networks involving powerful actors, such as wealthy businessmen running illegal sawmills for timber exports, corrupt officials in the police, army, and government, and local elites (Ministry of Forestry, 2003).

Poaching also threatens the conservation efforts for large mammals and several bird species (Ministry of Forestry, 2003). From 2000 to 2005, the WWF recorded 59 poaching activities which killed mainly elephants, tigers, and rhinos (WWF, 2007).

Table 3.10. Access Roads in the BBSNP

Access roads	Length (km)	Type of road	Source of formal approval
Sangi-Bengkunat	11.5	National road	Ministry of Forestry
Krui-Liwa	15	National road	Ministry of Forestry
Pugung Tampak-Menula	14	National road	Ministry of Forestry
Sukabumi-Suoh	8	District road	Directorate General of Forestry
Tiga Jaya-Suoh	10	District road	None
Sidomakmur-Suoh	20	District road	None
Lombok-Melesom	8.5	District road	None
Air Dingin-Semong	2.5	District road	None
Sumberejo-Way Haru	10	Management path	None

Source: (Bureau of BBSNP, 2010b)

The above concerns are exacerbated by the problem of habitat fragmentation due to the development of roads through the Park (Ministry of Forestry, 2003). The penetration of main and secondary roads is shown in Figure 3.6 above. There are nine recent access roads in the Park varying from 2.5 to 20 km in length (Table 3.10). Of these, only four had the formal approval of the Minister of Forestry and the Directorate General of Forests (Bureau of BBSNP, 2010b). The development of access roads fragments the habitat into smaller parts, isolating faunal populations, in particular mammals, by restricting their mobility. The other consequence, as noted above, is the increased opportunities for human disturbance in the Park (Ministry of Forestry, 2003).

Finally, the Park management is faced with human-wildlife conflicts. According to Bureau of BBSNP (2010b), 43 conflicts with wild animals were recorded just for the year 2008. These included 8 conflicts with tigers, affecting people's ability to farm, and conflicts with elephants that caused destruction of human habitations and agricultural plots.

3.5 Conclusion

Government in Indonesia has been highly centralised since the colonial era and, in particular, has exercised strong control over the exploitation of forest resources for commercial gain. Under the New Order regime, the granting of timber concessions to the military and favoured business interests helped underpin President Suharto's political

power. The partial decentralisation of power to the districts in the post-Suharto era and the reining in of the military did not prevent continued deforestation. Nevertheless, Indonesia under Suharto also embraced global conservation policies by signing the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) in 1978 and establishing National Parks as IUCN Category II Protected Areas from the early 1980s. The Bukit Barisan Selatan National Park was established in 1982 and is recognised as an area of rich biodiversity and very high conservation value. However, the Park faces problems arising from the dynamics of demographic and economic change in the surrounding districts, especially illegal logging, poaching, and illegal occupation. Smallholder production of Robusta coffee is the major source of livelihood for villages in the districts bordering the Park. The profitability of coffee farming has encouraged thousands of local and migrant smallholders to convert forest lands within the Park for coffee planting. Thus the issue of reconciling conservation and development is of vital concern in the study area.

CHAPTER 4
RESEARCH DESIGN AND METHODS

This research into the complex trade-offs between conservation and development in tropical rainforests was pursued through a case study of one site in Indonesia where these trade-offs are particularly acute – the Bukit Barisan Selatan National Park (BBSNP). The BBSNP and its surrounding landscape provided the common context for two specific cases emphasising contrasting approaches to the management of conservation-development trade-offs – a conventional law-enforcement or exclusionary approach and an incentive-based approach linked to the international coffee market. In this chapter I describe the overall design of the research and the methods of data collection and analysis used.

4.1 Research Design

4.1.1 The case-study approach

Case-study research has long been used as a qualitative method with one or a small number of research units (Lijphart, 1971). Blatter (2008) analyses the place of case-study research in three contrasting philosophical traditions – naturalism, positivism, and constructivism. Naturalism aims to generate practical and detailed knowledge by "natural generalisation" through social diffusion and learning processes. The selected cases in this view are those that have real-life impact. The focus is more on the internal complexity of the case than on making broad generalisations. Analysis involves providing a comprehensive and consistent picture of a case using an inductive approach. Positivism aims to establish conceptually law-like propositions and models that allow prediction, using "statistical generalisation" based on logical inferences to a specified population from a sample of cases. In this view, cases are selected by statistical considerations to be able to provide statistical generalisation. Constructivism aims to contribute to and check on a theoretical discourse through "theoretical generalisation" (or "analytic generalization" (Yin, 2014)) through interpretative inferences from observable objects to meaningful abstract concepts. To make these theoretical generalisations, there is a combination of deductive and inductive processes, deriving from a theory-oriented selection of cases. The constructivist view is the most widely used in the case-study literature (Stake, 1995; Yin, 2010, 2014).

Case-study research involves more than simply conducting research on a single individual or situation but has the capability to deal with complex social phenomena (Baxter & Jack, 2008). It is used not only in social studies but also in various fields such as medicine, psychology, political science, anthropology, business, education, nursing, and community planning (Yin, 2014). Yin (2014) specifies the specific conditions when case-study research should be considered: (a) the research questions are “how” and “why” questions, (b) the researcher has no control over events, (c) the research focuses on contemporary events that are believed to be relevant to the phenomenon under study, and (d) the boundaries between phenomenon and context may not be clear.

Blatter (2008, p. 2) characterises case-study research as “a research approach in which one or a few instances of a phenomenon or units of analysis are studied in depth.” Gerring (2007, p. 19) defines a case as “a spatially delimited phenomenon (unit) observed at a single point or over some period of time” and case-study research as “an intensive study of a single unit or small number of units (the cases), for the purposes of understanding a larger class of similar units (population of cases).” The common aspects of these definitions are the “number of units” and the “depth of study”. Thus a case-study research design can have one or multiple case studies (Gerring, 2007; Yin, 2014). The depth of the research reduces as the number of cases increases and, at a certain point, the research becomes a study of a sample of cases, or a “cross-case” study (Gerring, 2007).

Some definitions of case-study research emphasise the type of evidence used and the methods of data collection, namely, qualitative rather than quantitative methods (Lijphart, 1971). However, Yin (2014) argues for a comprehensive understanding of case-study research as a research strategy from the logic of research design through to data collection and analysis. Thus the scope of case-study research is “an empirical inquiry that investigates a contemporary phenomenon in depth and within its real-world context, especially when the boundaries between phenomenon and context may not be clearly evident” (Yin, 2014, p. 2). A case-study inquiry then has many variables of interest and relies on many sources of evidence, not only qualitative data. A case study might make use of historical records, individual and group surveys, census data, or a combination of these and other methods to collect the information about the case. Yin (2014) emphasises the importance of multiple sources of evidence and the triangulation of methods and data to build up the reliability of a case study (Yin, 2014).

4.1.2 Conducting case-study research

Case-study research follows the general steps used in any other systematic and theory-oriented research (George & Bennett, 2005; Neale, Thapa, & Boyce, 2006). George and Bennett (2005) divide the general steps into three phases: “designing case study research”, involving formulation of the research’s objectives, design, and structure; “carrying out the case studies”, involving formulation of the general questions to ask of each case to be studied; and “drawing the implications of case findings for theories”, involving assessment of the findings in relation to the relevant theories.

Yin (2014) and Swanborn (2010) elaborate on these stages with the flowchart shown in Figure 4.1. Planning the research involves first determining the domain of the research for which the conclusion will be valid (Swanborn, 2010). The design phase involves five tasks (George & Bennett, 2005): (a) specification of the problem and research objective which guide the next tasks; (b) development of a research strategy for achieving the research objective; (c) selection of a case (or cases) that is relevant to the objective and well defined as part of the research strategy; (d) description of the variables which are important to the development of new theories or the assessment of existing theories; (e) formulation of data requirements and research questions. Yin (2014) classifies case-study designs based on the number of cases and the specification of units of analysis: (a) a single case; (b) a single case with embedded units of analysis; (c) multiple-case designs; and (d) multiple-case designs with embedded units of analysis.

Preparation involves “developing the case study protocol and pilot study”. This step is difficult due to the open-endedness of the research and the absence of well-documented procedures (Yin, 2014). The desired skills and values of the researcher are the ability to ask good questions, being a good listener, being adaptive, having a firm gap of the issue, knowing how to avoid bias, and bringing high ethical standards to the research (Yin, 2014). Nevertheless, developing the study protocol is important as it contains the procedures and general rules to be followed by all researchers involved and under all circumstances. This increases the reliability of the research (Yin, 2014). A pilot case study is often used to refine the data collection plans along with the data content and the procedures to be followed (Yin, 2014). Pilot cases are selected using criteria such as convenience, access, and geographic proximity.

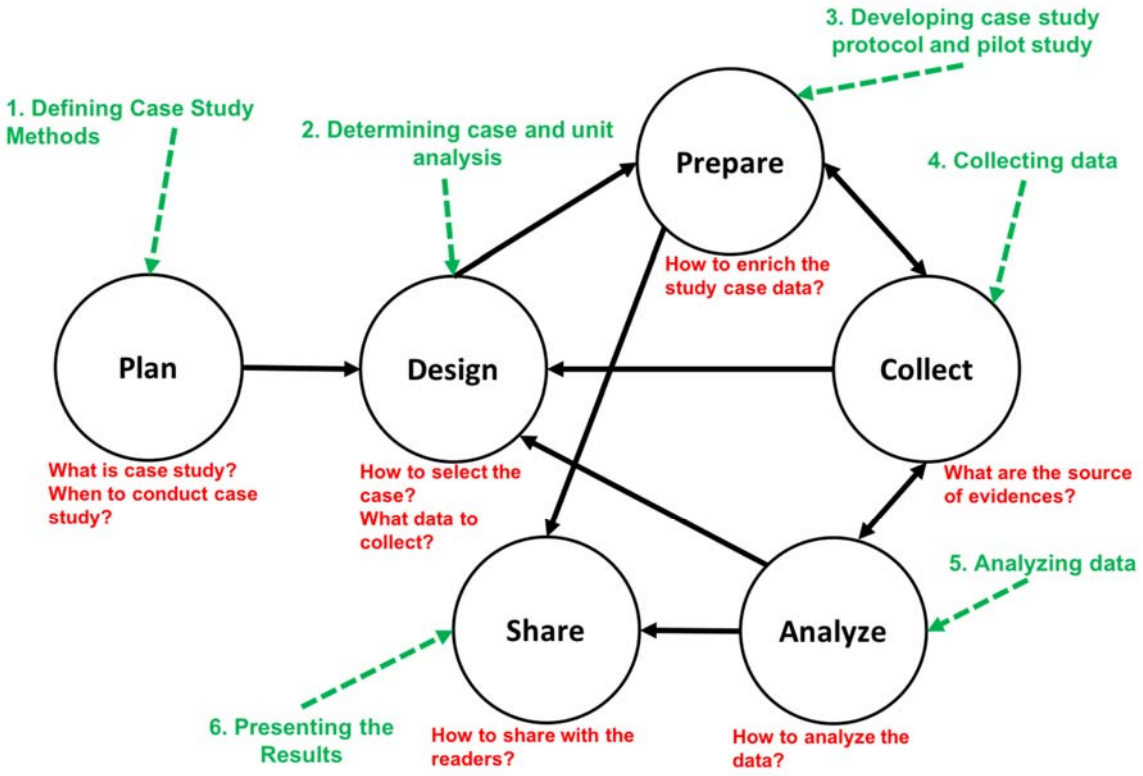

Figure 4.1. Flow chart for case-study research

Adapted from Swanborn (2010) and Yin (2014)

Collection of data or case study evidence is the next step after the preparation. According to Yin (2014) this can involve six types of source: documents, archival records, interviews, direct observation, participant-observation, and physical artefacts. Documents can include letters, earlier research reports, agenda or minutes of meetings, newspaper clippings, program proposals, administrative documents, progress reports, and formal studies (Swanborn, 2010; Yin, 2014). Archival records include public use files for census and other statistical data, service records, organizational records, or survey data (Yin, 2014). Both documentary and archival evidence is stable and outside the researcher's control (Swanborn, 2010). However, these kinds of evidence can have some biases towards the institutions and persons who created the documents or archives (Swanborn, 2010).

Interviews are common in case-study research and are typically guided conversations or semi-structured interviews, though more structured surveys can also be used (Yin, 2014). This method is an efficient way of collecting data and allows the researcher to gain admittance with key personnel (Swanborn, 2010; Yin, 2014). However, its weakness is in the risk of bias in response, confusion due to poorly-articulated questions, and inaccuracies

in recall (Yin, 2014). Direct observation, whether done formally or casually, is needed in case-study research to appreciate the real-world setting of the case. It can be time-consuming and expensive as various observers' notes have to be collated and analysed (Swanborn, 2010). Participant-observation involves the researcher participating directly in the actions being studied (Yin, 2014). This gives immediacy, covering actions in real time, and can provide contextual evidence as well as giving insights into personal behaviours and motives (Yin, 2014). However, as with direct observation, it can be time-consuming and expensive, and risks bias due to the participant-observer's influence over events (Yin, 2014). Physical artefacts have less relevance in most case-study research but can give important insights into cultural features or technical operations (Yin, 2014).

The analysis of evidence and presentation of findings are necessary to complete the case-study research cycle. Generalisation from the evidence is an essential part of this research strategy. This might be seen as problematic because of the small number of cases but, as mentioned above, generalization in case-study research is theoretical or analytic generalization rather than using statistical inference (Yin, 2010, 2014). Generalization can be undertaken based on the research protocol and the depth of investigation (Stake, 1995; Yin, 2010). Moreover, even if a single case study is undertaken, the same case can be observed more than once by observing the case over time (diachronically) or observing within-case variation between units of analysis (synchronically) (Gerring, 2007). Generalization can also draw on the existing research literature and not only on the case study in question (Yin, 2010).

4.1.3 Design of the BBSNP case study

In this study, I adopted a constructivist perspective and attempted to follow the stages described above, including many of the specific methods outlined (see below), in order to develop some well-founded generalisations about the nature of conservation-development trade-offs in tropical rainforests and the effectiveness of different approaches to managing these trade-offs. The BBSNP was a single case but, within this case, the overall structure of the research involved a two-case design with embedded or multiple units of analysis (following Yin (2014); Figure 4.2). The two cases were the two broad approaches to conservation and development used in the Park – an incentives-based approach using coffee certification and an exclusionary approach based on varying degrees of enforcement of Park legislation. The units of analysis included farm households, farmer groups, hamlets, and villages within the overall study area as described in Chapter 3.

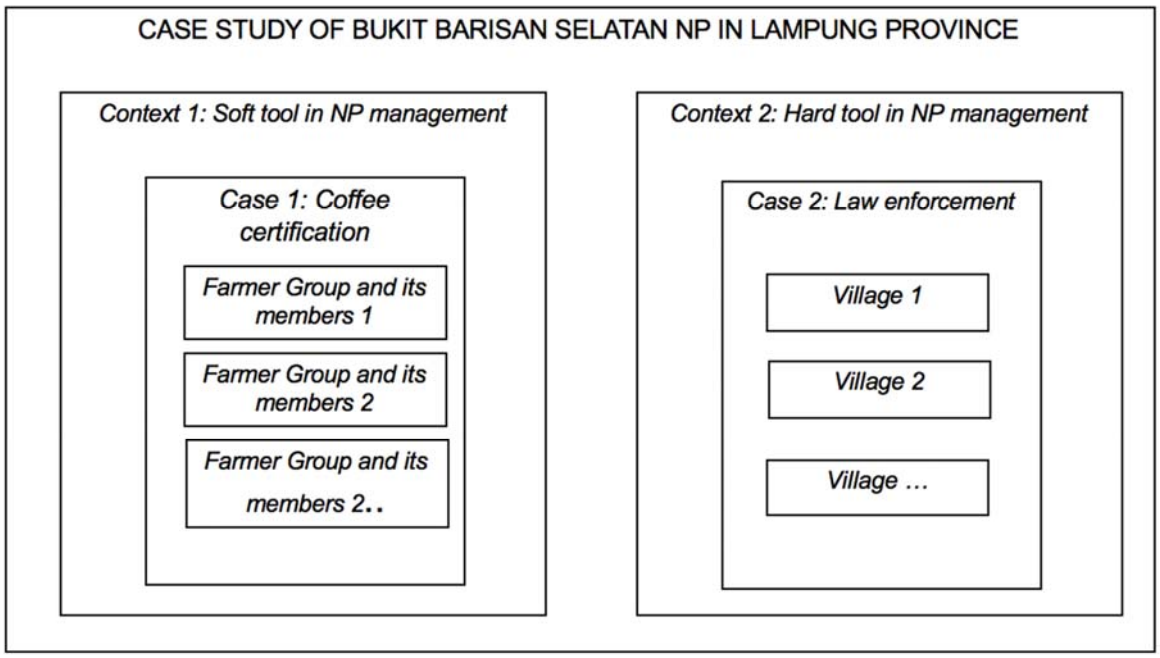

Figure 4.2. Multiple-case design in the study of Bukit Barisan Selatan National Park

The phases of the research are shown in Figure 4.3. The first phase of the research was to review literature and conduct field research at the village level to understand the utilisation of natural resources, the evolution of land use, the issues facing the management of the Park, the actors involved, and how the Park was viewed locally. In this phase, the two approaches were identified – coffee certification and law enforcement – and these became the two different cases studied and compared in this research. The next phase was to undertake data collection and analysis for each case. This was done at different times and in different locations, given that the two approaches were not applied uniformly across the study area. The final phase was to conduct a cross-case comparison to develop higher-level generalisations about the processes of and prospects for conservation and development in the BBSNP case.

4.2 Data Collection Methods

Mixed methods were used to collect quantitative and qualitative data for the research and to enable triangulation of both methods and results. Bryman (1988) describes this combination of methods as providing mutual confirmation based on each method being used to examine the same research problem in different ways. Figure 4.3 summarises the data collection for each of three research activities – the preliminary study of the dynamics of

land-use transformation in the study area (providing the context for the two case studies), the first case study of coffee certification, and the second case study of law enforcement. Qualitative data collection included direct and participatory observation while interviews included face-to-face individual and group interviews. Quantitative data collection included documentary evidence from various sources and surveys of farm households, using both random and non-random sampling. The details of the methods used in each of the three components of the research are now described in turn.

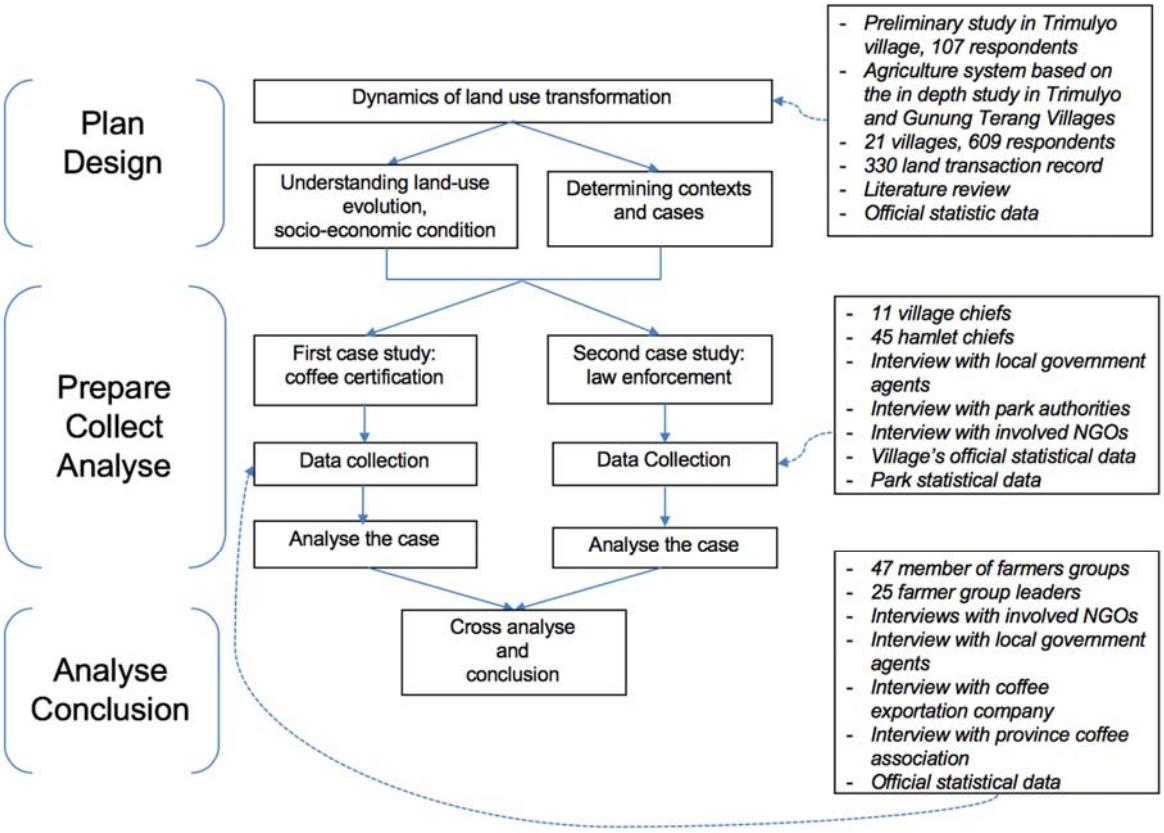

Figure 4.3. Flow chart of research activities, showing sources of data

4.2.1 Dynamics of land-use transformation

At the outset, I needed an official introduction to make contact with officials in villages, sub-district and district offices, the BBSNP Bureau, the Indo Cafco coffee company, and NGOs. For this, I had a letter signed by my academic supervisor in English to explain that I was a student intending to collect data in West Lampung District for my PhD degree on conservation-development issues facing the BBSNP. This letter was a requirement to obtain

a formal letter from the University of Lampung (Unila) where I have been affiliated as a lecturer in the Faculty of Agriculture since 2005. The letter from Unila was in Indonesian and was used as a formal introduction and a permission letter for local purposes. This letter was updated at the beginning of each period of data collection.

The dynamics of land-use change in the study area were investigated to gain an appreciation of demographic change, the evolution of farming systems, the nature of property rights and boundaries, and the condition of forest cover in and around the BBSNP. As the first activity of the research, this provided the context for the case studies. The activity involved a review of literature and secondary data, field observation, participant observation, key-informant interviews, and household surveys (Figure 4.4).

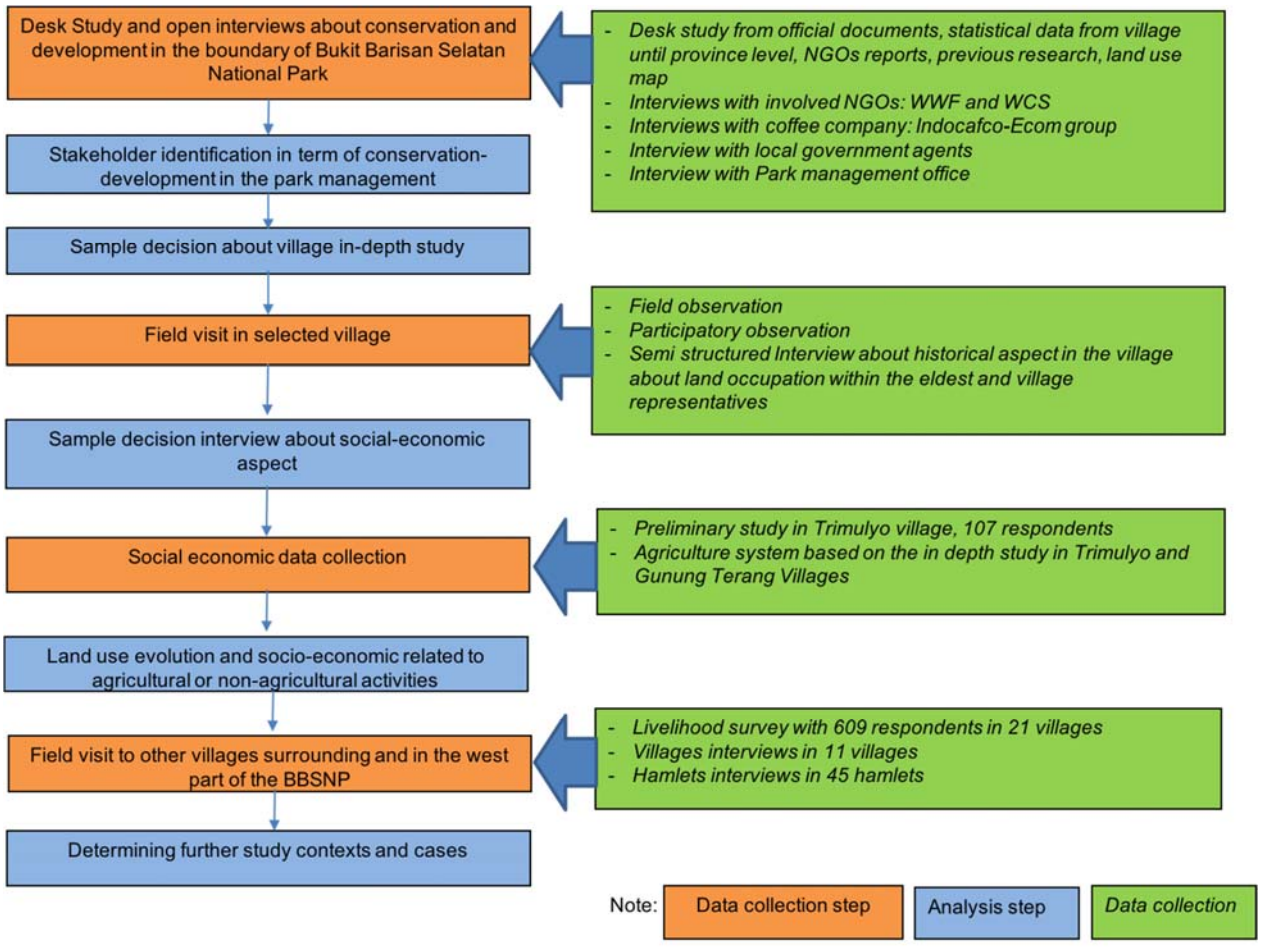

Figure 4.4. Data collection for preliminary study of land-use change

First, a desk study was undertaken to review documents and statistics from the district and province, Park statistics, NGO reports, and land-use maps from previous research. Semi-structured interviews also undertaken with several key informants from WWF, WCS, the coffee exporter Indo Cafco, local officials, and the BBSNP Bureau. The desk study and interviews gave an appreciation of the issues in conservation-development and the key actors involved. Based on this, a village was selected for a preliminary field study.

An in-depth study was then conducted in the village of Trimulyo (Figure 4.5). This village was selected because of its history, its range of land uses, and its location on the boundary of the BBSNP and a Protection Forest. Additional observations were made in the neighbouring village of Gunung Terang to compare and validate the findings (Figure 4.5). In Trimulyo, the first step was to observe the landscape to identify and characterize the different agro-ecological zones. Then interviews were undertaken with the village head, the heads of sub-villages, village elders, and other key informants using a snowball technique. These interviews were to understand the historical transformation of the village, the growth of population, the cultivation of coffee, land ownership, and access to the Park and Protection Forest. These interviews were conducted during several visits from 2009 to 2010. At the same time, participant observation was undertaken with local residents to gain more knowledge about the agricultural system and other aspects of their livelihoods. For example, I walked with villagers to their farms while asking information about the area along the way, joined them during their working day at the coffee farms, talked with women during their free time in the village, and helped during meal preparation where I stayed.

The desk study, field observation, participant observation, and historical study were used to plan surveys to understand the socio-economic situation and the crop and livestock systems in more detail. Semi-structured interviews were conducted with 107 household heads, selected by quota sampling to obtain a representative group from each sub-village (Table 4.1), subject to each individual's availability to be interviewed. Technical and economic information about the agricultural system was obtained, with particular reference to coffee production. Interviews were conducted in purposively selected field sites to represent each farming system in Trimulyo and Gunung Terang. Economic calculations were undertaken to estimate the land and labour productivity of each system.

After the field studies in the two villages, reconnaissance visits were made to villages in different sub-districts of West Lampung District to compare the conditions of villages in the vicinity of the Park. Based on the research to this point, the two case studies were determined – coffee certification and law enforcement. A household livelihood survey was

then conducted in 21 villages in West Lampung District to test the findings about land-use transformation from Trimulyo and Gunung Terang over a wider area, focusing on the two identified issues. The local Farmer Groups Organisation and the Bureau of Plantation Crops in West Lampung District gave me authorisation to conduct the survey. Stratified random sampling was designed to obtain a total of 200 respondents in each of three categories – members of farmer groups with coffee certification, members of uncertified farmer groups, and farmers who did not belong to any farmer group (Table 4.2). Within each category, respondents were selected randomly. The randomisation process involved obtaining three lists: (1) farmer group members from farmer group leaders, (2) household lists from sub-village heads, and (3) lists of non-certified farming group members from local extension agents. I selected interviewees randomly from each list, based on random numbers generated by a calculator.

In fact, a total of 609 interviews were conducted but five of of these were incomplete and not included in the analysis, hence the final sample size was 604. The survey was undertaken in collaboration with the Rekadesa Company, which was implementing a socio-economic study of a micro-credit project for the Rabobank Bank Foundation. I was responsible for designing the questionnaire, recruitment and training of interviewers, village selection, and sampling procedure. This survey (referred to in subsequent chapters as the Livelihood Survey) provided data not only for the analysis of farming systems and landscape change in Chapter 5 but also for the study of coffee certification in Chapter 6.

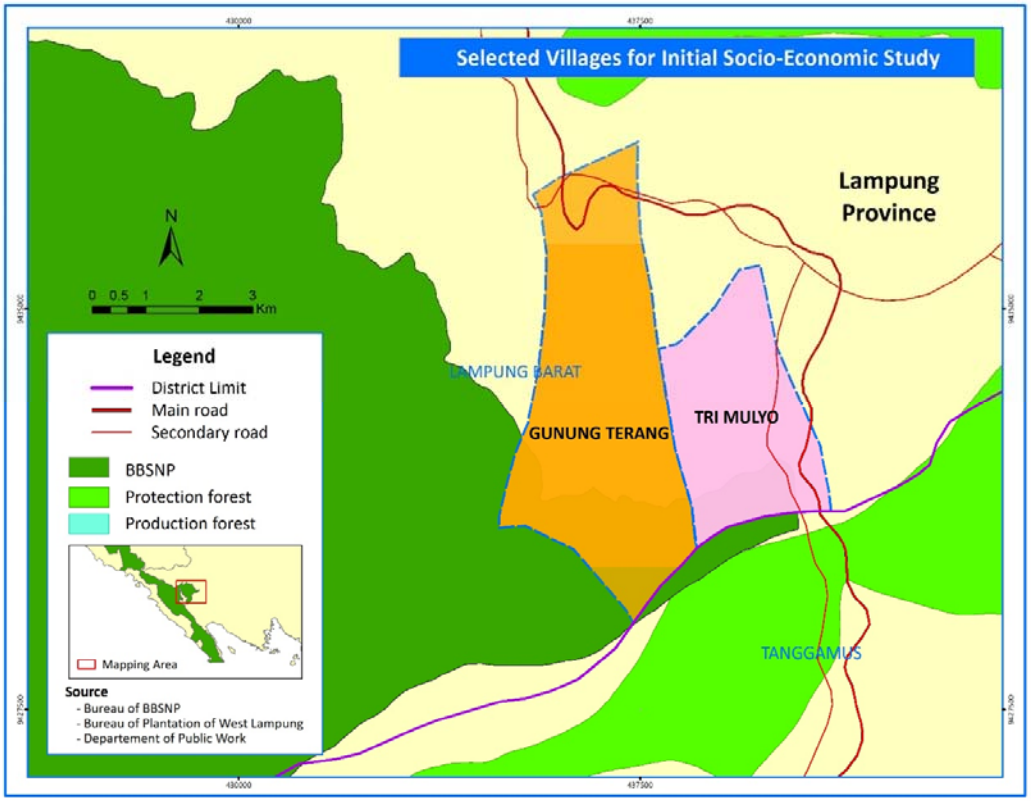

Figure 4.5. Trimulyo and Gunung Terang Villages

Table 4.1. Sub-villages in Trimulyo in 2009

Sub-village	No. of households	Population
Air Dingin I	207	767
Air Dingin II	213	745
Talang Panjang I	139	556
Talang Panjang II	169	679
Air Dadapan	132	541
Total	860	3,288

Source: Trimulyo Village Statistics, 2009

Table 4.2. Sampling design for household survey in West Lampung District, October 2009

Sub-district	Village	Respondent qualification*		
		Member of farmer group		Not a member of farmer group
		Certified	Non-certified	
Sekincau	Giham Sukamaju	10	10	10
	Batu Bayan	10	10	10
	Mekarsari	10	10	10
	Waspada	10	10	10
	Pampangan	10	10	10
	Tiga Jaya	10	10	10
Gedung Surian	Trimulyo	10	10	10
	Mekarjaya	5	5	5
	Gedung Surian	5	5	5
	Cipta Waras	10	10	10
Sumberjaya	Sukapura	10	10	10
	Tribudi Syukur	10	10	10
	Simpang Sari	10	10	10
	Muara Jaya	10	10	10
	Suka Jaya	10	10	10
Way Tenong	Gunung Terang	10	10	10
	Sidodadi	10	10	10
	Sri Menanti	10	10	10
	Tanjung Raya	10	10	10
	Mutar Alam	10	10	10
	Padang Tambak	10	10	10
Total		200	200	200

*The original survey design was to select 600 respondents. In fact, 609 respondents were selected but 5 interviews were not completed. Hence there were 604 interviews used in data analysis.

I was conscious of the potential for bias in the collection and interpretation of data. To limit this risk, I made repeat visits to Trimulyo and Gunung Terang to confirm my understanding of the context. I also presented my preliminary analysis of the data to these villages to get feedback in time to correct my interpretations. In visiting other villages, I asked about the same topic at different times with different interviewees to double check the information I was being given.

During 2009-2010, 11 villages in West Lampung and West Coast Districts were visited as part of the law enforcement case study (see Section 4.2.3 below). To supplement the land-use dynamics study, data on land transactions were collected at the same time. These data were collected by directly interviewing farmers involved in the transactions because not all

transactions were officially recorded or witnessed by the village officials, especially if the land was within a protected area. For each of 389 transactions, information was obtained on the year of transaction, land condition, farming activity, location, and price. Some of the transactions involved land in other villages that were not part of the study, hence there were 17 villages in total (Table 4.3). These data were used to assess trends in land values in relation to tenure status, land use, and other factors (see Chapter 5).

Table 4.3. Land transaction data obtained for 17 villages in West Lampung District

Sub-District	Village	No. of land transactions
Bengkunat Belimbing	Pagar Bukit	29
	Pemerihan	16
Biha	Pelita Jaya	3
	Way Tenumbang	24
Lemong	Rata Agung	27
	Malaya	55
Nassal	Tebing Rambutan	15
Ngambur	Pekon Mon	34
	Nambour	23
Pematang Sawa	Way Nipah	15
Suoh	Bumi Hantatai	31
Pesisir Tengah	Gunung Kemala	15
	Pahmongan	14
Pesisir Selatan	Tenumbang	16
Bengkunat	Pardasuka	10
	Raja Basa	12
Gedung Surian	Trimulyo	50
Total		389

4.2.2 Study of coffee certification

The case study of coffee certification was conducted to investigate how certification affects coffee farming and Park conservation in West Lampung District. Data were collected from April to July 2009 through document review, key informant interviews, a household survey, and semi-structured interviews within the leaders and members of farmer groups (Figure 4.6).

The first activity was a desk study to review documents and data about coffee production and certification in Indonesia. This was followed by interviews with key informants in WWF Indonesia; the project manager and field officers of the coffee company, Indo Cafco, who

were involved in implementing certification in the study area; local government officials; the Coffee Exporters Association in Lampung Province; and local traders. These interviews were to obtain a basic understanding of coffee certification in the study area and its relation to Park protection, and also to assist in designing the survey of certified coffee farmers. It emerged that the certification system was organized by the single coffee exporter in the district through farmer groups, with the support of the district government extension agency. Within a village, farmers operated independently or in farmer groups, with or without certification.

The Coffee Certification Survey was conducted with 25 certified farmer groups spread over 17 villages in four sub-districts of West Lampung District: Way Tenong, Gedung Surian, Sumberjaya, and Sekincau (Table 4.4). These represented just under a quarter of the 104 groups that had the right to sell certified coffee in cooperation with Indo Cafco. The survey aimed to elicit the perceptions and circumstances of group leaders and farmer participants. I conducted all interviews personally using a semi-structured format. The survey was conducted in two phases. First, interviews were conducted with the leaders of the 25 certified farmer groups. Second, four of the 25 groups with contrasting circumstances were selected for individual interviews with members. In each of the four groups, at least a third of the group members were randomly selected and interviewed regarding the ownership status and location of their coffee plots and their perceptions of the impacts of certification on prices and profits. In total, there were 47 in-depth interviews with group members. I also interviewed 19 hamlet chiefs, traders, and staff of the coffee company regarding the certification project.

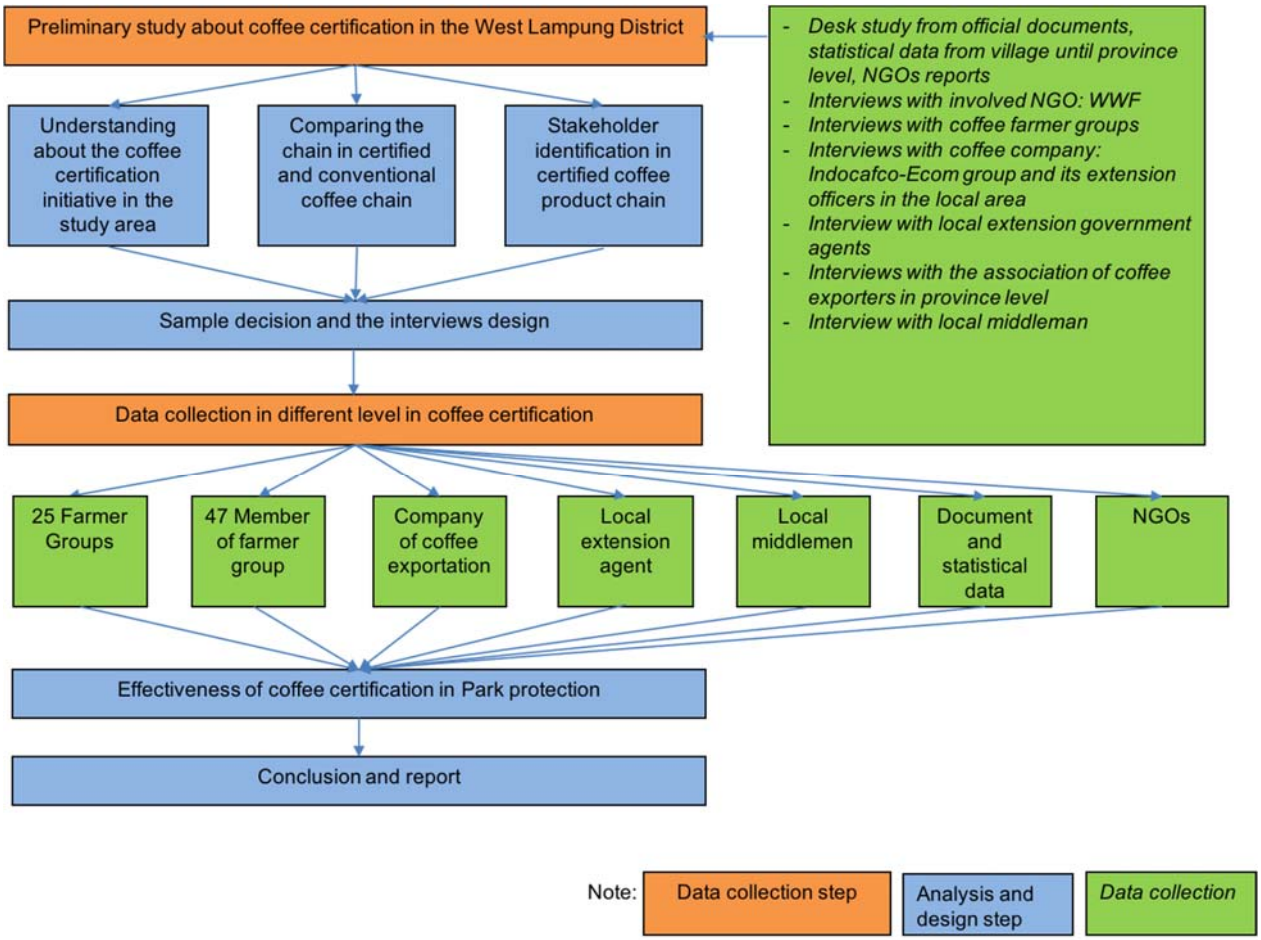

Figure 4.6. Data collection for the study of coffee certification

The first step in analysis was to understand how certification works in the study area, including the roles of the key actors and the history of the certification project. Then the farmers and farmer groups were categorized by comparing the time of commencing certification, the level of certification, the sales quota, and the realization of these sales quotas. The returns to coffee-based farming systems were then calculated to compare conventional and certified systems.

The interviews had a number of limitations. First, the data being sought related to a sensitive issue, namely, the traceability of the coffee sold through the certification channel. Data that cast doubt on the origins of the coffee could have affected the credibility of the farmer group and the company. Hence there were some data that I could not obtain from the company, or questions that led to vague responses from farmers. To get around this I asked the question in different forms to obtain clues and confirm my general understanding of what happened in reality. Second, most of the study of coffee certification was conducted in 2009,

at an early stage in coffee certification in Lampung. However, as explained below, I was able to get an update during a revisit to the study area in 2014. Third, there was a question over the objectivity of interviewee responses during group discussions. When I conducted an interview within the Farmer Group Authority, some ordinary members of farmer groups were present. To limit this bias, I conducted the personal interviews with farmer group members.

Table 4.4. Sub-district, coffee farmer groups, and number of interviewed members included in coffee certification study

Sub-district	Village	Interviewed famer groups	Nb of total farmer groups members	Interviewed members
Gedung Surian	Ciptawaras	1	30	
	Trimulyo	4	149	13
Sekincau	Giham Sukamaju	2	48	
	Sekincau	2	70	
	Sekincau Kebas	1	30	
	Sunur	1	25	12
	Tiga Jaya	1	25	11
Sumberjaya	Budi Sukur	1	65	
	Karya Tani	1	25	
	Pura Jaya	1	35	
	Simpang Sari	1	21	
	Suka Jaya	1	26	11
Way Tenong	Gunung Terang	3	60	
	Mutar Alam	1	25	
	Srimenanti	2	46	
	Sukajadi	1	21	
	Tambak Jaya	1	35	
	Total	25	736	47

4.2.3 Study of law enforcement

Enforcement of the laws and regulations governing the BBSNP was considered by Park management and related NGOs as an effective approach to protecting the Park. Illegal activities included land encroachment, poaching, and illegal logging within the Park. Each of these activities had penalties attached. However, the first study of land-use transformation

in the buffer zone of the Park (in Trimulyo and Gunung Terang) indicated that there was differential application of the law in that it was not being enforced at the same level in all border villages. This observation was the basis of the design of the second case study. The methods used in the law enforcement study included interviews and observations in a variety of villages in the buffer zone of the Park, beyond the study area of for the coffee certification case (Figure 4.7).

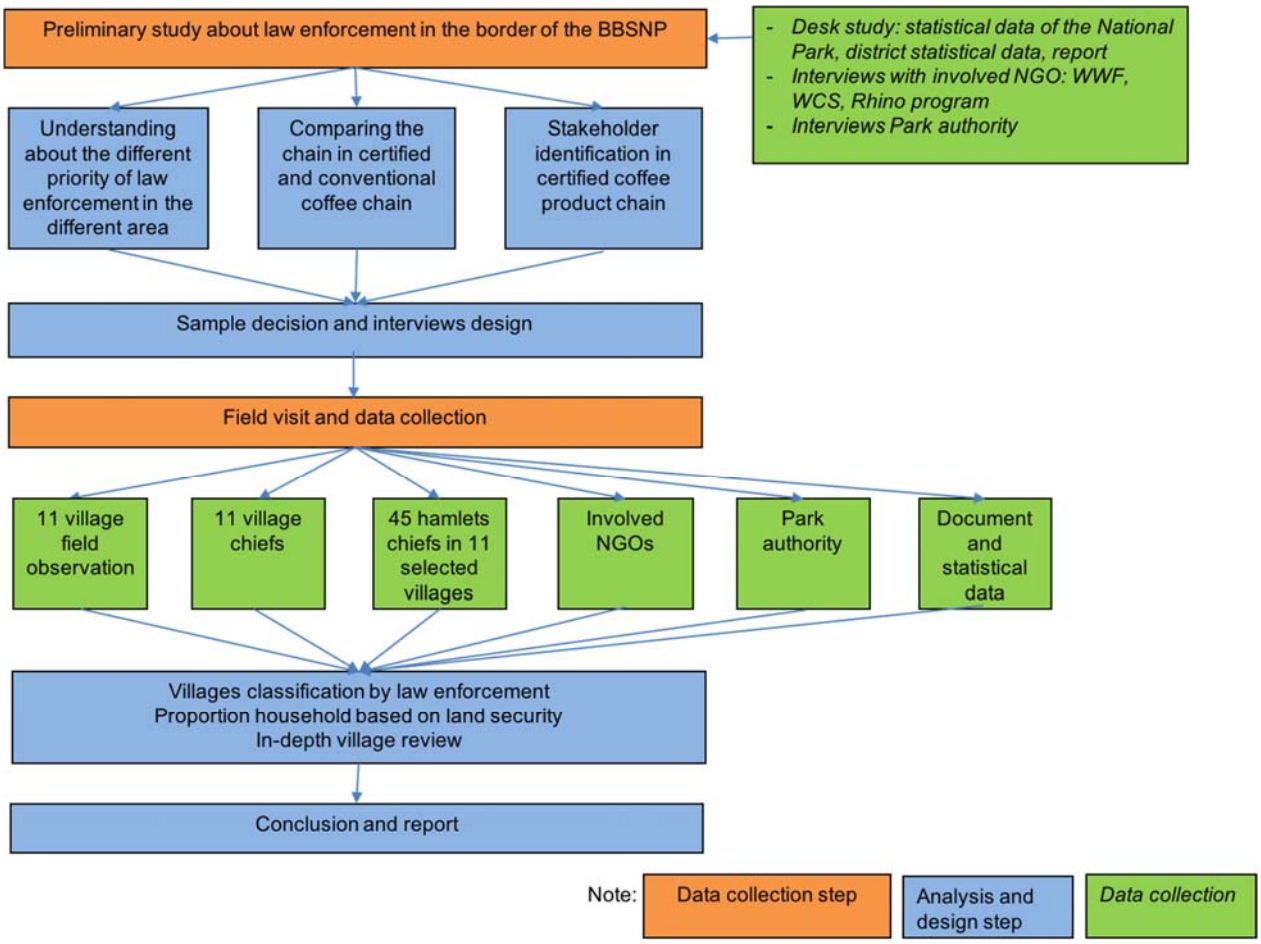

Figure 4.7. Data collection design in law enforcement study

Eleven villages were selected from around the Park and interviews were undertaken in October 2009 (Figure 4.8). The villages were selected using the following criteria: (a) they should all border the Park, thus highlighting the trade-off between conservation and development; (b) there should be variation in the level of enforcement experienced, (c) the villages should have different origins and ethnic composition (especially as between indigenous and migrant groups), and (d) the villages should have different degrees of

accessibility to markets and towns. In 10 of the selected villages, apart from the village head (*kepala desa*), all heads of hamlets (*kepala rukun warga*) were interviewed, giving a total of 45. In the eleventh village, Trimulyo, interviews with its seven hamlet chiefs had already been conducted during the first and second studies on land-use dynamics and coffee certification, so for this study 18 sub-hamlet chiefs (*kepala rukun tetangga*) were interviewed, making 63 interviews in total. Open-ended interviews on law enforcement were conducted with Park rangers and officers, officials in the BBSNP Bureaus, and NGOs that were involved in law enforcement in the Park.

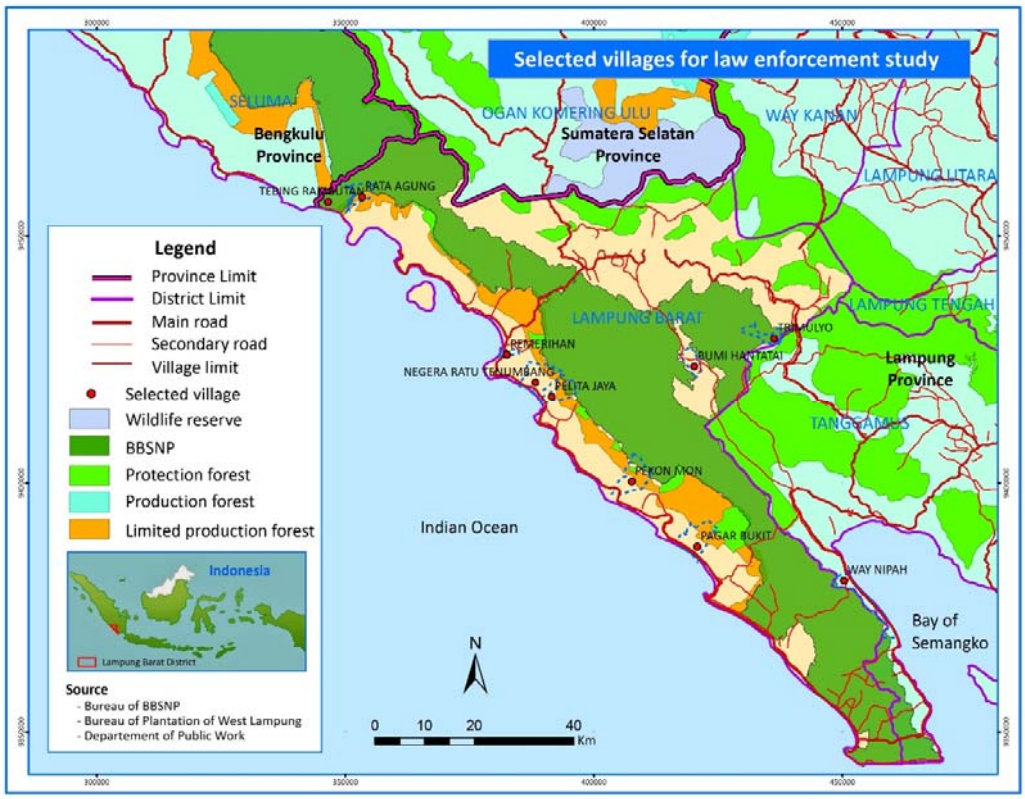

Figure 4.8. Location of villages in the law enforcement case study

For each village, three different questionnaires were used: (a) one for the village level to obtain information on the overall condition of the village, including the application of law enforcement measures; (b) one for the hamlet (or sub-hamlet) level to obtain more detailed information on land ownership of individual households, land use, perceptions of the Park, and ideas to resolve the problem of encroachment; and (c) one on changes in land prices and land transactions within and outside the Park (as explained in Section 4.2.1 above).

To classify the villages in terms of their experience of law enforcement, a scoring system was used. The two dimensions of enforcement were the frequency of patrols and the implementation of sanctions. Each was scored from 1 to 5, with 1 representing a low frequency of patrols (rare or never) or a low incidence of sanctions being imposed (never), and 5 a very high frequency of patrols (at least weekly) or a high incidence of sanctions, including forced evictions (Table 4.5). The classification was used to conduct qualitative and quantitative analyses of the relation between law enforcement and encroachment on the Park, as explained in detail in Chapter 7.

Table 4.5. Scoring used to classify villages in terms of level of law enforcement

Score	Patrol frequency	Implementation of sanctions
1	Never (not for several years)	Never
2	Rare (less than once per month)	Rare (less than 5 cases)
3	Average (once per month)	Average (5-10 cases)
4	Often (more than once per month)	Frequent (more than 10 cases)
5	Very often (at least weekly)	Intense (more than 50 cases, including forced evictions)

This study was made difficult because of poor road access in some villages, limiting field observations. Most the villages were also in a new area that I had not previously visited, including several in West Coast District. Hence, I had to ask someone from the local authority to accompany me to the field. An additional limitation was that calculating the proportion of households in the hamlet in different tenure categories (that is, whether farming entirely within village land or partly or wholly inside the Park) was based on the assumption that the hamlet or sub-hamlet chief knew precisely the land ownership status of each household as they normally kept records of all households in the hamlet. However, there could have been inaccuracy or bias in these estimates for larger hamlets for which the chief may not have had exact or complete records. A further concern was the difficulty of obtaining information about outsider households that occupied an agricultural parcel within the Park but were not formally under the jurisdiction of the hamlet.

4.2.4 Revisiting the study area

As I took an intermission from the PhD research for personal reasons, on returning to complete the analysis, it was appropriate to update the initial research findings. A revisit to the research area was undertaken in September-October 2014. The fieldwork aimed to

verify some previous findings and get an update on the situation of the BBSNP and the surrounding villages, especially with regard to the issue of Park encroachment, coffee certification, and law enforcement. Data were collected in Bandar Lampung (the provincial capital), Kota Agung (the headquarters of the BBSNP Bureau), Liwa and Krui (district capitals), and in the original study villages (Trimulyo and Gunung Terang) (Figure 4.9). Semi-structured interviews were conducted to obtain both primary and secondary data from sources at various levels from the Province to the farm: the BBSNP Bureau, coffee companies in Lampung (Indo Cafco and Nestle), the Coffee Exporters Association of Lampung, the Provincial Plantation Crops and Forestry Bureaus, the District Plantation Crops, Forestry, and Planning Bureaus, the Bureau of Statistics for Lampung Province, the Rhino Protection Unit, the head of selected farmer groups, members of selected farmer groups, and the head of a forest farmer group (farming under a Community Forest lease in a Protection Forest). The findings from this 2014 visit are mostly added in a separate section towards the end of Chapters 5, 6, and 7.

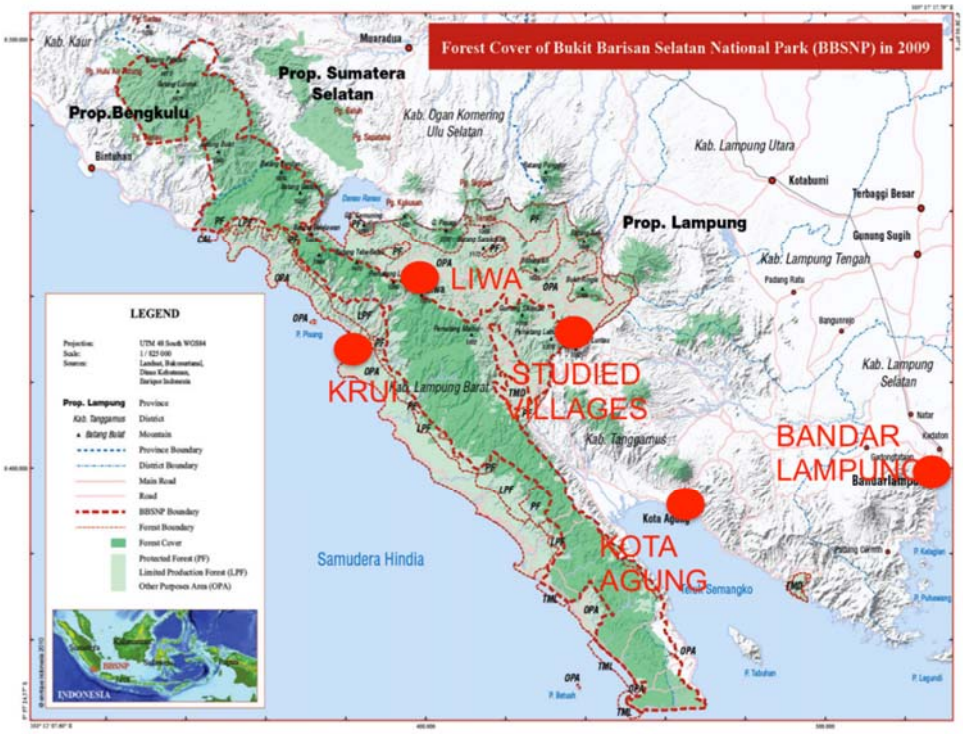

Figure 4.9. Study sites for second period data collection in September-October 2014

4.2.5 Ethical aspects of the research

The ethical aspects of the research mostly arose during the first period of fieldwork from 2008 to 2010 and were considered within the institutional framework of the main sponsors, Montpellier University and CIFOR, as well as Lampung University. This period of data collection involved interviews, surveys, and observations about human behaviour and its implications in a setting where livelihoods were at stake and illegality was part of the phenomenon under study. In such cases it is important that participants are assured that their interests and safety are not under threat as a result of their participation. In each site where I engaged in data collection by interviewing individuals or groups or observing land-use activities, I introduced myself and my research project and asked permission from sub-district and village authorities. Individual informants and interviewees were assured that their identities would remain anonymous, especially in relation to illegal actions such as encroachment into the BBSNP. As one interviewee insisted: “I tell and share with you, but don’t tell anyone that it is me who told you.” The ethical aspects of the research can be discussed in relation to each of the three studies described above: (a) dynamics of land use, (b) coffee certification, and (c) law enforcement.

In the study of land-use dynamics, I began interviews by introducing myself as a Lecturer of Lampung University and as a PhD student of in The Paul Valéry Montpellier 3 University, France. The introduction was both oral and written, using the official letter, a copy of which could be retained by the respondent if they desired. Before I began the interview, I explained the research theme and my background. The emphasis in the introduction was different for officials from whom I needed to get permission to conduct research in their domain and for individual respondents, where the concern was more with obtaining informed consent.

I explained to the respondent that the research was not for any government agency, Park authority, NGO, or company, so I was neutral with regard to the Park and its management, the coffee certification project, or other government programs. This was to obtain the confidence of the respondent and encourage honest answers. In case of sensitive answers related to the illegal activities, I assured the respondent that I would not reveal their identity and would use a code or pseudonym in any research report. Most important, the respondent had the right to accept, decline, or postpone the interview, or decline to answer any given question.

In this first study I stayed in the village of Trimulyo for about five months to understand the local context and provide opportunities for observation and open-ended inquiry. During the stay, I benefited from the time to get to know people in the village and to be known by them.

I paid close attention to the timing of activities so as not to disrupt the villagers. During the day, I often went to the interviewee's farm to minimise disturbance to their work. Sometimes interviews were conducted during the evening at the interviewee's house if this was more convenient.

In the second study about coffee certification, I again had an official letter and commenced interviews by introducing myself and the project. I asked the respondent's permission each time before conducting an interview with the leaders of the coffee farmer groups in each village, the individual farmer group members, local government officials, NGO officers, and company representatives. A major concern of this study was the issue of coffee traceability, especially conventional coffee or coffee grown illegally in the Park or other protected areas but channelled through the certified supply chain. As this was obviously a sensitive issue, I explained that the data were only to be used for research purposes and were not to incriminate them. Hence the identity of the respondents or the groups to which they belonged would not be revealed to avoid any risk of action against them by local government or Park management.

For the third study on law enforcement, most of the interviews were the first time I had met the respondent. In every village visited, I introduced myself and the project to the village head and presented the official letter of support. In this meeting I asked permission to meet and interview the hamlets chiefs. The village head introduced me and my team to the hamlet chiefs by phone or text and provided me with an official letter of recommendation. As the hamlet chiefs reported directly to the village head, this recommendation was necessary. In this study the issue of illegal land ownership inside the Park was sensitive, though a common practice. However, I have used the actual names of the villages studied, while keeping individual respondents' names and their hamlets anonymous.

4.3 Conclusion

The trade-offs between conservation and development in tropical rainforests were explored using a case study of the Bukit Barisan Selatan National Park, with two cases embedded. These cases were the two broad approaches to protecting the Park, an incentive-based approach using coffee certification and an exclusionary approach relying on enforcement of Park laws. The units of analysis included farm households, farmer groups, hamlets, and villages, all within the biophysical and socioeconomic context of the larger study area.

The data for the research were obtained during two periods. The first, in 2008-2010, contributed most of the findings, while the second, in September-October 2014, helped

update and test the findings. The gap in the research meant that the initial results were somewhat dated. On the other hand, the opportunity to conduct follow-up fieldwork gave a longer perspective on what was and is an evolving situation. Nevertheless, there were limitations to the accuracy and completeness of the data collected. First, the respondents and informants were limited to those living in the villages around the Park. This did not include farmers who were not village residents but came from outside to maintain and harvest their coffee plots. Second, the sensitivity of the theme of the research may have affected the accuracy of responses. This was offset to a large degree by assuring respondents of their anonymity and the neutrality of the interviewer, as well as by cross-checking information at different points in the interview and between different interviewees. Third, responses from government officials may not have reflected the real situation. This was also offset to a degree by coming at the question from different angles in the same interview and conducting more than one interview with the same organisation.

CHAPTER 5
EVOLUTION OF FARMING SYSTEMS AND LANDSCAPE CHANGE

In this chapter population growth, rural development, and the corresponding evolution of farming systems on the eastern edge of the National Park is traced from the 1940s until the first period of fieldwork in 2010. This landscape history was reconstructed from an in-depth qualitative study of two villages and a visual analysis of successive maps of forest cover in and around the Park, as described in Section 5.1. This is followed in Section 5.2 by an analysis of the contemporary pattern of land use in the same villages, based on a study of coffee and other agricultural activities. A typology is presented of the different farming systems in which these activities are combined and of the households practising these farming systems. In Section 5.3, a household typology is presented based on the degree of encroachment on protected areas. This typology is applied to the analysis of data from the Livelihood Survey in 21 villages along the eastern boundary of the Park. Then, in Section 5.4, data on transactions in coffee land within and outside the Park from about 2000 to 2010 are analysed to determine the trends in land prices and the factors affecting them. Section 5.5 concludes.

5.1 Land Settlement and Landscape Change

As explained in Chapter 4, the history of land settlement and land use was investigated in two villages – Trimulyo and Gunung Terang – to provide a basis for understanding the history of the area along the eastern boundary of the Park (see Figure 4.5 in Chapter 4). These two villages were administratively one until they were split in 1986, and their characteristics at the time of the research were very similar. Most of the village population (90%) was Javanese and the production system was dominated by coffee and lowland rice. The villages were located between 800 and 1,400 masl. The highest part had been zoned as part of a protected forest area by the Dutch and was officially incorporated in BBSNP in 1982. Further down was a buffer zone with a mixture of coffee and timber plantations, giving way to an area of sloping land used for mixed or diversified coffee plantations. Closer to the river was the settlement area and lowland fields for rice and vegetables.

In the 1940s, village areas were largely forested and occupied by the Semendo ethnic group, a sub-group of the Melayu family, who cultivated upland rice and coffee. With the opening

of West Lampung District to migration from the early 1960s, successive waves of Javanese settlers arrived, both sponsored and spontaneous migrants. These settlers played an important role in land-use transformation in both villages. Based on interviews with village informants, the history of land use since the 1940s can be divided into four periods (Figure): (1) initial settlement; (2) arrival of transmigrants in the 1950s and 1960s, resulting in more intensive coffee production; (3) land clearing by spontaneous migrants in the 1970s and 1980s, encroaching on protected areas for coffee planting; (4) a complex of trends from the 1990s, including development programs, decentralisation, population increase, intensification of coffee production, and declining farm size. These trends were influenced by waves of migration into the region, improved road access and regional development, and increasing population pressure. The four historical periods are explained in the following sub-sections and then compared to evidence of changing forest cover in and around the Park since the early 1970s.

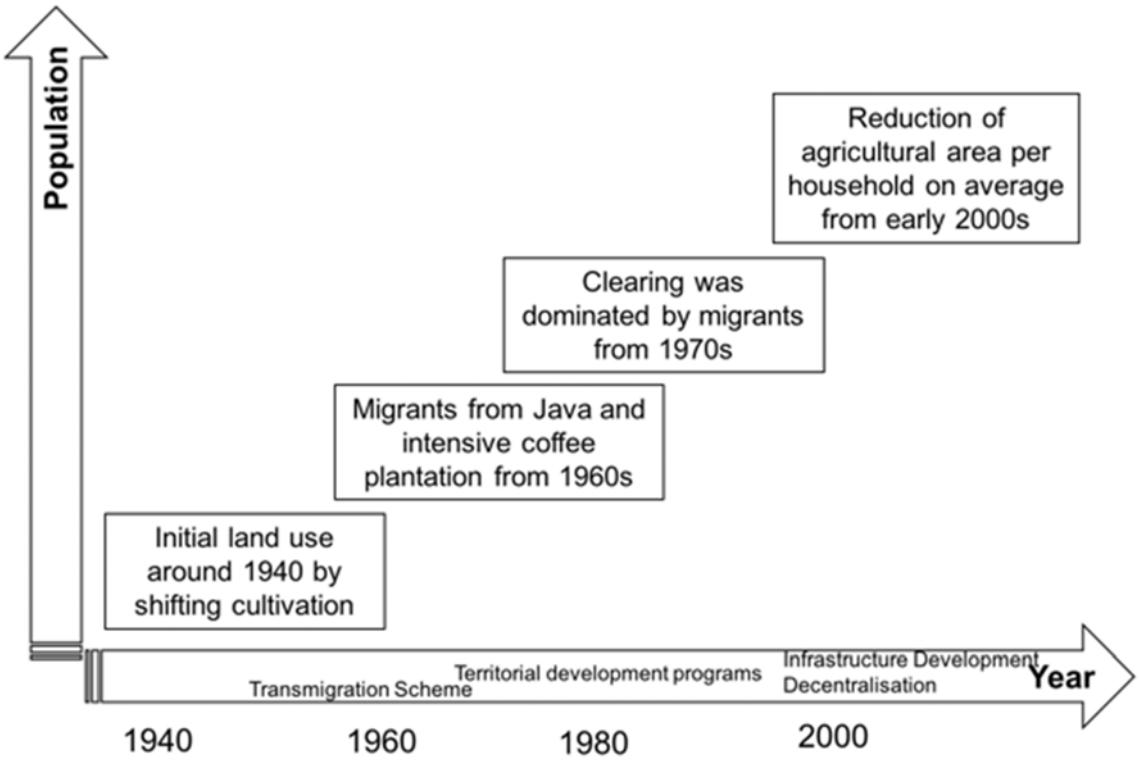

Figure 21. Timeline of settlement and land use in Trimulyo and Gunung Terang

Source: Interviews with village elders and authorities, 2008-2010

5.1.1 Opening up the area by shifting cultivation

The earliest clear recollection was for the 1940s as elderly interviewees of the Semendo ethnic group could retell their own experience and recount memories from their parents. Before 1940, most of the area was dense forest. The original inhabitants were a small population of Semendo whose settlements were scattered. Their production system was based on shifting cultivation – they cut and burned the forest to plant upland rice for up to three years and then harvest coffee from years four to six or until coffee production declined due to loss of soil fertility. The land would then revert to forest-fallow until cultivated again with upland rice. Meanwhile they would open up another plot. Under this long-fallow system, each household may have possessed an area of around 20 ha. Figure 5.1 illustrates the shifting cultivation cycle in that period.

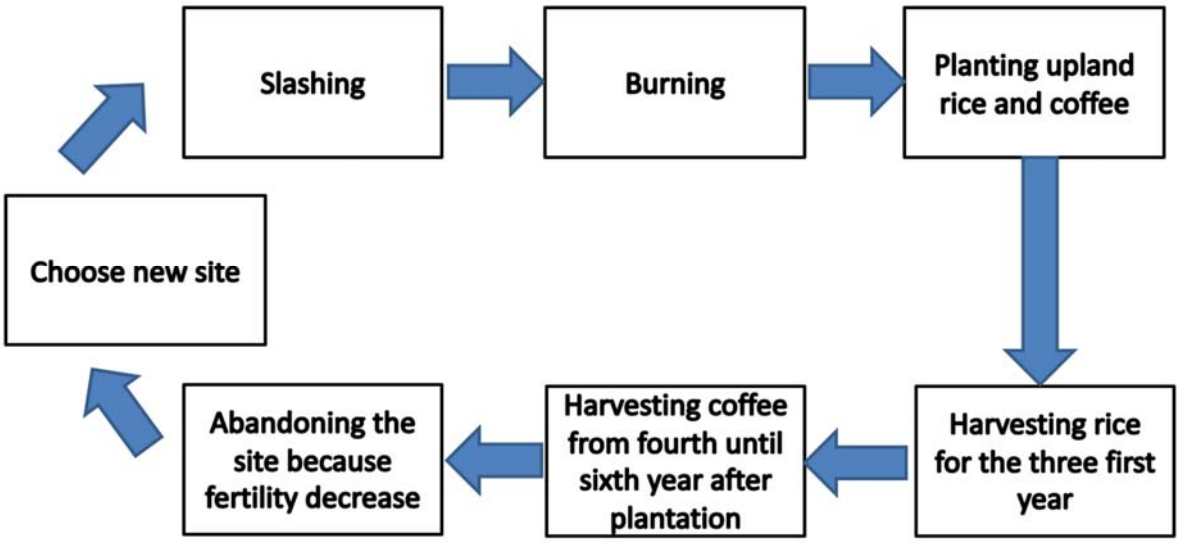

Figure 5.1. Shifting cultivation based on upland rice and coffee as practised by Semendo villagers until 1940s in Trimulyo and Gunung Terang

Source: Interviews with Semendo elders in Trimulyo

The cycle began with clearing and burning the dense forest and then planting upland rice and coffee. They would obtain a yield from rice in the first two (possibly three) years and then start harvesting coffee from the third or fourth year. In Interview 1, an elderly Semendo woman of around 80 years described the practice before 1940:

> In 1950, I began married life and split from my parents, who were Semendo. Before that, I lived with my parents who practised shifting cultivation in the dense forest. The first year we planted upland rice, the second year we cleared another plot, and then in the third year, coffee was in production. [3]

Until the late 1940s, several villages (*pekon*) were administered by traditional chiefs (*pesirah*) as a single territory (*marga*). After Independence, the *pesirah* were replaced and administration was under each village head. However, the *pesirah* continued to play an important role in the administration of the village, including giving permission for settlement by newcomers. Interview 2 illustrates this. The interview was conducted with a man in Air Dingin Sub-Village of Trimulyo Village. He was the first migrant to come to Trimulyo, arriving from Kebumen in Central Java in 1949. He recalled:

> The development in the village of Trimulyo was granted by the Pesirah. It was not difficult to get agreement to settle and obtain agricultural land because the administration was not strict. However, the boundary between the village area (marga) and the protected state forest area (kawasan hutan) was well defined.[4]

As pointed out by this informant, the border between the village area and the National Park was well-known by the villagers and the newcomers who came to settle in the village. This border was set by the Dutch as the boundary of a wildlife sanctuary which became the BBSNP in 1982.

5.1.2 Migration from Java and intensive coffee plantations

The village population began to be augmented through the early transmigration program in the 1950s. This program involved the sponsored transfer of population from densely-populated Java and Bali to other islands, organised by the National Reconstruction Agency (*Badan Rekonstruksi Nasional*, BRN). Lampung Province, especially West Lampung District, was the first transmigration destination. The population of the study area began to increase with the arrival of Javanese and Sundanese migrants. The transmigration sites were scattered in small hamlets, but always with a major facility in every village. There was

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[3] Interview 1 was conducted in Air Dingin Sub-village in Trimulyo Village on 5 May 2009. The interviewee was a Semendo woman elder who had lived in the village with her husband since 1950 when she was 20 years old.

[4] Interview 2 was conducted in Air Dingin sub-village in Trimulyo village on 11 May 2009. The interviewee was a former village chief who arrived from Java in 1949 as a migrant after which he started to plant coffee in the village.

a main road to the closest town, Fajar Bulan, which was more than 10 km from the two villages, but it was unsealed and not always passable.

Since the transmigration scheme, the population in both villages increased. The newcomers created new hamlets called "*bedeng*" or "*petay payak*" in dispersed areas. Each hamlet had something in common such as the settlers' place of origin in Java and the hamlet was often named after this place of origin. The newcomers were of two types – those with capital to buy land and those with little or no capital. Those with capital normally bought land from local Semendo while those with less capital would become share-croppers on Semendo land, with the harvest divided on a 50:50 basis. The Semendo sold established plots to the migrants and also provided "abandoned" or fallowed land for free. The newcomers mostly focused on coffee growing.

Interview 3 illustrates how the new migrants bought land from the Semendo. The interviewee was a 70-year-old man who came to Trimulyo in the 1960s from Kebumen in Central Java. He said:

> I bought Semendo land when I arrived from Java. I moved into the sub-village Talang Panjang I, as part of the village of Trimulyo. Talang Panjang I was founded in the early 1960s by six families from Java by opening up the forest… In 1980, 10 new families founded the sub-village Talang Panjang II (not far from Talang Panjang I). They also bought their coffee plots from Semendo people.[5]

Agriculture in this period was still dominated by coffee production along with upland rice. The original population of the two villages still practised shifting cultivation with upland rice and coffee in a long rotation on about 20 ha. Due to the augmented population, the average farm size decreased for other farmers. Sale of land and subdivision through inheritance resulted in less agricultural land per family. This resulted in more intensified coffee and paddy fields (*sawah*) on about 6 ha, while others had monocrop coffee plantations of about 6 ha. Conservely, the newcomers had bought about 1-2 ha per household or share-cropped 1-2 ha of coffee and paddy fields. Figure 5.2 illustrates the coffee plantation systems in this period.

[5] Interview 3 was conducted in Talang Panjang II sub-village in Trimulyo Village on 29 April 2009.

5.1.3 Forest clearing by spontaneous migrants in the 1970s and 1980s

As described above, the Semendo opened up the forest through shifting cultivation, and then the first transmigrants from Java came and acquired land from the Semendo. After the first wave of official transmigration, spontaneous migrants from Java began arriving in the area. Most of these newcomers had relatives or friends who had arrived earlier. The newcomers settled in the village area and some engaged in small trade to gain money. The migration continued until the existing agricultural land was not enough to support all the newcomers or the villagers who wanted to expand their farming area. In the 1970s, the newcomers began to take up shifting cultivation in the village forest to obtain land for permanent farming. Thus, forest clearing was no longer dominated by the Semendo villagers.

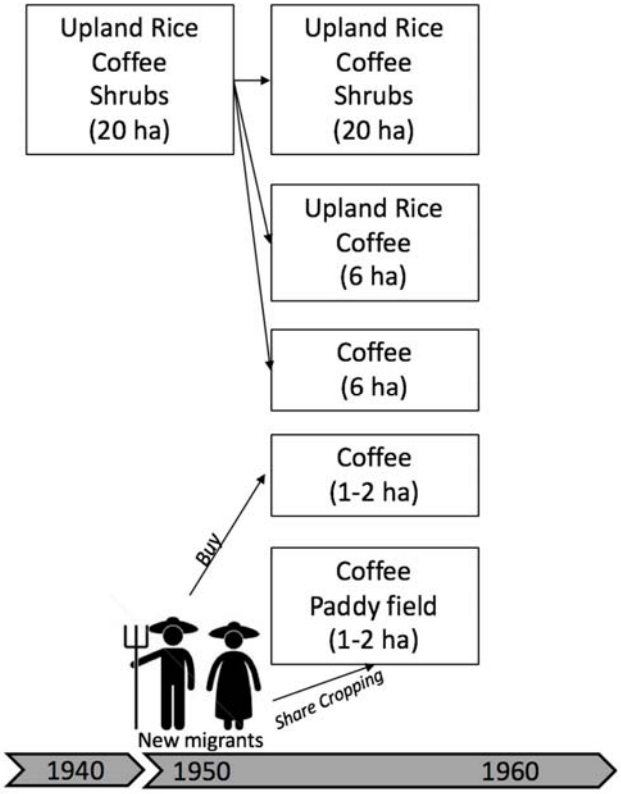

Figure 5.2. Evolution of farming systems with first wave of transmigrants in 1950s and 1960s

With increased population, farming systems were further differentiated and intensified, along with the introduction of livestock (Figure 5.3). The extent of shifting cultivation was reduced and diversified coffee plantations mixed with pepper, cloves, and paddy fields became the

dominant land use. Goat breeding was also introduced at this time. Newcomers continued to arrive and buy, clear, or share-crop small plots of 1-2 ha with coffee and paddy fields. These farming systems remained much the same until in the early 2000s.

Interview 4 illustrates the conditions in the 1970s when the interviewee, a 58-year-old Javanese farmer and trader, first arrived in the area:

> I was born in 1954 in Blitar in the Province of Central Java. The fact that I did not have land in Java motivated me to join the government transmigration with my brother. However, I did not stay in this for long because I tried to look for another opportunity through doing business, especially in trading. When I was 21 (in 1974) I went to the city of Metro [the second largest city in Lampung Province] to study. In 1976, I came to the sub-district of Way Tenong, then I cleared the forest to plant coffee on a plot of 3 hectares. In the first three years, I harvested rice and then the coffee was ready to harvest in the fourth year.[6]

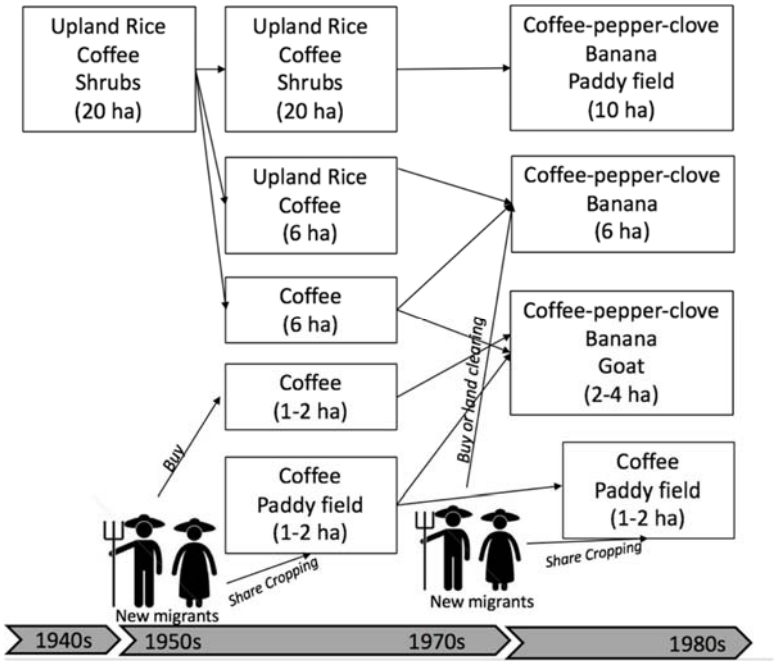

Figure 5.3. Evolution of farming systems with arrival of spontaneous migrants in 1970s and 1980s

[6] Interview 4 was conducted in Air Dingin I sub Village in Trimulyo Village on 1 May 2009. The interviewee was one of the big traders in Trimulyo Village who originated from Java.

The bloody crackdown on the Indonesian Communist Party (*Parti Komunis Indonesia*, PKI) in 1965-6, mainly in Java, prompted further migration to the area through the late 1960s and early 1970s. Interview 5 was conducted with an elderly man who arrived to the village in 1970. He said:

> After the overthrow of the PKI in 1965, there was a lot of migration into this region, especially later on from 1975 to 1980 in the village of Trimulyo… In the late 1960s, there were 6 families who came from Java and established themselves here by opening secondary forests.[7]

The protected forest was relatively undisturbed at this time.

From the 1980s the villages experienced improved road access and investment in other infrastructure such as schools. This development was not uniform in space, with villages closer to the main provincial road benefiting first. Thus, Gunung Terang experienced this development earlier than Trimulyo. However, the development was concentrated in the main settlement area at the centre of the village, with outlying hamlets less affected. Spontaneous migration continued to increase during this period, with the migrants' main motivation being to obtain agricultural land for planting coffee. Migrants acquired access to agricultural plots either by purchasing part of an existing coffee plantation or share-cropping coffee and paddy fields owned by the existing villagers.

The impact on the forest during this period is referred to in Interview 6 with a 55-year-old man in Gunung Terang:

> When I arrived in 1972 in Gunung Terang, there was always dense forest, but since the 1980s the forest [Park] was cleared by immigrants from Java who came with friends or families.[8]

Interviewee 5 explained that it had begun to be difficult for newcomers to acquire a coffee plot:

> In 1980, there was almost no land in the village for newcomers. They obtained plots for coffee after working for wages on other people's farms for one or two years. Then they would buy a plantation or enter into the harvest-share system.

Because of the increasing population, average farm size was declining. Farmers had begun to diversify their cropping systems, combining pepper, cloves, and bananas in their coffee

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[7] Interview 5 was conducted in Air Dingin sub-village in Trimulyo Village on 1 May 2009. The interviewee was elderly and a former village head.
[8] Interview 6 was conducted in Gunung Terang Village on 17 December 2009.

plantations to increase farm income. In this period, a local government extension agent also introduced goat raising to the village. The Semendo farms were now about 10 ha and the fallow period for shifting cultivation was less than half what it had been in the 1940s (Figure 5.3). The Semendo coffee plantations were also becoming diversified.

During this period, deforestation became more extensive, not just to obtain arable land but to extract timber for sale. Clearing for agriculture had reached Bukit Rigis to the south, where two small hamlets of Javanese migrants, Talang Rigis and Talang Maryono (later merged to become Talang Rigis Jaya) were located.[9] Clearing had also encroached on the forest reserve to the west.

In 1982, the BBSNP was declared. As the border with the Park remained the same as with the Dutch-designated reserve, the local people were aware of the Park boundary. In 1988, there was a forced eviction of those who had settled inside this boundary. These households were moved to transmigration sites in North Lampung District and the area was reforested by planting *Calliandra calothyrsus* seedlings. Interview 7 was conducted with a man who was expelled from the park in 1988:

> I was forced to leave the Park with 150 other families. We were scattered in eight different villages in the district of North Lampung. I was settled in the area of Rawa Pitu, and I was given 2 hectares of land, including 0.25 hectare for housing in the new location.[10]

He subsequently returned to Trimulyo in 2000 to resume coffee planting in the same site within the Park.

5.1.4 Trends since the 1990s

The period since 1990 was marked by further infrastructure development, followed in the post-Suharto era (i.e., after 1998) by the decentralisation of government. Throughout this period, forest cover in the Park and the Bukit Rigis Protection Forest continued to decrease. The infrastructure development included roads, markets, schools, electricity, and drinking water (sourced from the watershed of Bukit Rigis). With the implementation of the

[9] Bukit Rigis is an area of Protection Forest that directly borders the National Park. The area is known as Hutan Lindung Bukit Rigis, Register 45B, Resort Bukit Rigis. It is shown in light green in Fig. 21.
[10] Interview 7 was conducted in Trimulyo Village on 1 June 2009.

government's decentralization policy, the forest area in the Park was also opened up by large numbers of new arrivals as well as by the local population.

Among the newcomers were some who had been expelled in the 1980s. Interview 7 illustrates the experience of one who had been expelled from the Park in 1988 but later returned. He recounted:

> I took up my farm plots in the new transmigration area to accumulate capital. But I always kept my farm plots in Rawa Pitu and returned to the Park again in 2000.

This farmer had 1,500 coffee trees (just under 1 ha) within the Park. He stayed five days a week in his small hut at the coffee plot, returning to his house in the village for two days a week to be with his family.

Some long-established farmers also began encroaching on the Park. For example, the farmer in Interview 3 owned some coffee plots within the Park. He explained why.

> Village land (*lahan marga*) has not been available for new coffee plantations since 1990, and people are looking for plots in the forest area of between 0.5 and 5 ha. As for me, in 1999 I started to clear some plots in the forest area too.

Interview 8 was conducted with a district official, 42 years old, who described his experience under the more relaxed conditions of the decentralization era:

> Before, my friends in the village and I would hide when we illegally harvested coffee in the area from which people were evicted in 1988. But with *reformasi*, people thought that the forest is a resource for the people. After that, we do not hide anymore to plant and harvest the area inside the Park… And people are working in small groups together of 4 to 5 people to open further plots for coffee planting.[11]

Despite this expansion of cropped land, population pressure on the land continued to increase, resulting in a further decline in farm size. The coffee plots were managed more intensively from this time with the introduction of chemical fertilizer and improved planting material by the local government, resulting in higher yields. Interview 3 illustrates this:

> The productivity of coffee was determined by climate, with the dry season and the rainy season alternating during the year. But since 1990, we began

[11] Interview 8 was conducted in Air Dingin 2 in Trimulyo Village on 25 June 2009.

to plant better seedlings and add chemical fertilizers in the coffee plots. This was introduced by the Bureau for Plantation Crops (*Dinas Perkebunan*) in Lampung Barat District. Production has been better since 1993.

The diversification of coffee gardens also continued, meaning that overall land-use intensity increased (Figure 5.4).

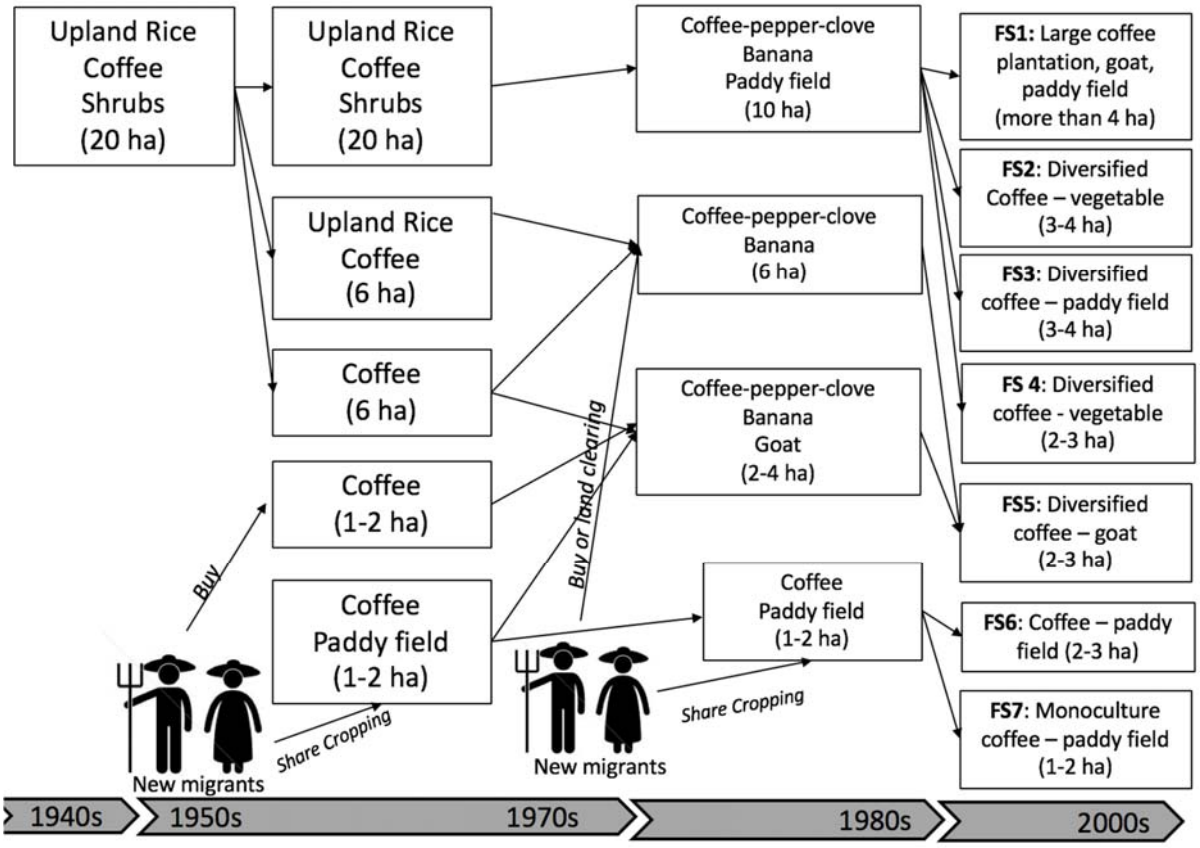

Figure 5.4. Evolution of farming systems in Trimulyo and Gunung Terang with further development in the 1990s and 2000s

5.1.5 Mapping the decline in forest cover in the Park, 1972-2009

The historical analysis of the two villages reveals the trends and events that have increased population pressure and the demand for agricultural land and so contributed to deforestation in and around the BBSNP. To see the impact on forest cover, maps for 1972, 1985, 1994, 2002, and 2009 provided by David Gaveau and the BBSNP Office, and prepared by Enrique Indonesia Cartography, are reproduced here as Figure 5.5 to 5.9.

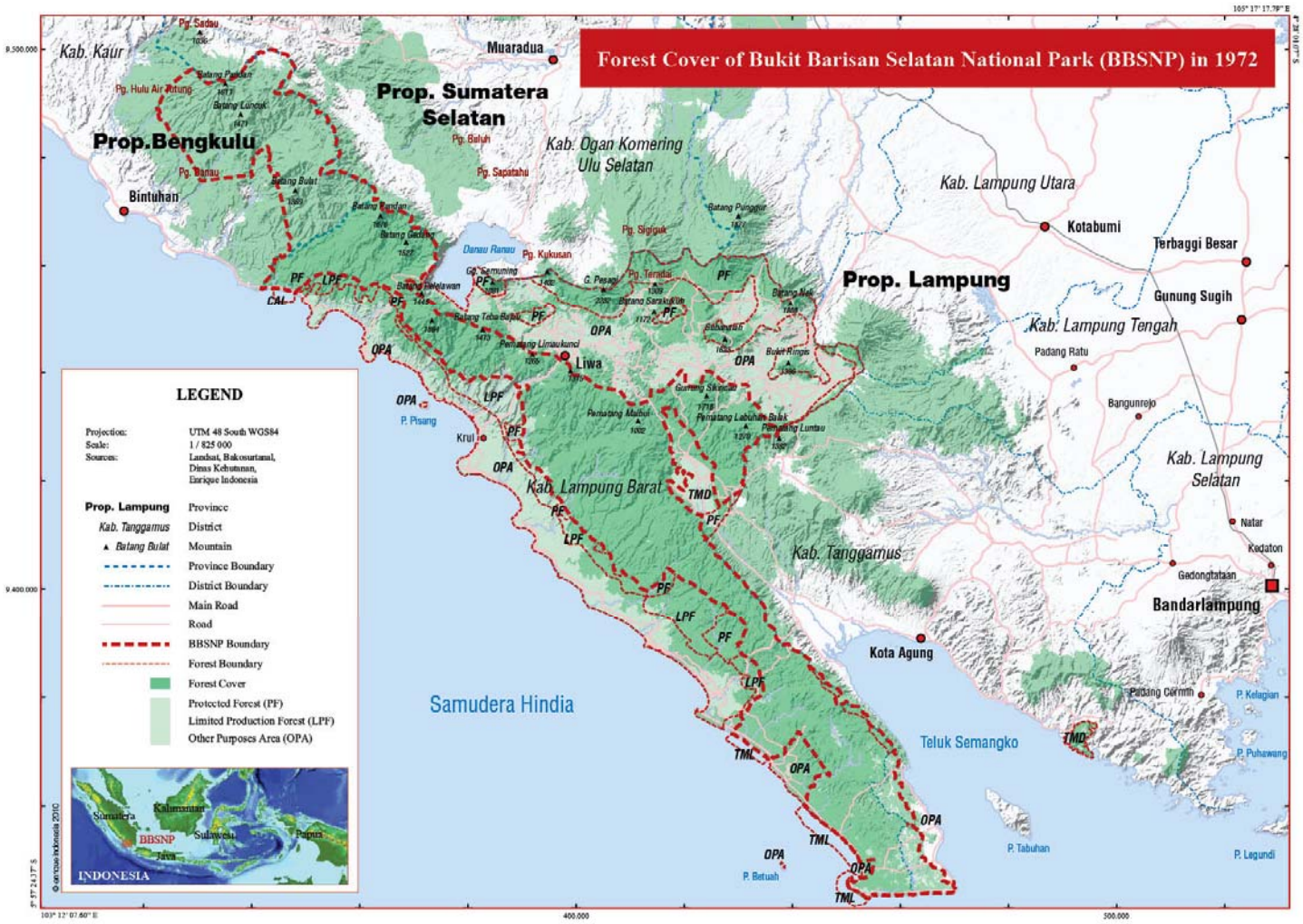

Figure 5.5. Forest cover of BBSNP in 1972

Map data provided by David Gaveau and Office of BBSNP, copyright Enrique Indonesia Cartography.

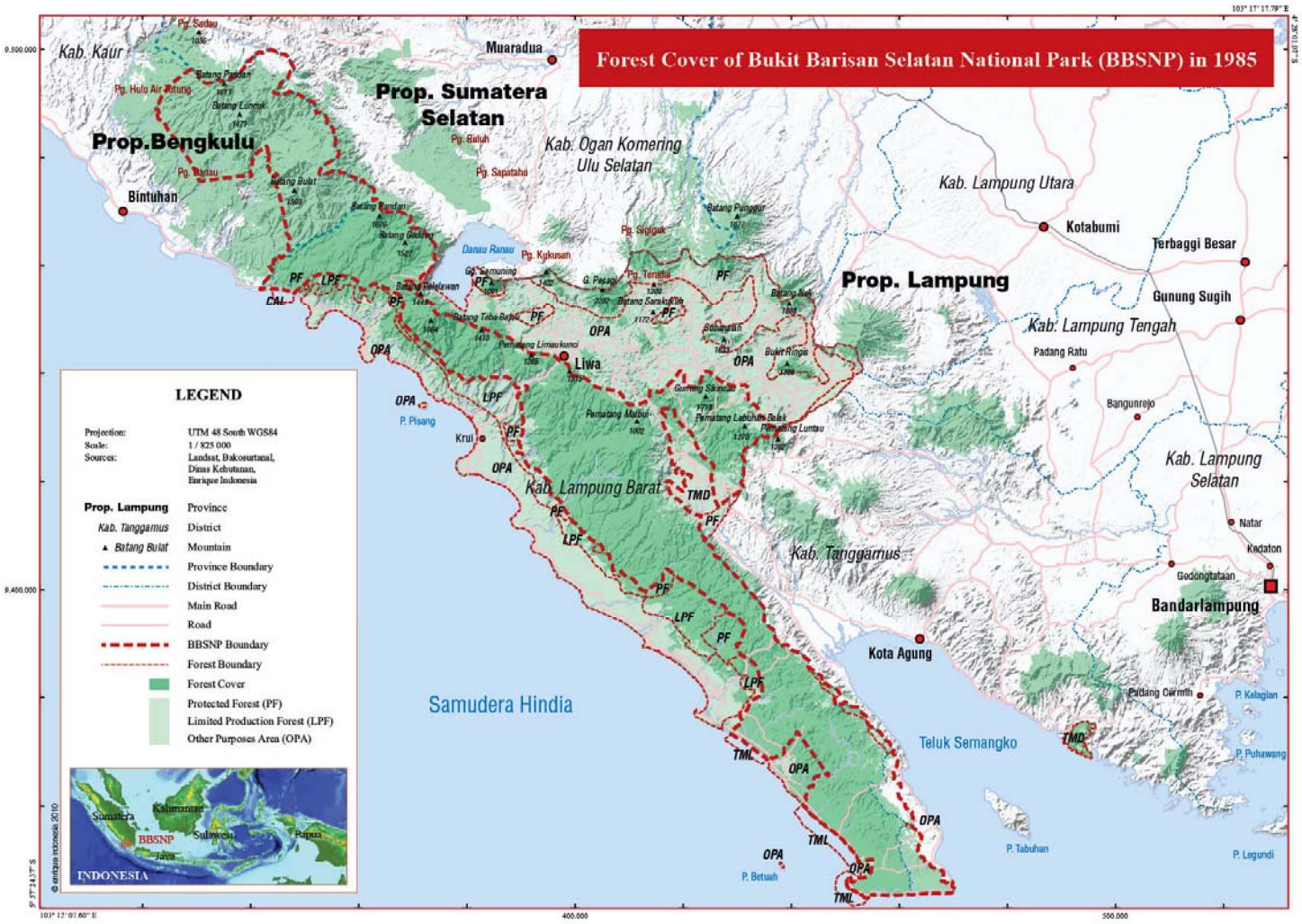

Figure 5.6. Forest cover of BBSNP in 1985

Map data provided by David Gaveau and Office of BBSNP, copyright Enrique Indonesia Cartography

Figure 5.7. Forest cover of BBSNP in 1994

Map data provided by David Gaveau and Office of BBSNP, copyright Enrique Indonesia Cartography.

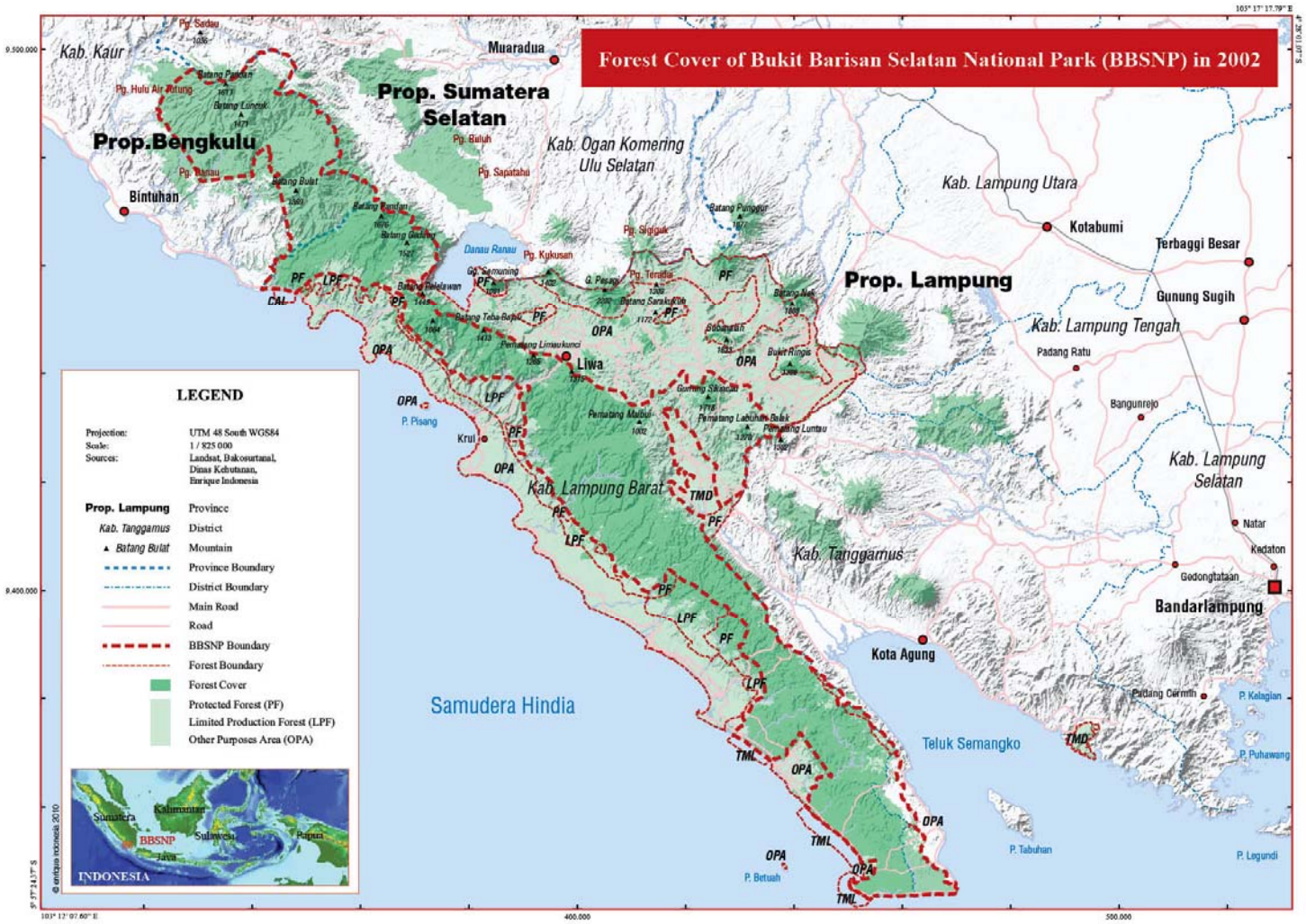

Figure 5.8. Forest cover of BBSNP in 2002

Map data provided by David Gaveau and Office of BBSNP, copyright Enrique Indonesia Cartography

Figure 5.9. Forest cover of BBSNP in 2009

Map data provided by David Gaveau and Office of BBSNP, copyright Enrique Indonesia Cartography

In 1972, the earliest year for which images were available, forest cover within the Park was relatively undisturbed and the Protection Forest (PF) on the eastern side of the Park was still dense (Figure 5.5). By 1985 (Figure 5.6), there is apparent a loss of forest cover in the PF. In the Park, too, deforestation had occurred, especially in the border area between West Lampung and Tanggamus Districts where Trimulyo is located, and in the easternmost area of the Park in Gedung Surian Sub-district. By 1992, the development of infrastructure and government decentralisation was beginning to accelerate the loss of forest cover in the PF and the eastern arm of the Park (Figure 5.7). The 2002 map shows this deforestation continuing in the PF and the Park especially in the eastern part of West Lampung District (Figure 5.8). The latest map shows the extent of forest cover in 2009 when this study was conducted (Figure 5.9). This map reveals that the PF next to Trimulyo had been completely deforested. Deforestation had also occurred in other PFs and Limited Production Forests (LPFs), as well as within the Park along the western boundary, but not as extensively as on the eastern side in West Lampung District.

The map analysis combined with the historical study of Trimulyo and Gunung Terang shows that the forest cover in and around the BBSNP was steadily reduced over the four decades to 2010, mostly due to the spread of coffee cultivation on the eastern-central side of the Park. The population pressure caused by natural growth and the successive waves of sponsored and spontaneous migration from Java, combined with the opening up of the area to development, were the main drivers of landscape change in the study area and around the Park generally. Despite the expansion of agricultural land through deforestation, land for coffee farming became scarce and more expensive and average farm size declined. Hence the pressure on the Park increased.

5.2 Diversity of Farming Systems in 2010

In this section, the contemporary farming systems in Trimulyo and Gunung Terang are described, based on field observations and interviews in the two villages. First, the farming landscape and the main crop and livestock activities within that landscape are described in Section 5.2.1. Then the productivity of the different activities is analysed in Section 5.2.2. These activities were combined into different farming systems, depending on the household's land resources, labour force, and livelihood strategy. A typology of these farm-household systems is presented and analysed in Section 5.2.3.

5.2.1 Characteristics of farming landscape and activities

The study area was an inland valley surrounded by hilly terrain at 800-1,400 masl. The Way Besai River passed through the village lands and was fed by numerous smaller streams draining the surrounding hills. Settlements were mainly located in areas of flat land close to the main river or streams, although small hamlets were located in the hills. In the valleys, the landscape comprised paddy fields, small vegetable gardens, and coffee plantations with a mixture of other crops. The river and streams were used to irrigate the rice and vegetables. Moving away from the river, the land was covered by diversified coffee plots on undulating land, monocrop coffee plots on the slopes, patches of upland rice, and some secondary growth. The higher land fell within the protected areas (*kawasan*), whether the Protection Forest or part of the National Park.

A stylised illustration of the landscape in Trimulyo is shown in Figure 5.10. The landscape in Gunung Terang was very similar. A schematic land-use profile for both villages is presented in Figure 5.11. The main settlement was located near the main river, with diversified coffee plots and vegetable gardens nearby. The paddy fields were of two types – those in the main valley and those in a secondary valley. Hamlets were located on higher land than the main settlement, close to the monocropped coffee gardens on sloping land.

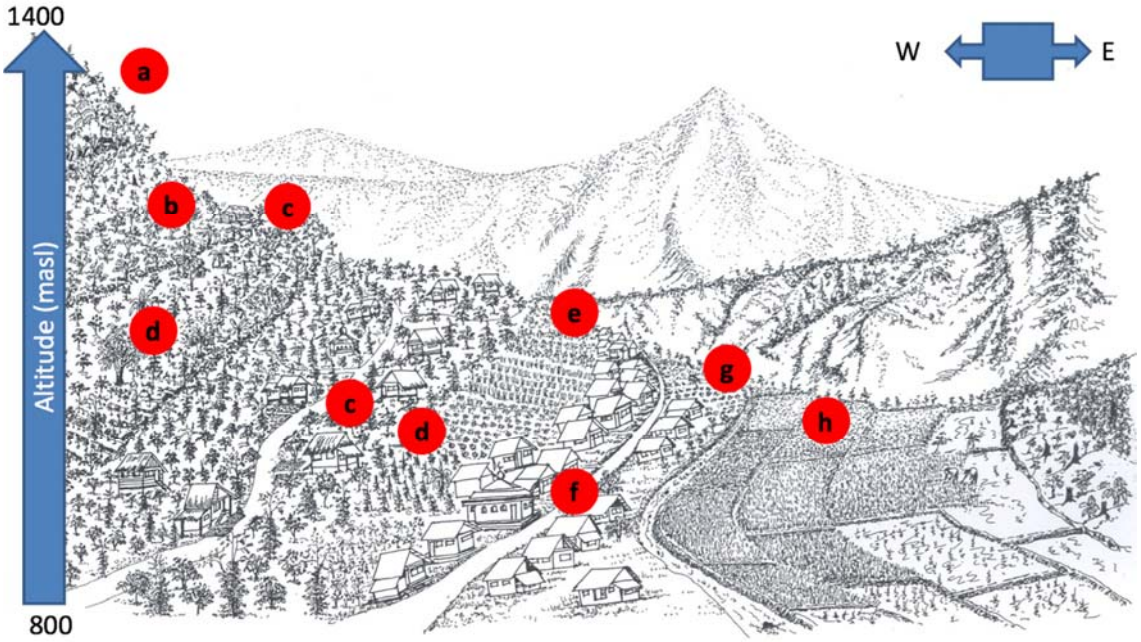

Figure 5.10. Simplified landscape in Trimulyo, looking north up the Way Besai River. Designed by Yulia Fitriana, drawn by Wiyono, CIFOR Indonesia. See Fig. 33 for key.

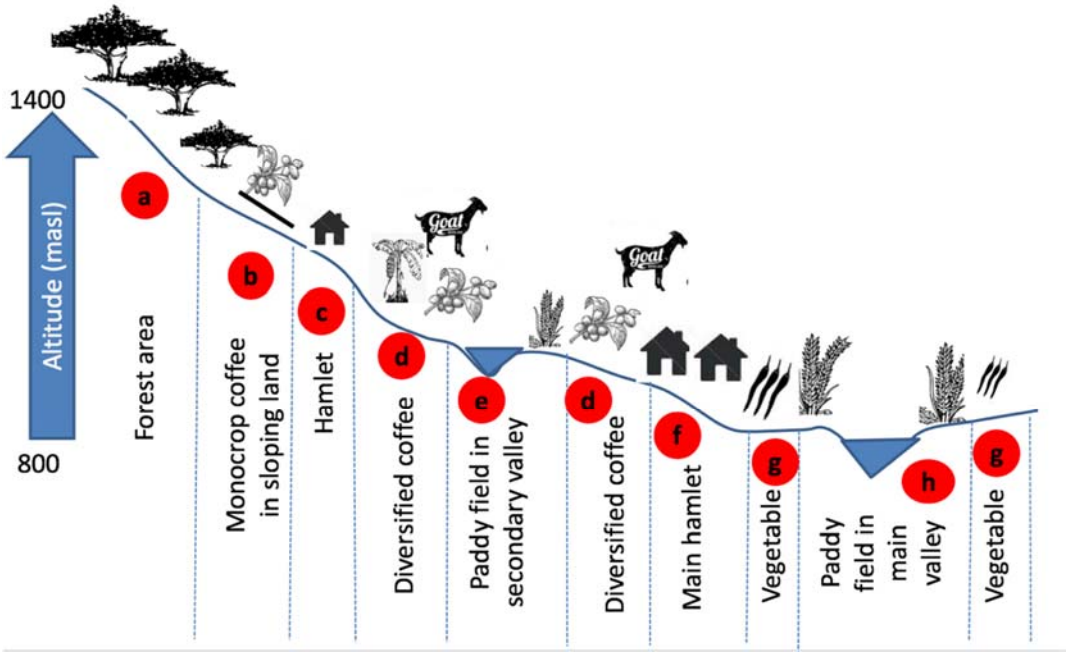

Figure 5.11. Schematic land-use profile in Trimulyo and Gunung Terang villages Designed and drawn by Yulia Fitriana

The series of photographs that follows also helps provides an appreciation of the landscape in Trimulyo. A transition area from the Park to the upper coffee plots is shown in Figure 5.12, while a road giving precarious access to these upper fields is shown in Figure 5.13. The different types of house in the village are seen in Figure 5.14, reflecting differences in both wealth and ethnicity. A hamlet located in the upper slopes close to the Park is shown in Figure 5.15, while Figure 5.16 shows an isolated farmstead within the Park boundaries.

The cropping and livestock activities that made up the farming systems in the two villages were: (1) lowland rice in the main valley, (2) lowland rice in secondary valleys, (3) vegetable production, (4) coffee in agroforestry plots, and (5) monoculture coffee on sloping land. Rearing goats was the only livestock activity.

The lowland rice activity was classified into two types, depending on whether it was undertaken in the main valley or in the secondary valley (Figure 5.17). Paddy fields in the main valley had more consistent water supply throughout the year. Their location along a large river valley meant there was a wider zone of flat land with greater sedimentation and therefore higher soil fertility. Hence the yield in the main valley was higher than for the second type of paddy field. Production costs were also lower due to the utilisation of hand tractors in this environment.

Figure 5.12. Transition area from forest area to coffee plots and hamlet. The area pictured is part of the National Park but includes secondary forest and areas converted to monoculture coffee plots. Photo by Yulia Fitriana, 2009.

Figure 5.13. The main access to the hamlets near the forest area from the main settlement in Trimulyo. This temporary road was very slippery during the wet season. Photo by Yulia Fitriana, 2009.

Figure 5.14. Different types of house in the main settlement in Air Dingin I hamlet in Trimulyo. The house of one of the wealthiest persons in the village (top left), a permanent house (top right), a Semendo's wooden house (bottom left), and a Javanese wooden house (bottom right). Photo by Yulia Fitriana, 2009.

Figure 5.15. Air Dadapan Hamlet in a hilly area of Trimulyo. Picture shows diversified coffee plots surrounding the settlement and monoculture coffee on sloping land behind. At the top of the hill some isolated houses can be seen. Photo by Yulia Fitriana, 2009.

Figure 5.16. Isolated farmstead in Lutau, Trimulyo, within the National Park. Photo by Yulia Fitriana, 2009.

Figure 5.17. Paddy fields in the main valley (left) and in a secondary valley (right) in Trimulyo. Photos by Yulia Fitriana, 2009.

Around the paddy fields in the main plain, vegetable crops were grown, including chili and beans in rotation (Figure 5.18). The flat land and reliable water supply were favourable for this activity. The paddy fields were also used for vegetable cultivation when not in rice production.

Figure 5.18. Chili and bean cultivation in valley in Trimulyo. Note use of plastic mulch. Photo by Yulia Fitriana, 2009.

Coffee plots had a major role in the farming system and the majority of households had planted some coffee. The coffee activity could be differentiated based on topography (flat or sloping) and the diversity of crops grown (monoculture or diversified in an agroforestry system). Monoculture coffee was mainly found on sloping land (Figure 5.19). Diversified coffee was mainly found on flatter land near to settlements to make it easier to harvest crops in between the coffee harvest, whether for household consumption or for sale (Figure 5.20). In the diversified coffee plots, the coffee was interplanted with other perennials such as pepper, tree legumes such as *Gliricidia sepium* for livestock feed, bananas, and fruit trees such as jackfruit (*Artocarpus heterophyllus*), mango (*Mangifera indica)*, and *petai* (*Parkia speciosa*). In some places, timber species were also planted in coffee plots, mainly the umbrella tree or *kayu afrika* (*Maesopsis eminii*) as shown in the lower part of Figure 5.21.

Figure 5.19. Monoculture coffee plot on sloping land in Trimulyo. Note evidence of soil erosion. Photo by Yulia Fitriana, 2009.

Goat rearing was the only livestock activity found in the villages (Figure 5.21). Goats were introduced in the early 2000s as part of a development project run by local government and NGOs. The Etawa or Jamnapari breed, originally from India, provided milk and meat for home consumption or sale. The milk also played a direct role in improving family nutrition. The manure and urine produced by the goats could also be used by farmers as fertiliser. However, farmers had to ensure an adequate supply of feed on a daily basis. One source of feed was the leaves of *dadapan* trees (*Gliricidia sepium*) planted with the coffee and also grasses that could be collected near the river area or in secondary forest.

Figure 5.20. Diversified coffee plantations in Trimulyo on flat land interplanted with bananas, tree legumes, and pepper (above) and on sloping land interplanted with the umbrella tree (below). Photos by Yulia Fitriana, 2009.

Figure 5.21. Goat compound in Gunung Terang. Photo by Yulia Fitriana, 2010.

5.2.2 Productivity of farming activities

Activity budgets were estimated for each of the farming activities described above to assess the returns farmers were receiving. The gross value of production per hectare was estimated based on the annual harvest (including the amount sold and the amount retained for home consumption) valued at the market price, divided by the area cultivated. The value of inputs was deducted to give a gross margin, which was expressed on a per-hectare basis and per day of family labour. For coffee-based systems, the calculation was based on data from the household survey in Trimulyo and Gunung Terang in 2009 as coffee production was the main focus of the livelihood interview. For non-coffee cropping systems and the livestock system, the calculation was based on estimates derived from interviews with representative farmers for each system. By establishing the budget models of farming systems, comparisons of land and work productivity could be analysed.

Labour use in coffee production was estimated through intensive technical interviews with representative farmers rather than the household survey. The work calendar for monoculture coffee is shown in Figure 5.22. The peak seasons were from April to August, when weeding, fertilising, and harvesting were undertaken, and in December-

January, when most of the weeding was done. The total labour requirement was estimated to be 418 days per hectare.

Among the 124 respondents who practised monoculture coffee in Trimulyo and Gunung Terang in 2009, plot size averaged about 2 ha, but ranged from 0.3 to 8 ha (Table 5.1). The yield averaged 900 kg/ha, above the West Lampung District average for Robusta coffee in 2009 of 775 kg/ha (Bureau Statistics of West Lampung Regency, 2010), but showed wide variation, with a coefficient of variation (CV, standard deviation relative to mean) of 83%. The reported selling price averaged IDR 13,000 (USD 0.90) per kg. This also varied but the CV was only 15%. The differences in prices may have been due to different market conditions at the time of selling and/or differences in quality, although village traders, who were the main buyers, did not grade the coffee they purchased (see Chapter 6). The gross margin per ha (an indicator of land productivity) averaged about IDR 10.5 million/ha (USD 725) but with a CV of 98%. The gross margin per work-day (an indicator of labour productivity) averaged about IDR 25,000 (USD 1.75) but also varied widely, with a CV of 98%. For comparison, the daily farm wage in 2010 was also IDR 25,000.

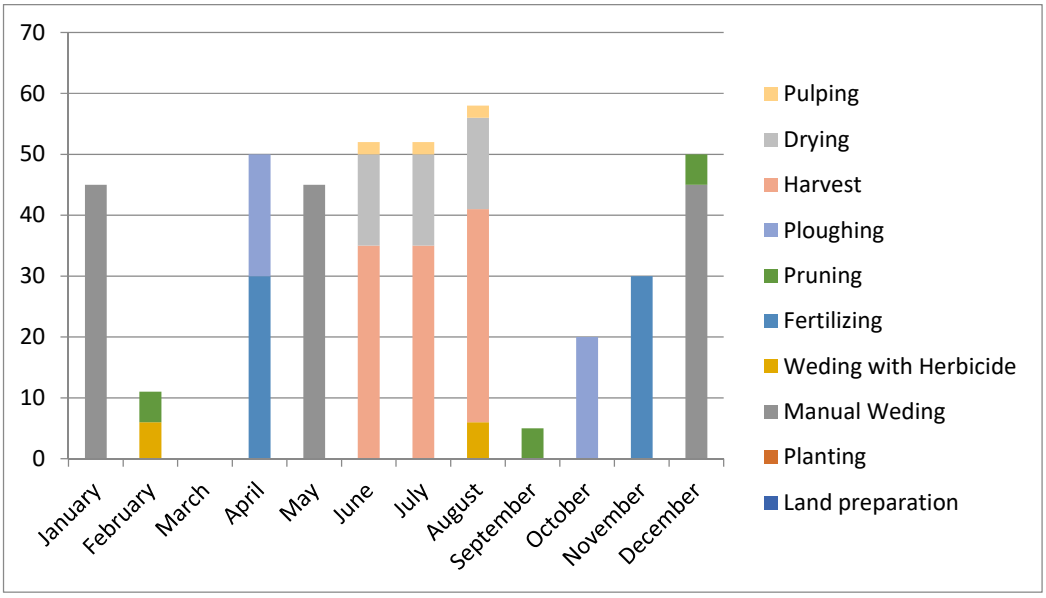

Figure 5.22. Working calendar for one hectare of monoculture coffee based on interviews with representative farmers in Trimulyo and Gunung Terang, 2009

Table 5.1. Activity budget for monoculture coffee

Budget item	Mean	Minimum	Maximum	Standard Deviation
Area of coffee plot (ha)	2.1	0.3	8.0	1.5
Yield (kg/ha)	893	80	4,000	739
Selling price (IDR/kg)	13,080	8,500	16,500	1,959
Gross revenue (IDR/ha)	12,316,210	708,333	60,000,000	10,772,274
Inputs costs (IDR/ha)	1,963,960	62,500	16,000,000	2,108,100
Gross margin (IDR/ha)	10,437,971	300,000	56,700,000	10,203,737
Gross margin/day (IDR)	24,971	718	135,645	24,410

Source: 124 respondents in Trimulyo and Gunung Terang who practised monoculture coffee, interviewed in October 2009. Input costs included fertilizer (manure and urea), herbicides, pesticides, and transport costs from the coffee plot to the buyer. USD 1 = IDR 14,379 (17 July 2018).

For diversified coffee, the labour profile was very similar, with the peak seasons in April-August and December-January (Figure 5.23). The total workload was somewhat higher at 423 work-days per ha, typically spread across two people. The gross income in this case was generated from coffee production and all other crops within the plot harvested during the year. Based on the interviews with the 43 respondents in Trimulyo and Gunung Terang who had diversified coffee plots at the time of the 2009 survey, the additional crops were pepper, bananas, jackfruit, and cocoa. The size of the diversified coffee plots averaged 3.2 ha, 50% more than for the monoculture plots (Table 5.2). However, the coffee yield was much the same at 930 kg/ha, with a CV of 71%. The average selling price was somewhat higher, at IDR 14,000/kg (USD 1.0), perhaps reflecting better quality coffee from the plots closer to the village settlement. The CV was 20%. The gross revenue from coffee represented 89% of the total gross revenue from the plot. Input costs were not allocated to the different crops as they were closely interplanted. The overall gross margin per ha averaged IDR 13.6 million (USD 950), about 30% higher than the monoculture plots. The gross margin per work-day was about IDR 32,000 (USD 2.25), also about 30% higher but still close to the poverty line. The CV was 75%, indicating that some farmers achieved a significantly higher return to their labour.

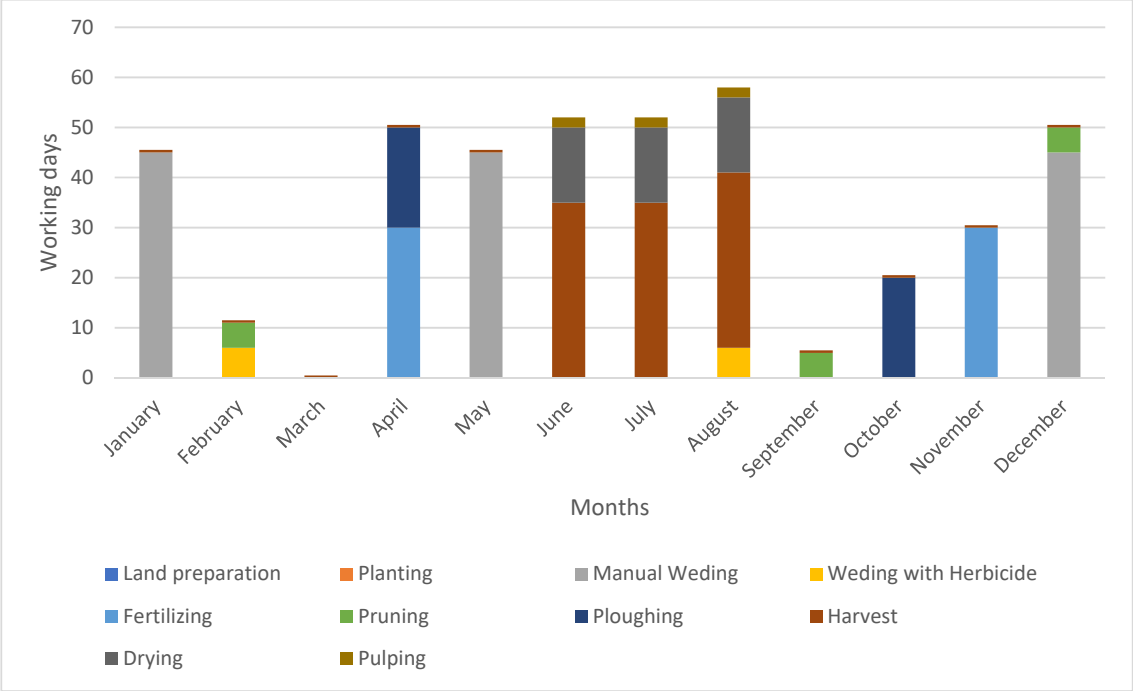

Figure 5.23. Working calendar for one hectare of diversified coffee based on interviews with representative farmers in Trimulyo and Gunung Terang, 2009

Table 5.2. Activity budget for diversified coffee

Budget item	Mean	Minimum	Maximum	Standard Deviation
Plot area (ha)	3.2	0.5	8.0	1.8
Coffee yield (kg/ha)	930	80	3,000	659
Coffee gross revenue (IDR/ha)	13,509,629	800,000	45,000,000	10,014,448
Other gross revenue (IDR/ha)	1,726,328	4,667	12,000,000	2,161,781
Input costs (IDR/ha)	1,605,074	204,000	6,000,000	1,288,041
Gross margin (IDR/ha)	13,630,883	1,300,800	44,215,000	10,185,879
Gross margin/day (IDR)	32,262	3,079	104,651	24,108

Source: 43 respondents in Trimulyo and Gunung Terang who had diversified coffee plots, interviewed in October 2009. Note: USD 1 = IDR 14,379 (17 July 2018).

Coffee was the main commercial farming activity in the study villages but, for those in the main village, household livelihoods were supported by rice and vegetable production in the valleys. Activity budgets were constructed for these cropping systems, differentiating between the more productive paddy fields in the main valley and those along smaller side-streams (Table 5.3). The paddy fields in the valley yielded on average about 5 tons/ha from a single crop, twice that in the side-streams. Farmers in the main valley also applied roughly twice as many inputs and 16% more labour because of the greater reliability of this crop. Valuing the paddy output using the local purchase price for rice, the gross margin per ha was about IDR 20.8 million (USD 1,450) in the main valley and IDR 10.4 million (USD 725) in the side-streams, while the gross margin per day was IDR 55,000 (USD 3.80) and IDR 32,000 (USD 2.25) respectively, both above the prevailing daily wage of IDR 25,000. Given that the rice was for local consumption, these were reasonable returns to land and labour. In addition, vegetables (chillies and beans in rotation) were grown in the valleys. This activity generated the highest return to land (IDR 88 million per ha) and labour (IDR 60,000 per day, more than double the daily wage). However, vegetables were grown on a small area and would have contributed a correspondingly smaller proportion of farm income.

Goat-rearing was the main livestock activity in the study villages. The labour requirement for this activity was 70 work-days for an operation with three females. The work was spread evenly over the year, with the most important activity being feed collection, which required the equivalent of about 4 work-days per month. A flock model based on interviews with selected goat breeders is shown in Figure 5.23. The model assumes one nanny producing three kids each year, most of which are sold. However, every seven years a doe is retained to replace the nanny, which is sold.

Table 5.3. Activity budgets for rice and vegetables

Budget item	Paddy-field in main valley	Paddy-field in secondary valley	Vegetables (chilli-bean rotation)
Yield (kg/ha/year)	5,000	2,500	20,000 (chilli) 8,750 (bean)
Price (IDR/kg)	5,100	5,100	5,000 (chilli) 2,000 (bean)
Gross revenue (IDR/ha)	25,500,000	12,750,000	117,500,000
Input costs (IDR/ha)	4,645,000	2,327,000	28,995,000
Gross margin (IDR/ha)	20,846,000	10,423,000	88,505,000
Labour input (work-days)	378	324	1,468
Gross margin/day (IDR)	55,148	32,170	60,290

Source: Interviews with representative farmers in Trimulyo and Gunung Terang in 2009 and 2010, based on one hectare. Labour inputs were estimated in hours and converted to work-days at 8 work-hours per day. The paddy price was computed from the price of rice in the local shop as the rice was consumed by the family. USD 1 = IDR 14,379 (17 July 2018).

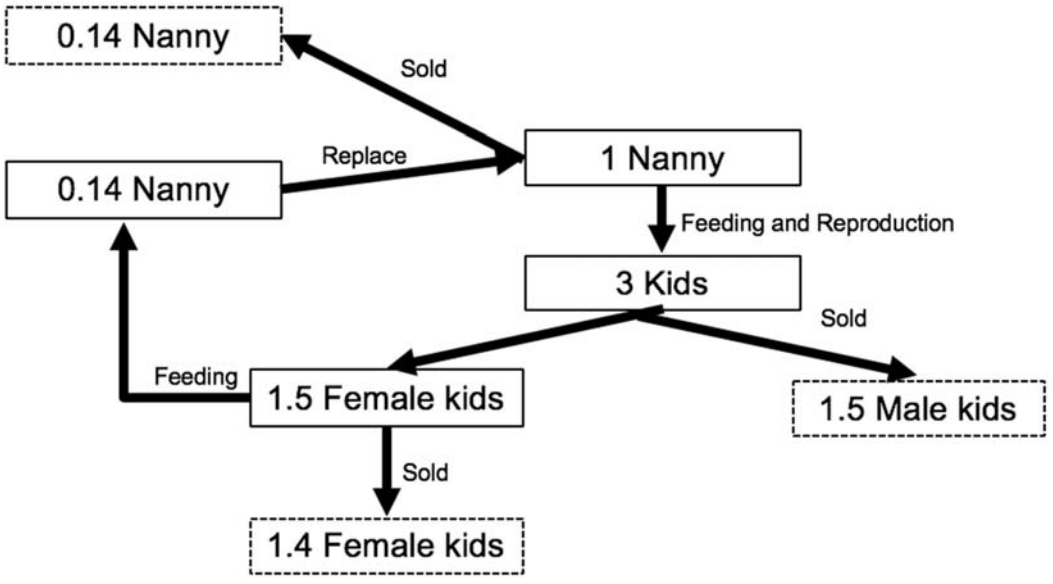

Figure 5.24. Steady-state annualised goat production system based on one nanny

This model was the basis for the activity budget in Table 5.4. An operation based on a single nanny could generate a gross revenue of IDR 2.7 million (USD 185) per year and IDR 110,000 (USD 7.70) per work-day. This was the highest return to labour of any activity, over four times the daily wage, though in fact the work was broken up into routine tasks of an hour or less per day, especially the never-ending task of collecting feed. Hence goats provided a worthwhile supplementary activity for farm households.

Table 5.4. Annualised activity budget for goat-rearing

Budget item	Quantity	Price (IDR/unit)	Total (IDR)
Outputs			
Nanny goats sold	0.14	1,500,000	210,000
Male kids sold	1.5	1,000,000	1,500,000
Female kids sold	1.4	700,000	980,000
Milk (5.5 months at 0.8 litres/day)	132	10,000	1,320,000
Manure (100 kg per month)	1,200	200	240,000
Gross revenue per nanny			2,690,000
Inputs			
Vitamins			60,000
Antibiotics			15,000
Insemination fee			30,000
Nanny goats retained (opportunity cost)			214,286
Input costs per nanny			105,000
Returns			
Gross margin per nanny			2,585,000
Labour input (work-days/year)	23		
Gross margin per day			110,786

Source: Interviews with representative farmers in Trimulyo and Gunung Terang in 2009. Note: USD 1 = IDR 14,379 (17 July 2018).

5.2.3 Typology of farming systems

The farming activities identified above were combined in various ways and with non-farm activities in pursuit of different household livelihood strategies. The evolution of farming in the two villages was described in Section 5.1. Coffee production had played

a major role for all households at least since the 1940s and by 2010, when the first round of fieldwork was undertaken, most households depended on coffee as well as off- and non-farm activities such as farm wage work, motorbike driving, or running a small shop. Seven farming systems were identified based on the questions: (1) What is the share of coffee income in household income? (2) Does farming meet household needs? (3) Is the farming system diversified? (4) Does the farming system accumulate capital? The seven farming systems are defined in the rightmost column of Figure 5.4 above and reproduced in

Table 5.5. Seven types of farming system in Trimulyo and Gunung Terang

Farming system	Component activities
FS1	Monocrop coffee, paddy field, and goats
FS2	Monocrop coffee and vegetables
FS3	Diversified coffee with fruit trees and pepper, and paddy field
FS4	Diversified coffee with fruit trees and pepper, and vegetables
FS5	Diversified coffee with pepper and bananas, and goats
FS6	Monocrop coffee and paddy field
FS7	Monocrop coffee on sloping land, paddy field in secondary valley

Table 5.5. For each farming system, the total gross margin was calculated, based on the average gross margin per ha and the average scale of each activity as computed from the survey data and representative farmer interviews. To this was added the gross value of off-farm income to give a measure of household income (Table 5.6; Figure 5.25).

Table 5.6. Farm size and income for farming systems in study area, 2009

FS	Respondents		Farm area (ha)	GM from coffee (IDR x 10^6)	GM from non-coffee (IDR x 10^6)	Off-farm income (IDR x 10^6)
	No.	%				
FS 1	25	14.9	5.1	44.2	8.6	2.6
FS 2	4	2.4	4.3	46.0	10.6	6.5
FS 3	8	4.8	3.8	9.3	3.7	7.5
FS 4	14	8.3	2.0	21.7	12.5	2.0
FS 5	15	8.9	2.8	10.0	5.3	3.3
FS 6	33	19.6	2.5	25.8	11.7	2.0
FS 7	69	41.1	1.3	16.6	15.8	3.9

Source: 168 respondents in Trimulyo and Gunung Terang. GM = gross margin.

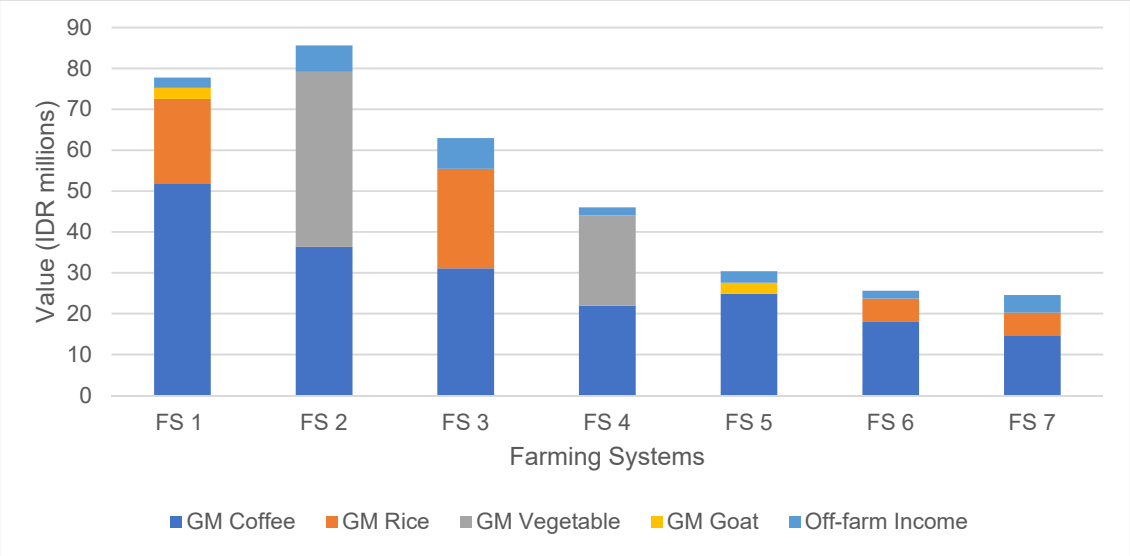

Figure 5.25. Contribution of farm and off-farm activities to income of farming systems in Trimulyo and Gunung Terang, 2010. Source: Livelihoods survey (n=168). Note: GM = gross margin.

The first farming system (FS1), with diversified coffee, a paddy field in the main valley, and goat rearing, had the largest area and was operated by established famers with more capital. Fifteen per cent of respondents were categorized as having FS1. The coffee plot was typically more than 3 hectares and the paddy field in the main valley was around 1 hectare. There were 3 or 4 farm workers, including a married couple and 1 or 2 unmarried children, with a hired worker to help during times of peak

workload, such as during the coffee and rice harvests. Coffee contributed somewhat more net income than rice, with goats making a smaller contribution. Overall, this system generated the second highest income.

The second farming system (FS2), with a diversified coffee plot and chilli production, typically occupied 2-3 hectares, consisting of 2.5 hectares of coffee and an intensively-farmed chilli field of 0.5 hectares. There were 2 or 3 workers comprising the married couple and one other family worker or hired labourer. The chilli crop played an important role in the household's livelihood, accounting for more than 75% of net income. There were only 4 respondents (2%) with this farming system, which generated the highest income.

The third farming system (FS3), with a diversified coffee plot and a paddy field in the main valley, had up to 3 hectares. Typically, this comprised 2.5 hectares of coffee and a 0.5 hectare paddy field. As for the previous farming system, there were normally two or three farm workers. The rice produced was used for household consumption and sale. Coffee and rice contributed almost the same amount to net income. There were 8 respondents (5%) with this system, which had the third highest income.

The fourth farming system (FS4), with a diversified coffee plot and an intensive vegetable plot, had 3 to 4 hectares for coffee and vegetables in two separate plots. Typically, there were 3.5 hectares of coffee and other tree crops and a plot of 0.5 hectare supporting a rotation of chillies and beans. There were typically four workers supporting this very labour-intensive system. Fourteen respondents (8%) had this system, which had the fourth highest income.

The fifth farming system (FS5) combined diversified coffee with goat breeding. This system had a maximum of 2 hectares of coffee, which accounted for most of farm income. Non-farm activities such as driving a motorcycle taxi or running a small store were needed to supplement income. Nine per cent of respondents had this system, which was among the three lowest incomes, generating IDR 30 million or less.

The sixth farming system (FS6) combined a diversified coffee plot and a paddy field in a secondary valley. The coffee plot was about 1.5 hectares and the paddy field about 0.5 hectares, managed by two family workers. Non-farm activities were also undertaken. This system was the second lowest in terms of net income, yet was associated with 20% of respondents.

The seventh farming system (FS7), which accounted for the largest share of respondents (41%), comprised a monoculture coffee plantation on sloping land and a paddy field along a secondary stream. Hence it was less physically productive than most systems and also had a small land base of 1-2 hectares. The system could be managed by the owner or a share-cropper. If the latter, half the net income had to be shared with the owner. In either case, household members sought non-farm income from driving a motorcycle taxi or running a small shop or other part-time business. This system generated the lowest income of the seven, averaging IDR 25 million.

The farming system typology for Gunung Terang and Trimulyo was used a basis for identifying farming systems in other villages in this study. Along the eastern side of the Park, where Gunung Terang and Trimulyo were located, the general pattern was for coffee to have the dominant role in household livelihoods, supported by rice and vegetables, as indicated in the preceding analysis. Along the western side, coffee was still dominant but other crops were also important, including citrus, coconut, cocoa, and resin (*damar*) production from the forest. Livestock activities were also more complex in the west, with cattle, goats, poultry, and fish ponds. Off- and non-farm income sources were also different, related to the presence of the copra industry, the cacao processing industry, and marine fishing.

For this study, it was important to know the relation between the types of farming system observed and the tenure status of the farm, that is, whether the land was partly or wholly within a protected area. Only land within the village territory could be issued with an official ownership document (*sertifikat tanah*), yet farmers had cleared or purchased land for farming within the adjacent Protection Forest and the National Park[12]. In Table 5.7, for each farming system, the mean and range of land area within the village, within the Protection Forest, and within the National Park are recorded.

Across the farm types, land ownership within the village varied from zero to 6 or 7 hectares. FS1 and FS2 had the largest area within the village, averaging about 3 hectares. FS7 had the smallest area, averaging 0.5 hectares.

[12] In parts of West Lampung District, land contracts had been issued between the local government, which has jurisdiction over Protection Forests, and forest farmer groups (see Chapter 6).

Within the Protection Forest, again land ownership ranged from zero to 6 hectares. FS1, FS2, and FS3 – the highest-earning types – averaged between 1 and 1.5 hectares within this zone, which the historical and map analysis showed was the first protected area to be deforested.

Within the National Park itself, farm land varied from zero to 4 hectares; only FS2 (with just 4 households) was not represented in this zone, consistent with its high income status. The mean area within the Park averaged from 0.2 to 0.9 hectares across the other six systems, with FS5 and FS6 the highest. Moreover, while types FS1 to FS4 averaged from 0 to 12% of farmland within the Park, the poorest three types (FS5 to FS7) averaged from 28 to 38%.

Thus 70% of respondents were dependent on the Park for about a third of their farming land on average. If the Protection Forest is added in, these 70% depended on illegal occupation for half to two thirds of their farming land. Even the 30% of respondents with FS1 to FS4 averaged 20 to 44% of farming land outside the formally recognised village territory.

Table 5.7. Land status of each farm type

FS	No.	Area in village (ha)			Area in Protection Forest (ha)			Area in National Park (ha)		
		Mean	Min.	Max.	Mean	Min.	Max.	Mean	Min.	Max.
FS1	25	3.1	0	7	1.4	0	6	0.6	0	4
FS2	4	3.0	0	6	1.3	0	4	0	0	0
FS3	8	1.9	1	3	1.1	0	3	0.4	0	2.5
FS4	14	1.6	0	3	0.2	0	1	0.2	0	2
FS5	15	0.8	0	2	0.7	0	2	0.9	0	3
FS6	33	1.2	0	3	0.6	0	3	0.7	0	3
FS7	69	0.5	0	2	0.2	0	2	0.3	0	2

Source: Household interviews with 168 respondents who owned agricultural land in Trimulyo and Gunung Terang in 2009

If both the Protection Forest and the National Park are regarded as protected forest areas (*kawasan hutan*)[13], which was the way locals viewed them, the tenure status of survey households can be categorised as (a) only occupying land within the village, (b) occupying land within the village and a protected forest area, and (c) only occupying land within a protected area. The incidence of these three categories across the farm types is shown in Figure 5.26. It can be seen that all farm types except FS3 were found in all three tenure categories. FS3 and FS5 had the lowest number and proportion of households occupying land only within the village, while FS6 and FS7 contributed the largest numbers and among the highest proportions of households solely dependent on the protected forest areas. This categorisation is explored further in the following section.

Figure 5.26. Incidence of three land occupancy types in each farming system based on household survey in Trimulyo and Gunung Terang in 2009 (n=168)

[13] Because the specified villages did not yet have HKm, for the analysis of land security in this chapter, I grouped together land in Protection Forest and National Park as *kawasan* or protected area.

5.3 Farming in the Village and in the Park

5.3.1 Household typology

The research in Trimulyo and Gunung Terang showed that households with farming land within the village boundary were the most secure while those with some or all their farming land the National Park or Protection Forest had low security of tenure. This was confirmed in other villages in West Lampung District within the vicinity of the Park. Hence, as in the preceding section, households surrounding the Park were differentiated into three groups based on their land occupancy and thus tenure security (Figure 5.27). The first group was termed “villagers”, comprising those who lived and occupied one or more plots inside the formal village area but not within a protected area. The second group was termed “encroachers”, who lived within the village and occupied land both within the village and within the Park. The third group was termed “squatters”, who occupied plots only within the Park (or Protection Forest) and could live either within the Park or within the village (or in some cases both, regularly moving between the village and the farm).

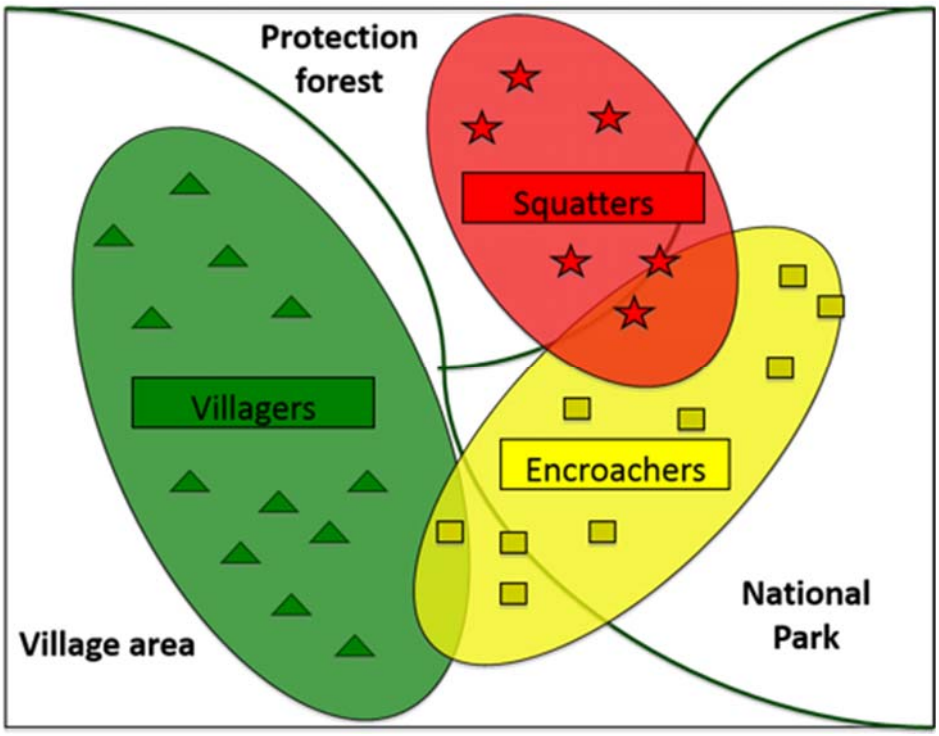

Figure 5.27. Three types of household based on their occupation of land within the village and protected forest areas

In Trimulyo and Gunung Terang, these three types of household had come to the area in successive waves of migration. In Figure 5.28, the cumulative frequency of each type of household is plotted from around 1960 to the time of the survey in 2009. Villagers had come from the early 1960s and occupied land within the village area, outside the Park. Others who began to come in numbers from the early 1970s had occupied village land and also encroached, particularly on the Protection Forest. From the 1980s, squatters began to arrive in large numbers and occupied land within the Park. While the numbers of villagers and encroachers has levelled off, the number of squatters is continuing to increase as land in the village becomes more scarce and expensive than land inside the Park.

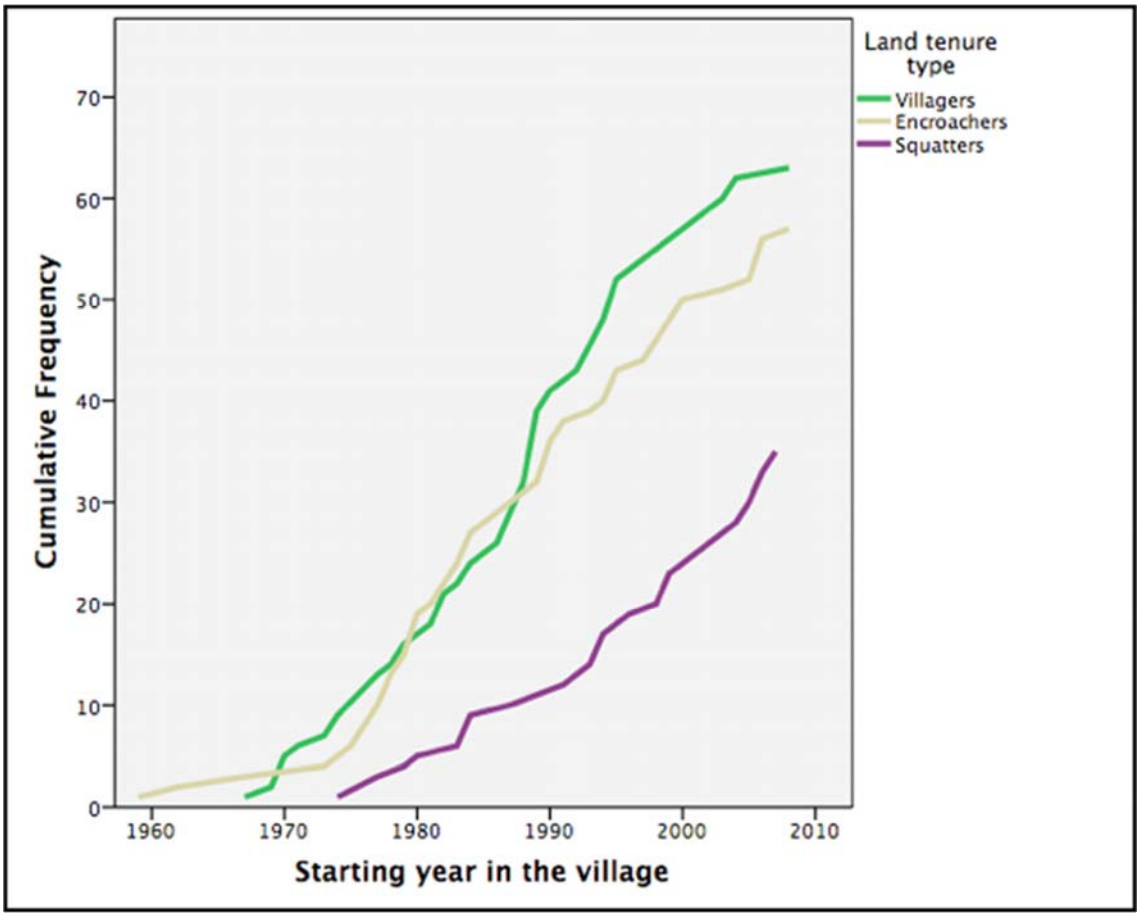

Figure 5.28. Cumulative frequency of villagers, encroachers, and squatters from 1960 to 2010 in Trimulyo and Gunung Terang

Data source: household interviews with 168 respondents in 2009 in Trimulyo and Gunung Terang. Analysed using the Statistical Package for the Social Sciences (SPSS Version 23)

5.3.2 Survey of household types on eastern border of BBSNP

Based on the household typology developed for Trimulyo and Gunung Terang, in 2009 a livelihood survey was conducted with 604 households in 21 villages along the eastern boundary of the Park in West Lampung District. Of the respondents, 70% were classified as villagers, 20% as encroachers, and 10% as squatters.

Among the villagers, the respondents were aged from their late 20s to their 50s. Their age at arrival in the village varied from those who were born there to those who had come at the age of 20-30 years. About 80% of respondents had 3-6 household

members. Most households comprised one nuclear family, but older households were still hosting their adult children and their new families. Almost all respondents (95%) in this category had received formal education, with 54% completing primary school, 21% secondary school, 15% high school, and 5% university. All respondents had their house in the village settlement area and 10% with more capital had a second house, also in the village. By definition, all these households had their agricultural plots within the village area. About 88% had 0.5-1.0 ha in another village, mostly in the same sub-district. As in the initial case-study villages, almost all (93%) of respondents depended on coffee as their main source of income, along with rice, vegetables, agricultural wage work, trade, and working in the civil service. Very few had cows, while raising poultry and goats was more common. Most (63%) sold coffee to a local trader, 12% sold through a farmer group, and 18% had other options.

Of the encroachers, about 25% were born in the village and the remainder had either arrived as children or young adults. Their age at the time of the interview was between 30 and 50 years. Most households (85%) comprised one nuclear family, while the remainder incorporated two families. Again, most were formally educated, with 45% completing primary school and 44% high school. All the encroachers interviewed had their house within the village area and a few had invested in a second house. These respondents had farming plots within the village and within a protected forest area. However, about 70% owned land for renting out or planting in another village in the same sub-district, including 47% with more than 1 hectare, 23% with 0.5-1.0 hectares, and 12% with less than 0.5 hectares. A few also owned land in another sub-district. More than 90% reported that coffee was their main source of income, with other agricultural commodities and agricultural work as secondary sources. Almost all sold their coffee to a local trader, as with their other agricultural commodities such as pepper, cocoa, and vegetables.

Among the squatters, the age of respondents was mostly 30-40 years. Typically there were 4 household members, including 2-3 dependants. Almost all (90%) comprised a single nuclear family. About 50% were born in the village while for the others the age at arrival varied. Hence many of the squatters were in fact the second generation of local families. About 50% had completed primary school and most of the remainder had completed secondary school. Only 66% of squatters had a house in the village, while the rest had a residence inside the Park or Protection Forest. These respondents

farmed entirely in protected forest areas and not at all on village land. Moreover, unlike the other two categories, 70% of squatters did not have any other land, although 19% had a hectare or more and 10% had 0.5-1.0 hectares in another location. Again, more than 90% of these respondents depended on coffee, with agricultural work as a secondary source of income. They also sold their coffee and other farm produce to local traders.

5.3.3 Contribution of the Park to household income

The survey results confirmed that, despite tenure insecurity, low yields, high transport costs, poor living conditions, and less scope for income diversification, the households categorised as encroachers and squatters continued to farm inside the Park or Protection Forest. This raises the question of the economic contribution of this illegal activity. The 604 respondents provided data about the costs and returns of their coffee and other farm activities, as well as off- and non-farm income. These were used to calculate average incomes for each of the three household types, and the income derived from farming in the Park (Table 5.8).

As seen in the table, mean coffee yields were similar across the three categories, at 800-900 kg/ha, slightly above the mean for coffee growers in Lampung as a whole. Villagers averaged more land in the village (1.6 ha) than encroachers (1.2 ha), but the encroachers averaged almost as much land in the Park, meaning they averaged 2.3 ha in total. The encroachers and squatters averaged a similar area within the Park – 1.1 and 1.2 ha respectively – but again the encroachers had twice as much land overall. Hence the encroachers averaged more income from coffee, about IDR 19.3 million, 33% more than the villagers and 56% more than the squatters. Non-coffee agricultural income was higher among the villagers than the two other types, indicating that the villagers had access to better land for more diversified farming activities. However, non-coffee income contributed a relatively small proportion to household income, as did non-farm income. Hence the encroachers had the highest total income per year, largely due to their augmented coffee area, followed by the villagers and squatters.

Considering the coffee income generated from cultivation within the Park (the last two rows of (Table 5.8), the encroachers realised an additional IDR 9 million, or 38% of total income, while the squatters realised around IDR 12 million, or 80% of total

income, through occupying land within protected areas. This highlights the economic importance of farming in the BBSNP and other protected areas for the 30% of households in the vicinity of the Park that engage in this activity.

Table 5.8. Sources of income for three household types

Variable	Villagers (n=420)		Encroachers (n=124)		Squatters (n=59)	
	Mean	SD	Mean	SD	Mean	SD
Coffee yield (kg/ha)	897	513	829	644	897	450
Farming area in village (ha)	1.6	1.2	1.2	1.1	0	0
Farming area in park (ha)	0	0	1.1	0.7	1.2	0.6
GM coffee (IDRx10^6)	14.56	16.17	19.34	18.47	12.39	8.46
GM non-coffee (IDRx10^6)	2.22	7.51	1.81	5.27	1.39	3.81
Non-farm income (IDRx10^6)	1.82	5.28	2.54	5.87	1.79	4.39
Total income (IDRx10^6)	18.60	-	23.69	-	15.57	-
GM from coffee in park (IDRx10^6)	0	-	8.94	8.94	12.39	8.46
% of total income from coffee grown in park	0	-	37.7	-	79.6	-

Source: Survey of 604 households in West Lampung District, October 2009. Note: GM = gross margin; SD = standard deviation.

5.4 Land Transactions and Prices in Villages around the Park

As described in Section 5.1, compared with the extensive access to land enjoyed by the original Semendo occupants, the area of farming land per household has been decreasing due to successive waves of in-migration, despite the conversion of forest to agricultural land. The trajectory of farming also changed from extensive swidden farming to more intensive and diversified farming on smaller areas, with coffee the dominant crop. In the villages in the vicinity of the Park, both formal and informal markets for land have developed and the price of land has been steadily increasing, even for land within the Park, despite the insecurity of tenure.

During the fieldwork in 2009-2010 for the law enforcement study, information was recorded for a total of 225 transactions, including land purchases and sales, involving

coffee plots in 17 villages across 11 sub-districts in West Lampung and West Coast Districts, that is, on both sides of the Park.[14] The data included coffee plots within the village territory and in protected areas (National Park and Protection Forest). The variables recorded for each transaction were the price, year of transaction, area of the plot, maturity of the coffee trees, accessibility of the plot, location of the plot (whether in the village or in the Park), and the accessibility of the village. The data set was truncated to exclude transactions more than 10 years before the time of interview, that is, before 2000.

5.4.1 Land transactions within the village

Coffee plots within the village area are subject to formal ownership, with an official land certificate (*sertifikat tanah*) and a liability to pay annual land tax. The certificate itself could be used as collateral for a bank loan or an informal loan. Not all village land had this official certificate; such unregistered land could be transacted, based on local knowledge of ownership, and processed later with payment of a fee to the local land office (*Badan Petanahan Nasional*, BPN) to obtain a certificate. Hence land with a certificate was costlier than land without a certificate. Nevertheless, because of the security of tenure, coffee plots on village land were clearly preferred, regardless of whether they had a certificate. The high demand from both villagers and outsiders for the limited supply put strong upward pressure on land prices.

Of the transactions recorded, 108 transactions in 15 villages involved productive coffee plots within village lands. The mean area transacted was 1.2 ha, ranging from 0.5 ha to 6 ha. The boundaries and precise areas of these plots were demarcated and measured by the local land office as the basis for issuing an official land certificate. The mean price per hectare for these plots in each year from 1999 to 2010 was graphed in Figure 5.29. The mean price increased 3.5 times over 12 years, from about IDR 16 million to IDR 58 million – a compound growth rate of 11% per annum. The inflation rate in Indonesia for this period averaged about 8%, so this growth rate was significant in real terms (3% per annum). If the more recent period is considered, from 2005 to 2010, the growth rate in land prices had accelerated to about 20% per annum or 12% in real terms.

[14] The respondents were those selected for the law enforcement study in 12 villages, but the transactions included land in 17 villages.

The other type of coffee plot transacted within village land, involving 98 transactions, was abandoned or unproductive coffee plots. These averaged 1.2 hectares, ranging from 0.5 to 10 hectares per transaction. These plots were also eligible for a land certificate as proof of ownership. As would be expected, the unproductive coffee plots were priced lower than productive plots. The highest recorded price up to 2010 was just under IDR 40 million per hectare, compared with IDR 200 million per hectare for productive plots. As with the productive coffee land, however, the price grew rapidly between 2005 and 2010.

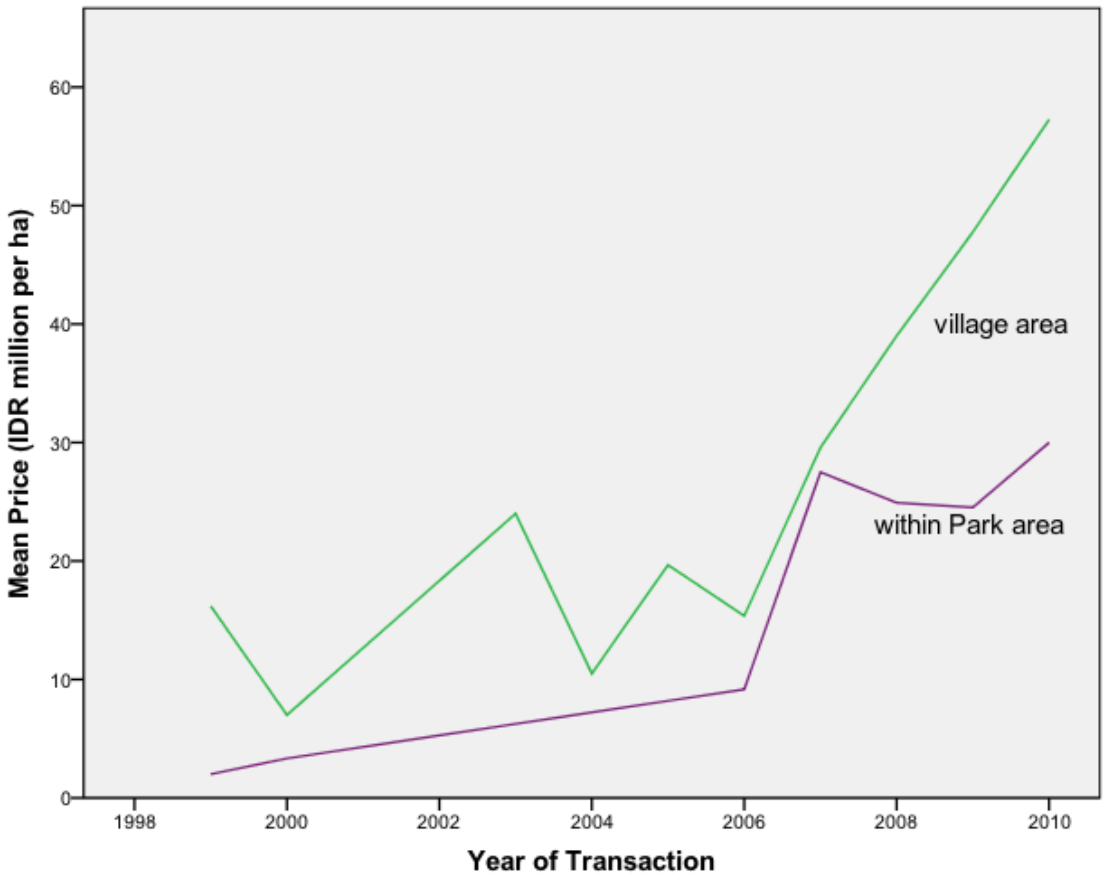

Figure 5.29. Trends in mean price per hectare of productive coffee plots within village land and within Park, 1999 to 2010.

Analysed using the Statistical Package for the Social Sciences (SPSS Version 23)

5.4.2 Land transactions in protected areas

As state land, land within the National Park and Protection Forests could not be owned privately and hence could not be legally transferred from one person to another.

However, as described above, much of this land was occupied for farming and plots were in fact transferred with no legal proof of ownership – just an unofficial receipt between buyer and seller, sometimes signed by a witness. The area of the plot was not measured as accurately as land in the village area. Rather, the area was determined by the number of coffee trees on the plot, assuming 2,500 trees per hectare. The borders of the plot were marked by plants, trees, a river, a road, or other landmarks. The accessibility of these plots was normally difficult as they were on steep land and relatively far from the main road and the centre of the village. In some plots, a small, impermanent shed was built inside the plot to accommodate the farmer during work periods. In addition, tenure security within the Park was low. There was always the chance of being caught and evicted by Park Management patrols, with the coffee trees being destroyed, making coffee cultivation on this land a highly risky activity.

A total of 122 land transactions were recorded in 16 villages across 11 sub-districts for productive coffee plots located inside the Park and Protection Forests. The average area of the plots was 1.2 hectares, ranging from 0.5 hectares to 10 hectares. In Figure 5.36, the mean price per hectare of productive coffee plots within the Park is graphed against the year of transaction. The price of coffee plots within the Park was generally lower than for plots on village land, though following the same steep upward trend (25% per annum, or 17% in real terms, from 2006 to 2010). Productive plots within the Park were worth almost as much as unproductive coffee plots in the village area.

Another land price difference that emerged from key informant interviews rather than statistical analysis was that land within a Protection Forest that was subject to a 35-year Community Forest (*Hutan Kemasyarakatan*, HKm) contract was valued more highly than non-contract land, because of the higher security of tenure. Even though such land remained state land and could not be legally transferred to another person, unofficial transactions had occurred, as mentioned by a forest extension officer and affirmed by members of a forest farmer group in Tri Budi Sukur Village who were participating in a HKm agreement.[15]

[15] Interview with Forestry Extension Officer and with four members of a HKm forestry group during livelihood interviews in Tri Budi Sukur Village in May 2009.

5.4.3 Factors affecting land values

The quantitative data were further examined using multiple linear regression. The price of the coffee plot in IDR million per hectare was regressed on the plot size in hectares, the actual year of transaction, the condition of the plot (measured as a dummy variable with 1 = productive and 0 = unproductive), the tenure status of the land (measured as a dummy variable with 1 = inside a protected area and 0 = inside a village area), and general location (measured as a dummy variable with 1 = the eastern border of the Park and 0 = the western border of the Park).

Table 5.9. Results of multiple linear regression of price of coffee plot on five independent variables

Variable	Unstandardized coefficients		Standardized coefficients	t value	Sig.
	B	Std. Error	Beta		
Constant	-6551.374	1996.014		-3.282	0.001
Plot size (ha)	-7.75	2.753	-0.172	-2.815	0.005
Year of transaction	3.269	0.995	0.201	3.286	0.001
Condition of plot	5.445	4.739	0.075	1.149	0.252
Tenure status	-19.77	7.007	-0.193	-2.821	0.005
General location	32.017	7.133	0.326	4.488	0.000
R^2	0.156				
Adjusted R^2	0.138				
F (5,229)	8.486				
Significance	p<.001				
Dependent variable: Price of coffee plot (IDR million/ha)					

Source: Data collected for 235 coffee plots transacted between 1999 and 2010 in 16 villages in West Lampung and West Coast Districts, analysed using the Statistical Package for the Social Sciences (SPSS Version 23).

The results are presented in Table 5.9. Overall, though the F value indicated that the equation was significant at the 1% level, the adjusted R^2 was low, indicating that over 80% of the variation in land prices was not explained by the five independent variables. Given the wide geographic spread of the data and the many unrecorded factors that

can affect the value placed on a given plot of land, this is not surprising. Nevertheless, four of the coefficients were significant at the 1% level.

Somewhat surprisingly, the coefficient for plot size was significant but negative, implying that the price per hectare was lower for larger plots. This may have reflected that most of the demand was for smaller plots, given the scarcity of capital among most of the buyers.

As expected, the coefficient for the year of transaction was significant and positive, reflecting the boom in land values discussed above. The value of the coefficient implies a linear growth in land values of IDR 3 million per year. Starting with an average price of IDR 10 million in 1999, the equation predicts a price of IDR 46 million by 2010, consistent with the graphs in Figure 5.29. (However, a curvilinear functional form may have better reflected the acceleration in land prices since the mid-2000s.)

Again, as expected, the coefficient for tenure status was significant and negative, implying that plots within the Park were discounted relative to plots within village lands. The size of the coefficient indicates that on average plots within the Park were valued at IDR 20 million per hectare less than those outside. While much of this was no doubt due to tenure insecurity, other factors were clearly involved, including the slope of the plot and the difficulty of access, neither of which were recorded separately.

The general location of the plot was also significant, with plots on the eastern side of the Park, closer to major urban centres and markets, being valued on average at IDR 32 million per hectare more than plots on the western side (in West Coast District).

Surprisingly, the condition of the coffee plot, whether the coffee was productive or had been abandoned, was not a significant factor, though the coefficient was of the expected sign and gave weak support to the conclusion that a productive plot was valued at about IDR 5.5 million per hectare more than an abandoned plot. This result may have reflected that productive plots were themselves of varying age and productivity and that farmers felt they could rehabilitate an unproductive plot relatively cheaply.

5.5 Conclusion

The landscape surrounding the BBSNP has seen dramatic change since the initial settling of the area by small populations of indigenous Semendo in the 1940s and

earlier. The in-depth study of Trimulyo and Gunung Terang showed an evolution of land use from long-rotation shifting cultivation combined with low-input coffee cultivation to much more intensive use of village lands for wet rice, vegetables, and diversified coffee plots, with greater demands on labour and inputs. The influx of migrants from Java from the 1950s and 1960s, both transmigrants and spontaneous migrants, increased the demand for village land, mainly for coffee planting. The continued growth of population locally, combined with further spontaneous migration from the 1970s and 1980s, led to increasing encroachment on the National Park and Protection Forests, contributing to the partial deforestation of the Bukit Barisan Range. Unlike the farming systems on village lands further downslope, farming systems within the protected areas were primarily based on monoculture coffee.

Coffee production was the main source of livelihood for households both within and outside the Park. Monoculture coffee plots averaged about 2 hectares and diversified coffee plots about 3 hectares; both yielded about 900 kg per hectare, slightly higher than the mean for coffee smallholders in southern Sumatra. However, the returns to labour averaged only IDR 25,000 per day for monoculture coffee and IDR 32,000 per day for diversified coffee, at or just above the prevailing rural wage. Nevertheless, the demand for land for coffee cultivation was such that a survey in 21 villages along the eastern border of the BBSNP found that, while 70% of respondents farmed only on village lands outside the Park (“villagers”), 20% could be classed as “encroachers”, with plots in the village and in the Park, and 10% were “squatters”, farming entirely within the Park. Interestingly, 50% of squatters had been born in the village, implying that not only recent migrants but second-generation residents were being driven by land-shortage to move into the Park. The encroachers obtained nearly 40% of their household income from within the Park and the squatters, 80%, all from coffee. Although coffee productivity was similar across the three groups, the encroachers earned more income from coffee and in total because they had augmented their village landholdings with land inside the Park.

The demand for land for coffee production was reflected in the rapid rise in land prices in the study area over the previous decade. Land prices were higher for village land than for land in protected areas, and higher for productive coffee plots than abandoned plots. Other factors affecting the unit price of land were the size of the plot and whether the land was on the more accessible eastern side of the Park or the western side.

Nevertheless, all categories of land, both outside and inside the Park, had grown rapidly in value since the mid-2000s, at nominal rates of 20-25% per annum and real rates of 12-17%. It was thus the boom in smallholder coffee and the growth and influx of rural population that constituted the major threat to the conservation values of the BBSNP.

Two major approaches were implemented separately in order to solve the encroachment threat in BSSNP: incentive-based and coercive approaches. These two approaches will be explained in the next two chapters.

CHAPTER 6
AN INCENTIVE-BASED APPROACH TO PARK CONSERVATION: COFFEE CERTIFICATION

In Chapter 5, changes in the farming system were traced and different types of farm-household were identified in terms of their access to the Park for coffee farming. In this chapter and the next, case studies are presented of contrasting approaches to restrict coffee farming within the Park – an incentives-based approach and the more traditional coercive approach. Along the eastern border of the Park there were coffee smallholders who were participating in a coffee certification scheme initiated by a private company in collaboration with the local government. This scheme was viewed as part of a rural development program to provide an extra incentive for good production practices as well as to ensure the traceability of coffee produced without encroaching on the Park. This coffee certification project was the focus of the case study presented in this chapter.

As described in Chapter 4, the data for the case study were collected by interviewing the principal stakeholders in coffee certification, including coffee farmers, farmer groups, the coffee export company, and government officers from the Bureau of Plantation Crops (*Dinas Perkebunan*) in West Lampung District. Qualitative and quantitative research methods were used. The data were analysed to relate the research questions in Chapter 1 to this particular case: What are the trade-offs between conservation and development? How effective are the existing mechanisms for conservation in and around the Park?

First, in Section 6.1, the movement towards sustainable coffee production and coffee certification in the global market is explained, and the initiation of certification schemes in West Lampung District is described. In the main part of the chapter (Section 6.2), the pioneering coffee certification project that began in 2005 is described, the constraints to the implementation of coffee certification are analysed, and the effectiveness of the project in Park conservation is discussed. In Section 6.3, an updated account is given of coffee certification projects implemented in the study area by other companies since 2010. Section 6.4 concludes the analysis.

6.1 The Emergence of "Sustainable Coffee" Certification

Private initiatives for sustainability of agricultural production chains have become popular in recent years (Fransen, 2015; Fransen, Schalk, & Auld, 2016; Grabs, 2018; Grabs *et al.*, 2016). There have been two major drivers of private sustainability governance: (1) the unsolved problem of smallholder poverty despite state and non-state efforts (DeFries *et al.*, 2017) and (2) the pressure for incorporating environmental protection and sustainable production practices within long-term commodity supply objectives. To solve these two concerns, a range of external verification systems were established, for example, Fairtrade, Rainforest Alliance, and UTZ Certified (Auld, 2014; Lernoud *et al.*, 2016).

Coffee is a major commodity in world trade and makes a significant contribution to GDP and export earnings in a number of developing countries. Coffee is a major source of income for small farmers in the tropics (Lewin, Giovannucci, & Varangis, 2004). According to International Trade Center (2011), in 2010 there were over 26 million coffee farmers in 52 producer countries, with total exports of USD 16.5 billion. Coffee production is not only important for rural livelihoods but has important environmental impacts. Currently, coffee is produced in 16 out of 34 biodiversity hotspots in the world (Conservation International, 2012). Figure 6.1 shows the overlap between the area of coffee production with the 34 areas that are rich in biodiversity but highly endangered. Even where farmers abandon their coffee plantations, other crops or livestock grazing can continue to impact on these hotspots (O'Brien & Kinnaird, 2004).

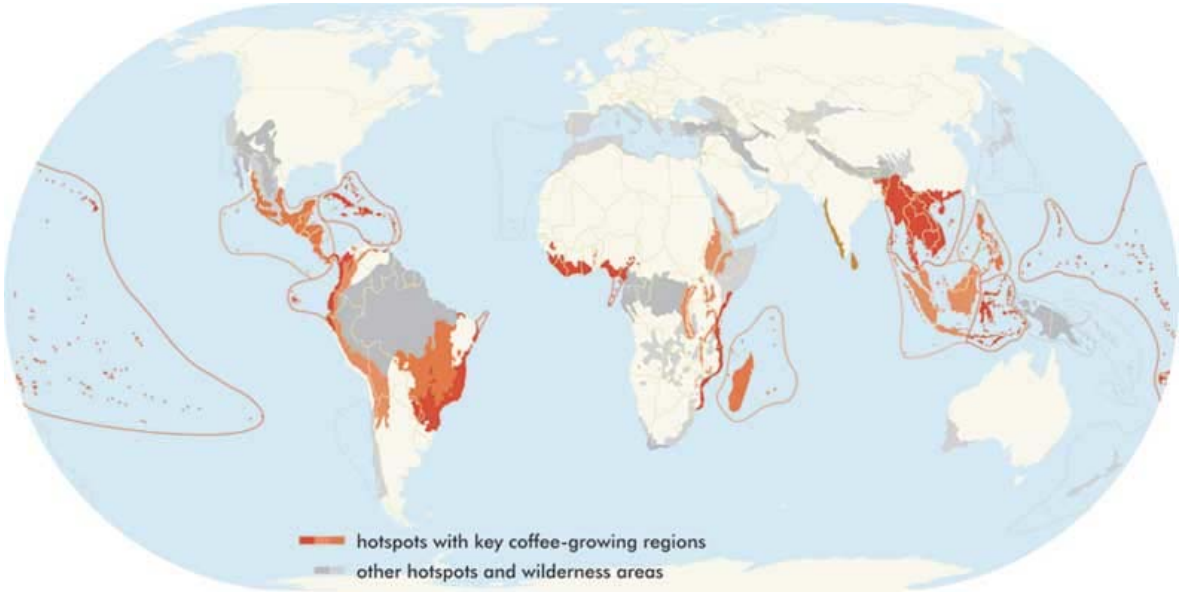

Figure 6.1. Coffee-growing regions and biodiversity hotspots (Conservation International 2012). Orange shading indicates overlap between coffee and hotspots

The price of coffee is thus an important variable affecting both livelihoods and the environment. The international price fluctuates daily with global supply and demand, moderated by factors including quality, available stocks, market expectations, speculation, and movements in exchange rates (International Trade Center, 2011). From 1962 to 1989 the world price of coffee was determined by the periodic negotiation and allocation of quotas under the International Coffee Agreement (ICA). Under this system, the producing countries had market power by taking control of global stocks and thus influencing the international price (Daviron & Ponte, 2005; Lindsey, 2004). From the growers' point of view, the regulation of trade created higher and more stable prices, assisting them in the decision to plant (Mehta & Chavas, 2008). However, in 1989 the parties to the ICA failed to renew the Agreement and determine a new set of quotas (Muradian & Pelupessy, 2005). This failure resulted from Brazil's unwillingness to lose its market share in the face of US insistence on satisfying consumer preferences for higher-quality coffee (Acheson-Brown, 2003; Pelupessy, 2001). Since 1989, in the absence of producer quotas, the producing countries have lost market power and the global price depends on shifts in supply and demand (Daviron & Ponte, 2005). In the 1990s and 2000s, unregulated expansion in production, especially from Vietnam, led to further encroachment into tropical forests

and a sharp decline in coffee prices (Mehta & Chavas, 2008; Muradian & Pelupessy, 2005).

This prompted calls for new trade agreements for coffee (Lindsey, 2004). The option of reducing supply was considered not feasible because it would affect the livelihoods of millions of small farmers. The other possibility was to increase the demand for coffee through product promotion in consuming countries. One aspect of this strategy was for producers to target high-value markets based on the growing demand for specialty coffees. This would involve the adoption of voluntary regulation in the global coffee value chain, with auditing standards for both social issues and environmental sustainability (International Trade Center, 2011; Muradian & Pelupessy, 2005). Daviron and Ponte (2005) use the term “sustainable coffee” for these systems of voluntary regulation.

Thus, from the early 2000s, the concept of sustainability in coffee production was promoted as a response to the global coffee crisis. The “sustainable coffee” movement aimed to incorporate the concept of conservation in the coffee value chain (Conservation International, 2012) and also give a competitive advantage to smallholders through price premiums as a form of compensation (Lewis & Tomich, 2002). The Solidaridad Network, a worldwide group of development organizations, was founder of the first fair-trade label for coffee (Max Havelaar) in 1988, along with other certified products. Building on this pioneering initiative, the sustainable coffee movement developed a series of principles and procedures to guide certification efforts.

Daviron and Ponte (2005) describe sustainable coffee in terms of three initiatives. The first is “organic coffee”, implying a viable and sustainable agro-ecosystem. The second is “fair trade coffee”, based on ethical trade practices that support the long-term sustainability of coffee producers. The third is “coffee under shade” that protects habitat for bird species and other wildlife. Conservation International with other related organizations defined the principles of sustainable coffee production in 2001 to assist the sustainable coffee movement (Conservation International *et al.*, 2001). These principles were:

a. sustainability of livelihoods (production systems should improve the coffee trade and livelihoods, and provide economic benefits to local communities)

b. conservation of ecosystems and wildlife (production systems should maintain and enhance biodiversity and ecosystem functions)
c. soil conservation (farm management practices should control erosion and maintain or improve soil structure and fertility)
d. conservation and protection of water (production systems should reduce water consumption to the extent possible and prevent pollution of water resources)
e. conservation of energy (at all stages of production, renewable energy sources should be used whenever possible)
f. waste management (the environmental impact of waste products and by-products of coffee should be reduced by applying the principles of reduction, reuse, and recycling)
g. management of pests and diseases (production systems should strive to eliminate all inputs of chemical pesticides, fungicides, herbicides, and synthetic fertilizers).

While producers may improve their performance and efficiency by following Good Agricultural Practices (GAP) and Good Management Practices (GMP), they have no means of guaranteeing or verifying their practices. However, the demand from consumers who want to have some confidence in producers' claims has led to the emergence of various product warranties based on third-party certification schemes (International Trade Center, 2011).

Certification takes the form of issuing a certificate that the product has conformed to the rules and regulations of the voluntary standards in place in a given setting. The certification must be confirmed by a third party – in this case, a certified auditor. Certification is frequently undertaken on an annual basis and needs to be periodically renewed (International Trade Center, 2011). Audits may also be undertaken without producing a certificate for final consumers. The best-known guidelines are incorporated in "The Common Code for the Coffee Community", administered by the 4C Association, which includes the larger producers and buyers (International Trade Center, 2011). The guidelines have the same objectives as a certification audit by encouraging improved standards of sustainability and also assuring the quality of the product. There are also auditing systems that are linked to a particular company, such as "The Starbucks CAFE Practices Program" and "Nespresso AAA Sustainable Quality" (International Trade Center, 2011).

There are several major certifiers of sustainable coffee in Indonesia. UTZ Kapeh, now known as UTZ Certified, has developed codes of conduct for specific products along the entire chain from producers to consumers. These codes are intended to promote continuous improvement, with the producer required to fulfil basic criteria regarding record keeping and farm management, the well-being of employees, and protection of the environment. More detailed requirements have been added with successive revisions over the years (UTZ, 2011).

The Rainforest Alliance is part of the Sustainable Agriculture Network (SAN), a coalition of non-profit organizations that promotes sustainability in agriculture by developing standards of farm management. The Rainforest Alliance aims to maintain biodiversity and support sustainable livelihoods through land-use management, business practices, and consumer behaviour (Rainforest Alliance, 2012).

Organic certification is organized at the global level by the International Federation of Organic Agriculture Movements (IFOAM), with 750 member organizations in 116 countries (IFOAM Organics International, 2012). The objective of organic certification is to avoid the use of chemical inputs, ensure quality, and prevent fraud in trade. It also includes standards for the conservation of nature (International Trade Center, 2011).

Fair Trade is “a trading partnership, based on dialogue, transparency and respect that seeks greater equity in international trade” (Fairtrade International, 2012). It contributes to sustainable development by offering better trading conditions and securing the rights of marginalized producers and workers, especially in developing countries. Fair Trade is governed in most of the world by Fairtrade Labelling Organizations International or FLO (Fairtrade International, 2012).

As one of largest exporters of coffee, Indonesia has been under the spotlight regarding the impact of the coffee crisis on the environment, particularly Lampung Province, which contributed 70% of national Robusta coffee exports in 2003-2011 (including coffee originating from Bengkulu and South Sumatra) (Association of Coffee Exporters of Lampung, 2012a, 2012b). Several studies have drawn attention to how parts of the coffee sector in Lampung are threatening biodiversity. According to Kinnaird *et al.* (2003), 70% of coffee production in Lampung was produced in or around the BBSNP and 28% of the Park area had been converted to coffee plantations, with the rate of

deforestation linked to coffee prices (O'Brien & Kinnaird, 2004). In 2007, the WWF released a report based on their research on illicit coffee plantations in the Park and were vocal in calling on the actors involved for a solution (WWF, 2007). In the meantime, they promoted an embargo on purchasing Lampung coffee.

At the same time, the government, some environmental NGOs, private buyers, and coffee processors began to pay attention to the conservation of the Park as well as the livelihoods of the coffee producers in the Park, especially given the WWF-initiated embargo. One of the many solutions put forward was product certification of coffee as an incentive to curb production within the Park. Product certification was to provide traceability to ensure that the coffee processed and sold to consumers was produced sustainably outside the Park.

The relation between coffee certification and protected areas was specifically highlighted in the 4C and RA standards. The 4C standard identified the following as an unacceptable practice: "There is evidence of destruction of protected areas (designated by national and/or international legislation) by any business partner of the 4C Unit since 2006." Similarly, the RA standard required that "High Conservation Value (HCV) areas have not been destroyed from November 1 2005 onward" and that "production activities do not degrade any protected area.

Three types of certification were introduced in West Lampung District: UTZ Kapeh, Rainforest Alliance, and 4C. As noted above, UTZ Kapeh certified farmer practices and their use of the natural environment. Rainforest Alliance certification was a practical program for land management in order to maintain a balance between sustainable agriculture and biodiversity conservation. 4C was a voluntary code of conduct for the entire coffee value chain intended to encourage social, economic, and environmental sustainability. A third party monitored all certifications on a three-year cycle. With multiple certifications, a parcel was certified by several certifiers and there was an assessment by the certifying institution before the certificate was issued or extended.

The implementation of coffee certification in West Lampung District can be divided into two periods based on the number of companies involved. From 2005 to 2010, PT Indo

Cafco[16] began coffee certification in cooperation with the local government and farmers' groups. From 2010, other companies began coffee certification in the District using diverse approaches. An in-depth study was made of the coffee certification scheme undertaken by PT Indo Cafco between 2005 and 2010. Then in 2014 the study site was revisited to assess developments in coffee certification since 2010. In the next section, the focus is on the first period and the Indo Cafco project. In the section that follows the various approaches used since 2010 are compared.

6.2 Coffee Certification in West Lampung District, 2005-2010

6.2.1 The Indo Cafco coffee certification project

The certification project in Lampung Province was initiated by PT Indo Cafco in 2005. Indo Cafco is part of ECOM Agroindustrial Corporation, a multinational trading and processing company based in Switzerland that focuses on coffee, cocoa, and cotton in 40 producing countries. ECOM was considered one of the top two coffee merchants and the largest coffee miller in 2016 (Ecom Agroindustrial Corporation, 2017b). The company claims to focus on sustainable and socially responsible commodity production by improving the supply chain from local producers to manufacturers. To respond to increasing demand from leading brands for products that are traceable and give assurance of good practice, ECOM implemented product certification in 14% of their worldwide coffee sales in 2011 and accounted for 15-20% by volume of certified coffee in the same year (Ecom Agroindustrial Corporation, 2017a). ECOM uses the third-party standards of Rainforest Alliance, UTZ Certified, 4C, AAA, and CAFE.

[16] PT is an acronym for Perseroan Terbatas, referring to a limited liability company.

Table 6.1. Logical framework of Indo Cafco coffee certification project

Project component	**Indicators of achievement**	**Means of verification**	**Assumptions**
Goal			
Facilitate sustainable coffee production and improved farmer livelihoods	Conservation and development in project area	Traceability investigation; Estimation of farmers' income	World demand for coffee is stable and price is high
Purposes			
1. Improving coffee cultivation and post-harvest management	Yield and quality of coffee increase; Agricultural practices improving; Certified product	Study of farmers' practices; Certification data	Improved coffee quality gives broader market access and is environmentally friendly
2. Broader access to the market	Farmers have better bargaining position	Investigation of coffee value chain	
3. Environmental protection	Traceability of coffee ; Less encroachment into Park	Traceability investigation; Encroachment study	
Outputs			
1.1 Change of coffee production practices for higher yield and quality	Farmers' income increases	Survey of farmers' practices, yields, and incomes	Farmers see benefit of good practices
1.2 Change of post-harvest practices to improve quality	More farmers using lining or solid floor to dry coffee beans		Farmers benefit from improved post-harvest practices
1.3 Higher coffee yield and better quality	Higher yield and better price		Famers can implement improved practices
1.4 Farmers attain ability to assess quality of coffee bean	Farmers can predict coffee quality	Prediction of price from farmers' quality assessment	Farmers can practise quality assessment
2.1 Better market access for farmers	Farmers' product enters new markets	Investigation of value chain	Company can buy certified product
2.2 Farmers achieve higher price than in local market	Higher price for participating farmers	Interviews with farmers	Certified coffee attracts price premium
3.1 Farmers adopt soil conservation practices	Farmers practise soil conservation	Observations and interviews	Farmers see importance of soil conservation
3.2 Farmers adopt sustainable pest control measures	Farmers practice sustainable pest control	Observations and interviews	Farmers see importance of good pest management
3.3 Coffee is traceable to ensure none is produced in National Park	No coffee produced in Park or on-sold from other farmers	Traceability investigation	Farmers cooperate with traceability of their coffee
Activities			
1.1.1 Extension and training about sustainable coffee production	Implementation of sustainable production practices	Monitoring of participants	High level of participation in extension activities
1.2.1 Support provision of post-harvest tools for better quality coffee	Farmers acquire lining or hard floor for drying		Support from micro-credit institutions

1.3.1 Extension and training about coffee productivity	Increased productivity		High level of participation in extension activities
1.4.1 Training in self-assessment of coffee quality	Farmers can assess quality		
2.1.1 Farmers sell certified coffee directly to company	Value chain shorter, costs reduced	Value chain analysis	Company can buy certified product
2.2.1 Payment of price premium for certified coffee	Higher farm price for certified coffee	Interviews	Higher market price for certified coffee
2.2.2 Provide daily price data to farmers	Farmers receive daily text message	Interviews	Farmer have mobile phone access
3.1.1 Extension and training about soil conservation	Better knowledge, willing to implement	Monitoring of participants	High level of participation in extension activities
3.1.2 Extension and training about soil fertility management	Better knowledge, willing to implement		
3.2.1 Extension and training about pest control	Better knowledge, willing to implement		
3.3.1 Company assists farmer groups to ensure traceability of coffee	Company's local agents facilitate collection and transportation	Documentation of transaction	Cooperation between local agents and farmer groups
3.3.2 Determination of reasonable quota by company	Data on quota for each group	Verification of quota and product sold	Company can buy the full quota

Table 6.2. Key events in coffee certification by Indo Cafco in West Lampung District, 2005-2014

Year	Event
2005	Coffee certification initiated by Indo Cafco Information sessions (*sosialisasi*) by local government officials
2006	Project *sosialisasi* by Indo Cafco through farmers' groups Formation of farmer groups' organisation (KUB) Fee agreement between farmer groups, KUB, and Dinas Perkebunan UTZ Kapeh certification granted Certification in 4 sub-districts, with total quota of 77 tonnes
2007	Demand decreased, Indo Cafco could not buy all coffee from farmers Certified coffee sold as general coffee
2008	Re-initiation of coffee certification, adding 4C and Rainforest Alliance Quota increased to 150 tonnes from 4 sub-districts More farmers' groups joined certification project Indo Cafco provided training and equipment for coffee production
2009	4C and Rainforest Alliance certification schemes used by Indo Cafco Quota increased to 1,800 tonnes from 4 sub-districts
2010	Quota increased to 2,000 tonnes
2011	Indo Cafco built local warehouse to collect certified coffee harvest
2012	Quota increased to 2,500 tonnes
2013	Quota increased to 3,000 tonnes
2014	More local Indo Cafco agronomists in the sites Two more Indo Cafco local offices in West Lampung District

Source: Key informant interviews and documentary research in 2009; quota information provided by Indo Cafco.

The certification scheme was introduced to coffee farmers in West Lampung in 2005 by the Dinas Perkebunan in cooperation with Indo Cafco (Table 6.2). In 2006, a process of informing and persuading farmers (*sosialisasi*) was undertaken by the company with farmer groups (*kelompok tani*), introducing them to UTZ Kapeh certification. Certification was to be granted to groups rather than individual farmers. At the same time, the farmer groups were formed into an overarching organisation (*Kelompok Usaha Bersama*, KUB). The value chain for certified coffee was shorter than for conventional coffee because the certified product was sold through farmer groups exclusively to Indo Cafco (Figure 6.2). With a shorter value chain (hence lower marketing costs) and a higher base price, farmers were expected to have higher returns than conventional producers.

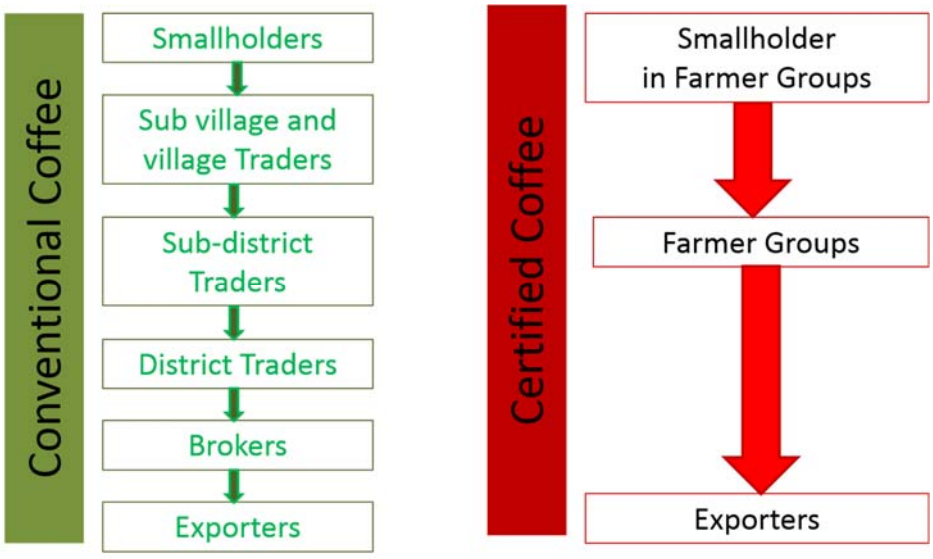

Figure 6.2. Comparison between conventional and certified coffee value chains

Following *sosialisasi,* participating farmer groups were allocated their own sales quotas. However, in 2007 the company was unable to buy the full quota amounts as demand had fallen. Many farmers could not sell their certified product and instead sold it as conventional coffee to local merchants. In 2008, Indo Cafco re-launched the certification project, adding Rainforest Alliance and 4C certification, and began to buy certified beans. In the study site, every certified farmer group had 4C certification, while some groups also met the criteria for UTZ Certified and Rainforest Alliance.

The general objective of certification was to guarantee that the product was sustainably and ethically produced according to social, environmental, and economic criteria. However, each certifier had specific criteria in their evaluations. The certification had to be accredited by an authorised third party at least once a year and each certificate was renewable every three years. The price premium for the certified product was determined by market conditions and the quality of the coffee beans. Daily price data for conventional and certified coffee were sent by the company to the farmer level.

In 2009 the company added further farmer groups, though some groups had withdrawn. The net effect was an increase in the total number of coffee growers participating, hence in the coffee area and production within the certification project. The quantity of certified coffee beans bought by Indo Cafco steadily increased, from 150 tonnes in 2008 to over 3,000 tonnes in 2014 (Table 6.2). A local warehouse was built in 2011 to store the certified product before transporting it to the main Indo Cafco warehouse in Bandar Lampung. In 2014 the company established two more local offices in West Lampung District with additional field staff.

The certification project involved several actors: coffee producers, farmer groups, the farmer group organization, the local tree-crops extension agent, the coffee exporting company, and local traders (Table 6.3). These actors constituted three different parties – local government, local farmers, and the private sector (Figure 6.3). The local government in this case was the Bureau of Plantation Crops (*Dinas Perkebunan*) in West Lampung District, located in Liwa, the district capital. The Dinas had local extension agents called *Petugas Pendamping Lapangan* (PPL) who were responsible for certain villages and farmer groups. Local coffee growers who participated in certified farmer groups were the producers of certified coffee beans. All farmer groups that participated in the project were members of a Farmer Group Organization (*Kelompok Usaha Bersama*, KUB), with one representative from each group. The third party was the private sector. Indo Cafco initiated and funded the coffee certification project. The company was located in Bandar Lampung, the provincial capital, and employed local agents who assisted the farmers and farmer groups in the certification process. Local merchants were also involved in the project, especially in collecting and transporting coffee to the company.

Table 6.3. Actors in Indo Cafco's coffee certification project

Actor	Roles
Coffee growers	Coffee production
	Improve quantity and quality of coffee
	Participate in farmers' group
Farmer groups	Represent members
	Collect product
	Transmit information
Farmer group organisation (KUB)	Node for information diffusion
	Coordinate groups
	Forum for discussion and deliberation
Dinas Perkebunan through local extension agents (PPL)	Technical assistance on site
	Local government representation
Local agents of export company	Project *sosialisasi*
	Inform price on daily basis
	Assistance in the certification project
	Represent company at local level
Export company	Buyer of coffee
	Determine base price
	Determine quality of coffee
	Ensure certification process
	Facilitate evaluation of certification
	Provide training
Larger local merchants	Collect and buy coffee in large quantities
	Transport coffee to company
Certifiers for each certification type	Inspect and evaluate at farm level
	Issue certificates
	Accredited agency, paid by the company

Source: Observations and interviews in 2009

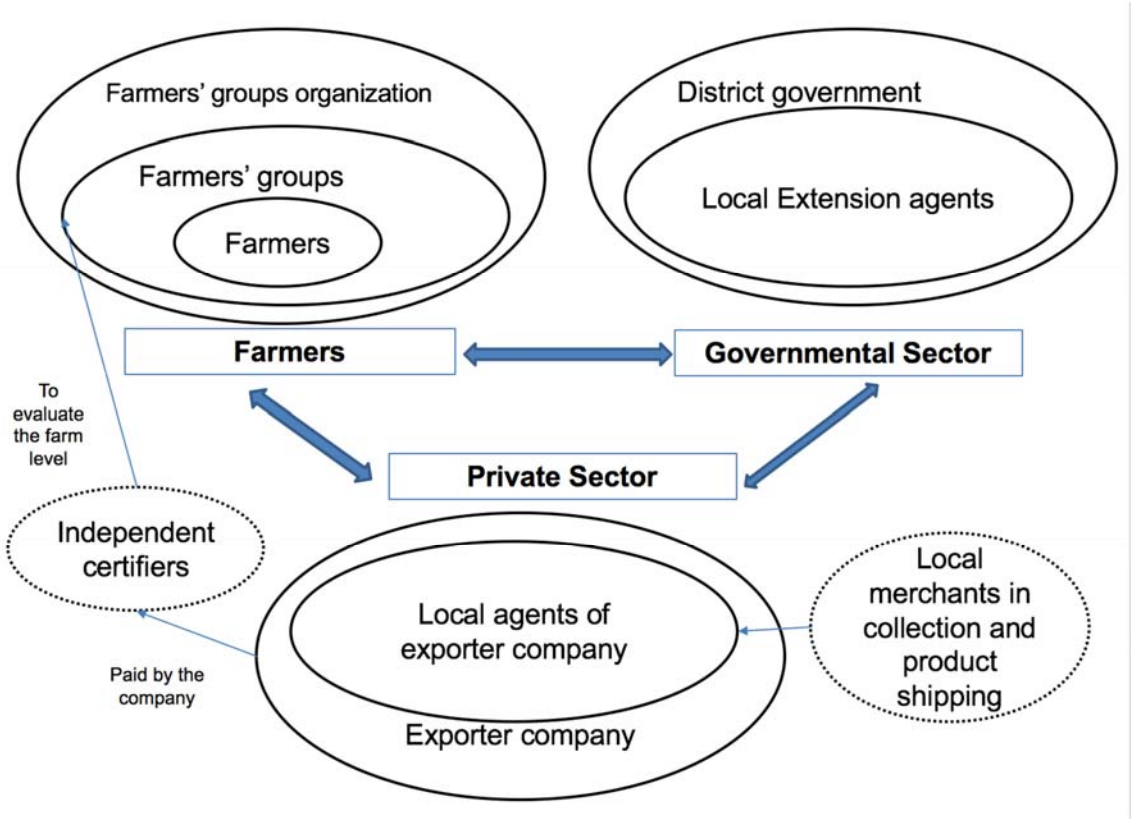

Figure 6.3. Interactions in Indo Cafco coffee certification project

The company was responsible for funding all the activities related to coffee certification – including information sessions, preparation for certification, the fee for certifiers, famers' equipment (such as face masks for spraying), and training of farmer groups. In this case, the company held the certificate and received the premium price for its exports. For each kilogram of certified coffee beans, the company was to distribute a fee to the local government extension agent of IDR 15, to the Farmer Group Organisation of IDR 15, and to each farmer group of IDR 20.

6.2.2 Coffee certification in practice

As described in Chapter 4, interviews were undertaken in 2009 with 47 members of certified farmer groups. The interviewees were asked what they understood by certification. The largest proportion (39%) associated certification with improving the quality of coffee produced, reflected in harvesting beans at full maturity and achieving the right moisture content. Another 9% associated it with management practices in production, with a certificate as evidence. About 6% saw certification as a way of

guaranteeing a higher price in the future, and 15% saw it as a project to strengthen the farmer group. Although all interviewees were certified through their group and could therefore sell certified coffee, 20% were not familiar with coffee certification and 11% of respondents had heard about it but did not yet understand it.

As stated above, the certification project aimed to improve coffee productivity in terms of both yield and quality. These variables were measured in the livelihoods survey of 603 respondents[17] in West Lampung District in 2009 (see Chapter 5), including farmers in certified farmer groups, farmers in non-certified farmer groups, and unaffiliated farmers (those not in any farmer group). The mean results are shown in Table 6.4. A one-way ANOVA showed that the differences in mean yield between the three groups were not significant while the differences in mean price were significant at the 1% level. A comparison of adjacent means using a two-tailed t test indicated that members of certified farmer groups received significantly higher price than members of uncertified farmer groups ($p=0.022$), but the difference in price between the latter group and unaffiliated farmers was not significant ($p=0.681$). The higher price may have been attributable to Indo Cafco paying the certification premium. However, certified farmers averaged only 4% higher prices than the other groups. This may have been because the price also reflected the quality of the coffee, as indicated by the proportion of defective beans and the moisture content, so the price premium may have been offset by deductions for lower quality. Either way, the overall effect of certification on price was small.

Based on interviews with leaders of 25 certified farmer groups, most (68%) associated certification with using good practices in production, having an incentive to produce good quality coffee, and being recognised by other parties through a certificate. Another three (12%) of the group leaders saw certification as a program for the farmers in the group to access support for coffee production. Two (8%) emphasised control by other parties (local government, the company, and others) to ensure that they used good practices in their coffee plots.

[17] One respondent was considered missing data because of the incomplete data, so in this analysis I included 603 interviews.

Table 6.4. Comparison of coffee yield and price between farmers in certified groups, farmers in non-certified groups, and unaffiliated farmers

	All	In certified groups	In non-certified groups	Unaffiliated	ANOVA Test	
					F	Sig.
No. of respondents	603	204	204	195		
Mean yield (kg/ha)	884	896[a]	837[a]	908[a]	0.881	0.415
Mean price (IDR/kg)	10,849	11,095[a]	10,725[b]	10,646[b]	4.423	0.012

Source: Interviews with 603 coffee farmers in West Lampung District in 2009; one respondent excluded due to missing data. A one-way analysis of variance was performed for each variable (yield and price), followed by a two-tailed t test for pair-wise comparison of means. Lavene's Test for equality of variances supported the assumption of homogeneous distributions. Means in the same row with the same superscript were not significantly different at the 10% level. Analysed using the Statistical Package for the Social Sciences (SPSS Version 23).

Three of the 25 group leaders (12%) felt that certification did not help in practice because there was little or no difference in the farm-gate price, yet the group members were indebted to others outside the certified value chain. As one leader stated: "People do not know if coffee is certified unless it is written on the bag during shipping. We do not sell to Indo Cafco because the price of certified coffee is little different from conventional coffee, just 100-200 rupiah in the final analysis, given the quality of coffee that we have. With the same product, we prefer to sell to local merchants with whom we have debts from off-season cropping."

Agents of the coffee exporter interviewed saw coffee certification as a certificate that gives proof of having passed an inspection by an authorized party and as a key to opening up new opportunities. The initiation and implementation of coffee certification reflected their commitment to environmental sustainability, which was a benefit to the company. Certification was seen as providing an opportunity to export coffee to that segment of the international market that required certification. However, certification was not a guarantee of accessing that market, nor a guarantee of increased income.

6.2.2 Qualitative evaluation of coffee certification project

In the interviews with 25 certified farmer group leaders and 47 group members, interviewees were asked to rate the economic, social, and environmental impacts of the certification project. After analysis of the interviews, an impact scale was

developed, ranging from 1 for low impact to 5 for high impact. Low impact meant that less than 20% of respondents reported the impact and high impact meant that at least 80% of respondents felt the impact, while 20-40% represented a score of 2, 40-60% a 3, and 60-80% a 4.

Table 6.5. Coffee certification impact matrix

Purpose	Expected Outputs	Score (1-5)	Explanation
Economic aspect Improving production, income and post-harvest practices	Changed coffee production practices for higher quality and yield	4	Many farmers understand need to harvest red beans and adopt better cultural practices
	Changed post-harvest practices towards higher quality coffee	4	Adoption of lining for coffee drying but not all farmers can afford cost
	Better quality of coffee bean and higher yield	4	Farmers that implement better harvesting and drying methods
	Farmers can assess quality of coffee beans	3	Some farmers can assess quality but not accurately
	Famers receive higher price than in local market	3	Most farmers have low-quality beans; price lower if selling poor quality beans to company
Social aspect Broader access to the market, information, and farmer group re-activation	Better access to market for farmers	5	Farmers get daily price information and have more options to sell
	Re-activation farmer groups	4	Certified farmer groups were administratively better
	Communication forum within famer groups	4	Farmers groups organisation was viewed as a good forum to exchange communication and information for each farmer group
Environmental aspect Environmental protection	Farmers practise soil conservation in their coffee plots	3	Good practices by farmers who already knew about soil conservation
	Farmers practise environmentally safe pest control	2	Farmers use same pest-control practices but begin to understand importance of safe pest control
	Traceability to ensure coffee not produced in Park	1	Difficult to implement traceability in practice

Source: Interviews with 25 certified farmer group leaders and 47 members in West Lampung District in 2009.

The resulting impacts matrix is presented in Table 6.5. The results indicate that the economic and social impacts were relatively high, though farmers' ability to correctly assess the quality of their coffee beans was not greatly improved and, critically for the

overall success of certification, most farmers were not receiving higher prices because of the poor quality of their beans. However, the environmental impacts were disappointingly low. Impacts on soil conservation and use of environmentally safe pest control were low to moderate, while the critical question of traceability to ensure only coffee produced outside the Park was certified was not achieved.

Table 6.6. Sustainability evaluation of coffee certification project

Benefits perceived	Score (1-5)	Explanation
Changing attitude to coffee production practices	4	This would be sustained. Before the project, farmers implemented technologies to improve yield and quality and they would continue to make suitable adaptations.
Higher yield and better quality of coffee	4	This would continue to be the objective of each farmer.
Improved post-harvest practices	4	Farmers are aware of the benefit to coffee quality.
Better access to market	2	This would not be sustained as the company controls certification, whereas the main market chain is through local traders.
Higher price due to premium for certified coffee product	1	This would not be sustained as certification would end if the project ended.
Environment-friendly soil and pest management	3	This might be sustained as the farmers were more aware of environmental protection and conservation.

Source: Interviews with 25 certified farmer group leaders and 47 members in West Lampung District in 2009.

The sustainability of the project's positive impacts was assessed by asking the 25 group leaders and 47 group members whether the outputs with high levels of beneficial impact in Table 6.5 would continue at that level if the certification project was discontinued. Six of these beneficial impacts were identified and scored from 1 (not sustainable) to 5 (highly sustainable) (Table 6.6). The changed attitude to improved production practices, achieving higher yield and better quality, and improved post-harvest practices were all considered sustainable because farmers were motivated to pursue these goals for their own benefit. Achieving greater market access and a price

premium were seen to be dependent on selling exclusively to Indo Cafco to receive certification, but this would cease if the project ended. Environmentally appropriate soil and pest management practices were considered somewhat sustainable as farmers' awareness had been increased.

6.2.3 Constraints to coffee certification implementation

(a) Access to and use of coffee certification

In West Lampung District, there were 96 certified farmer groups in 2010, with 3,604 members, accounting for 5% of farmers in the district. Certified output was less than 10% of total production. Thus, certification was not available to most farmers. The general perception in the district was that certification was about the quality of the coffee, not that it was about a process from planting to post-harvest activities.

According to the interviews with farmer group leaders, the main motivation for groups to join the certification project was to increase market opportunities through capacity building and support for the group, and negotiation of a higher market price. As noted above, each group had its own annual sales quota indicating the maximum amount that could receive certification. This quota was not a strict contract; there was no obligation to fill the production quota each year. Hence farmers still had the ability to decide where to sell their harvest.

In fact, most farmer groups did not meet their annual sales quota. Even those groups that did fill their quota may have done so by acquiring beans from other farmers outside the group. According to the survey of 47 group members, 79% of coffee was sold without going through the certification process and only 17% was sold as certified coffee. A small proportion (4%) was stored for later sale when income was needed.

From the company's point of view, the certification scheme was a means to enhance its social and environmental image and to tap into the growing global market for sustainably produced coffee. Hence the annual quota set by the company and its willingness to fill that production target was affected by prevailing market conditions. For example, in 2007, at the beginning of the certification project, the company did not buy certified beans from farmers because of the low global demand for this product at that time.

(b) Dependence on credit

Under the certification project, small coffee farmers could sell directly to the company and receive a better price (if the quality was high). In this way, theoretically, farmers would not be dependent on local intermediaries to buy their product at local prices decided by the intermediaries themselves. In practice, participating farmers also sold coffee to village collectors. Typically, they were bound to do so because they had borrowed money from the collector at the start of the season. The borrowed money was used for inputs, especially fertiliser, but also for daily household needs.

There were two coffee harvests each year but, between harvests, small coffee producers had difficulty meeting their basic needs because they had no income. In this period, many farmers borrowed money for daily needs, to pay school fees, and to buy inputs for the coffee. In the next harvest season, these farmers were obliged to sell to the local trader at a lower price to repay their loans, even if their coffee was already certified.

In addition, farmers had little capacity to store their coffee and wait for a better price as they were usually faced with an urgent need for cash. Wealthier farmers could save the profits from coffee sales and use them to invest in such assets as land, a motorcycle, jewellery, house renovation, or a small shop. Poorer farmers would retain any small surplus in the house for emergency expenses.

Farmers who obtained loans from a coffee collector found this procedure to be quicker and simpler than seeking formal credit. Loans could be in the form of cash or inputs (fertilizers and/or pesticides). According to the farmers, they never paid any interest on the loans; the only requirement was to sell their coffee to the collector (though presumably there was an implicit interest charge in the price of inputs and/or the price of the coffee).

In contrast, the farmer groups were not able to provide adequate financial services for their members. Loans to farmer group members could meet only a small part of their overall capital needs. Only groups with assets in excess of IDR 100 million (typically with 25 members) were able to meet the financing needs of their members. Unfortunately, only a few groups in West Lampung had this level of capital. Most had no working capital to assist their members and were not planning to develop such a facility, focusing instead on fostering cooperation among members.

Most coffee farmers thus needed additional capital to be able to intensify production. This capital constraint limited efforts to improve productivity and helped to normalise low yields. Among the 204 certified farmers interviewed in the 2009 livelihoods survey, 46% said they had outstanding debts at the time of the interview. The purpose of the credit was mostly to buy agricultural inputs such as fertilizer and pesticide, with repayment periods of 6-12 months. The method of repayment in the majority of cases was to sell the harvested coffee to the credit supplier.

(c) Difficulty of shipping certified coffee

Certified coffee was sold directly through a coffee farmers' group which functioned as a collector, assembling a sufficient quantity of beans to be transported by truck – a minimum of 9 tons. Some small coffee farmers preferred to sell locally rather than wait for the other farmers to deliver enough for a shipment to be made to the company. In addition to the waiting period for shipment, small producers had to wait again for payment as it took time for the coffee to be delivered, the quality to be assessed, and the money to be transferred. This added to the incentive for poorer farmers to sell locally to obtain faster payment.

(d) Price premium not assured

Although the base price for certified coffee was higher, the price farmers received may have ended up lower than conventional coffee prices due to the rigour of the company's quality control (e.g., measurement of moisture level). Hence the base price was not sufficient reason for farmers to join and supply the group. At the same time, the purchase price could be influenced by the particular company's quality assurance process. For example, famers thought that Indo Cafco was stricter than other companies such as Indocom or Nescafe (which had entered the district since 2010).

Certification was a way to improve quality, but if the quality was still low, it was better for the farmer to sell to other market intermediaries, even if the coffee plots themselves were already certified. The group quotas could be met by including the produce of other farmers (members and non-members) until there was sufficient good quality coffee to deliver to the company.

(e) Contamination of certified coffee from other sources

In practice, the monitoring of certified coffee was not as rigorous as indicated by the certifiers. There were three types of product contamination in the certification project.

Certified coffee could be mixed with: (1) coffee produced within the Park, (2) coffee produced by farmers who were not members of a certified farmer group, or (3) coffee produced by an authorized and certified member of another farmer group.

Among the 47 interviewees (certified farmers), 34% were of the “encroacher” type who owned land both within the village territory and within the Park or Protection Forest (Chapter 5). This category of farmer had the greatest incentive and opportunity to mix in coffee from the Park as they could have a certified plot in the village territory and another (necessarily uncertified) plot inside the Park. These “encroachers” sold 38% of their coffee through the certification channel, compared with 17% for “villagers”, and earned three times as much from the certification scheme as villagers (Table 6.7).

Table 6.7. Comparison of certified coffee producers classified as villagers and encroachers

	Encroachers (n=16)	Villagers (n =31)
Mean coffee area in protected area (ha)	1.3	0
Mean coffee area within village (ha)	1.5	2.2
Share of certified coffee in total production (%)	38.4	17.1
Mean annual income from certification (IDR x 10^3)	1.84	0.62

Source: Based on 47 farmer interviews in 25 farmer groups in West Lampung in 2009

Drawing on the 204 certified farmers in the livelihoods survey and comparing the three types of producer, the encroachers could benefit more in absolute terms from accessing the premium price for certified coffee, given their larger total coffee area and similar yields. However, the relatively small price premium meant they could obtain only around IDR 340,000 (USD 25) in additional income by selling all their output through the certification project compared with using conventional market channels.

6.3 Coffee Certification in West Lampung District, 2010-2014

6.3.1 Overview

In the first round of fieldwork (2009-2010) there was only one company – Indo Cafco – implementing coffee certification in West Lampung. However, since 2010, other companies have started to implement coffee certification in the district in response to increasing international demand for certified coffee. In the second round of fieldwork in 2014, it was found that five additional companies had initiated coffee certification – PT Nestlé Indonesia, Louis Dreyfus Company, PT Nedcoffee Indonesia Makmur Jaya, PT Indocom Citra Persada, and PT Samson Jaya.[18] The extent of certification in 2014 is shown in Table 6.9.

Table 6.8. Potential additional income from coffee certification for each type of certified farmer in household survey

	Villagers	Encroach-ers	Squatters	All
Number of respondents	138	50	16	204
Coffee area in National Park (ha)	0	0.3	0.2	0.1
Coffee area in PF (ha)	0	0.9	1.0	0.2
Coffee area within village (ha)	1.8	1.4	0	1.5
Total household coffee area (ha)	1.8	2.6	1.2	1.8
Coffee yield (kg/ha)	893	876	990	896
Price of coffee (IDR/kg)	11,034	11,251	11,321	11,095
Gross income from conventional coffee (IDR x 10^3)	17.7	25.6	13.5	17.9
Potential additional income from certification scheme (IDR)*	241,056	341,601	178,128	237,808

Source: Livelihood Survey of 603 farmers in West Lampung District in 2009, of whom 204 were certified farmers. One from 604 total interviews was considered missing data.

* Assuming a price premium of IDR 150 per kg and that the farmer can sell all their product as certified coffee, regardless of where it was produced.

[18] As noted above, PT is an acronym for Perseroan Terbatas, referring to a limited liability company (LLC). All companies in Indonesia with foreign investment must be LLC.

Nestlé in Indonesia is a part of the multinational company Nestlé S.A. based in Switzerland and has operated in Indonesia since 1971. Nestlé operates factories in Java for confectionary and dairy products and in Lampung for processing instant coffee (Nestlé Indonesia, 2017). Louis Dreyfus Company is another multinational company with a long history that trades in a diverse range of agricultural commodities. In coffee, the company trades in both Robusta and Arabica coffee, mainly from Vietnam and Colombia, but has expanded its business in Brazil, Indonesia, and Honduras. The company uses the certification programs of 4C Association, UTZ, Rainforest Alliance, CAFÉ Practices, and Fairtrade Certification (Louis Dreyfus Company, 2017).

Table 6.9. Coffee export companies engaging in coffee certification in West Lampung District in 2014

Company	Start year	No. of farmer groups	No. of house-holds	Area (ha)	Certified product in 2014 (t)
Nestlé	2012	62	3,310	4,000	2,700
Louis Dreyfus	2010	35	915	200	500
Nedcoffee	2011	13[a]	1,500	?	1,100
Indocom	2011	67	?	?	0[b]
Samson	2014	47	1306	2,500	0
Indo Cafco	2006	142	3,500	4,000	2,700
Total		366	10,531+	10,700+	7,000

[a] Forest Farmer Groups; [b] Indocom had been rejected by the certification evaluator.

Source: Interview with Bureau of Plantations, West Lampung District, 2014.

Several Indonesian companies had also started certification projects in West Lampung (Table 6.9). PT Nedcoffee Indonesia Makmur Jaya (or Nedcoffee) was established in Indonesia in 2005 with Dutch investment and started operation in Lampung Province, specialising in Robusta coffee, with a warehouse and main office in Bandar Lampung. The company has implemented Rainforest Alliance certification in Tanggamus and West Lampung Districts since 2011. PT Indocom Citra Persada (or Indocom) is an Indonesian-owned company that specializes in coffee exporting. The company was founded in 1996 in Lampung Province and has its own warehouse in Bandar Lampung. PT Samson Jaya (or Samson) is another locally-owned company based in

Bandar Lampung, specializing in Robusta coffee. It began implementing coffee certification in West Lampung District only in 2014.

The certification projects by Indo Cafco and Nestlé had the most households participating (over 3,000 each) and the largest certified area (4,000 ha each), and bought the largest quantity of certified product – about 2,700 t each in 2014 (Table 6.9).[19] It was found that some farmer groups had transferred from the Indo Cafco project to the Nestlé project.[20] Louis Dreyfus and Nedcoffee had fewer farmer groups and households and bought less certified coffee compared to Indo Cafco and Nestlé. Samson had started a coffee certification process but had not yet bought any certified product. The Indocom Company had tried to implement coffee certification from 2011 but failed to achieve third-party approval. About 7,000 tons of certified coffee was produced in 2014, representing about 14% of the total Robusta production in West Lampung District of 48,000 tons (Badan Pusat Statistik Kabupaten Lampung Barat, 2015).

Each company in the study site had its own approach to coffee certification. Three different approaches were identified – the farmer group approach, the training-of-trainers approach, and the forest farmers approach. These are discussed in turn.

6.3.2 Farmer group approach

The farmer-group approach to implementing coffee certification was used by Indo Cafco, Samson, and Indocom. As explained above, Indo Cafco involved local farmers in a hierarchy with three levels, from individual farmers, to the farmer groups, to the farmer group organization. The company obtained a price premium for every kilogram of certified coffee and distributed fees to the farmer groups, local government agent, and farmer group organization. Samson had just started its certification program in 2014 with the 4C scheme and expected to start buying certified coffee from farmer groups in 2015. Indocom had failed to get its certification scheme approved because

[19] Indo Cafco was still the biggest company in coffee certification until finally they stopped buying certified coffee in 2016 because of less market demand for this premium coffee (interview with an Indo Cafco officer in Sustainable Management Services Department, 22 March 2018).
[20] Officially, a farmer or farmer group could not be involved in more than one certification project because of the need to register coffee plots and verify the certification process.

of the lack of community orientation (*sosialisasi*) and hence lack of readiness of the farmer groups.

In the farmer-group approach, local government staff from the Dinas Perkebunan were involved in the *sosialisasi* process, recommending farmer groups to the company, and forming the farmer groups' organization. During the project, the Dinas also had a role in facilitating the project and conducting training for the farmer groups. In return the Dinas received a share of the premium from every ton of certified product sold.

6.3.3 Training-of-trainers approach

The approach of training and education of farmers who would then train other farmers was applied by Nestlé since the beginning of its certification project in Sumberjaya and Tebu Sub-districts. However, the trainers and trainees could come from beyond the immediate area and could recruit participants for training from anywhere. The training involved several resource persons – local agents of the company, evaluation bodies (in this case from Rainforest Alliance), and university staff – as well as various sources of information, including curriculum guides, booklets, posters, and a pocket booklet with practical information about coffee certification. Nestlé was well-known by local farmers as a company that only bought high-quality coffee and had stricter quality controls than other companies (e.g., including a coffee aroma test in its criteria).

A different approach was used by the Louis Dreyfus Company to implement coffee certification, mainly using 4C certification. As explained by an officer in the Dinas Perkebunan, this company involved local merchants in the coffee certification process. Local government staff were not as involved as with other projects, only informing farmers of the company's project and also sharing in the premium fee from the certified coffee sold.

6.3.4 Forest farmer approach integrated with HKm program

Unlike the other companies using a farmer-group approach, the Nedcoffee Company specialised in targeting forest-farmer groups. These groups had members with coffee plots inside a Protection Forest (but not the National Park) who had a long-term (35 year) right of land usage. As discussed in Chapter 3, this form of social forestry scheme, called *Hutan Kemasyarakatan (HKm)*, was officially established in 2001 by the Decree of the Ministry of Forestry No.31/Kpts-II/2001. Permits are issued to

forestry groups by the District Head (*Bupati*), with facilitation from the Bureau of Forestry at district and provincial levels. Farmers are authorised to use part of the Protection Forest for tree crops for 35 years on condition that they plant a minimum of 400 non-coffee trees per hectare and that another portion of the Protection Forest is conserved.

At the time of data collection in October 2014, HKm schemes were underway in four out of the 10 Protection Forests in West Lampung District, mainly on the eastern border of the Park, encompassing 7,625 ha (of which 6,276 ha were under coffee and 1,349 ha protected), representing 16% of the total PF area in the District (Bureau of Forestry, West Lampung District, 2014). These schemes involved 26 forest groups with 3,860 members – 4% of the coffee planters in the District. Sumberjaya Sub-district was the most advanced in implementing HKm schemes since 2001, thanks to facilitation by the World Agroforestry Centre (ICRAF) through their RUPES (Rewarding Upland Poor for Environmental Services) program.

As part of the coffee certification process, each member of a participating forest-farmer group had a registered plot. There were about 1,500 households involved in coffee certification through Nedcoffee in 2014, or just under 40% of the total number of HKm households in the District.

6.3.5 Constraints to certification since 2010

To evaluate the constraints facing coffee certification projects since 2010, the five constraints identified for the original Indo Cafco project were revisited: (a) access to certification was limited, (b) the farmers were dependent on credit, (c) there were difficulties in shipping certified coffee, (d) farmers were not assured of receiving the price premium, and (e) contamination of certified coffee from other sources was hard to control.

The first constraint was the limited access to or participation in coffee certification as reflected in the number of households involved and the area declared to be certified. The changing status of certification over the subsequent five years is shown in Table 6.10. As the number of companies promoting certification increased from one to five, the number of households involved almost trebled and the number of farmer groups more than trebled. The area of certified coffee increased by 2.6 times, while the production of certified coffee increased by only 25%. The smaller increase in

production was because some areas that were still at the beginning of the certification process were not yet producing certified coffee.

In terms of the extent of involvement in certification among coffee farmers in the District, the proportion of coffee farmers who were certified had more than doubled to 12% and the certified area had also more than doubled to be 16% of the total coffee area. Thus certification had become more accessible to farmers in West Lampung District as each company had its own area of operation and, in the case of Nedcoffee, this extended into Protection Forests. There was also more choice, enabling some farmers to switch between alternative certification schemes.[21]

The second constraint was the dependence on credit, especially among smaller farmers. There was no evidence that this had lessened over the ensuing five years. The nature of the cash flow from coffee production, with two harvest periods annually, and the urgent need for cash for household needs and farm inputs prompted farmers to take loans from local traders and applied pressure on farmers to sell immediately after harvest to repay loans and meet further cash expenses. Farmer groups were still not in a position to meet members' needs for working capital.

Table 6.10. Status of coffee certification in West Lampung District in 2009 and 2014

Variable	2009	2014
No. of companies implementing certification	1	5
No. of certified farmer groups	96	336
No. of certified households	3,604	10,531
Coffee area certified (ha)	4,188	10,700
Certified product sold (t)	5,575	7,000
Total coffee planters in District	76,680	86,420
Total coffee area in District (ha)	59,357	67,356
Certified planters as % of total in District	5	12
Certified coffee area as % of total in District	7	16

Sources: Interviews with Indo Cafco and Dinas Perkebunan (West Lampung) in 2014; Badan Pusat Statistik Lampung Barat.

[21] This conclusion needs qualification in light of Indo Cafco's recent withdrawal from certification, as noted above (Interview with officer in Sustainable Management Services Department, Indo Cafco, 22 March 2018).

The third constraint related to the time and cost involved in delivering the certified product to Indo Cafco, reducing farmers' incentive to sell to the company, even if their coffee was certified. Some farmer groups had improved on this situation because they had access to a local intermediary who arranged to transport the coffee from the village to the Indo Cafco warehouse in the district capital. In other cases, farmers waited for other farmers in the group to transport their certified coffee together. However, since 2012, Indo Cafco had established a local warehouse in West Lampung District, making it easier for certified farmers to deliver their coffee. Nestlé had also established a local warehouse in the District. Thus the delivery problem had been partly resolved.

The fourth constraint related to obtaining a higher price as compensation for involvement in the certification process. The premium price was viewed by the farmers as the price for better-quality coffee beans. For farmers who could afford to provide good-quality coffee, the price premium gave them a higher price overall. However, for farmers who could not attain the quality criteria, the price premium was not sufficient to give them a net price higher than they could get in the local market. This situation remained unchanged since the beginning of certification in the study site.

The last and, from the point of view of this thesis, most critical constraint was the contamination of the certified product with product from other sources, whether from inside the Park, non-certified farms, or other farmers with unknown practices. The lack of traceability and the contamination of the product remained unchanged.

6.4 Conclusion

Coffee certification has been implemented in West Lampung District since 2005 and has continued to expand in terms of the number of companies involved, the number of certification schemes, the number of farmers and farmer groups, and the area of coffee included, though the output of certified coffee has not yet increased to the same degree. Coffee certification is initiated and mostly funded by the private-sector coffee traders, who act to implement the project, hold the certification, and buy the certified coffee from the farmers or (more commonly) farmer groups.

The original case study was based on the project implemented by Indo Cafco, which was the pioneer in certification in the study site and remained the largest player in 2014 (though it has recently withdrawn). This project involved a range of actors

including coffee farmers, farmer groups, local government, company agents, and certifiers. The main certification schemes were UTZ Certified, 4C, and Rainforest Alliance, with the common objective of rewarding farmers through a premium price for coffee produced by good farm practices that were socially and environmentally sustainable, including being produced outside the National Park.

Similar certification schemes have been introduced since 2010, with Nestlé in particular rapidly expanding to match Indo Cafco. However, several constraints to implementing coffee certification in the District were identified in the 2009 study and these largely remained in 2014. Though farmers' access to and use of certification had increased, certified production accounted for only 16% of the coffee area and 14% of Robusta production in the District. The lack of financial institutions able to reduce the growers' dependence on traditional credit was also a constraint. The difficulties in shipment of certified coffee had been reduced due to some companies establishing local warehouses and traders offering to transport the farmers' certified product. However, the fact that the premium price was not assured continued to discourage farmers, who found that discounts for poor quality beans could erode any price advantage from certification.

The most significant constraint was the contamination of certified product with non-certified beans, reflecting the inability of the certification schemes to continually monitor the source of the coffee. In particular, farmers with certified coffee plots in the village as well as illegal plots inside the Park had a strong incentive to subvert the scheme by mixing in beans from their non-certified plots, and there was little or no capacity to prevent this. Hence, whatever its benefits, coffee certification did not appear to be preventing encroachment of the Park.

The lack of monitoring and enforcement of the certification program has contributed to the sub-optimal outcome. In BBSNP, enforcement has been used, not specifically as part of coffee certification, but as a separate tool to prevent illegal activities in BBSNP. In the next chapter, law enforcement in this sense will be examined.

CHAPTER 7
A COERCIVE APPROACH TO PARK CONSERVATION: ENFORCING EXCLUSION

In Chapter 6 I presented a case study of coffee certification as an incentive-based approach to conservation in the Bukit Barisan Selatan National Park (BBSNP), one that provides a price premium for coffee produced according to good environmental, economic, and social practices. In this chapter, a contrasting approach is examined – one that attempts to enforce exclusion from the Park and compliance with conservation legislation through a range of punitive measures. Data were collected from September to December 2009, mainly along the western boundary of the Park where enforcement is the main strategy, but including some villages on the eastern side. In 2014, additional fieldwork was undertaken to update the picture obtained in 2009. Eleven villages encompassing 63 hamlets (or sub-hamlets) were included in the study. In each village and (sub-)hamlet, data were obtained about location with regard to the Park, settlement history, sources of livelihood, local-level forest management, encroachment on the Park, and the intensity of patrols and sanctions encountered. Interviews were also conducted with Park officers and rangers, and officers of three NGOs involved in Park protection – the Worldwide Fund for Nature (WWF), the Wildlife Conservation Society (WCS), and the Rhino Protection Unit (RPU).

The chapter begins in Section 7.1 with an analysis of the legal basis for enforcing exclusion from the Park and the actors involved in enforcement, including NGOs, local government, the military, and local people. This is followed in Section 7.2 by an account of how enforcement has been implemented in the study area, including the use of routine patrols and the identification of priority areas. The data from the villages and hamlets are then presented in Section 7.3 to characterise these settlements and their experience of enforcement. This is followed in Section 7.4 with an analysis of the factors affecting the degree of encroachment on the Park and the effectiveness of enforcement activities. In Section 7.5 a brief update is presented of enforcement activities from 2010 to 2014. An overall assessment of the enforcement approach is given in Section 7.6.

7.1 Legal Basis of Exclusion from BBSNP

The management of forest areas in Indonesia is regulated by a series of laws and regulations, as described in Chapter 3 and summarised in Table 7.1. Based on the 1945 Constitution, the Basic Agrarian Law of 1960, and Law No. 5 of 1967 about Forestry, the authority to determine forest management and forest use rights resides with the central government. The justification has been that the forest is an important natural resource affecting the welfare of the people nationally. Even with the decentralisation of government since 1999, the management of National Parks remains under the central government through its local-level institutions. This was regulated by Law No. 22 of 1999 about Regional Government, replaced by Law No. 32 of 2004. More detail was provided in Government Regulation No. 38 of 2007 concerning the division of government affairs between central, provincial, and district or municipal government.

Table 7.1. Legal basis of enforcing exclusion from BBSNP

Undang-undang Dasar 1945 (1945 Constitution)
"Production sectors that are vital to the state and that affect the livelihood of a considerable part of the population are to be controlled by the state" (Art. 33, Para 2).
"Earth, water and natural resources contained therein are controlled by the State and used for the greatest prosperity of the people" (Art. 33, Para 3).
"The national economy is organized on the basis of economic democracy with the principles of togetherness, fairness, efficiency, sustainability, environmental insight, independence, and by maintaining a balance of progress and national economic unity" (Art. 33, Para 4).
Undang-undang Pokok Agraria Tahun 1960 (Basic Agrarian Law 1960)
"The implementation of the … right of control by the State may be delegated to the autonomous regions and adat law communities, if deemed necessary and not being in conflict with the national interest in accordance with the provisions of Government Regulations" (Art. 2, Para 4).
"… the exercise of such customary rights and rights of customary law communities, to the extent they in fact still exist, shall be in accordance with national and state interests, based on national unity, and may not conflict with other laws and regulations" (Art. 3).
Undang-undang Tahun 1967, No. 5, tentang Pokok-Pokok Kehutanan (Law No. 5 of 1967 on Principles of Forestry)
"All forests within the territory of the Republic of Indonesia, including natural resources contained therein, shall be controlled by the State" (Art. 5, Para 1).
Undang-undang No. 41 Tahun 1999 tentang Kehutanan (Law No. 41 of 1999 on Forestry)
"Utilization of a forest area can be undertaken in all forest areas except in a Nature Reserve Forest and the core and wilderness zone of a National Park" (Art. 24).
"Everyone is prohibited to: a. work and/or illegally use and/or occupy forest areas; b. penetrate the forest area…" (Art. 50, Para 3).

"To ensure the implementation of forest protection, certain forestry officials in accordance with the nature of their work are granted special police authority" (Art. 51, Para 1). "Officials who are given special police authority as referred to in section (1) shall be authorized to: a. conduct patrols within the forest or its area of jurisdiction…" (Art. 51, Para 2).
Peraturan Pemerintah No. 38 Tahun 2007 tentang Pembagian Urusan Pemerintahan antara Pemerintah, Pemerintah Daerah, Provinsi, dan Pemerintahan Daerah Kabupaten/Kota (Government Regulation No. 38 of 2007 on Division of Government Affairs between Government, the Provincial Government and the Regional Government of District/City) "Government affairs shall consist of government affairs which are entirely under the authority of the central government and government affairs which are shared between the levels and/or the structure of government" (Art. 2, Sec. 3). "Government affairs as referred to in Section 3 shall consist of 31 areas of government affairs including: ... forestry ..." (Art. 2, Para 4).
Peraturan Pemerintah 19/Menhut II/2004 tentang Pengelolaan Kolaboratif di Kawasan Lindung dan Pelestarian Alam (Regulation of Ministry of Forestry No. 19 of 2004 about Collaborative Management in Protected Areas and Nature Conservation Areas) "Collaboration in the framework of the management of Nature Conservation Areas and Nature Reserve Areas is a process of cooperation undertaken by the parties agreed on the basis of the principles of mutual respect, mutual trust, and mutual benefit" (Art. 4, Para 1). "The parties referred to: a. Central Government, b. Local Government, c. Local Community Group, d. Individuals both from within and abroad, e. Local, national, and international NGOs working in the field of Natural Resources Conservation, f. State-owned, regional or private enterprises, and g. Universities/scientific institutions/educational institutions" (Art. 4, Para 3).
Inpres No. 4 Tahun 2005 tentang Pemberantasan Penebangan Kayu Secara Ilegal di Kawasan Hutan dan Peredarannya di Seluruh Wilayah Republik Indonesia (Presidential Instruction No. 4 of 2005 about Eradication of Illegal Logging in Forest Territory and throughout the territory of the Republic of Indonesia) "Minister of Law and Human Rights, Minister of Foreign Affairs, Minister of Defence, Minister of Industry, Minister of Trade, Minister of Manpower and Transmigration, State Minister of Environment and Head of State Intelligence Agency to provide support in order to eradicate illegal logging in the Forest Area and its distribution [of illegal logs] …" (Sec. 3).
Undang-undang No. 18, Tahun 2013, tentang Pencegahan dan Pemberantasan Perusakan hutan (Law No. 18 of 2013 about Prevention and Eradication of Forest Destruction) "The Government and Regional Government are obliged to eradicate deforestation" (Art. 8, Sec. 1). "Eradication of forest destruction shall be done by legally acting against the perpetrators of forest destruction, either directly, indirectly, or otherwise" (Art. 8, Sec. 2). "The act of forest destruction as referred to in this Law includes illegal logging activities and/or illegal use of forest areas" (Art. 11, Sec. 1).

Activities undertaken in State Forests without government permits are considered in violation of the law. However, Forestry Law No. 41 of 1999 prohibits any form of utilisation in a Nature Reserve Area (*Kawasan Suaka Alam*, KSA) and in the Core (*Zona Inti*) and Wilderness Zones (*Zona Rimba*) of a National Park (*Taman Nasional*), as the main purpose of these tenures is to protect the original condition of the forest. The same law provides for certain forestry officials to be granted police authority to conduct patrols within a National Park. As explained in Chapters 3 and 5, the main

threat to the BBSNP is encroachment by coffee farmers, which has been a persistent problem even though it is clearly an illegal activity (Figure 7.1 and Figure 7.2). As stated in Law No. 18 of 2013, “the act of forest destruction as referred to in this Law includes illegal logging activities and/or illegal use of forest areas” (Art. 11, Sec. 1).

Figure 7.1. Signboard on the main road that crosses the BBSNP in Tanggamus District, listing the interdicted activities in the Park and indicating the maximum penalty of 10 years in prison and a fine of IDR 5 billion (Photo: Yulia Fitriana, 2010)

Figure 7.2. New coffee farms illegally planted inside the BBSNP by farmers from Rata Agung Village in 2009 (Photos: Yulia Fitriana, 2009)

Officially, then, the management of the BBSNP is under central government authority, namely, the Ministry of Forestry (since 2014 the Ministry of Environment and Forestry) through the Directorate General for Forest Protection and Nature Conservation (*Perlindungan Hutan dan Konservasi Alam, PHKA*, since 2014 the Directorate General for Conservation of Natural Resources and Ecosystems (*Konservasi Sumberdaya Alam dan Ekosistem, KSDAE*)). On site, the Park is managed by the Head Office of BBSNP (*Balai Besar Taman Nasional Bukit Barisan Selatan*, BBTNBBS), located in Kota Agung, capital of Tanggamus District. There are two management divisions (*bidang pengelolaan*) for the Park: Zone I in the south (Semangka), termed the administrative domain as it is where the head office is located, and Zone II in the north (Liwa), which is purely a technical conservation domain. Zone I is divided into two working units (SPTN) in Sukaraja and Bengkunat and Zone II is also divided into two

working units in Krui and Bintuhan. Each Working Unit has several Resort Units (the term used for the lowest level of management); in total there are 17 Resort Units in the Park (Figure 7.3).

According to the Ministry of Forestry's Regulation No. 19 of 2004, the management and protection of forest areas can involve collaboration between a range of actors from central and local governments, local community groups, NGOs, private enterprises, and scientific and educational institutions (Table 7.1). Wider engagement in forest management was reaffirmed in 2005 with Presidential Instruction No. 4 of that year, appealing for other ministries and the military to assist in eradicating illegal logging. In this instruction, law enforcement was endorsed across the relevant government ministries and agencies, including the Ministry of Forestry. Then Law No. 18 of 2013 obliged central and regional governments to work together in preventing forest destruction.

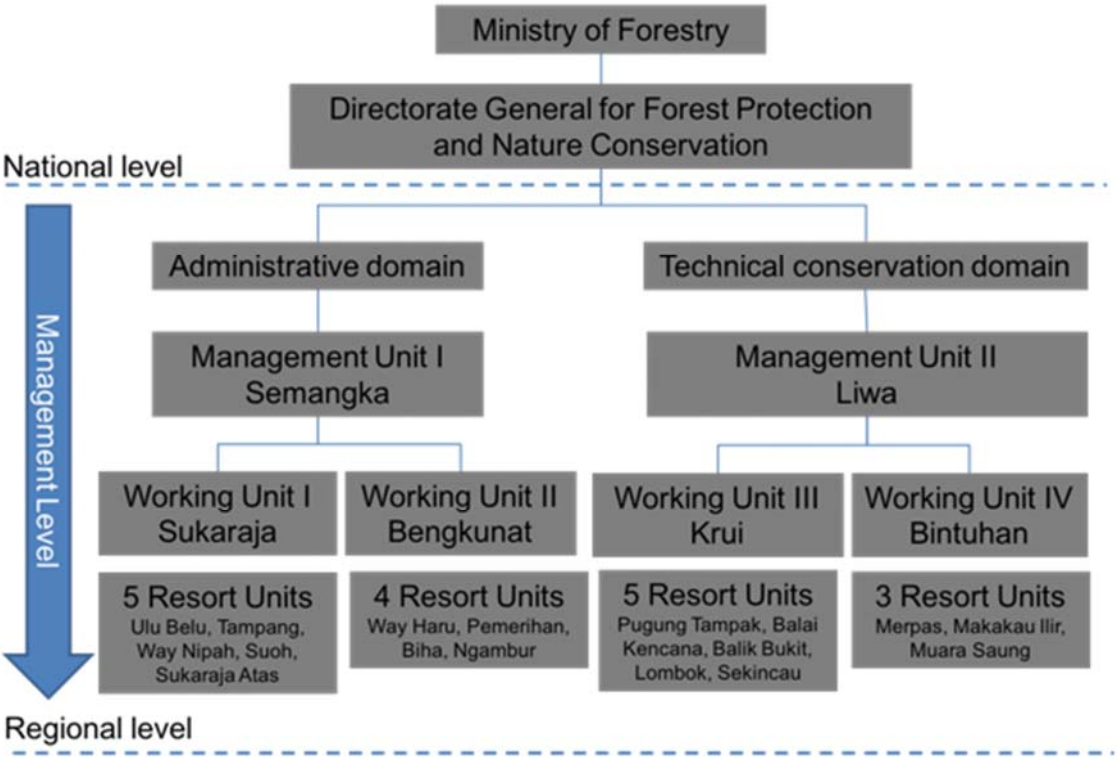

Figure 7.3. The structure of the management BBSNP from central to regional level through the Bureau of the BBSNP in Kota Agung. Source: Adapted from Statistics of BBSNP in 2010 (Bureau of BBSNP, 2010b)

Collaboration between organisations has been implemented by BBSNP management since the 1990s when cooperation with WWF, WCS, and RPU began. As mentioned in Chapter 3, the Park is surrounded by 224 villages in five districts in three provinces (Bureau of BBSNP, 2014). This collaborative management has involved both community development programs and law enforcement through patrols of the border areas.

Based on interviews with a Park officer in 2014, “community empowerment” activities had been conducted since 1994-5 to help villages in the buffer zone by donating seedlings of timber and fruit trees, installing clean water facilities (pipes and pumps), and providing goats. These projects were financed by the central government budget through the Ministry of Forestry and the Bureau of BBSNP. Up to 2012, there were 32 villages in West Coast and West Lampung Districts, 21 villages in Tanggamus District, 4 villages in Kaur District, and 2 villages in South Oku District that were involved in this development program (Bureau of BBSNP 2014). The priorities of the target villages were determined according to each village’s written proposal to the Park management. Other development projects were implemented by non-government partners, mainly WWF, WCS, and RPU, which had an interest in research, habitat protection, and wildlife protection. This partnership in collaborative management is explained in Section 7.2.

The second activity related to buffer zone management was law enforcement by conducting patrols to detect illegal activities. These also involved non-government partners. Priority areas were identified for these patrols, based on the level of illegal activity and the distribution of protected fauna, especially the Sumatran rhinoceros, tiger, and elephant. This aspect is discussed in Section 7.3.

7.2 Partnerships in Law Enforcement in BBSNP

The identification of partnerships for enforcing exclusion from the BBSNP was based on interviews with Park management, with staff of WWF, WCS, and RPU, and with planning and forestry officers in West Lampung District. In addition, secondary data were obtained from reports in 2007 and 2012 evaluating collaborative projects in the BBSNP and statistical data from the Bureau of BBSNP. This analysis revealed that, in implementing enforcement in the BBSNP, most budgetary and technical support came from international NGOs with long-term projects in the Park. These included direct

enforcement activities as well as research and community development directed towards the protection of endangered wildlife and habitats. BBSNP management has also involved the local government and the armed forces (military and police) in joint enforcement operations.

7.2.1 Partnerships with international NGOs in support of enforcement

The three main long-term partners in BBSNP management related to enforcement, involving routine patrols and joint operations, have been the Worldwide Fund for Nature (WWF), the Wildlife Conservation Society (WCS), and the Rhino Protection Unit (RPU). Park management has engaged in enforcement activities with these partners since 1997-1998. These NGOs have also provided most of the budget for enforcement activities through their various projects. The identified partners have somewhat different emphases on the protection of endangered species, the development of local communities, and law enforcement (Table 7.2). The major partner has been WWF, focusing on habitat and wildlife protection through community development and law enforcement. WCS has focused on research about protected fauna and wildlife habitat protection. RPU has focused on the protection of the Sumatran rhinoceros by implementing enforcement and surveying and monitoring the rhinoceros population (Bureau of BBSNP, 2007). All three partners are actively involved in routine patrols in and around the Park. Each partner's activities are now described in turn.

(a) WWF. The World Wildlife Fund (now the World Wide Fund for Nature) began operation in Indonesia in 1962 as the Indonesia Program of the global organisation. It was established as an Indonesian-registered foundation, WWF-Indonesia, in 1998. WWF started its activities with the BBSNP in 2001 as part of the WWF AREAS (Asian Rhino and Elephant Action Strategy) Project. It focuses on the protection of the Sumatran rhinoceros, Sumatran tiger, and Sumatran elephant. Initially, from 2001 to 2003, WWF staff obtained data to help map the major threats to the Park's conservation goals and contributed to the division of management areas in the Park.[22]

[22] Interview with Iwan Setiawan, WWF Office, Bandar Lampung, 2009.

Table 7.2. Collaboration in enforcement activities in BBSNP until 2014

Partner and year started	Project overview	Activities	Activities related to enforcement
World Wide Fund for Nature (WWF-BBS) - 1998	Protection of Sumatran rhinoceros, Sumatran tiger, and Sumatran elephant.	Community empowerment, biological survey and forest inventory, GIS, enforcement, public awareness re wildlife and Park protection.	Create awareness and encourage BBSNP management, Forestry Service, and other agencies to enforce law against activities that damage Park and surrounding forest. Routine patrols with Park rangers - 3 teams of 4 members each.
Wildlife Conservation Society (WCS-IP) - 1997	Research on endangered animal populations and distribution, and finding solutions to improve their conservation status.	Way Canguk research station for long-term research and training. Research on elephant population via camera traps. Research on Sumatran tiger population. Animal Conflict Mitigation Unit. Wildlife Crime Unit.	Not stated at time of data collection in 2009 but involved in patrolling. Since 2009, Wildlife Crime Unit investigates illegal activities related to endangered species, poaching syndicates, and enforcement of exclusion from Park.
Rhino Protection Unit, Program Konservasi Badak Indonesia (RPU-PKBI) - 1997	Protection of Sumatran rhinoceros and its habitat and of other wildlife to maintain ecosystem and genetic diversity.	Prevention efforts, law enforcement, survey and monitoring of rhinoceros population and other wildlife.	Routine patrolling of forest area for illegal activities. Destroying traps and rescuing trapped rhinoceroses. Intelligence operations with network of local agents reporting on illegal activities. Work with BBSNP management and other agencies for enforcement.

Source: Collaboration Report 2007 (Bureau of BBSNP, 2007) and Collaboration Report 2012 (Bureau of BBSNP, 2012).

Activities of WWF have also focused on community development, promoting the diversification and intensification of agriculture, supporting the program for sustainable coffee production (including certification) in collaboration with the local government, strengthening the institutional capacity of local communities, and increasing the public's role in securing the BBSNP. Up to 2007, the program was focused on eight of 32 villages in Tanggamus District that had been surveyed by WWF since 2001. In 2008-9, WWF initiated coffee certification in these eight villages with a local partner, Yayasan Dana Mitra Lestari (the DML Foundation).[23]

The organisation also used Geographic Information Systems (GIS) and remote sensing to provide a baseline for spatial planning of the BBSNP and surrounding areas. In terms of enforcement, WWF initiated awareness and encouraged BBSNP Management, the Forestry Service, and other relevant agencies to enforce the law against illegal activities that damaged the Park and surrounding forest area (Bureau of BBSNP, 2007).

Based on an interview with the head of the WWF project in 2014, the activities can now be divided into six main domains. (1) Support of law enforcement for forest protection. There are three patrol teams, each consisting of three WWF staff and one forest ranger from the Bureau of BBSNP based in Kota Agung. Each team patrols for ten days at a time for 20 days per month. (2) Monitoring of rhinoceros, tiger, and elephant populations and distribution using observation and inventory, DNA research, and camera trapping. (3) Mitigation of human-wildlife conflict. (4) Forest restoration, supporting the reafforestation of degraded or converted Park areas. (5) Study of environmental services, specifically, micro-hydro-energy projects as an alternative source of renewable energy. (6) Livelihood-related activities including training in coffee culture, biogas production, and environmental awareness. The locations of WWF activities up to 2014 are shown in Figure 7.4.

[23] At the time of the 2010 survey, certification had been rejected by Rainforest Alliance. Certification was achieved in 2012 but it was not maintained due to marketing difficulties. The company did not want to buy the coffee and the farmers sold their certified coffee elsewhere. The certification was not subsequently renewed. However, WWF still felt that certification provided a potential solution and had plans to revive its certification project. Interview with Job Charles, WWF Office, Bandar Lampung, 2014.

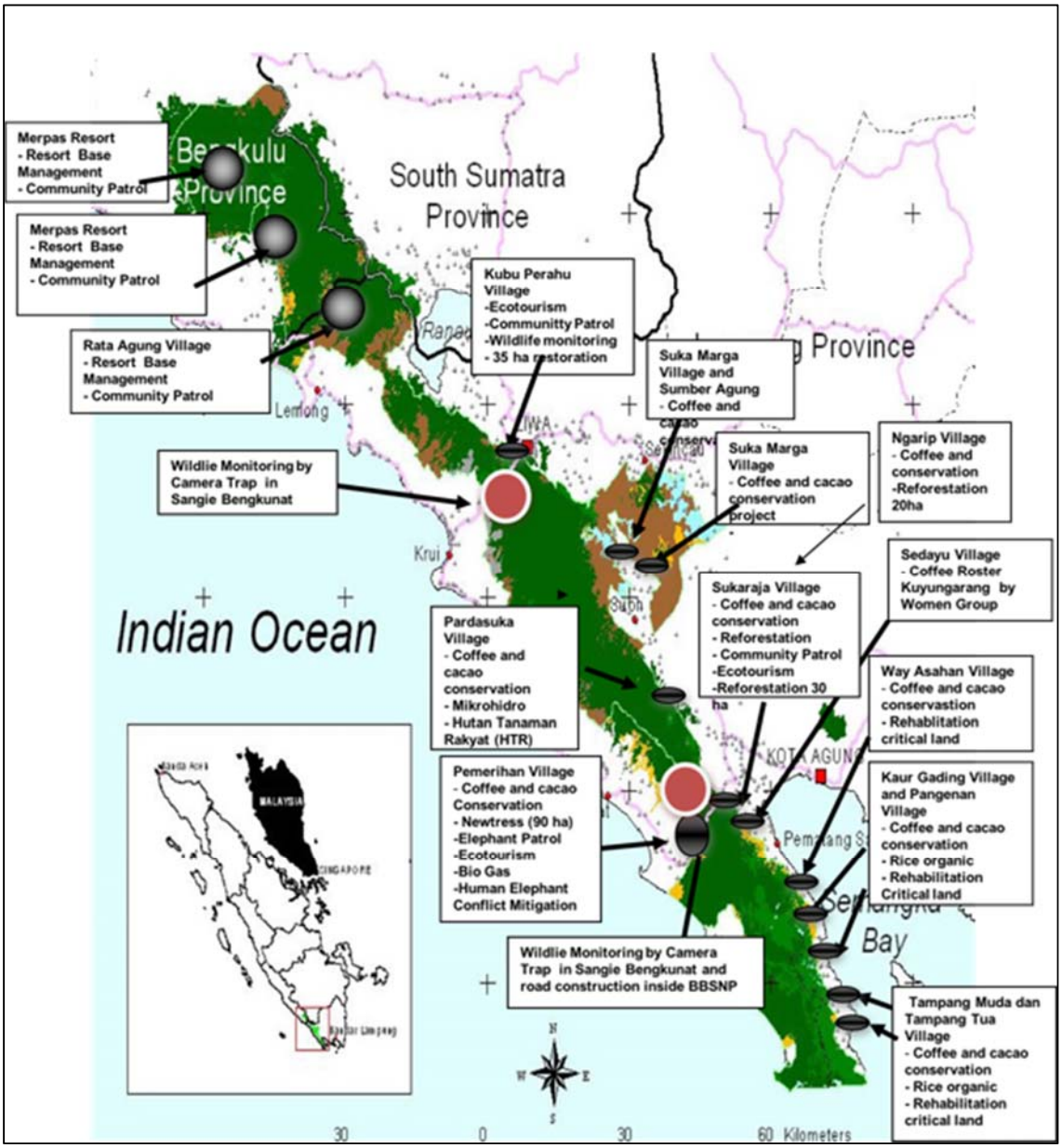

Figure 7.4. Sites of WWF projects in BBSNP up to 2014
(Source: Job Charles, Head of WWF-Indonesia in Lampung, 2014)

(b) WCS. The Indonesia Program of WCS focuses on research and action regarding the density and distribution of endangered animal species. In the BBSNP, the WCS-IP established a research station in Way Canguk in 1997 to facilitate research and training. An on-site branch office is located in the town of Kota Agung. WCS began research on the Sumatran tiger in 1998 and the Sumatran elephant in 2000, using camera traps in ten locations and the identification of wild animals in camera-trap

images (Bureau of BBSNP, 2007). WCS also provides technical support for routine patrols and has been involved in joint operations since 2009. In an April 2018 update titled “Collective Statement of Intent Addressing Coffee-driven Deforestation in the Bukit Barisan Selatan Landscape” (WCS Indonesia, 2018), WCS declared its support for the concept of sustainable coffee production in Lampung to help solve the encroachment problem, but with no specific mention of coffee certification.

(c) RPU. The Indonesian Rhinoceros Conservation Program (IRCP) is the result of an agreement in 1998 between the Directorate of Forest Protection and Nature Conservation, the International Rhino Foundation (IRF), the Asian Rhino Specialist Group (ARSG), and Mitra Rhino Foundation (Yayasan Mitra Rhino, YMR) to fight against poaching and protect rhinoceros habitat. Its activities are carried out locally by the Rhino Protection Unit (RPU), established under the technical direction of the Bureau of BBSNP.

An interview with the RPU in 2009 indicated that the activities of the unit included investigation and monitoring of rhinoceros populations and security patrols to uncover illegal activity in the Park. The approach was to prioritize the areas at greatest risk of illegal activity (poaching, illegal logging, and illegal occupation) in Pemerihan and Karang Berak (near Kota Agung, the capital of Tanggamus District, where there was road construction inside the Park), Bengkunat (near Krui, the capital of West Coast Lampung District), and Kubu Perahu (near Liwa, the capital of West Lampung District). The patrolling was done in collaboration with the park rangers and involved seven patrol teams. The RPU was also involved in several joint operations with the district government, the police, and the army (at national and regional levels) against illegal activities in the Park.

7.2.2 Enforcement by local government, local police, and the military

The first round of fieldwork indicated that the government of West Lampung District had developed policies and development programs related to the protection of the forest.[24] These policies and programs were aligned with the district’s mission of eradicating poverty based on sustainable development. The district government

[24] Interview with Bupati of West Lampung in 2009.

considered that, given the number of people depending on the Park for their livelihoods, evicted squatters had to be given an alternative source of income to prevent them encroaching on the Park again.

To address this issue, the District Government had initiated various activities for forest resource management.[25] These included: (1) increasing the production of non-timber forest products through empowerment of communities near the forest and supporting a Community Forest (*Hutan Kemasyarakatan*, HKm) Program; (2) establishing the Liwa Botanical Garden Development Plan adjacent to BBSNP; (3) improving awareness of the need to protect forest areas; (4) increasing public awareness and community participation in forest protection activities; (5) improving participatory border maintenance; (6) improving cooperation with related actors and institutions; (7) improving the quality and number of forest security personnel; (8) coordinating with law enforcement agencies; and (9) enforcement of the forest protection laws.

In 2005 the District enacted a regulation governing joint operations to eliminate the illegal exploitation of timber.[26] Since 2012, cooperation between the Bureau of BBSNP and West Lampung District has been about the strengthening of Park management in the Way Haru and Way Heni areas in Bengkunat-Belimbing Sub-district in the southern section of the Park (now part of West Coast District) and Tanggamus District. This cooperation was legalised in two regulations and covered the development of facilities and infrastructure to support forest security activities; rehabilitation of the Park in the Way Heni and Way Haru areas; addressing the encroachment problem in these areas; community development in the vicinity of the Park; and development of ecotourism and environmental services in the Park.[27]

The District Government's specific activity relating to law enforcement in the Park since the 1990s has consisted of joint operations with the armed forces to detect and remove encroachers and destroy coffee plantations and settlements within the Park boundaries (Figure 7.5). These operations involve first the briefing or "socialisation" of the actors involved, then the socialisation of local villagers to give them notice about the operation, and finally the implementation of the operation.[28] The local police are

[25] Interview with Deputy Head of West Lampung District Planning Office, Liwa, 2009.
[26] District Regulation No. B/135/KPTS/IV.05.
[27] District Regulations No. PKS.882/BBTNBBS-1/2012 and No. 522/09/II.14/2012.
[28] Interview with Arif, coordinator of RPU-BBSNP project, in Kota Agung, 2014.

also involved as a source of intelligence and to legally charge the suspects apprehended by the patrols.

Figure 7.5. Military and police involvement in a joint operation to destroy illegal plantations in Rata Agung Village in December 2011

7.2.3 Implementation of patrols in priority areas

Given the number of actors and the scope of the task, enforcement efforts were coordinated by the BBSNP Bureau and targeted to priority areas. Every month there was a coordination meeting with the Park Ranger Division of the Bureau to discuss the areas to be patrolled and patrol-related activities.[29] The WWF and RPU teams coordinated with each other to determine the main target area for their patrol. Each

[29] Interview with RPU personnel, 2014.

agency had its own priority area. For WWF, the priority area was 9 of the total of 17 resort management units from the north to the south of the Park, with decisions about the patrol area based on the distribution of wildlife as monitored (Figure 7.6). The RPU focused on the central area of the Park as the main location of the rhinoceros and other endangered species, and the site of most illegal activity (Figure 7.7).

As mentioned above, WWF had 12 personnel for patrol activities in the Park, allocated to four teams comprising three WWF members and one Forest Police Officer (*Polisi Hutan*) from the BBSNP Bureau (Figure 7.8). Each patrol was of 10 days' duration, with two patrols per month.[30] The RPU had seven patrol teams also consisting of four members – three RPU personnel and one forest police (Figure 7.9). As with the WWF patrols, the duration of each patrol was 10 days, undertaken twice per month.[31]

[30] Interview with Job Charles, Head of WWF-Indonesia in Lampung, 2014.
[31] Interview with Arif, RPU coordinator of BBSNP project, 2014.

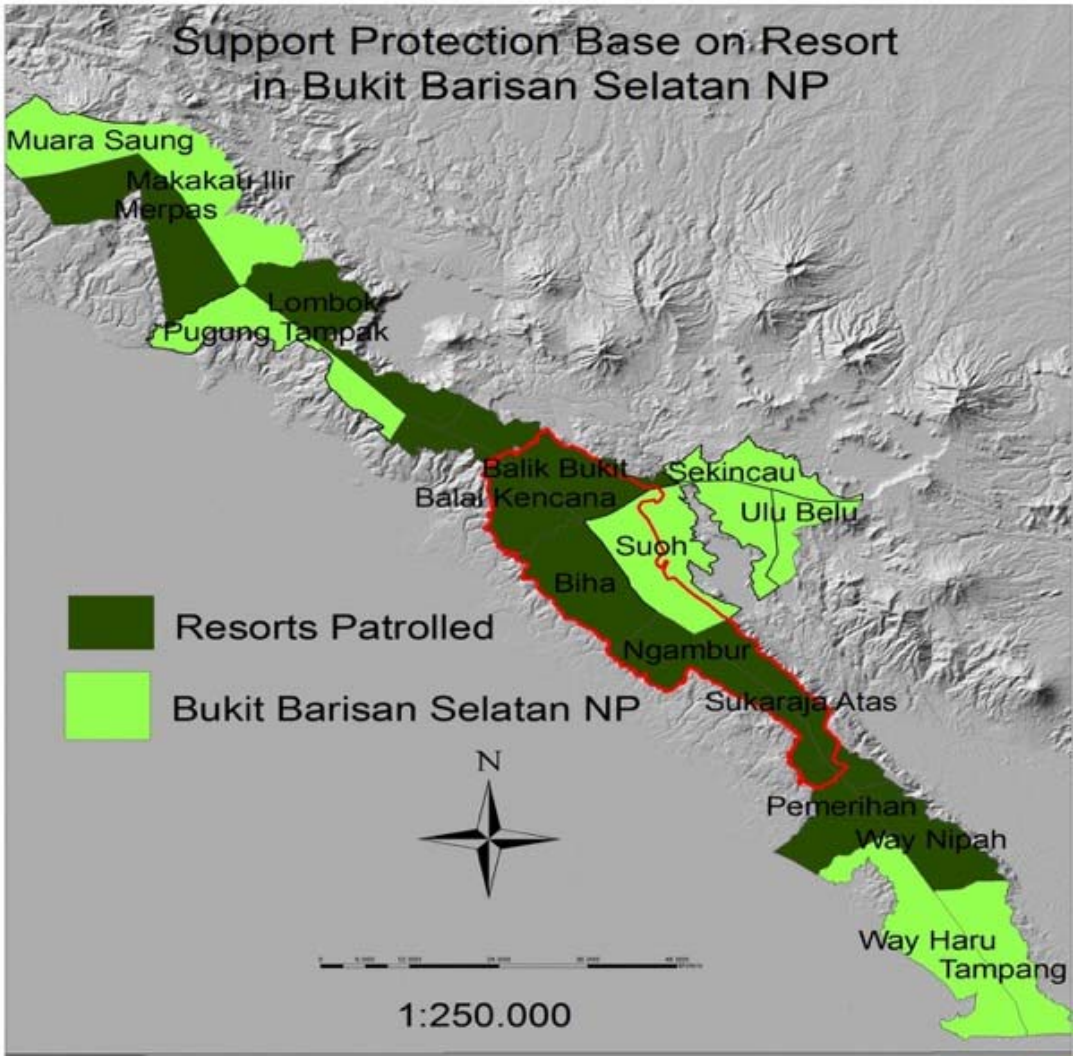

Figure 7.6. Resort Areas in BBSNP patrolled by WWF (Source: WWF 2014)

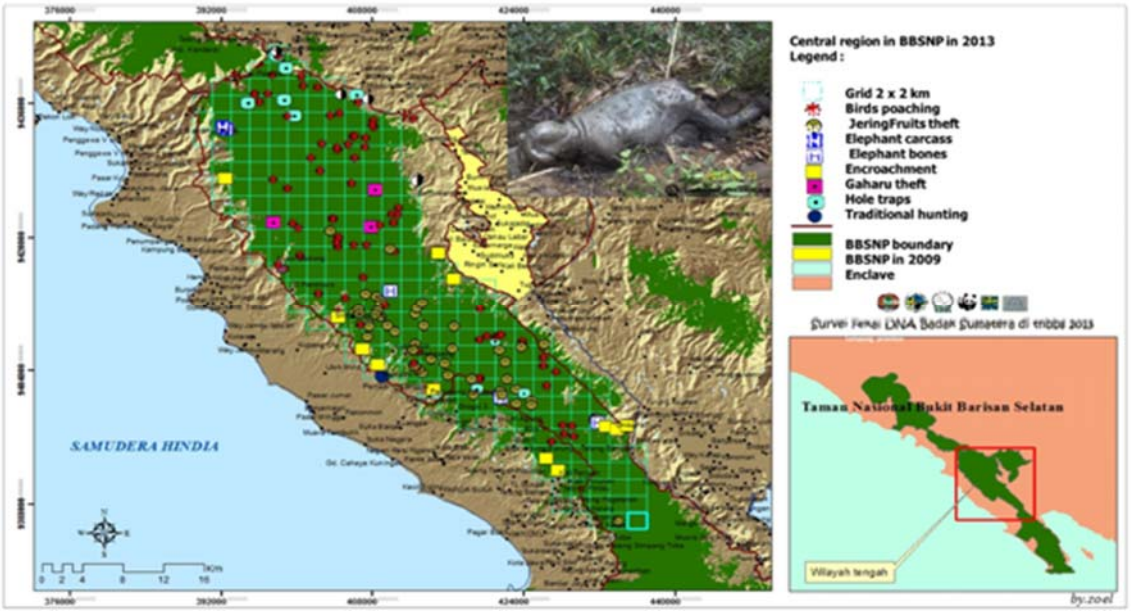

Figure 7.7. Distribution of illegal activities in the central region of BBSNP in 2013, the main patrol area of the RPU (Source: RPU 2014)

The RPU patrols were undertaken routinely throughout the year while the WWF patrols were implemented less regularly. As well as routine patrols, there were specific types of patrol, including operations to catch a suspect in a certain location, motorcycle patrols enabling quick response over a larger area, boat patrols across Semangka Bay (enabling rapid access to the southern part of the Park from Kota Agung), and combined patrols under the command of the Bureau of BBSNP.[32]

Since 2013 there have also been elephant patrols. This type of patrol was initiated by the Park management with WWF in collaboration with local communities, the West Lampung District Government, and the Way Kambas National Park in East Lampung District in order to train patrol elephants. These patrols were focused on areas of elephant habitat and where there was frequent conflict between elephants and humans. The long-term objective was to test the feasibility of an ecotourism activity.

As there were priority areas for conducting patrols, the intensity of enforcement of Park legislation has been different in each village. To assess the impact of the enforcement activities described above, 11 villages were selected based on the intensity of patrols

[32] Interview with Arif, coordinator of BBSNP program of RPU, 2014.

and sanctions, accessibility, whether they directly bordered the Park, and ethnicity. The analysis of these villages is presented in the following section.

Figure 7.8. A patrol team consisting of one Forest Police officer and three WFF officers (Photo courtesy of WWF 2014)

Figure 7.9. Rhino Protection Unit officers in the patrol and law enforcement unit of Bukit Barisan Selatan National Park (Photo courtesy of RPU 2014)

7.3 Analysis of Enforcement in Selected Villages

7.3.1 Characteristics of the study villages

Eleven villages were selected in 2009 to investigate the degree and effectiveness of enforcement of conservation laws in the vicinity of the Park (Figure 7.10). The villages were located in eight sub-districts in West Lampung District and the recently-created West Coast District, though Village 2 was just across the border in Bengkulu Province. The 11 villages were Trimulyo (the original case-study village described in Chapter 5) and 10 other villages. Interviews were conducted with each village head (*kepala desa*) and with all hamlet heads (*kepala dusun*) in the village (Table 7.3). In the case of Trimulyo, the heads of 18 sub-hamlets in 7 hamlets were interviewed. The interviews were conducted in early 2009 in Trimulyo and in October 2009 in the other 10 villages.

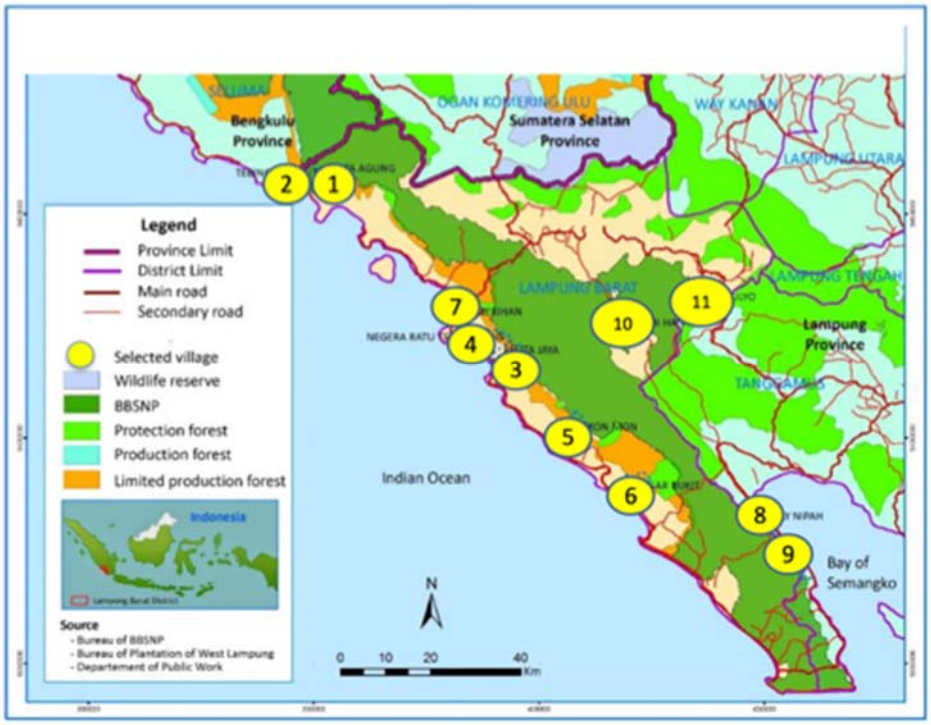

Figure 7.10. Eleven study villages around Bukit Barisan Selatan National Park (see Table 7.3 for key)

Table 7.3. Eleven villages selected for enforcement study in 2009

Village	Sub-District, District	No. ham-lets	No. house-holds
1. Rata Agung	Pesisir Utara, W. Coast	6	766
2. Tebing Rambutan*	Nasal, Kaur	3	172
3. Pelita Jaya	Biha, W. Coast	3	350
4. Negeri Ratu Penumbang	Pesisir Selatan, W. Coast	5	404
5. Pekon Mon	Ngambur, W. Coast	8	802
6. Pagar Bukit	Bengkunat-Belimbing, W. Coast	5	1,155
7. Pemerihan	Bengkunat-Belimbing, W. Coast	4	577
8. Way Nipah	Pematang Sawa, Tanggamus	2	251
9. Pesanguan	Pematang Sawa, Tanggamus	3	248
10. Bumi Hantatai	Suoh, W. Lampung	6	538
11. Trimulyo	Gedung Surian, W. Lampung	18**	667
Total		63	5,930

Note: * Tebing Rambutan village is located in Bengkulu Province. ** Sub-hamlet interviews in Trimulyo Village.

The village-level interviews covered three general topics: (1) Basic information about the village, including accessibility, location relative to the border of the Park and Protection Forest, ethnic composition, and a brief history of the village. (2) Information about the livelihoods of villagers, including types of farming, non-agricultural activities, main sources of income, education levels, land ownership, and identified problems at the village level. (3) The role of village-level management in forest protection, the state of the forest, the location of the border between the Park and the village territory, access to the Park, and the incidence of patrols and sanctions involving the villagers. The October 2009 survey began by obtaining a Park Entry Permit (*Simaksi,* or *Surat Ijin Masuk Kawasan*) from the Bureau of BBSNP and then successively visiting Villages 1 to 10 in Figure 7.10 and Table 7.3.

The first village visited was Rata Agung (Village No. 1), based on prior information that this village had a significant number of people encroaching on the Park; this was followed by Tebing Rambutan (Village No. 2), just across the border in Bengkulu Province (Figure 7.10). It was indeed the case that residents of Rata Agung had encroached significantly on the Park, while in Tebing Rambutan, the encroachers were mainly smallholders who originated from outside the village itself such as from Lampung and Palembang cities, or from Java, rather than the local population. In

general, people knew that their farming lands were in the BBSNP but were not clear about the boundaries between their village and the Park.

Heading south-east through West Coast District, the third and fourth villages were mainly Lampungese, with few Javanese or Sundanese residents. These villages bordered the Park and an area of Limited Production Forest (*Hutan Produksi Terbatas, HPT*). The village leaders were clear about the boundaries between the village and the Park and the HPT zone. Village No. 5 was further south-east in the coastal district. Originally a Lampungese settlement, in 1991 the village became a transmigration site for settlers from South and East Lampung Districts, adding Sundanese and Semendo to the population, but few Javanese. While the villagers had traditionally practised *damar* agroforestry, this was no longer part of their livelihoods. The agricultural practices of the newcomers dominated, as well as the nearby oil palm plantations. About 20 households were farming within the Park. A logging company, Andatu, had also opened up nearby Production Forest in the 1980s.

In Villages No. 6 and 7, most residents and most of the cultivated area were inside the Park. The majority of villagers were Javanese and Lampungese, followed by Sundanese and Ogan (another South Sumatran group). Villages No. 8, 9, and 10 were located on the eastern side of the Park in West Lampung District. The residents were mostly Javanese and Lampungese, along with some Sundanese. Village No. 10, which was dominated by Javanese, was the most remote village, located within an enclave of the Park where encroachment had been most extensive.

There were several characteristics that differentiated the 11 villages (Table 7.4 and 43). First, they differed in accessibility to towns and markets. Those with direct access to a major road had high accessibility, while those with only tertiary roads were relatively inaccessible. Second, three villages bordered the Park, three bordered a Protection Forest, and five had direct border access to both. Third, the year of village establishment varied from around 1800 for the Lampungese village of Way Nipah to the 1960s and 1970s for Pekon Mon and the largely Javanese villages of Pagar Bukit, Pemerihaan, and Bumihantati. The villages of Rata Agung, Tebing Rambutan, and Trimulyo were founded in the 1980s and 1990s by various ethnic groups, while the youngest village, Pesanguan, was an offshoot of the oldest village, Way Nipah, in 2007.

Table 7.4. Selected characteristics of study villages

Village	Year est.	Dominant ethnic group	Access to main road	Borders PF?	Borders NP?
1. Rata Agung	1986	Lampungese	Direct	Yes	No
2. Tebing Rambutan	1985	Semendo	Direct	Yes	Yes
3. Pelita Jaya	1970	Lampungese	Direct	Yes	Yes
4. Negeri Ratu Penumbang	n.a.	Lampungese	Direct	Yes	Yes
5. Pekon Mon	1963	Lampungese	2º road	No	Yes
6. Pagar Bukit	1970	Javanese	Direct	Yes	Yes
7. Pemerihan	1960	Javanese	Direct	No	Yes
8. Way Nipah	1800s	Lampungese	2º road	Yes	No
9. Pesanguan	2007	Javanese	3º road	Yes	No
10. Bumi Hantatai	1976	Javanese	3º road	No	Yes
11. Trimulyo	1994	Javanese	3º road	Yes	Yes

Source: Village and hamlet survey in 2009.

Table 7.5. Area and population of study villages in 2009

Village	Village area (ha)	No. of house-holds	No. of persons	Persons per km^2	Area per house-hold (ha)
1. Rata Agung	2,854	488	1,787	62.6	5.8
2. Tebing Rambutan	600	397	1,510	251.7	1.5
3. Pelita Jaya	2,052	213	970	47.3	9.6
4. Negeri Ratu Penumbang	4,070	252	1,154	28.4	16.2
5. Pekon Mon	6,576	586	2,648	40.3	11.2
6. Pagar Bukit	10,668	1,300	3,865	36.2	8.2
7. Pemerihan	3,643	449	905	24.8	8.1
8. Way Nipah	2,089	396	1,468	70.3	5.3
9. Pesanguan	987	168	485	49.1	5.9
10. Bumi Hantatai	2,527	988	3,008	119.0	2.6
11. Trimulyo	1,040	560	2,937	282.4	1.9

Source: Statistical reports for each sub-district in 2009-2010, and village data from Kepala Desa of Tebing Rambutan.

The dominant ethnic group was Lampungese in the villages on the western side of the Park, except for Tebing Rambutan, dominated by the Semendo ethnic group from South Sumatra and two predominantly Javanese villages. The three villages on the eastern side were predominantly Javanese, with Lampungese, Sundanese, and

Balinese minorities. The villages varied widely in area, from 600 to 10,000 ha, and in population density, from 25 inhabitants per km^2 in Permerihan to 280 inhabitants per km^2 in Trimulyo. The average area per household also ranged widely, from 1.5 ha in densely-populated Tebing Rambutan to 10 ha in Pelita Jaya.

7.3.2 Village typology based on enforcement intensity

As explained in Chapter 4, the intensity of enforcement in the 11 villages was scored based on the frequency of patrols conducted and the number of sanctions applied for illegal activities, including illegal logging, poaching, illegal settlement, and farming inside the Park. This information was obtained in the village- and hamlet-level interviews and then scored from 1 to 5 from low to high levels of enforcement on each criterion, as shown in Table 4.5, in Chapter 4. Based on these scores, each village was then classified as “low” (<3) or “high” (3-5) on the two dimensions of patrols and sanctions. This gave rise to four types of village – Type 1: low frequency of patrols and sanctions; Type 2: high frequency of patrols but low frequency of sanctions; Type 3: low frequency of patrols but high frequency of sanctions; Type 4: high frequency of patrols and sanctions (Table 7.6). The distribution of the eleven villages between these types is shown in Figure 7.11. An analysis of the villages in each type follows.

Table 7.6. Scoring of frequency of patrols and sanctions in study villages

Village	Patrol Level	Sanction Level	Village type
1. Rata Agung	4	3	4
2. Tebing Rambutan	4	2	2
3. Pelita Jaya	3	2	2
4. Negeri Ratu Penumbang	2	2	1
5. Pekon Mon	2	1	1
6. Pagar Bukit	4	4	4
7. Pemerihan	5	5	4
8. Way Nipah	3	5	4
9. Pesanguan	3	4	4
10. Bumi Hantatai	2	3	3
11. Trimulyo	2	5	3

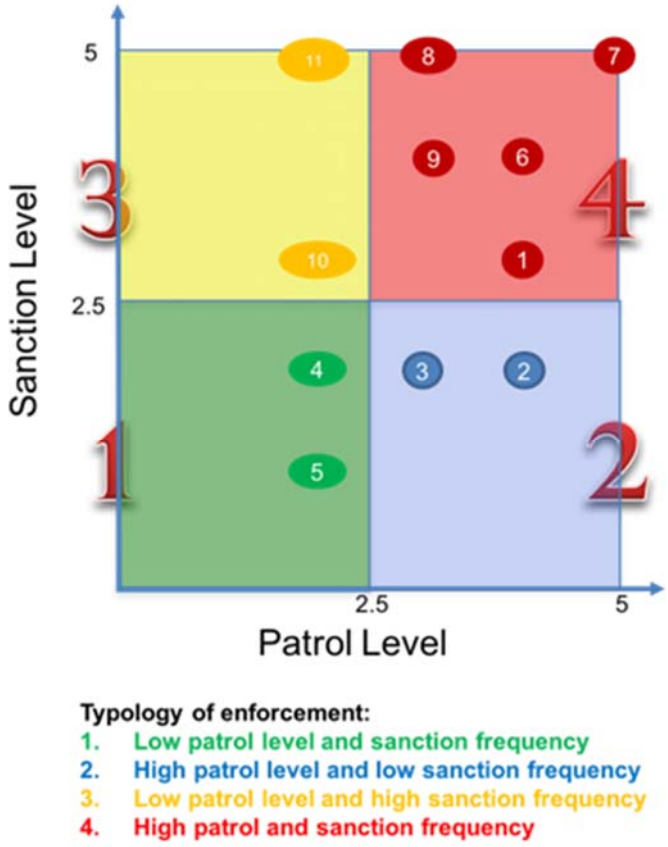

Figure 7.11. Typology of enforcement as experienced by study villages

(1) Type 1 villages. Negeri Ratu Penumbang (Village No. 4) and Pekon Mon (Village No. 5) experienced a low frequency of both patrols and sanctions. These villages were dominated by the Tenumbang sub-group of the Lampungese ethnic group. Negeri Ratu Penumbang was the oldest village in the sub-district and had given rise to a number of daughter-villages over time. Both villages were located near the coast, with the main settlement along the coastal road (Figure 7.12). Paddy fields and *damar* plots were on the coastal strand, while further inland were subsidiary settlements along secondary roads, with paddy fields and plots of *damar* and coffee nearby. Pekon Mon village had more irrigated paddy fields and hence rice cultivation was a more important source of livelihood. In Negeri Ratu Penumbang rubber had recently been planted along with coffee. The two villages bordered the Park and a Limited Production Forest (HPT). The more elevated inland area in Figure 7.12 was either within the Park or in the HPT; this land supported coffee gardens, rubber, or secondary growth.

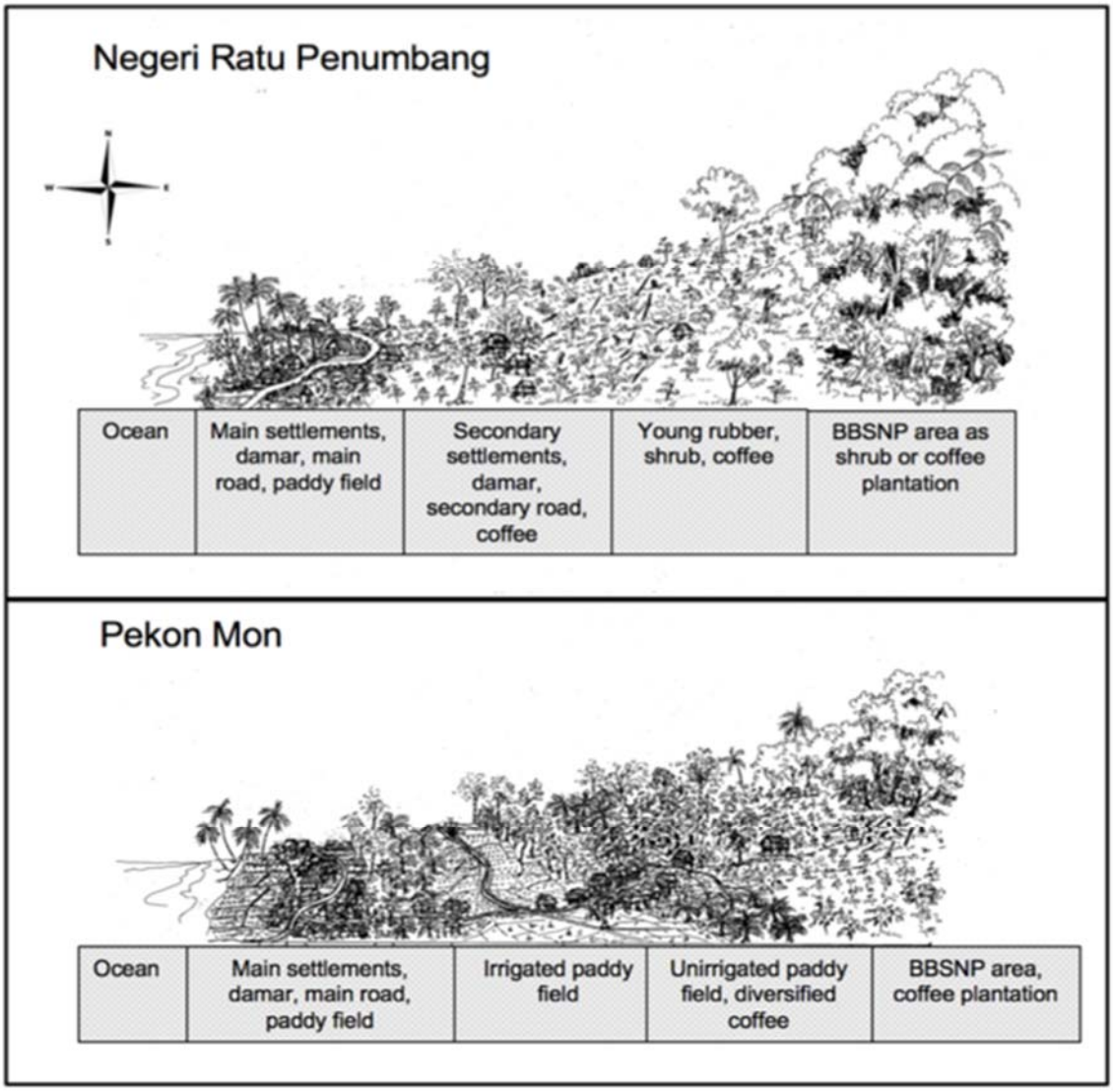

Figure 7.12. Land use profile in Negeri Ratu Penumbang and Pekon Mon (Source: Village observations in 2009, illustrated by Pak Wiyono)

The area of the HPT was used for rubber planting under legal land-use rights granted by the District Government. In Pekon Mon, the access to the HPT gave the villagers extra agricultural land, hence pressure on the Park was less. The head of Pekon Mon declared: “The National Park area still remains forested because it must be maintained according to its main function. The HPT area is also maintained if possible, but it can

also be utilized … People who want to enter the forest should be processed according to the rules, report to the Village Head, and then proceed."[33]

The Park boundary was viewed differently in each village. In Pekon Mon, the boundary was clear and villagers knew its location, while in Negeri Ratu Penumbang there was on-going conflict over the boundary. Here the village head said: "I've lived 40 years here, but have never seen any Park boundary marker. It's also never been 'socialized'. This is not yet coordinated between the BPN [National Land Agency] and Forestry Agency..."[34]

(2) Type 2 villages. Two villages were categorized as having a high frequency of patrols but a low level of sanctions – Tebing Rambutan (Village No. 2), established in 1985, and Pelita Jaya (Village No. 3), established in 1970 – both located along the coast to the west of the Park (Figure 7.13). Semendan was the dominant ethnic group in Tebing Rambutan and Lampungese in Pelita Jaya, with Javanese households also present. Both villages bordered a Limited Production Forest (HPT) and the Park. There were young rubber trees in both villages and oil palm in production, especially in Tebing Rambutan. Rubber and oil palm were planted in the village area and the HPT, while more fertile land for coffee plots was sought inside the Park.

The Village Head of Pelita Jaya stated: "Land transactions [in the Park] are still unknown [to village officials]; transactions are mostly unofficial (*bawah tangan,* literally "underhand"). Moreover, the same interviewee stated that the boundary with the National Park was still unclear: "Even now, there have been conflicts over land. The boundary problem remains unclear in this area…"[35] Customary law in these villages was still strong, hence the forest area was protected by the villagers. The head of Tebing Rambutan stated: "In the village there is a forest area that is protected, that should not be felled by the people. Timber may be utilized but large trees should not be cut."[36]

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[33] Interview the village head of Pekon Mon Village, November 2009.
[34] Interview the village head of Negeri Ratu Penumbang Village, November 2009. The term '*sosialisasi*' is commonly used to refer to government information and discussion sessions at the village level.
[35] Interview with the village head of Pelita Jaya, November 2009.
[36] Interview with the village head of Tebing Rambutan, November 2009.

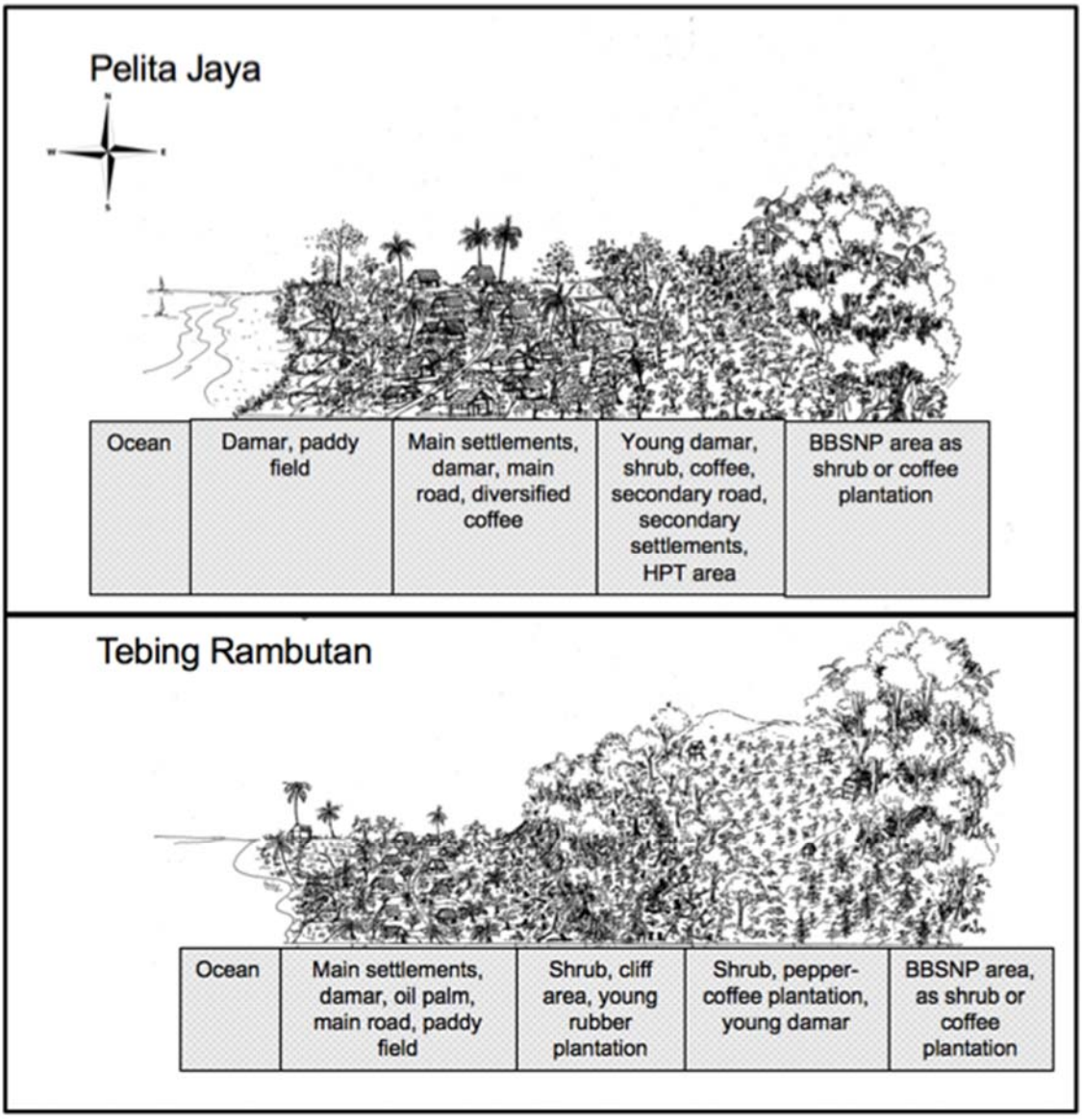

Figure 7.13. Land use profile in Pelita Jaya and Tebing Rambutan (Source: Village observations in 2009, illustrated by Pak Wiyono)

(3) Type 3 villages. Bumi Hantatai (Village No. 10) and Trimulyo (Village No. 11) were categorized as having a low frequency of patrols but a high level of sanctions, both being in the area of the park in West Lampung District where deforestation had been most extensive. Trimulyo was discussed in detail in Chapters 5 and 6. Bumi Hantatai was officially established in 1976 with the local Lampungese population in the majority, but Javanese migrants later became the main ethnic group in the village. Bumi Hantatai's village land was formally mapped as an "enclave" within the Park, not

subject to Park regulations. Coffee had been the main source of income (along with cocoa and pepper) from the beginning. The village was located deep in the deforested area and remote from the main road. Village infrastructure development began in the 1990s and peaked again in the 2000s, especially under the tenure of the current Bupati who promised development as part of his 2007 campaign. The Village Head remarked: "Bupati Mukhlis [the District Head in 2009] initiated many development projects in Suoh Sub-district as result of the support for his election."[37] In both villages, the Park area was used to plant coffee (Figure 7.14). However, patrols were infrequent. There seemed to be unofficial recognition that the area already converted to coffee farms had to be maintained to support settlers' livelihoods, but local government officials appealed to villagers not to open up new forest areas for crops.

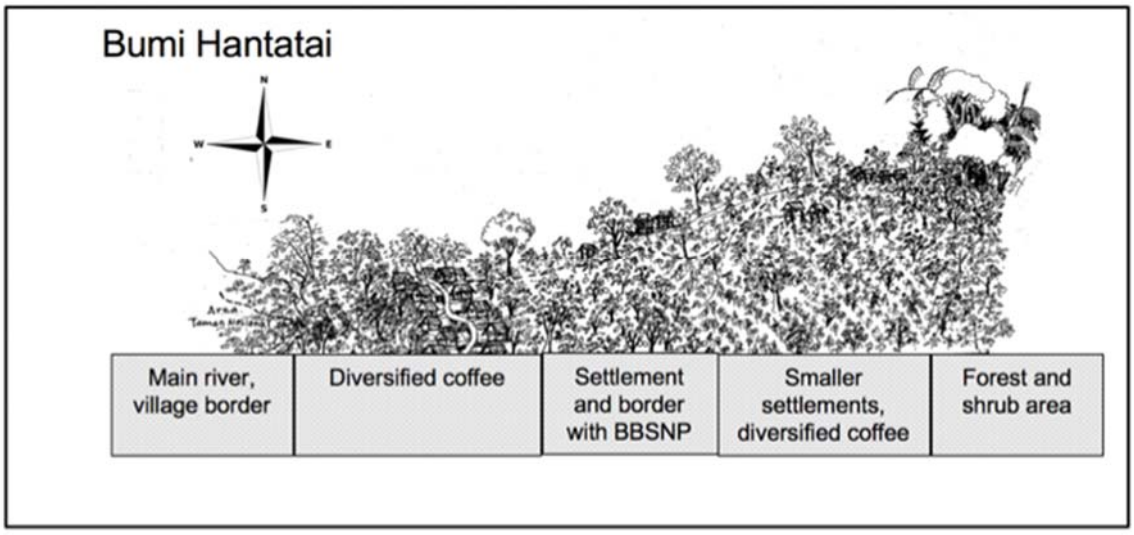

Figure 7.14. Land-use profile in Bumi Hantatai (Source: Village observations in 2009, illustrated by Pak Wiyono)

Though patrols were infrequent, the level of sanctions was categorised as high in both villages. In Bumi Hantatai, there had been severe sanctions, especially related to poaching and illegal logging, while in Trimulyo the level of sanctions was regarded as high because of the experience of forced evictions. As mentioned in Chapter 5, there

[37] Interview with the village head of Bumi Hantatai, December 2009.

had been evictions from the Park and destruction of coffee plantations established by Trimulyo villagers in the 1990s. The evicted families were relocated to Rawa Pitu and Rawa Jitu in North Lampung District under a local transmigration scheme. They were allocated agricultural land and housing in the new location. However, in the Reformasi era, the cleared area in the Park was re-occupied and re-planted by many of the relocated families as well as new coffee planters.

(4) Type 4 villages. There were five villages categorised as having a high frequency of both patrols and sanctions. Way Nipah (Village No. 8) and Pesanguan (Village No. 9) were bounded by Semangka Bay on the east and had the same land-use pattern (Figure 7.15). The founders of Way Nipah and Pesanguan originated in the Sukau area to the north and established the current villages before Dutch colonisation. In 2009, the Lampungese were the dominant ethnic group in Way Nipah and the Sundanese in Pesanguan. Both villages were adjacent to the Park and, while their settlements were located outside the Park boundary, they had more farming land within the Park and Protection Forest than in the village area. The residents knew they were farming in the Park.

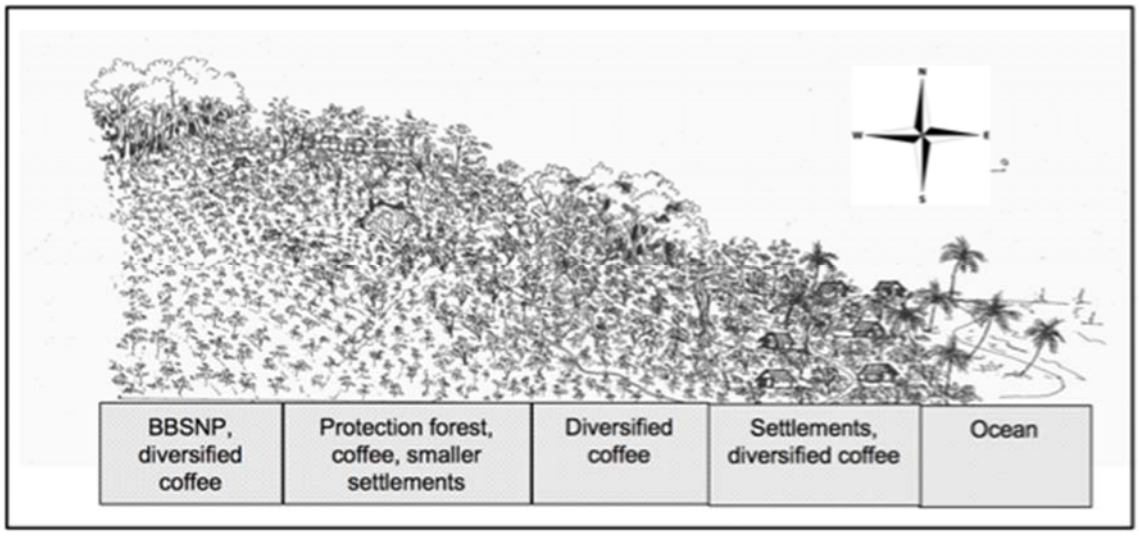

Figure 7.15. Land-use profile in Way Nipah and Pesanguan (Source: Village observations in 2009, illustrated by Pak Wiyono)

The other three villages – Rata Agung (Village No. 1), Pagar Bukit (Village No. 6), and Permerihan (Village No. 7) – were bounded by the sea on the west and had new coffee

plots inside the Park, as well cultivating rubber or oil palm. In Pagar Bukit (Figure 7.16) there were oil palm plots and diversified coffee plots along the coastal road where the main settlement was located, while inland the topography was hillier, with diversified coffee plots, paddy fields, and smaller settlements along secondary roads and paths inside the Protection Forest and the Park. In Pemerihan, the Park and a Production Forest occupied the coastal zone (Figure 7.16). The main road passed further inland, where the main settlement and diversified coffee farms were located.

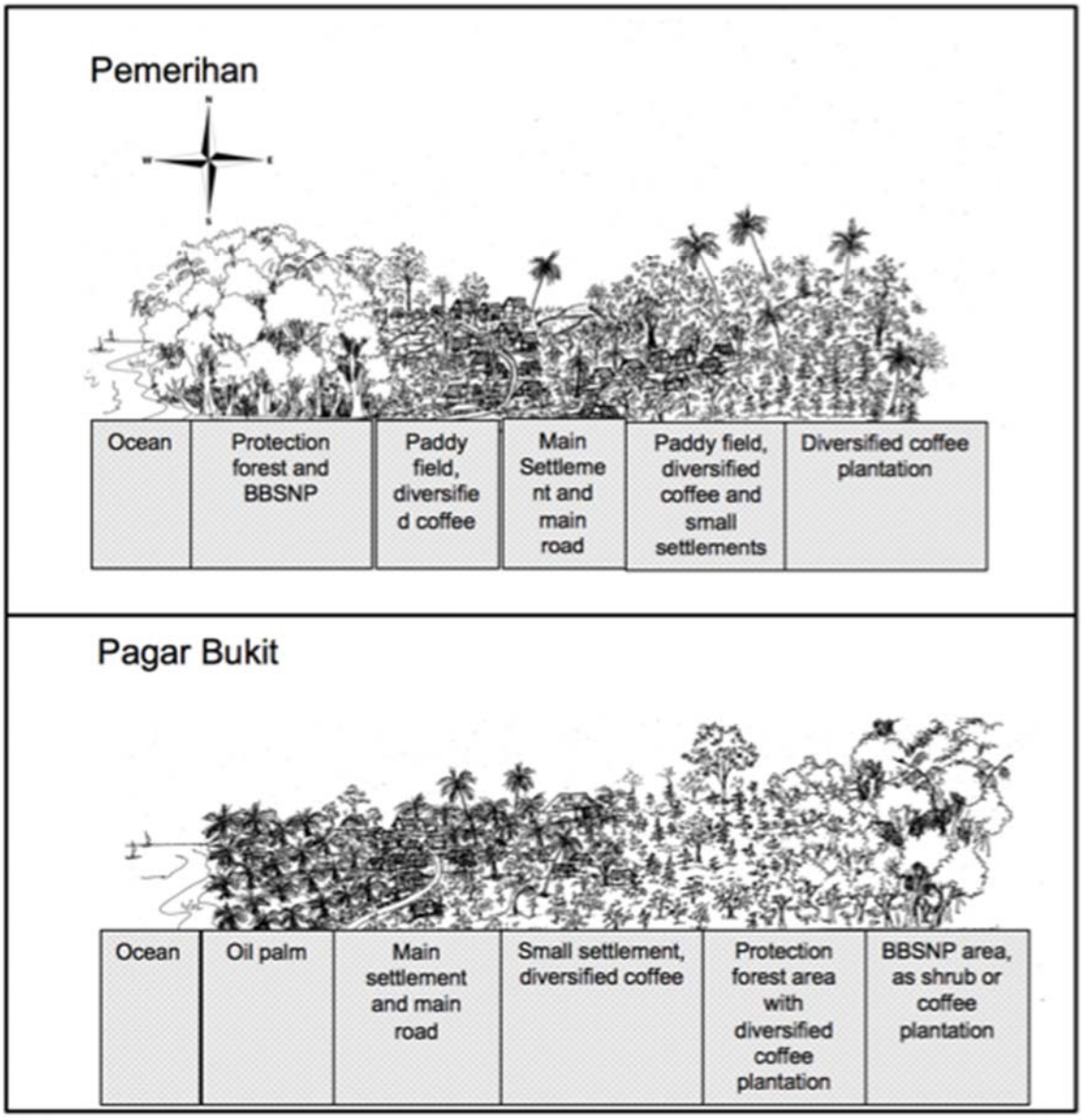

Figure 7.16. Land-use profile in Pemerihan and Pagar Bukit Villages (Source: Village observations in 2009, illustrated by Pak Wiyono)

Pemerihan and Way Nipah villages had been subject to forced evictions. In Pemerihan, the evictions occurred in 1980-5, especially in 1983 when 70 households were evicted from the Park and relocated. These eviction operations also involved elephant patrols to destroy coffee farms inside the Park. These cleared areas remained unoccupied for more than a decade but were re-occupied from around 1997. Hence joint operations were implemented again in Pemerihan in the early 2000s.[38] In Way Nipah, evictions were implemented in 1999 and since then routine patrols passed the village regularly.[39] During observations in both villages, the village heads mentioned that patrols had become more frequent in the 2000s and that sanctions of illegal activities were intensively applied. The Pemerihan Village Head stated that "it is no longer allowed to open up forest [in the National Park]. The officers [Park rangers and police] are very strict, and now the area [of the National Park] is empty".[40]

Rata Agung (Village No. 1) was established in 1986, following the construction of a road in 1982-1984. In the 1970s, the area was mostly dense forest, whereas by 1984 many newcomers had arrived and begun to plant coffee. At first the villagers were all local Lampungese but progressively Javanese came from outside the immediate area, especially since 1996, though Lampungese were still the dominant ethnic group. Initially, villagers owned and farmed the land within the village area, but then they began to penetrate the Park to plant coffee (Figure 7.17). Many new coffee farms had been established by clearing secondary forest in the Park since the early 2000s. The Village Head observed that "in the last three years [i.e., since 2006], there were many people encroaching on the forest, so the number cannot be counted accurately."[41]

7.4 Relating Enforcement to Encroachment in Selected Villages

7.4.1 Enforcement versus encroachment at the village level

Within the 11 study villages, the hamlet or sub-hamlet interviews were used to enumerate households based on the location of their agricultural land. These data were used to estimate the proportion of households in each village falling into the three

[38] Interview with the village head in Pemerihan, November 2009
[39] Interview the village head of Way Nipah, November 2009.
[40] Interview with village head in Pemerihan, November 2009.
[41] Interview with the village head and an elder man of Rata Agung, October 2009.

categories previously identified in Trimulyo, as described in Chapter 5: (1) “villagers”, who lived in the village and owned land only within the village area; (2) “encroachers”, who lived in the village and farmed both within the village and the Park; (3) “squatters”, who occupied plots only within the Park, though they may have lived in the village. Landless farmers (share-croppers) were also found in almost all study villages but were not included in the three categories as they did not possess any land, legally or illegally. The degree of encroachment at the village level was estimated by the number and proportion of households that were encroachers and squatters, that is, whose livelihoods depended partly or wholly on cultivating land inside the Park.

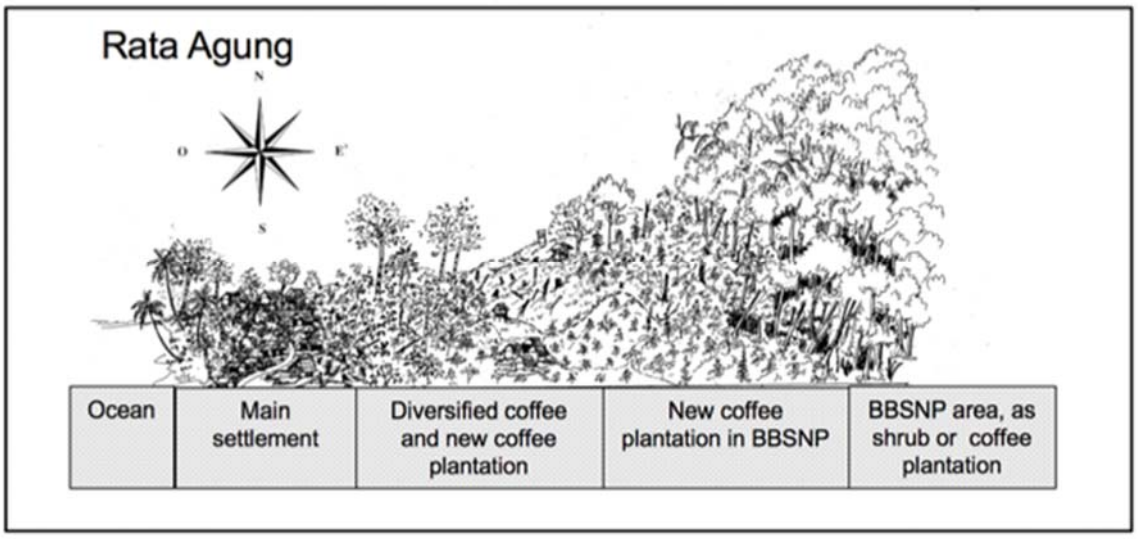

Figure 7.17. Land-use profile in Rata Agung (Source: Village observations in 2009, illustrated by Pak Wiyono)

The relation between this measure of encroachment and the extent of enforcement activities was explored, with the results shown in Table 7.7 and Figure 7.18. The study villages are again depicted in terms of the reported frequency of patrols and level of sanctions, with the number and share of households in each land category indicated by the pie charts. Type 1 and Type 2 villages, with varying frequency of patrols but low levels of sanctions, had the lowest proportion of “encroachers” and “squatters”, with “villagers” representing the majority in all cases expect Tebing Rambutan (46% of households). The Type 3 village (Bumi Hantatai), with low patrol frequency but high sanctions had one of the highest levels of encroachment (63% of households either

“encroachers” or “squatters”). The Type 4 villages, with high patrol frequency and a high level of sanctions also showed a high incidence of encroachment (>50%). This seems to suggest the absence of a causal relationship between enforcement and encroachment at the village level, or even an inverse relationship. However, it appeared likely that other causal factors were interacting with enforcement, suggesting the need for a multivariate analysis.

Table 7.7. Estimated incidence of encroachment in 11 study villages

Village	No. of house-holds	Villagers		Encroach-ers		Squatters		Share-croppers	
		No.	%	No.	%	No.	%	No.	%
1. Rata Agung	766	353	46.1	88	11.5	277	36.2	50	6.5
2. Tebing Rambutan	172	79	45.9	64	37.2	0	0.0	29	16.9
3. Pelita Jaya	350	335	95.7	5	1.4	0	0.0	10	2.9
4. Negeri Ratu Penumbang	404	324	80.2	54	13.4	0	0.0	26	6.4
5. Pekon Mon	802	588	73.3	110	13.7	34	4.2	70	8.7
6. Pagar Bukit	1,155	511	44.2	133	11.5	370	32.0	141	12.2
7. Pemerihan	577	264	45.8	201	34.8	90	15.6	22	3.8
8. Way Nipah	251	153	61.0	47	18.7	25	10.0	26	10.4
9. Pesanguan	248	48	19.4	149	60.1	51	20.6	0	0.0
10. Bumi Hantatai	538	99	18.4	34	6.3	305	56.7	100	18.6
11. Trimulyo	667	171	25.6	308	46.2	129	19.3	59	8.8

Source: Survey in 2009

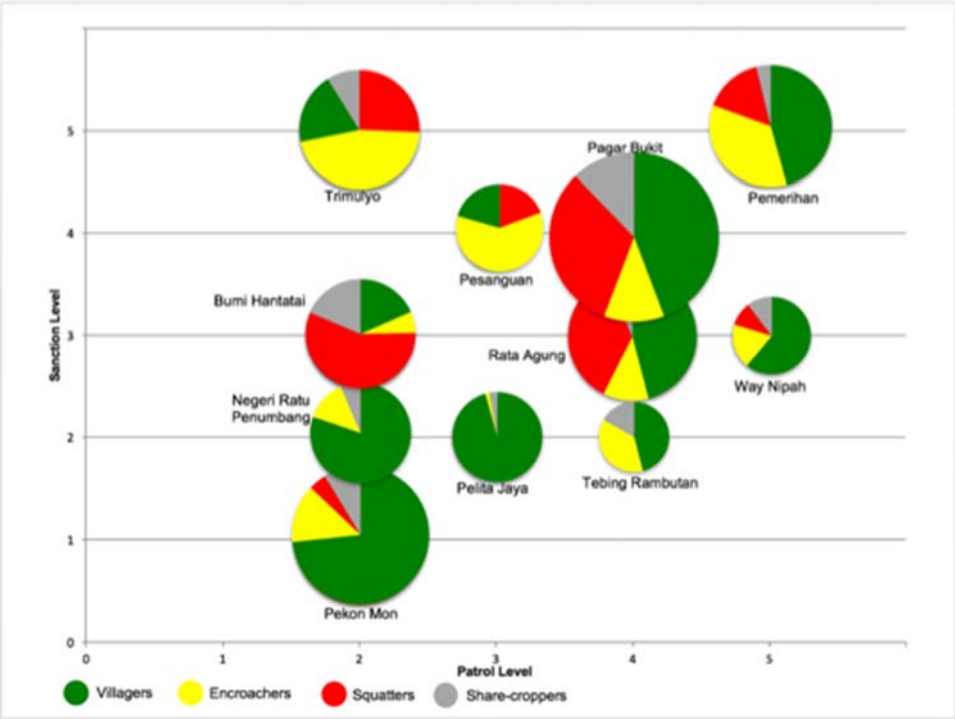

Figure 7.18. Mapping of enforcement and encroachment in 11 study villages

7.4.2 Multivariate analysis of the impact of enforcement

Multiple regression analysis was used to examine the impact of enforcement on squatting and encroachment, taking account of other possible factors. Hamlet-level data (n=63) were used to measure the degree of encroachment. Three alternative measures were used – the percentage of households in the hamlet classified as encroachers or squatters; the percentage classified as squatters; and the percentage classified as encroachers (Table 7.7). Hamlet-level data were also used to measure the degree of enforcement, that is, the frequency of patrols and the level of sanctions, as described above. Additional predictor variables were based on village-level data collected in November-December 2009 that were assumed to apply to the village's constituent hamlets – accessibility to the main road, whether the village directly bordered the Park or Protection Forest, the relative balance between local (mainly Lampungese) and migrant (mainly Javanese) ethnic groups, and the village population density (Table 7.8). Descriptive statistics for the regression variables are presented in (Table 7.9). Three regressions were run, using each of the alternative measures of the illegal use of Park land. The results are presented in Table 7.10.

Table 7.8. Dependent and predictor variables used in multiple regression analysis

Variables	Variable definition	Scoring
Predictor variables		
Patrols	Frequency of patrols in village	1=never to 5=very often
Sanctions	Intensity of sanctions in village	1=never to 5=eviction
Accessibility	Access to main road	1=main road to 3=remote
Access to Park	Village bordering the Park	0=no and 1=yes
Population density	Village population density	Persons/village area (km^2)
Migrant population	Proportion of Javanese migrants in village population	1=locals in majority 2=locals/Javanese equal 3=Javanese in majority
Dependent variables		
Illegal land use	Extent of encroaching or squatting	% of encroachers plus % of squatters in hamlet
Encroachment	Extent of encroaching	% of encroachers in hamlet
Squatters	Extent of squatting	% of squatters in hamlet

Table 7.9. Descriptive statistics for multiple regression analyses

	Mean	Standard Deviation
Dependent variables		
Illegal land use	39.44	36.68
Encroachment	24.18	28.22
Squatters	15.30	25.60
Predictor variables		
Patrols	2.76	1.01
Sanctions	3.48	1.48
Accessibility	1.73	0.70
Access to Park	0.81	0.40
Population density	126.59	111.32
Migrant population	2.17	0.98

With “illegal land use” as the dependent variable, the regression was significant and the adjusted R^2 was 0.326, indicating that a third of the variation in illegal land use was explained by the six predictors. However, only the accessibility (to major road) variable was significant at the 5% level. The intensity of patrols and sanctions were not significant predictors of illegal land use and, in any case, the signs of both coefficients were positive, which was the reverse of the expected direction of influence.

Table 7.10. Results of three multiple regressions of illegal land use on enforcement and other variables, with hamlet as unit of analysis

	Illegal land use		Encroachment		Squatting	
Predictors	b	Sig.	b	Sig.	b	Sig.
Intercept	-62.545	0.024	-39.481	0.068	-23.1	0.300
Patrols	7.765	0.203	3.832	0.423	3.933	0.432
Sanctions	8.635	0.178	14.036	0.007	-5.401	0.305
Accessibility	22.056	0.018	16.429	0.025	5.627	0.453
Access to Park	11.482	0.298	-1.933	0.823	13.415	0.142
Popn. density	0.033	0.526	0.04	0.325	-0.007	0.862
Migrant popn.	-0.505	0.957	-12.732	0.091	12.227	0.120
R^2	0.391		0.362		0.154	
Adjusted R^2	0.326		0.294		0.064	
F (6, 56)	6.000		5.302		1.720	
Significance	p<.001		p<.001		p=0.138	

Analysed using the Statistical Package for the Social Sciences (SPSS Version 23).

With “encroachment” as the dependent variable, the regression was again significant and the adjusted R^2 was only slightly lower at 0.294, suggesting that the inclusion of “squatters” in the “illegal land use” measure added very little. Accessibility was again significant at the 5% level and, in this case, so was the level of sanctions, but again with a positive rather than the expected negative coefficient. The relative importance of migrant Javanese villagers was also significant at the 10% level, but the sign of the coefficient was negative, implying that more Javanese in the village led to less encroachment.

The third regression, with “squatting” as the dependent variable, was not significant and the adjusted R^2 was only 0.064. However, it is worth noting that there was weak statistical confirmation (at the 15% level) that both bordering the Park and having a high population of Javanese migrants had a positive influence on the extent of squatting. This is certainly consistent with the village profiles above that show a tendency for recent Javanese migrants, who typically have no land in the village, to clear and occupy land within the Park, especially where the village is bordering the Park.

The regression results confirm the preliminary conclusion based on an inspection of Figure 7.18, namely, that “enforcement effort” cannot predict the overall level of illegal

land use, even when other variables are taken into account. The most obvious explanation for this result is that, as noted in Section 7.3, enforcement activities were not conducted across the board but were targeted in specific zones. In particular, patrols were more intensive where populations of endangered wildlife species were more abundant and where illegal activities were occurring, such as in the south-eastern sector of the Park (Figure 7.10). This would create the incorrect impression in a cross-sectional analysis that more enforcement was causing more illegal activities. On the other hand, in the pocket in West Lampung District where illegal land use was most extensive, squatters had incurred the highest sanction of eviction. The eventual return of many evictees meant that illegal land use remained high, even though the villages scored highly on enforcement. Hence it was concluded that more insight could be gained by looking in more detail at specific cases.

7.4.3 Selected cases of enforcement and exclusion

To unravel the nature and impacts of enforcement, three villages were explored in more detail – Pelita Jaya as a case of low enforcement, Bumi Hantatai as a case of medium enforcement, and Pemerihan as a case of high enforcement (Figure 7.19).

In Pelita Jaya, most households had no farming land inside the Park. This was a “gated community” that did not accept migrants because of the strong adherence to Lampungese tradition (*adat Lampung*), influenced by the local customary leader. Hence there were no squatters. At the same time, the low pressure of population on village land (47 persons per km^2) meant that there was almost no encroachment. Thus low enforcement was associated with a low level of illegal land use because “self-enforcement” made external enforcement largely unnecessary in this case. This situation was common in Lampungese villages around the Park.

In Bumi Hantatai, located in a remote pocket of the Park, there was high population pressure on the land (119 persons per km^2) and poor access to main roads. The local village elite had considerable power and influence in the village and was also influential in supporting the election of local leaders and government officials. This elite was supportive of Javanese in-migration, hence the dominance of Javanese in the village population and the high incidence of squatting.

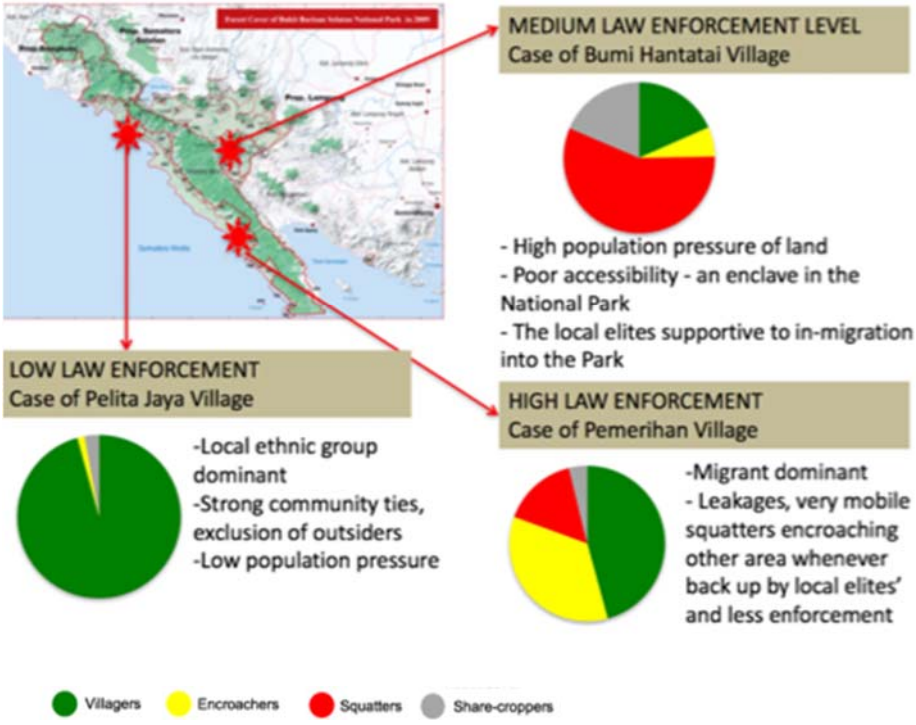

Figure 7.19. Degrees of enforcement in three selected villages

In Pemerihan, where enforcement was intense, encroachment and squatting were both high but had been curtailed under the pressure of enforcement activities. Even though the population density was relatively low compared to the other villages, the availability of land for legal occupation under *adat* was low. The Village Head claimed that only 400 ha of the total area of the village was subject to the customary rights of the clan (*marga*).[42] However, Javanese households in the village were very mobile, with good access to transportation and communication. They could move in and out of the Park and move to other villages where local elites were more supportive of encroachment and there was less enforcement.

These examples indicate that, together with enforcement by government authorities, the nature of village institutions and the attitude of the local elite were important, perhaps decisive variables that were not captured in the above quantitative analyses.

[42] Interview with the village head in Pemerihan, November 2009.

Interviews with smallholders who occupied land in the Park indicated that they would be willing to leave the Park in order to preserve endangered wildlife as long as the law was applied to everyone equally and they were given another source of livelihood. However, in the 11 study villages, it was observed that the local elite could be for or against Park protection. Those who were supportive of protection were involved in Park management through extension programs, rural development projects, maintaining the Park's borders, and influencing policies. Those who were unsupportive could neglect Park protection policies, give tacit or explicit support to encroachment and squatting, and undermine enforcement activities (e.g., by warning villagers of an impending patrol). This implies that enforcement policies should target village elites as well as farmers if they are to be more effective.

7.4.4 Local perceptions of solutions to illegal occupation

The 63 hamlet chiefs (*kepala dusun*) interviewed were asked to suggest solutions to the problem of illegal occupation of the Park. Their responses ranged from "hard" approaches that gave no reward to illegal behaviour through to "soft" approaches that legalised and thus rewarded illegal occupation. The different responses were partly correlated with the interviewee's situation.

At one extreme, 19% of interviewees saw eviction and the destruction of coffee farms as the solution, without any compensation or support for the illegal occupants. These respondents were in villages with access to the main road and a high level of law enforcement. Their answers may have been biased towards a hard-line approach because of their exposure to monitoring and sanctions and their greater capacity to pursue livelihoods without encroaching on the Park.

The most frequently suggested solution (40%) was relocation, by which the respondents meant moving people to another place as in a local transmigration scheme such that the evictees could have agricultural land and settlement areas. This solution had been implemented in the late 1990s near Trimulyo, hence interviewees were aware of the option. Relocation was a softer and more rewarding approach than mere eviction because the evictees would have alternative land for farming and housing, hence an alternative source of income. It was felt that this would prevent them from reoccupying land in the Park. This solution was mentioned by hamlet chefs

who were from both indigenous-majority and migrant-majority villages with relatively high population density and good road access.

Another 17% of interviewees also suggested solutions in this middle range between "hard" and "soft" approaches. They proposed government support and extension to help diversify sources of income within the village and thereby decrease dependence on income from illegal coffee. These hamlet chiefs were mainly in indigenous villages located close to the main road and subject to intermediate levels of enforcement.

At the other extreme, 21% of interviewees hoped that the areas of the Park already converted to agriculture could be legalised, with farmers granted legal ownership or at least a use right for a certain period. Not only would this remove the risk of lost income due to eviction but it would immediately increase the value of their land, hence it was soft towards and rewarding of illegal occupation. This approach was inspired by the social forest (*Hutan Kemasyarakatan, HKm*) scheme that had been implemented in certain Protected Forests in West Lampung District since 2001, especially in areas converted to coffee (see Section 6.3.3 in Chapter 6). Those advocating this approach were in migrant-dominated villages with medium to poor accessibility, hence with a high degree of encroachment.

7.5 Enforcement of Exclusion since 2010

Interviews in October 2014 with the Bureau of BBSNP indicated that encroachment into the Park for coffee planting was still the main issue for Park management, requiring ongoing enforcement effort. UNESCO's decision in 2011 to place the Park on the List of World Heritage in Danger "to help overcome threats posed by poaching, illegal logging, agricultural encroachment, and plans to build roads through the site"[43] was a major concern for Park management. Bureau officers interviewed felt that if the central government approved construction permits for roads through the Park, UNESCO could further reduce the Park's status. This could affect the allocation of budget support from the government as well as other sources of funds and resources from international NGOs.

[43] The decision was made at the 35th session of UNESCO's World Heritage Committee in Paris in June 2011, placing the Tropical Rainforest Heritage of Sumatra (which includes the BBSNP) on the List of World Heritage in Danger (http://whc.unesco.org/en/news/764/, accessed 8 August 2017).

This had spurred the Park management to raise the level of enforcement by applying more routine patrols and evictions. As before, routine patrols were undertaken through cooperation between Park rangers, the RPU, and the WWF. The priority areas continued to be determined by the distribution of elephants, rhinoceroses, and tigers, which were mainly found in the central part of the Park. Evictions had been implemented since 2010 in joint operations between the Park management, local government, the military, police, and NGOs (Table 7.11). The stated objective was to eliminate all encroachment in the Park. The Bureau claimed that 47% of encroachment cases had been successfully resolved by 2013.[44]

Table 7.11. Encroachment eradication targets by joint operations, 2011 to 2014

Year	Resort	Resort area (ha)	Deforested area (ha)	No. of encroachers
2011	Tampang	20,091	651	316
	Way Nipah	16,567	2,172	275
	Ngambur	15,294	1,855	80
	Pugung Tampak	18,493	9,689	1,399
	Pemerihan	17,902	699	170
	Biha	21,906	434	23
	Balai Kencana	17,022	7	7
	Sukaraja Atas	13,806	20	7
	Target for 2011		15,527	2,277
2012	Balik Bukit	23,011	1,598	455
	Lombok	24,238	4,242	1,599
	Way Haru	28,224	215	107
	Merpas	30,504	3,040	190
	Target for 2012		9,905	2,351
2013	Sekincau	13,415	9,994	6,343
	Ulu Belu	6,741	5,633	1,706
	Muara Saung	25,601	171	167
	Target for 2013		15,798	8,216
2014	Suoh	37,56	19,713	3,093
	Makakau Ilir	26,425	1,653	180
	Target for 2014		21,366	3,273
	Target for 2011-14		61,786	26,214

Source: Bureau of BBSNP 2011.

[44] Interview with the Bureau of BBSNP personnel, in Kota Agung, 2014

The locations of “resolved” and “unresolved” cases are shown in Figure 7.20, provided by the Bureau of BBSNP. It can be seen that the resolved cases were concentrated in the northern part of the Park as well as along the central western and south-eastern fringes. The large deforested pocket on the eastern side of the Park in West Lampung District (where Bumi Hantatai and Trimulyo are located) remained “unresolved” or “not yet handled” (*belum tertangani*). This was the same area identified in Chapter 3 as being a “rehabilitation” zone (Figure 3.7) and as “non-forest” (Figure 3.8). Authorities considered that is was difficult to enforce eviction in this area because of the large number of smallholders involved. Furthermore, there seemed to be unofficial recognition that the area already converted to coffee farms had to be maintained to support settlers’ livelihoods, but local government officials appealed to villagers not to open up new forest areas for crops.

The main area of this illegal occupation remained the same as “non-forest” area (Figure 3.8) and as being “rehabilitation” zone (Figure 3.7) in Chapter 3. It was considered difficult to enforce eviction in this area because of the large number of smallholders involved. Furthermore, there seemed to be unofficial recognition that the area already converted to coffee farms had to be maintained to support settlers’ livelihoods, but local government officials appealed to villagers not to open up new forest areas for crops, as found in selected studied villages.

7.6 Conclusion

The enforcement of exclusion from the Park was still considered by BBSNP management to be the main strategy to eradicate illegal activities and conserve the Park’s wildlife and habitat. Enforcement was implemented by conducting patrols, imposing sanctions, and joint operations to force evictions. Given the costly and labour-intensive nature of the activities, partnerships had been developed with prominent environmental NGOs for routine patrols, detection of illegal activities, and local enforcement, and with local government and the police and military to implement joint operations for forced evictions. Nevertheless, given the size of the task relative to available resources, these enforcement activities focused on areas where the population and habitat of protected animals, especially the elephant, tiger, and

rhinoceros, were most abundant, that is, where enforcement was most beneficial as well as most achievable.

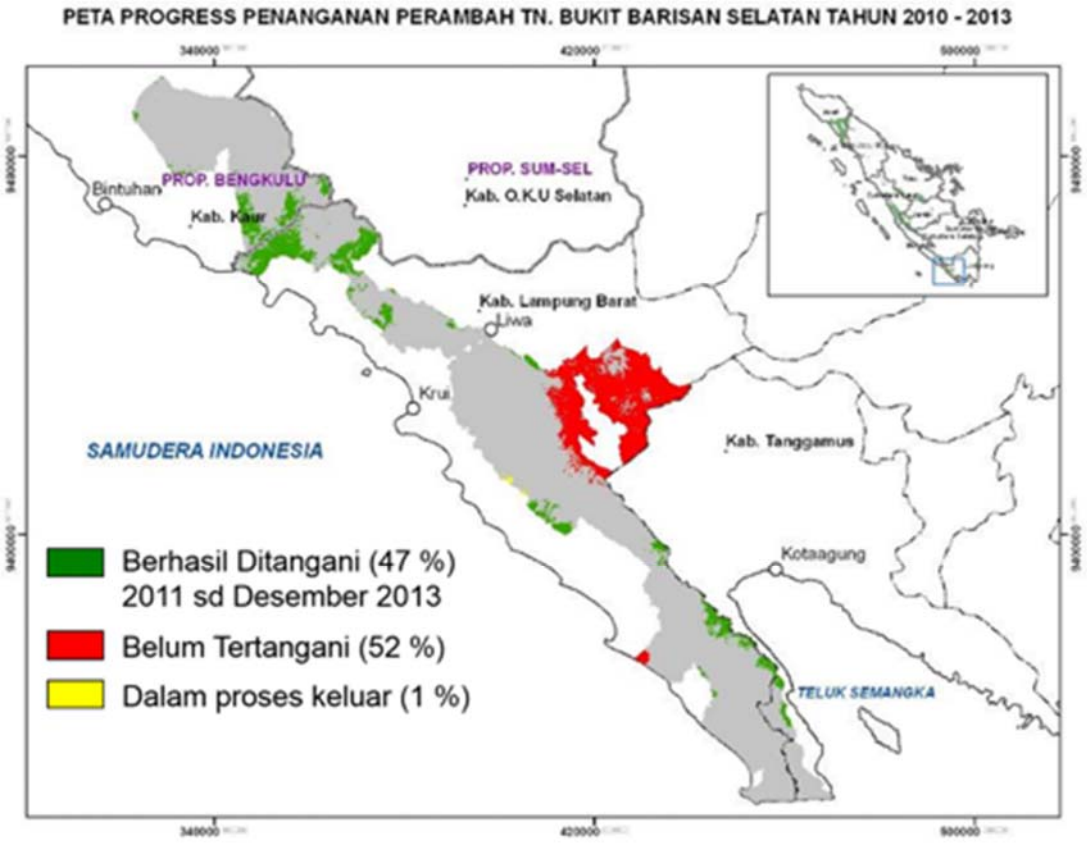

Figure 7.20. Progress of dealing with encroachment in BBSNP from 2010 to 2013
Legend: green = successfully handled; red = not yet handled; yellow = in progress.
Source: Bureau of BBSNP.

Among the 11 villages studied, varying degrees of enforcement were experienced in terms of both the frequency of monitoring and the severity of sanctions. The villages could be categorised into four types, combining low and high monitoring with low and high sanctions. Relating these types to the degree of illegal land use in the Park (encroaching and squatting) suggested that the degree of enforcement experienced by a village was not closely related to illegal agricultural occupancy of the Park by residents of that village. Hence it was necessary to consider if other factors were involved.

The multiple regression analysis at the hamlet level found that the intensity of patrols and sanctions were not significant predictors of illegal land use in the hamlet, whether measured as the proportion of households that were encroachers or squatters or both,

and allowing for the influence of other variables. There was weak statistical confirmation that bordering the Park and having a high population of Javanese migrants had a positive influence on the extent of squatting. This was consistent with the observation that Javanese migrants, who typically had no land in the village territory, cleared and occupied land within the Park, especially where the village was bordering the Park.

The more detailed analysis of three villages with low, medium, and high levels of external enforcement gave more insight into the complex processes at work. The low-enforcement village also had low levels of illegal land use, largely because of the "self-enforcement" provided by village leadership and institutions. This was fairly typical of established Lampungese villages around the Park. In the medium-enforcement village, the level of illegal land use was high, which was typical of the extensively-deforested pocket in the eastern section of the Park where there was high pressure for land from migrants and support from local elites for in-migration and agricultural expansion in the Park. In the high-enforcement village, there was more support from local elites for squatters and a tendency of responding to the high level of sanctions (namely, evictions) by moving to occupy land elsewhere and/or to return to take up the cleared land again along with new migrants.

In summary, enforcement activities were not uniformly implemented throughout the Park but were targeted in specific zones. In particular, patrols were more intensive where deforestation had been less extensive and populations of endangered wildlife species were more abundant, such as in the south-eastern sector of the Park. While enforcement was less frequent in the area where illegal land use was most extensive, here squatters incurred the highest sanction of eviction. Yet the eventual return of many evictees meant that illegal land use remained high, even though the villages scored highly on enforcement. Hence, while enforcement activities continued to be important, just over half the illegally occupied areas in 2014 remained "not yet handled."

Law enforcement in the BBSNP focused on illegal activities, including illegal occupation, poaching, and illegal logging, by implementing patrols and sanctions in targeted areas. However, the NGO programs and activities did not address the incentives of the coffee value chain as a way to protect the Park, except for the WWF's early but unsuccessful attempt at coffee certification.

From this study of law enforcement, it appears that relying on a coercive approach through law enforcement has failed to solve the problem of encroachment in the BBSNP. In the absence of incentives for farmers, whether an improvement in farm income or the provision of alternative sources of income, encroachment will continue to be an important issue for BBSNP Management.

CHAPTER 8
DISCUSSION

8.1 Introduction

The overall aim of this study was to improve our understanding of how to manage the trade-offs between conservation and development in tropical rainforest areas in Indonesia – in pursuit of the elusive goal of "sustainable development". As discussed in Chapter 2, forest ecosystems of high conservation value, such as in the Sundaland Biodiversity Hotspot which encompasses Sumatra and much of western Indonesia, can be regarded as a common pool resource. It has long been theorised and is well-documented in practice that such resources can be overexploited if there are no institutional constraints to prevent a "tragedy of the commons" (Baland & Platteau, 1996; Dietz *et al.*, 2003; Ostrom, 1990, 2009; Ostrom *et al.*, 1999).

Two potential solutions to this dilemma have been debated and implemented. One is the imposition of a state property regime through the declaration and enforcement of protected areas – in particular, National Parks (Chape *et al.*, 2003; Dudley, 2008; Dudley *et al.*, 2005; Swallow *et al.*, 2007). Another is the creation of a common property regime whereby local communities manage the resource according to established institutions (Tomich & van Noordwijk, 1995).

The first policy of establishing exclusive, "people-empty" and "wilderness" protected areas (Nash, 1982) has a long tradition, going back to Yellowstone National Park in the US in 1872 and Kruger National Park in South Africa in 1926 (Ramutsindela, 2004). However, it is now widely argued that this approach may be less effective in achieving conservation goals because of its impact on the livelihoods and incentives of "forest-dependent" and (more generally) "forest-adjacent" communities (Ramutsindela, 2004; Swallow *et al.*, 2007). Thus policies have shifted towards the integration of conservation of protected areas with the participation and development of local communities. Included in this integrated approach is a recognition that economic incentives can be used to reduce the trade-offs between conservation and

development goals, including environmental certification (Blaikie & Jeanrenaud, 1997; Brown, 2002).

This study was about how to reconcile conservation and development on the fringes of a National Park in Indonesia – the Bukit Barisan Selatan National Park (BBSNP) in Lampung Province – a forest ecosystem of rich biodiversity and high conservation value. The Park, which originated in 1935 as a wildlife reserve under Dutch rule, has been managed since 1982 as exclusive state property with public resources devoted to enforcing exclusion. This regime is supported in some instances by community institutions which effectively uphold the rules of access specified by the state. However, neither state nor community property regimes on their own have been able to prevent encroachment by smallholder coffee producers in major sectors of the Park. This has prompted the use since 2005 of an incentive-based, market mechanism, namely, coffee certification (operating through community structures such as farmer groups), as an alternative to relying on enforcement alone. The study has examined these two main approaches, their interaction, and the circumstances affecting their impact on conservation and development goals.

In this chapter, the findings of the study are discussed in relation to the four research objectives outlined in Chapter 1. The first objective was to explore the extent and dynamics of the problem of encroachment and deforestation in the BBSNP; this is addressed in Section 8.2. The second and third objectives, to assess the effectiveness of the coercive or law-enforcement approach and the incentive- or market-based approach (namely, coffee certification) are discussed in Section 8.3. The fourth objective, to use the research findings to explore the feasibility of possible solutions to the problem, is addressed in Sections 8.4 (exploring locally-proposed solutions) and 8.5 (lessons learned from the research). Section 8.6 sums up the conclusions of the thesis and makes suggestions for future research.

8.2 Dynamics of Encroachment and Deforestation

Conflict over the use of protected forest areas in Indonesia was the core issue of the research. “Protected area” refers to all state forest areas reserved for conservation purposes. As explained in Chapter 3, the area now designated as the BBSNP was declared a National Park (or IUCN Category II Protected Area) in 1982. At the time of fieldwork it was one of 43 National Parks in Indonesia with a total area of over 12

million hectares. On the margins of the Park were other, smaller types of protected area, mainly Protection Forests (intended to protect watersheds) and Limited Production Forests (intended for small-scale local timber extraction). National Parks in Indonesia were regulated and managed by the central government, while Protection Forests and Limited Production Forests were regulated and managed by provincial and district governments.

The issue facing the managers of the BBSNP was that loss of forest in the Park (and surrounding protected areas) affected its basic function to preserve biodiversity. Human activity in the Park not only included timber extraction and harvesting of non-timber forest products (including wildlife), but involved extensive encroachment and conversion of forest to agricultural land, mainly for coffee production. This constituted the sharpest of trade-offs in that converting forest land to coffee plots completely undermined the conservation value of the land and also diminished the conservation value of adjacent forest by virtue of reducing habitat size and contiguity.

Thus the BBSNP case provided important insights into the conservation-development dilemma. The National Park had to be protected from human impact, yet it had been widely converted into non-forest use for smallholder farming linked to a global commodity chain. On one hand, the Park as an institution was considered the primary means to protect the common pool resource and thus maintain biodiversity and other environmental services. On the other, the human pressure to use the forest in support of livelihoods was intense. The growth of local population and its augmentation through large-scale in-migration over 50 years had created strong demand for agricultural land, motivating poor farmers to clear forest within and outside the Park (Chapter 5). Hence the concept of completely excluding people from the Park seemed impossible to enforce.

8.2.1 Farming systems, agricultural intensification, and deforestation

The landscape in which the BBSNP was situated had seen major change since the initial settling of the area by small populations of indigenous Semendo and other local groups. The in-depth study of Trimulyo and Gunung Terang showed an evolution of land use from long-rotation shifting cultivation combined with low-input coffee cultivation in the 1940s and earlier, to much more intensive use of village lands for wet rice, vegetables, and diversified coffee plots, with greater demands on labour and

inputs (Chapter 5). Shifting cultivation systems, in which farmers rotate through forested land to meet their subsistence needs, require a large area of land per household but have a low impact on the forest (Angelsen, 1995). Other studies have found that shifting cultivation was dominant in Lampung Province as recently as the 1930s, and even longer in undeveloped areas with low accessibility (Brandon, 1995; Wells *et al.*, 1995).

The influx of migrants from Java from the 1950s and 1960s, both transmigrants (sponsored by the central government) and spontaneous migrants, increased the demand for village land, mainly for coffee planting. The growth of population prompted intensification and commercialisation of the farming system to provide more income from less land. The cropping period was extended and the fallow period reduced, until small permanent plots became the norm. The increased availability of agricultural workers, whether wage workers or sharecroppers, made these more intensive systems feasible. The continued growth of population locally, combined with further spontaneous migration from the 1970s and 1980s, aggravated land scarcity and led to increasing encroachment on protected areas. Improvements in road access and regional development since the 1980s facilitated this influx of migrants. Encroachment occurred first in Protection Forests (which were more accessible and had fewer restrictions), then in the National Park itself, contributing to extensive deforestation of the Bukit Barisan Range, especially the eastern flanks. Unlike farming systems on the more accessible village lands downslope, farming systems on the remote, sloping uplands within the protected areas were primarily based on monoculture coffee.

This finding is consistent with other research that points to agricultural expansion as one of the main drivers of tropical deforestation globally (Chomitz, 2007; Didia, 1997; Geist & Lambin, 2002; World Bank, 1992; WRI, 1990). In Indonesia, this expansion into forest lands has been mainly for tree crop production to supply global commodity chains (Miyamoto (2006). However, Angelsen (1995) argues that agricultural intensification, such as occurred over time in the study area, could in theory contribute to reducing forest clearing because of the smaller land area required to meet the basic needs of the household. On the other hand, he acknowledges that intensification leading to more productive and profitable farming could attract people from outside the area, thereby offsetting the first effect and increasing deforestation. Byerlee *et al.* (2014) shed light on this paradox by specifying two types of intensification – market-

driven and technology-driven. Whereas technology-driven intensification (such as high-yielding crop varieties) may support Angelsen's (1995) argument for reduced deforestation, Byerlee *et al.* (2014) find that market-driven intensification is the main cause of agricultural expansion causing deforestation, especially near the forest frontier (Byerlee *et al.*, 2014). Barraclough and Ghimire (2000) and Chomitz (2007) also find that the expansion of export commodities has a positive correlation with deforestation globally by attracting more people to the forest frontiers.

The expansion of coffee production at the expense of forest in the BBSNP and surrounding areas was a clear case of market-driven intensification, with the profitability of coffee, even with relatively simple technology and low yields, encouraging local farmers to expand the area under this crop as well as drawing in thousands of migrants. The BBSNP Bureau estimated that, by 2008, an area of just over 57,000 ha was illegally occupied by more than 16,000 households, accounting for 16% of the Park area. Angelsen (1999) refers to this as "unplanned deforestation" because it results from numerous independent decisions at the level of the farm household. This connection between the profitability of coffee and deforestation is supported by other empirical studies in Lampung Province (Benoit *et al.*, 1989; Gaveau *et al.*, 2009). The global price of coffee has thus been an important driver affecting both livelihoods and the environment in the study area.

Coffee production was found to be the main source of livelihood for households both within and adjacent to the Park (Chapter 5). Coffee was grown in smallholdings, averaging 2 ha for monoculture plots and 3 ha for more diversified plots. Yields were low but slightly above the average for Robusta-coffee smallholders in southern Sumatra. The mean returns to household labour were also low, at or just above the prevailing rural wage. Nevertheless, the demand for land for coffee cultivation was such that in villages along the eastern border of the BBSNP, while 70% of households were classified as "villagers", only farming on village land, 20% were "encroachers", with land both in the village and in the Park, and 10% were "squatters", farming entirely within the Park. It was noteworthy that 50% of squatters were born in the village, implying that not only recent migrants but second-generation residents were being driven by land-shortage to move into the Park.

Encroachers obtained nearly 40% of their household income from within the Park, and squatters, 80%, all from coffee. Encroachers earned more income from coffee and

more income in total because they had added to their village landholdings by opening up land inside the Park. The demand for land for coffee production was reflected in the rise in land transactions and prices in the study area. Initially, in the 1950s and 1960s, new households in the village and migrant households acquired land by clearing primary or secondary forest. Later waves of migrants often engaged in share-cropping to accumulate the capital needed to buy already-cleared land. Land acquisitions occurred both through formal transactions within village lands (for which prices were higher) and informal transactions within protected areas, including the Park. Land prices in both formal and informal markets were growing at 10-20% in real terms in the 2000s.

8.2.2 Deforestation and protected areas

Deforestation is a complex process with multiple drivers interacting synergistically or antagonistically (Geist & Lambin, 2002). Establishing protected areas is regarded as a key instrument in the preservation of biodiversity, slowing the rate of deforestation even if deforestation occurs in surrounding areas (Naughton-Treves *et al*., 2005). As reviewed in Chapter 2, the rate of deforestation in protected areas around the world has been found to be lower than in areas without protected status (Andam *et al.,* 2008; Gaveau *et al*., 2007). This is partly due to the relative inaccessibility of protected areas but has also been taken as evidence of the general effectiveness of protected areas in at least retarding deforestation.

Notwithstanding the evidence for encroachment in the BBSNP, this study provides some support to the retarding effect of protected areas. This can be seen by comparing the BBSNP and West Lampung District with other parts of Lampung Province. Forest accounted for 90% of the total area of Lampung Province in the early 1900s (Benoit *et al.,* 1989; Durand, 1999, 2000; Verbist & Pasya, 2004). With limited access and low population density, the rate of deforestation was low until the 1950s (Benoit *et al.,* 1989). However, from the 1960s, deforestation accelerated because of large logging concessions and agricultural expansion due to population growth (over 6% in 2010-2015), such that by 1989 forest cover had been reduced to 38% and by 2000 was down to 30% (Herawati *et al.*, 2017).

Regarding deforestation in Lampung Province, Imbernon (1999) studied change in forest cover in North Lampung District in the central part of Lampung Province

adjacent to the study area. Around 1900 this District had about 70% forest cover and the population depended largely on shifting cultivation. By 1969 forest cover was reduced to 52% due to the conversion of land for production of commodities such as sugarcane, rubber, and timber (*Acacia mangium*), and the spread of shifting cultivation deeper into the forest. By 1996 there was no forest cover in North Lampung.

While similar drivers were at work in West Lampung, this degree of deforestation did not occur, as seen from the analysis of land-use maps from 1972 to 2009 in Chapter 5. Arguably, these differences in the rate of deforestation in different districts were partly due to the retarding effect of protected areas, which were concentrated in the western and eastern parts of Lampung Province.

In general, deforestation occurs first where the land has high productive potential, depending on agro-climatic conditions, the market value of the standing forest, and the location of the land relative to roads, towns, and markets (Bruner *et al.*, 2001). This study found that forest clearing was especially motivated by the assumption that land rents would be high because of the condition of the soil and its suitability for coffee cultivation. Other factors were the distance from the main village settlement (both for accessing the farm on a daily basis and transporting the output to village-based local traders) and the legal status of the land. Angelsen (1999) argues that deforestation can be considered a form of land investment if the land rights can be subsequently "owned". Hence further deforestation could potentially be reduced if farmers had security of tenure. However, (Kaimowitz, 1996b) warns that giving land titles to encroachers would merely encourage further deforestation.

In the study area, farmers' deforestation decisions appeared to be related to the tenure status of the forest. Forest was subject to several kinds of tenure affecting its accessibility (the ease with which it could be acquired) and security of occupation once cleared for farming. These included: (1) Village lands, subject to a right of private ownership (*hak milik*); (2) Village Forest Reserves (*hutan desa*); (3) Limited Production Forests; (4) Protection Forests; and (5) the National Park. The accessibility and tenure security of these classes of land varied, and this clearly affected farmers' preferences.

As shown in Chapter 5, forest clearing for coffee by both locals and migrants began in village lands. Moreover, the market price of established coffee plots within the village was consistently higher than for plots in protected areas. However, villages also

retained their own forest reserves (*hutan desa*) as protected or undisturbed forest, as a source of water, and to prevent erosion and landslides. These were typically steep areas that were difficult or impossible to cultivate. This kind of local protected area was still intact in Trimulyo and Gunung Terang when the villages were revisited in 2014, reflecting both the viability of village common-property institutions and the unattractiveness of this land for any other use.

The next areas to be deforested were the state-owned but district-managed protected areas – Protection Forests and Limited Production Forests – which were less strictly controlled. Protection Forests, *de jure*, were to remain forested for watershed protection but *de facto* were planted with coffee once the available land within the villages became scarce. Limited Production Forests were also state forests managed at the district level. They were intended to support local livelihoods through limited extraction of timber, firewood, and other products such as turpentine and copal resins. On the western boundary of the Park, Limited Production Forests were subject to numerous logging operations in the 1970s and 1980s and the construction of logging roads made it easier for farmers to gain access to and clear the forest for coffee and agroforestry systems, as observed more generally by Chomitz (2007).

The introduction of Community Forest (*Hutan Kemasyarakatan*, *HKm*) schemes in some Protection Forests and Limited Production Forests meant that farmers received permits to continue coffee farming for 35 years by planting shade trees among the coffee plantation and supporting activities to replant and to conserve other areas (Chapter 6). This was based on the notion that agroforestry systems can contribute to the conservation of biodiversity (ITTO, 2000). However, the *HKm* permits were seen by farmers in these protected areas as secure title to their coffee farms, and by others looking for land as an inducement to target these areas. In most villages surveyed this program had not yet started, while in others preliminary surveying had occurred. Nevertheless, the perception that these protected forest areas were rightly community lands, and the prospect of legitimation through *HKm* schemes, made them more accessible and secure.

While the protected areas around the Park were considered by the local population as available to cultivate coffee legitimately, especially because this could be legalised at the district level as Community Forestry, from the government's point of view the "convertible" area of these lower-status protected areas could provide an agroforestry-

based buffer zone to protect the National Park. The existence of low-status protected forest areas around the Park was a means to slow down deforestation within the Park. Hence study villages with no access to such protected forests tended to encroach more deeply into the Park.

The most restrictive tenure type was the National Park itself. Management of the BBSNP was directly under the central government through the Ministry of Forestry, operating through the BBSNP Head Office in Kota Agung City with international support to enforce exclusion. *De jure*, access to the Park was prohibited without a permit and was limited to research and tourism. However, deforestation for coffee cultivation had occurred in 16% of the Park area. Tomich and van Noordwijk (1995) found the same issue in other National Parks in Sumatra. Even though the existence of Protection and Production Forests had retarded deforestation inside the Park, encroachment and illegal occupation remained a serious problem.

8.3 Effectiveness of Existing Approaches

8.3.1 Coffee certification

Prompted in part by the failure to exclude coffee growers from the Park and surrounding protected areas, a widely-used incentive-based approach, coffee certification, had been implemented in West Lampung District since 2005, with expansion from 2010 in the number of companies implementing certification schemes, the number of farmers and farmer groups involved, and the area and output of certified coffee. Coffee certification was initiated and mostly funded by multinational private-sector coffee traders, who bought the certified coffee from the farmers or (more commonly) farmer groups. However, third-party certifiers were an essential part of the process, adhering to several internationally-recognised certification protocols. Indo Cafco was the pioneer in certification in the study site and remained the largest player in 2014 (though, as already noted, it recently withdrew from buying certified coffee in Lampung). The Indo Cafco project involved a range of actors including coffee farmers, farmer groups, local government, company agents, and certifiers. The main certification schemes were the widely-recognised UTZ Certified, 4C, and Rainforest Alliance, with the common objective of rewarding farmers through a premium price for coffee produced by good farm practices that were socially and environmentally sustainable, including being produced outside the National Park. Similar certification

schemes had been introduced since 2010, with Nestlé in particular rapidly expanding to replace Indo Cafco as the largest buyer of certified coffee in the study area.

However, there were major constraints to the successful implementation of coffee certification in West Lampung District. Though farmers' access to and use of certification had increased, certified production accounted for only 16% of the coffee area and 14% of Robusta production in the District. The lack of financial institutions able to reduce the growers' dependence on traditional credit was an important reason for the limited participation. The difficulties in transporting certified coffee had been reduced due to some companies establishing local warehouses and traders offering to transport the farmers' certified product. However, the fact that the premium price was not assured continued to discourage farmers, who found that discounts for poor-quality beans could erode any price advantage from certification. The most significant constraint was the contamination of certified product with non-certified beans, reflecting the inability of the certification schemes to continually monitor the source of the coffee. In particular, farmers with certified coffee plots in the village as well as illegal plots inside the Park ("encroachers") had a strong incentive (and capability) to exploit the scheme by mixing in beans from their non-certified plots, and there was little or no capacity to prevent this. Hence, whatever its benefits, coffee certification did not appear to be capable of preventing encroachment of the Park.

A number of studies have found that coffee certification can at least provide economic benefits though product differentiation and creating a larger market for the farmers' commodity (Kilian *et al.*, 2004; Méndez *et al.*, 2010; Parrish *et al.*, 2005). Arnould, Plastina, and Ball (2009) found the increased price and high volume of certified coffee provided significant economic benefits to individual farmers. A study of organic certification in Uganda found a positive impact as farmers who were "organic by default" could use low-cost practices to obtain a higher return (Bolwig, Gibbon, and Jones (2009). However, other studies in a number of countries found little economic benefit: Organic Certified Arabica coffee in Costa Rica because of lower yields despite the premium price given (Lyngbaek & Muschler, 2001); Fair Trade in Peru because of the modest effect on production and income (Ruben & Fort, 2012); in Latin America in general because of the limited market, the difficulty of advanced farm management, and the inability to produce higher-quality coffee (Kilian *et al.*, 2004); and Fair Trade

and Organic coffee in Central America and Mexico because of the low quantity of certified coffee sold given that not all farmers participated (Méndez *et al.*, 2010).

Consistent with these latter studies, coffee certification in West Lampung District was found to have little economic effect on producers as the increase in price and volume was insufficient to offset the extra costs, delays, and risks involved. Farmers' first priority was to repay their creditors on whom they were dependent for both farm inputs and household needs. Moreover, if the quality of their coffee was low it would be downgraded by the company, given the rigorous quality measurement in the coffee certification scheme. Hence farmers would choose to sell even potentially certified coffee to local traders who not only gave a higher price but paid them without delay.

It is true that, if a farmer could produce good-quality coffee and was debt-free at the time of harvest, he or she could get a higher price by selling through a coffee certification scheme, as the "base price" (before deductions for poor quality) was higher for certified than conventional coffee. In this case, it can be said that the higher price was mostly a function of the improved quality rather than the certification itself. However, the price incentive for higher-quality Robusta coffee was not a strong motivator to improve product quality as there remained a good market for non-premium Robusta coffee (Bennett & Godoy, 1992). In the study area, one benefit of the certification program was the social benefit of involvement in farmer groups. This increased members' access to information (including daily price data) and their capacity to work together, though it was not considered a major benefit by farmers. A similar benefit was also found in Africa, where (Bolwig *et al.* (2009) found that coffee certification provided social benefits through re-activating farmer groups.

The lack of economic impact was an important reason why coffee certification had little impact on the environment. The prime purpose of certification schemes was to provide higher returns to farmers by pursuing certified practices and thus to reduce the incentive for deforestation. In the West Lampung study villages, improvements in pest control and soil conservation occurred, not because of certification but because farmers already knew of these practices and could realise the benefits, though the certification projects helped improve some aspects of pest control. However, because of the low impact on economic returns, forest conservation as such was difficult to achieve. After 10 years of coffee certification in West Lampung District, there was no

evidence of impact on the rate or extent of deforestation and conversion to agricultural land.

Even with increased economic returns, however, the certification schemes studied could not be expected to protect the Park because of the lack of traceability in the scheme structure. Thus there was no guarantee that the certified coffee was all harvested from certified land. In particular, it was possible for certified farmers to also occupy land in the Park or Protection Forest ("encroachers"). Not only could their legally-grown coffee benefit from any price premium provided through certification while they continued to farm illegally, but there was nothing preventing them from mixing coffee grown in the Park with a consignment of certified coffee grown in the village. Farmer groups could also buy coffee grown illegally by non-members in order to meet their supply quotas sooner. Thus even "squatters" could potentially channel their coffee through certified groups.

There was also the question of the sustainability of coffee certification itself. Coffee certification in the study area was viewed as a business decision by the companies that initiated and financed it. The decision was based on global demand for a certified product. However, when the market for this product was unfavourable, the company might not buy the certified coffee from the farmers. These farmers could not sell to another company as the certificate was held by the first company, not the farmer group. Hence Indo Cafco briefly suspended purchase of certified coffee during the first period of fieldwork due to a drop in global demand and has now withdrawn altogether from coffee certification in the study area, reportedly for market reasons.

8.3.2 Enforcing exclusion

Studies about law enforcement in protected areas tend to focus on the illegal wildlife market and illegal harvesting of forest products, as well as the actors in law enforcement, primarily forest rangers (Moreto, 2016; Warchol & Kapla, 2012). As discussed above, deforestation within the Park occurred later and less extensively than in village lands or in lower-status protected areas bordering the Park, as the stringent legal status of a National Park required that exclusion be strictly enforced. Even so, illegal activities such as poaching and trading wildlife, harvesting forest products, and encroachment and occupation for farming were significant problems for

Park Management, showing the high costs of exclusion from a large common pool resource such as this.

More strict and effective enforcement of the state's exclusive property rights was seen by central government and conservationists as the main strategy to deal with these problems. International conservation NGOs have been prominent globally in helping to enforce exclusion from protected areas, bringing outside resources to the task (Nurse, 2015; White, 2012). The involvement of the military has also long been proposed as a way to obtain more resources for securing protected areas (Kaimowitz, 1996b). Both of these sources of support were being utilised in the BBSNP at the time of fieldwork in 2010. Enforcement was implemented by conducting patrols, imposing sanctions, and joint operations with the armed forces (*operasi gabungan*) to implement evictions. Partnerships had been developed with prominent environmental NGOs for routine patrols, detection of illegal activities, and local enforcement, and with local government and the police and military to implement joint operations for evictions. Nevertheless, even with these augmented resources, enforcement activities were focused on areas where the population and habitat of endangered animal species, especially the Sumatran elephant, tiger, and rhinoceros, were most abundant – that is, where enforcement was both most beneficial and most achievable, giving the highest returns to the limited resources.

Among the villages studied, varying degrees of enforcement were experienced in terms of the frequency of monitoring and the severity of sanctions. The villages could be categorised into four types, combining low and high monitoring with low and high sanctions, the most extreme sanction being eviction. Relating these types to the degree of illegal land use in the Park (that is, the incidence of encroaching and squatting) suggested that the degree of enforcement recently experienced by a village was not closely related to the current extent of illegal occupancy of the Park by residents of that village. While there was some statistical confirmation of the observation that villages directly bordering the Park and with a high population of Javanese migrants were likely to have a higher incidence of squatting, even allowing for such factors did not improve the hypothesised statistical relationship between enforcement and illegal occupation.

A more fine-grained analysis of selected villages with low, medium, and high levels of external enforcement gave more insight into the complex processes at work. The low-

enforcement village also had low levels of illegal land use, largely because of the “self-enforcement” provided by village leadership and institutions. This was fairly typical of established Lampungese villages around the Park where traditional institutions were more deeply rooted. In the medium-enforcement village, the level of illegal land use was high, which was typical of the extensively-deforested eastern sector of the Park where there was high pressure for land from migrants and support from local elites for in-migration and agricultural expansion in the Park. In the high-enforcement village, there was more support from local elites for squatters and a tendency for evictees to occupy land elsewhere before returning to take up the cleared land again, along with new migrants. Thus local leadership, institutions, and population pressure were important factors in explaining the degree of encroachment, along with or apart from external enforcement activities.

Nevertheless, the study found clear evidence of the lack of effectiveness of even the most stringent enforcement activities. Even when patrols were underway, farmers were often able to hide from Park officers or rangers. Information about routine patrols and joint operations was widely shared in advance through text messages, phone calls, and word of mouth. Before an eviction operation, notice was normally given to local authorities such as village heads, so most squatters or encroachers knew to hide to avoid arrest, even though their coffee could still be destroyed. Eviction from the Park was initially associated with “local transmigration” (*transmigrasi lokal*) to other areas of Lampung Province. This local transmigration aimed to solve the environmental problem of “illegal forest squatters” by providing them with alternative livelihoods in the same province (R. Elmhirst, 1999; R. J. Elmhirst, 1997). The coffee plots within the Park were destroyed and pioneer tree species were planted to promote reafforestation. However, as described in Chapter 5, the effect of eviction was largely temporary. Evicted farmers could continue to visit the Park to farm while based in their new location and eventually return to occupy the land when they had accumulated more capital and they judged the level of enforcement was reduced. Even with a high level of enforcement, the Park was still seen as available to continue coffee planting.

As noted above, enforcement activities were not uniformly implemented throughout the Park but were targeted in specific zones. The eastern part of the Park was where the most extensive encroachment had occurred and where the number of household livelihoods at stake was the largest. Hence this zone had come to be considered a

lower priority for conventional enforcement, compared with the western zone where targeted enforcement could be more effective. The findings show that law enforcement efforts were quite effective in reducing illegal activities in the areas targeted, especially illegal harvesting and poaching. However, these efforts were not enough to solve the problem of agricultural encroachment. Thus, while enforcement activities continued to play an important role, just over half the illegally occupied areas in 2014 remained "not yet handled."

8.4 Local Perspectives on Potential Solutions

Depending on their circumstances, local leaders and farmers offered different solutions to the problem of deforestation within the BBSNP (Chapter 7). Where the incidence of farming inside the Park or other protected forest areas was high, the preferred solution was in effect to excise the already-converted land from the Park and legalise the farmers' *de facto* tenure, thus formally privatising portions of the common pool resource. This was especially persuasive where large contiguous areas had already been deforested and converted to coffee farms on the eastern side of the Park. On the other hand, where local leaders were not supportive of squatters and encroachers, they advocated eviction, with our without organised relocation to alternative agricultural sites. In other words, they supported upholding the public property regime but with recognition in most cases of the importance of providing alternative livelihoods. The feasibility and desirability of these two options are briefly considered in this section.

8.4.1 Privatising the common pool resource

Farmers and leaders who were familiar with the terms of the Community Forest (*HKm*) schemes in Protection Forests and Limited Production Forests, whereby conditional 35-year permits were issued to previously-illegal coffee planters, advocated something similar for lands within the Park that had already been converted to coffee farms. The suggestion was that this land be "written off" as part of the protected area and its use for agriculture legalised with the issuing of occupation permits for a certain period. Farmers accepted that this would come with obligations to ensure protection of the remaining forest and manage their farm land to support conservation and biodiversity.

A study by the World Agroforestry Center in the Sumberjaya watershed in West Lampung District found that participants in the Community Forestry scheme were optimistic that this form of land tenure agreement would have a positive impact on their income, land security, and investment in the land (Pender *et al.*, 2008). Other occupiers of this Protection Forest who were outside the scheme were keen to take part, including members of forest-farmer groups who wanted to integrate their groups' rules and administrative processes with the HKm agreement.[45]

However, several problems with this legalisation of illegal land use in Protection Forests were identified during the first round of fieldwork in 2009. First, some farmers were unaware that they were included in a HKm scheme. Second, farmers were reluctant to fulfil the obligation to plant 400 non-coffee trees in every hectare of coffee, even though this included fruit trees that were expected to increase their income. When they were still saplings, the non-coffee trees did not affect the coffee trees, but when they grew up coffee production was adversely affected by shading. Some farmers admitted that they deliberately allowed the fruit trees to die in order to reduce shading. A third problem was that participation in the HKm scheme increased the land value, prompting illegal transactions of HKm land. In Chapter 5 it was shown that the price of coffee land varied with land status; in particular, the price of a coffee farm was higher in a Protection Forest than in the National Park because of the existence or potential existence of a long-term permit under a HKm contract.

Despite these imperfections, it appeared that the HKm scheme could have a positive impact on tenure security and hence on farmers' decisions to invest in their coffee farms, adopt more conservative farming practices, assist in protecting the environmental functions of the Protection Forest, and possibly join the coffee certification scheme. As mentioned in Chapter 6, 40% of HKm households in West Lampung District were involved in coffee certification in 2014. These positive impacts could be achieved if there was sufficient oversight and support. Implementing this approach in the National Park, however, would encounter serious difficulties.

[45] Interview with Forestry Officer in Sumberjaya Sub-district, West Lampung District, 16 May 2009. Forest farmer groups are recognised at the district level and have to meet some criteria to be registered, for example, by having a group hierarchy and a list of members.

First, from the perspective of Park Management, this was viewed as the least favourable option as the Park has World Heritage status and would risk losing this status. Even if it was possible to negotiate the excision of part of the Park for a HKm scheme, this area would have to be replaced by another area contiguous with the existing Park to ensure no net change in the area of the Park.

Second, as explained in Chapter 3, the National Park is under central government jurisdiction. Based on Article 19 of the 1999 Forestry Law concerning the "transfer of forest functions that have strategic impacts," the re-drawing of National Park boundaries to allocate land to another function must be approved by the People's Representative Council (*Dewan Perwakilan Rakyat*) at the national level. Thus the process would involve local, district, provincial, and national-level government.

The third and most important difficulty is that the legalization of agricultural occupation in some parts of the Park could trigger forest conversion in other parts of the Park, as well as in other protected areas throughout the country. The problem of encroachment on National Parks is not exclusive to the BBSNP, hence a change in the function of part of the BBSNP would be a national issue. Without greatly enhanced control over access to the remainder of the Park, requiring an unfeasibly large increase in resources, the privatisation approach would not solve the long-term problem of forest conversion and encroachment.

8.4.2 Enforcing public ownership of the common pool resource

Other local leaders interviewed argued for enforcing exclusion as the only strategy to solve the problem of deforestation in the Park. The Bupati of West Lampung District accepted this, provided the expelled households were equipped with the capital to survive in their new place, for example, by being allocated suitable land for agriculture and housing, or beef cattle to begin a livestock enterprise. The history of land use in Chapter 5 can be drawn on to comment on the likely effectiveness of this approach.

The story of the eviction of coffee farmers from Trimulyo in 1988 is instructive. A total of 150 households, comprising a population of about 600 people, who cultivated coffee plots inside the Park were relocated to North Lampung District in the Rawa Jitu and Rawa Pitu Transmigration Area. This was termed Local Transmigration (*Transmigrasi Lokal,* or *Translok*) as it involved sponsored migration to another district within the

same Province. At their new place, they were provided with 2 ha of agricultural land and 0.25 ha for housing – the standard allocation for transmigration schemes.

This was viewed at the time as a good solution for the expelled families to survive and build livelihoods in their new place, without depending on illegal occupation anymore. In fact, most of the evictees stayed in the new *translok* area. However, for some families, the new location was used to accumulate the capital needed to resume coffee planting in the same area from which they were evicted in 1988. These evictees typically kept their land in the *Translok* area but returned to grow coffee in the Park. Their motivation was the high price of coffee and the perceived reduction in law enforcement in that area of the Park. Research by Gaveau *et al.* (2009) suggests that the number of returnees was not large; of 1,384 farmers interviewed from north to south of Park's border, only 58 had previously been evicted.

Recent evictions from the Park, however, simply involved enforcing the law without offering the expelled households relocation as with the *Translok* in 1988. The question of what the expelled households would do to maintain their livelihoods was still a problem. With low levels of monitoring and control, it was even more likely this time that the evictees would try to return, but this time without the advantage of accumulated capital. Hence the evidence is that some form of *Translok* program is needed, along with consistent law enforcement within the Park.

8.5 Lessons Learned from the Case Study

8.5.1 Different types of household need different strategies

The study demonstrated that rural households in forest-adjacent communities have varied livelihood assets and strategies. Hence interventions to promote sustainable development must be carefully targeted, especially differentiating between the smallholders who are farming legally, those who have a combination of legally- and illegally-farmed land, those who are merely squatters on protected state forest land.

For those farming legally, incentive-based mechanisms that fall within the scope of Payment for Environmental Services (PES) can be implemented, such as coffee certification. However, such schemes need to ensure the traceability of the coffee produced if they are to have a credible impact on protecting the Park. Extension

programs and technical assistance from local government and the private sector can also target the legal farmers.

For encroachers and squatters, interventions need to combine targeted law enforcement (eviction and destruction of coffee trees) in areas with highest conservation value to get the best returns on the considerable costs of law enforcement. This approach is currently implemented by BBSNP management. However, ignoring the livelihood implications of strict enforcement for these household types will not meet development objectives and ultimately will undermine the conservation objectives.

8.5.2 Alternative livelihoods are needed for illegal coffee growers

Following on from the preceding lesson, it has to be emphasised that over 16,000 smallholders are occupying land in the BBSNP. In the study villages on the eastern margins of the Park, about 30% of interviewed households were partly or wholly farming in the Park. These households are not wealthy investors but are dependent on their small plots of coffee for their livelihoods. While the returns from coffee production are not especially high, being comparable to rural wage rates, if their access to the Park is removed they will lose their main source of income. Hence alternative sources of livelihood are needed if they are to survive without returning to encroach on the BBSNP or other environmentally-sensitive areas.

It was not within the scope of this study to identify alternative livelihood options. However, emerging agricultural activities observed in the study area included vegetable production and livestock breeding. By helping to diversify and intensify land use within village areas, it may be possible to enable at least “encroacher” households to offset their loss of income due to enforced exclusion from illegal coffee farming. Ecotourism may also provide scope for new local livelihoods. Ecotourism can provide compensation and conservation incentives for forest-adjacent communities in two ways – sharing revenues from user fees and gaining employment in the management and operation of ecotourism facilities (Swallow *et al.*, 2007). The borderlands of the Park have high value as landscapes as well as embodying the cultural values of indigenous ethnic groups and their interactions with Javanese migrants over more than half a century.

For “squatter” households, eviction would leave them landless, with no source of income, as they are entirely dependent on their coffee production within the Park. For these households, the provision of alternative livelihoods requires local transmigration with sufficient good-quality land and support to enable them to earn an adequate livelihood. This has been reasonably effective when implemented in the past and needs to be part of any long-term strategy.

8.5.3 Local elites and institutions influence effectiveness of Park management

An important lesson from the research was that local elites and institutions play a key role in enforcing protection or enabling encroachment of the National Park. This is consistent with the finding of Tomich and van Noordwijk (1995) that local institutions strongly affected natural resource management in various study sites in Sumatra. Local elites include powerful individuals at village and district levels who have knowledge about and influence over local affairs, including the activities of encroachers and the arrival of newcomers seeking land. These powerful actors can have a decisive positive or negative impact on forest protection.

Customary leaders and village elders can draw on traditional village rules and norms to support conservation of the Park and the village commons and exclude newcomers who are intent on encroachment. On the other hand, village leaders can encourage new settlers and support encroachment, undermining official efforts at law enforcement, as a way of building up their political and economic base. The devolution of many functions to local government at the district level and the introduction of district elections have ensured that district officials will give priority to regional economic development, regardless of environmental impacts. For the *bupati*, cultivating a broad base through supporting the economic activities of local and migrant populations increases his chance of re-election, whereas a hard-line approach to protected areas may lose votes.

8.5.4 Incentives or coercion alone are not sufficient

The incentives-based approach of coffee certification sought to reward “good practices”, especially foregoing cultivation in protected areas, by offering higher prices for certified coffee. However, the price premium was not seen as rewarding enough or reliable enough for smallholders to abandon illegal plots within the Park and focus on

intensification of legally-held plots in the village. In any case, the traceability of the coffee produced on the margins of the Park was not sufficient to ensure that it was not harvested from land inside the Park. These findings together show that the incentive-based approach was insufficient in itself to protect biodiversity.

Law enforcement, through patrolling the Park and sanctioning offenders, was relatively effective in reducing activities such as illegal logging and poaching, but not for solving the problem of illegal land occupation in the Park. It was difficult and costly to enforce exclusion from the large areas already converted to farming and occupied by many thousands of farm households, without providing those households with an incentive to comply. Thus a coercive approach on its own was also insufficient to address the problem of deforestation and encroachment.

The lesson is that at least some combination of incentives and coercion is needed. Livelihood-oriented projects such as coffee certification must include effective monitoring and enforcement if they are to contribute to conservation goals. Coffee certification can be misconstrued as rewarding encroachment if it is feasible to include coffee grown illegally in the Park, thereby triggering further deforestation. Thus targeted enforcement has to be the basis of any credible incentive-based approach.

CHAPTER 9
CONCLUSION

In-situ conservation through creating and enforcing exclusive protected areas is the principal global strategy to preserve endangered ecosystems and wildlife habitat, but in developing countries these protected areas are still linked to local communities whose livelihoods are at least partly dependent on the forest. The belief in “win-win solutions” that allow for conservation of forest ecosystems while supporting the (modified) livelihoods of “forest-dependent communities” has led to the growing advocacy of integrated approaches to conservation and development. However, while these might be feasible for carefully regulated, low-impact forest activities, agricultural expansion that permanently converts forested landscapes for the production of export crops like oil palm, rubber, and coffee is still the main cause of deforestation in the tropical rainforests of Indonesia and elsewhere. In this case, the sharp trade-offs between conservation and development make “win-win solutions” seem elusive.

This study of long-term land-use change in the Bukit Barisan Selatan National Park – one of the most significant protected forest areas not just in Indonesia but globally – has underscored the difficulty and complexity of managing large-scale common pool resources to achieve both conservation and development goals. Deforestation and expansion of agricultural land use on the fringes of the Park has buffered the core conservation area to some degree but the extent of forest loss, especially within the eastern boundary of the Park, has severely affected wildlife habitat and biodiversity. The dilemma is that the Park must be protected from agricultural encroachment (as well as poaching and illegal logging and harvesting) in order to preserve an adequate (that is, very large) area of natural rainforest habitat for the endangered species in the Park, especially the large mammals – the Sumatran tiger, elephant, and rhinoceros. At the same time, the Park has been exploited by poor and landless rural households, struggling to earn a livelihood by producing coffee to supply a global commodity chain in difficult and risky conditions, whose welfare is also of concern. An effective combination of economic incentives and rewards for Park conservation (sufficient to support affected livelihoods) and credible disincentives for encroachers and squatters (sufficient to deter further penetration of the Park) would be an ideal outcome.

To resolve the conservation-development dilemma in the Park, Park authorities enlisted the support and cooperation of other stakeholders, including private companies, NGOs, and local government agencies. This led to the implementation of two approaches: (1) law enforcement, mainly in partnership with NGOs, to enhance enforcement of exclusion in high-priority areas of the Park and (2) coffee certification, at the initiative of private coffee export companies, mainly in the areas where coffee cultivation was already widespread.

The first approach, the implementation of more stringent law enforcement, was not implemented uniformly throughout the Park but only in specific areas where populations of endangered wildlife were largest and large-scale conversion of forest habitat had not yet occurred. This enforcement effort was locally effective but not enough to solve the larger encroachment problem, partly due to the influence of the local elites. The second approach, coffee certification, was viewed as an incentive to curb coffee production within the Park. This approach had some positive impacts on farm management and farmer networks, but the economic impact was not great and it did not solve the problem of Park encroachment due to lack of traceability. Thus neither of these approaches on their own were effective to reconcile conservation and development objectives for the Park and the forest-adjacent population.

Two quite opposite solutions to the fundamental problem of agricultural encroachment were proposed by local actors. Each of these minimises the trade-off between conservation and development, not by finding an integrated solution but by allowing one of the objectives to be dominated by the other. The first option proposed was to “write off” the large area already converted to extensive coffee mono-cropping in the eastern part of the Park and grant occupation permits to the smallholders there, following the precedent of existing Community Forest schemes in locally-managed Protection Forests. The effect of this policy, assuming it could get through the bureaucratic and political hurdles it would face, would be to put the Park’s World Heritage status at increased risk and to create a powerful incentive for further forest conversion in the Park and elsewhere. The second option proposed was to enforce exclusion by mobilising the resources needed to evict all squatters and encroachers, regardless of whether new sources of livelihood could be provided. This of course would be very costly and would ignore the genuine development needs of the evictees.

There is thus no simple and obvious solution to the conservation-development dilemma in the BBSNP that is just waiting for the “political will” to be implemented. However, the study has identified some key lessons that can assist in developing a more effective, integrated approach: (1) Incentives or coercion alone are not sufficient. Market-based approaches cannot replace monitoring and enforcement if they are to be effective in changing behaviour. Conversely, the costs of coercion are insurmountable of there are no incentives in play. (2) Different types of household need different strategies. There is wide diversity in the goals and circumstances of different households and villages. Strategies need to be tailored to these specific situations. (3) Alternative livelihoods are needed for illegal coffee growers. To make relocation effective and to contribute to broader rural development goals, sufficient resources need to be invested in new livelihoods for households evicted from the Park, though this may entail acquiring suitable land from large agribusiness firms elsewhere in the Province. (4) Local elites and institutions influence the effectiveness of Park management. The role of these intermediate actors can be crucial in determining the success or failure of outside interventions. Engaging with local politics is thus unavoidable in pursuing any integrated strategy.

In an integrated strategy, both coercive and incentive-based approaches need to be combined, in the context of improved governance from national to local levels. An incentive-based approach will not be effective without enhanced law enforcement. Conversely, law enforcement will not be effective without involving local elites and providing incentives for compliance, including alternative sources of income for encroachers and squatters. Coffee certification may still have a role to play in promoting sustainable and profitable smallholder production, but this requires much deeper involvement of farmers, local elites, private companies, and government in ensuring traceability. Whatever the role of certification schemes (which in any case ultimately depend on global consumer demand), effective Park management will require enhanced capacity for law enforcement along with much greater support for alternative livelihoods for existing forest-adjacent communities and relocated farm households.

The study has thrown up many issues in need of further investigation. In particular, more research is needed in the following areas: (1) More spatial data analysis will help to monitor and understand the trends of deforestation and regrowth in relation to the

law-enforcement effort. (2) More investigation needs to be undertaken of the coffee value chain and the costs and benefits of ensuring the traceability of coffee from the farm to the exporter. (3) Studies are needed of the different ways in which companies are implementing coffee certification to assess their relative effectiveness. (4) Research could be undertaken into the role of local elites and institutions in influencing conservation and development outcomes in the vicinity of the Park.

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