



# The context of natural forest management and FSC certification in Brazil

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Photo by Neil Palmer/CIAT  
Aerial view of the Amazon rainforest

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# Contents

<b>Abbreviations</b>	<b>vi</b>
<b>Acknowledgements</b>	<b>x</b>
<b>Executive summary</b>	<b>xi</b>
<b>1 Introduction</b>	<b>1</b>
Claudia Romero, Francis E. Putz, Erin O. Sills, Manuel R. Guariguata, Paolo O. Cerutti and Guillaume Lescuyer	
1.1 Evaluation rationale and activities	3
1.2 FSC certification in Brazil	4
1.3 References	7
<b>2 Political economy considerations of the forest and timber sectors and natural forest management certification in Brazil</b>	<b>9</b>
Guilherme R. Lima and Nicole Munk	
2.1 Introduction	9
2.2 Land use dynamics, institutions, and programs	10
2.3 Forest regulation	15
2.4 Forest institution funding	20
2.5 Forested lands in Brazil	26
2.6 The forestry sector and timber industry	29
2.7 Forest certification within the country's institutional framework	33
2.8 References	41
2.9 Appendices	45
<b>3 Typology of the timber sector and dynamics along the natural forest certification continuum</b>	<b>49</b>
Luciana Maria Papp and Edson Vidal	
3.1 Introduction	49
3.2 Typology of the forest sector	52
3.3 Methodology	52
3.4 Results	54
3.5 Discussion	59
3.6 Results	61
3.7 Discussion	68
3.8 References	70
3.9 Appendix	73
<b>4 Assessment of self-selection into natural forest management certification in the Brazilian Amazon</b>	<b>84</b>
Maureen Voigtlaender	
4.1 Introduction	84
4.2 Methods	85
4.3 Results	87
4.4 Discussion	96
4.5 Conclusions	98
4.6 References	98
4.7 Appendix	100
<b>5 Conclusions</b>	<b>104</b>

# List of figures and tables

## Figures

1.1.	Integration of studies to generate information (Phase I), facilitate discussions with a variety of stakeholders, and identify the key elements of process and theory-based evaluations to be carried out during the second stage of research to assess the impacts of FSC certification.	2
1.2.	Schematic representation of key steps and decisions in the FSC certification process.	3
1.3.	Operational model of the process throughout the various stages of FSC evaluation.	4
2.1.	Stages and activities of the EEZ in Brazil.	12
2.2.	Ecological and Economic Zoning of the Legal Amazon approved by Presidential Decree in 2010.	12
2.3.	Timeline of forest laws and regulations influencing land use and forest management decisions in Brazil.	18
3.1.	Evolution of timber demand in the Amazon for the period 1998–2009.	49
3.2.	Relationship between market outlets and preferences of timber producers in the Brazilian Amazon	51
3.3.	Results of a MFA on groups of variables related to Market and Area characteristics of FMUs operating in natural forests in the Brazilian Amazon (N=65).	55
3.4.	Hierarchical tree showing the relationships among companies operating in natural forests in the Brazilian Amazon based on the scores of a multiple factor analysis on the first two axes (N=65; -67.03% of variance explained).	56
3.5.	Results of a hierarchical clustering on the resulting scores of a MFA for companies operating in natural forests in the Brazilian Amazon (N=65).	57
3.6.	Annual transitions (numbered arrows indicating transition number as explained in Table 6) between stages along the certification continuum.	61
3.7.	Total number of times that FMUs operating in natural forests in the Brazilian Amazon (N=105) made a particular transition during the study period (1994–2013).	62
3.8.	Dynamics of the number of FMUs in natural forests that made the first move towards engaging in certification (made decision D2: <i>Considering Certification</i> ).	65
3.9.	Number of newly certified FMUs in Brazil over the study period.	65
3.10.	Number of FMUs operating in natural forests in Brazil that have engaged in FSC certification over the period 1994–2013.	66
3.11.	Number of FMUs that remained certified (green) and those that lost certification (red) annually, for FMUs operating in natural forests in Brazil (N=105) between 1994 and 2013.	66
3.12.	Number of FMUs certified through IMAFLORA that became certified (green) and those that lost certification (red) over the years.	67
3.13.	Number of SCS certified FMUs that obtained certification (green) and those that lost it (red) over the years.	67
3.14.	Events that might have influenced decisions made by firms engaged in the management of natural forests in the Brazilian Amazon over the years.	69
4.1.	Results of semi-structured interviews depicting the main reasons why a company seeks certification of forest management.	89
4.2.	Main reasons why a company would seek certification in forest management based on semi-structured interviews in Brazil.	90

4.3.	Advantages (Panel A) and disadvantages (Panel B) of certification for companies that manage certified natural forests in Brazil.	92
4.4	Actions to facilitate and encourage the increase of areas of natural forest management under FSC certification in the Brazilian Amazon.	93
4.5.	Characteristics that respondents of semi-structured interviews (N=10) associated with companies opting for long-term FSC certification of natural forest management in Brazil.	94
4.6.	Characteristics associated with companies that abandon FSC certification after the suspension or termination of their certificates, based on semi-structured interviews in Brazil (N=10).	95
4.7.	Necessary improvements to the FSC certification system, as suggested by respondents of semi-structured in Brazil (N=10).	95
4.8.	General model that describes the interacting factors that discourage the FSC certification of natural forests management in Brazil.	97

## Tables

2.1.	Plans and programs related to forested land use.	11
2.2.	Ecological and Economic Zoning of the Legal Amazon approved by Presidential Decree in 2010.	13
2.3.	SNUC categories of Protected Areas and their correspondence with IUCN categories.	15
2.4.	Timeline of key events related to the Brazilian forests.	17
2.5.	Regulation of cutting cycle, maximum cut intensity and minimum cutting diameter.	20
2.6.	Main credit lines and programs for the forestry sector in Brazil.	22
2.7.	Number of contracts granted by programs related with the forestry sector and amount by selected credit lines between 2006 and 2010.	23
2.8.	Difference in fees paid by AMATA between 2010 and 2013.	24
2.9.	Population dynamics in the states that form the Brazilian Legal Amazon.	28
2.10.	Federal community managed forests.	31
2.11.	Timeline of FSC Certification in Brazil.	37
2.12.	Management Board of FSC Brazil.	37
2.13.	Area certified by FSC in the Legal Amazon (2012).	38
3.1.	Description of categorical variables used to construct a typology of active FMUs operating in natural forests in the Brazilian Amazon (N=65).	54
3.2.	Correlations between groups of variables and each of the two dimensions of the MFA of natural forest FMUs in the Brazilian Amazon (N=65).	55
3.3.	Contribution, quality of representation, and test statistics for continuous and categorical variables used in a multiple factor analysis (MFA) grouped in <i>Area</i> and <i>Market</i> groups, for companies operating in natural forests in the Brazilian Amazon (N=65).	56
3.4.	Cluster composition in terms of status of FMUs along the certification continuum.	57
3.5.	FMUs in Cluster 2 that lost their certification.	58
3.6.	Rules for assigning FMUs to different stages (indicated in italics) along the certification continuum, and for making transitions between those stages, as depicted in Figure 3.5.	61
3.7.	Results of likelihood ratio test for linked certification annual decisions made by FMUs engaged in natural forest management in Brazil, between 1994 and 2013.	63

# Abbreviations

ABNT	Brazilian Association for Technical Standards
AC	State of Acre
AFL	Atlantic Forest Law
AIMEX	Association of Timber Exporters of State of Pará
ALFA	Forest Law Application Initiative in the Amazon
AM	State of Amazonas
APP	Area of Permanent Preservation
ASI	Accreditation Services International
AUTEF	Forest Authorization
BNDES	National Bank for Economic and Social Development
CAPES	Coordenação de Aperfeiçoamento de Pessoal de Nível Superior
CAR	Rural Environmental Cadaster
CB	Certifying Body
CCZEE	Coordinating Committee of the Ecological and Economic Zoning of the National Territory
CDM	Clean Development Mechanism
CERFLOR	Programa Brasileiro de Certificação Florestal
CGFLOP	Commission of Public Forest Management
CONAFLOP	National Commission of Forests
CONAMA	National Council of the Environment
CONS	Considering Certification
DAS	Deforestation Alert System
DETER	Real-Time Detection of Deforestation
DoF	Document of Forest Origin
EEZ	Ecological and Economic Zoning
EST	Estuarine
EXP	Export
FC	Forest Code
FLONA	National Forest
FLOTA	State Forest



FM	Forest Management
FMU	Forest Management Unit
FNMA	National Environmental Fund
FPCFFM	Federal Program of Community and Familiar Forest Management
FSC	Forest Stewardship Council
FUNAi	National Foundation of Indigenous People
GF	Guia Florestal
GFA	GFA Consulting Group GmbH
GFTN	WWF's Global Forest & Trade Network
GTA	Grupo de Trabalho Amazônico
ha	hectares
HCPC	Hierarchical Clustering of the Principal Components
IBAMA	Instituto Brasileiro do Meio Ambiente e Dos Recursos Naturais Renováveis
IBGE	Brazilian Institute of Geography and Statistics
IBICT	Brazilian Institute of Information in Science and Technology
ICMBio	Chico Mendes Institute of Biodiversity Conservation
ICMS	Tax on Circulation of Goods and Services
IDEFLOR	Instituto de Desenvolvimento Florestal do Pará
IEB	Brazilian Institute of Education
IFOAM	International Federation of Organic Agriculture Movements
IFN	National Forest Inventory
IFT	Instituto de Florestas Tropicais
IIEB	Ideal Institute of Teaching Bataguassu
IMAFLOA	Instituto de Manejo e Certificação Florestal e Agrícola
IMAZON	Instituto do Homem e Meio Ambiente da Amazônia
INCRA	National Institute of Colonization and Agrarian Reform
INMETRO	National Institute of Metrology, Quality and Technology
INPE	Instituto Nacional de Pesquisas Especiais
INT	Intermediary
ITR	Rural Territorial Tax
LGFP	Public Forest Management Law
LPFM	Law of Public Forests Management
LULCC	Land Use and Land Cover Change
MA	State of Maranhão
MCTI	Ministry of Science, Technology and Innovation
MDA	Ministry of Agrarian Development
MDIC	Ministry of Development, Industry and Foreign Trade
MFA	Multivariate Factor Analysis

MMA	Ministério do Meio Ambiente
MT	State of Mato Grosso
NA	Not Available
NFC	New Forest Code
NFFD	National Fund for Forest Development
NGO	Non-Governmental Organization
NISR	National Institute for Space Research
NPCC	National Plan on Climate Change
NPRD	National Policy of Regional Development
NTFPs	Non-timber forest products
PA	Protected Area
PCFM	Program of Community and Familiar Forest Management
P&C	Principles & Criteria
PA	State of Pará
PACF	Annual Forest Concession Plan
PEEZ	Ecological and Economic Zoning Program
PEFC	Program for the Endorsement of Forest Certification Schemes
PMFS	Sustainable Forest Management Plan
PNGATI	National Policy for Territorial and Environmental Management of Indigenous Land
POA	Annual Operation Plan
PPCDAm	Action Plan for the Prevention and Control of Deforestation in the Legal Amazon
PPCerrado	Action Plan for the Prevention and Control of Deforestation in the Cerrado
PRA	Program of Environmental Regularization
PRODES	Projeto de Monitoramento da Floresta Amazônica Brasileira por Satélite
PRONAF	National Program of Familiar Agriculture Strengthening
RA	Rainforest Alliance
RDS	Sustainable Development Reserves
REDD+	Reducing Emissions from Deforestation and Forest Degradation
RESEX	Extractive Reserves
RIL	Reduced Impact Logging
RO	State of Rondônia
RR	State of Roraima
RSB	Roundtable on Sustainable Biomaterials
SBS	Brazilian Silviculture Society
SCS	Scientific Certification Systems
SEMAS	Secretaria de Estado de Meio Ambiente e Sustentabilidade do Pará
SFB	Servicio Florestal Brasileiro
SGS	Société Générale de Surveillance

SIMEX	System for Monitoring Timber Harvesting
SIMLAM	Sistema Integrado de Monitoramento e Licenciamento Ambiental
SINDISERPA	Sindicato das Indústrias de Serrarias Paragominas
SINDUSCON	Sindicato da Indústria da Construção Civil do Estado de Roraima
SINDUSMAD	Sindicato das Indústrias de Serrarias, Carpintarias, Tanoarias, Madeiras Compensadas e Laminadas, Aglomerados e Chapas de Fibras de Madeiras do Estado do Acre
SISFLORA	Sistema de Comercialização e Transporte de Produtos Florestais
SINMETRO	National System of Metrology, Normalization and Industrial Quality
SISNAMA	National System of the Environment
SLIMF	Small or Low-Intensity Managed Forest
SNUC	National System of Protected Areas
SUNDUSCON	Sindicato da Indústria da Construção Civil do Estado de Roraima
TAA	The Amazon Alternative
Terra Legal	Program of Land Regularization in the Legal Amazon
TFF	Tropical Forest Foundation
TFT	The Forest Trust
UNICAMP	State University of Campinas
UPA	Unidades de Produção Anual
WWF	World Wide Fund for Nature

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# Executive summary

This volume presents baseline information from four studies carried out in Brazil, as part of CIFOR's ongoing evaluation of the impacts of Forest Stewardship Council (FSC) certification on natural tropical forests. The findings of these studies will facilitate the design of an empirical impact evaluation, by providing background information on the biophysical, social, economic, and policy contexts of FSC certification. As such, this study aims to answer the questions of when, where, how, to what extent, why, at what cost to whom, and for how long FSC certification has contributed to the maintenance of the values of natural tropical forests. The components of this evaluation will link: 1) a theory-based impact evaluation of the intervention, developed through counterfactual analysis, and 2) a process evaluation, which assesses the extent to which the intervention was implemented as designed.

Our first chapter (*Introduction*) lays out the rationale for this study, and provides an overview of its philosophy and implementation. Chapter 2 (*Political economy considerations of the forest and timber sectors and natural forest management certification in Brazil*) presents an account of the main factors that have shaped the occupation, transformation, and use of forest lands in Brazil. The colonization of forested areas of the Legal Amazon (hereafter the Amazon), and the associated changes in land cover, began in the second half of the twentieth century, with the implementation of federal policies that prompted agrarian reform by providing economic incentives for migration into the area. The region has been characterized by high rates of deforestation, driven mainly by cattle ranching and industrial agriculture, with logging as a secondary activity concentrated on the harvesting of high value timber. Deforestation is the outcome of land-use decisions by a range of social actors (e.g., federal and state governments, landowners, and smallholders). The land use decisions made by

these actors may have been influenced by a number of factors, including explicit incentives to advance commodity production into the forest frontier (e.g. soy and cattle ranching), the development of infrastructure (e.g. roads, dams), and the expansion of services (e.g. education, health). As selective techniques are employed, logging contributes directly to forest degradation, but only indirectly to deforestation, and then only under conditions that favor land-cover change (e.g., increased access that facilitates agroindustrial development).

In the 1990s, in response to high deforestation rates, rampant illegality, and alarming biodiversity losses, Brazil's federal government began to adopt measures to tackle these problems. Concerns about global climate change, which became prominent in the early 2000s, led the federal government to assume a more active role and demonstrate its commitment to forest conservation. A number of policies were implemented to curb deforestation in the Amazon, with the goal of reducing greenhouse gas emissions, which are mainly associated with forest conversion. These policies were consolidated into the Action Plan for the Prevention and Control of Deforestation in the Legal Amazon (PPCDAm), which was launched in 2003, and restricted land use change in selected forested areas by designating Areas of Permanent Protection (APPs) and Legal Reserves. In 2006, further legal provisions were introduced to regulate the activities of the forest sector, which led to the creation of timber concessions in Public Forests. 2006 was also marked by the establishment of the Brazilian Forest Service (SFB), which represented an important institutional innovation. Many States launched their own initiatives to curb deforestation (e.g. Acre state's 2001 Forest Law) and established institutions to support these goals (e.g. the founding of IDEFLOR in the state of Pará in 2007). The Forest Code (FC) (1935) was most recently updated in 2012. The New Forest Code

(NFC) presents refined criteria for the use of forest resources on both public and private property.

Legal frameworks for land tenure and forest protection in Brazil continue to be both complex and dynamic. Powerful and diverse actors at various levels of government and society have made forest policy definition a playing field that is loaded with conflicts and prone to corruption and illegality. The vastness of the Amazon has historically posed a challenge to the enforcement of regulations, which has been only partially overcome by the launching of the Projeto de Monitoramento da Floresta Amazônica Brasileira por Satélite (PRODES) satellite, and the initiation of the Real-Time Detection of Deforestation (DETER) program in 2009. A range of public and private institutions and non-governmental organizations (NGOs) (e.g. Instituto do Homem e Meio Ambiente da Amazônia [IMAZON], Instituto de Manejo e Certificação Florestal e Agrícola [IMAFLOA], Amigos da Terra), have generated knowledge that facilitates the identification of the fundamental constraints to responsible forest management, and opportunities to improve forest governance.

Market-based instruments have become an important complement to command-and-control approaches. Examples include the emergence and implementation of instruments such as payments for ecosystem service schemes (PES) such as REDD+. Forest certification arose as a means to battle tropical forest loss and became a mechanism to facilitate market access with the prospects of more rewarding prices while fostering an image of social and environmental responsibility. The FSC scheme started in Brazil in the mid-1990s; in the early 2000s the national scheme CERFLOR, which is recognized by PEFC, was launched yet mostly focused on tree plantations. Although FSC certification is also more widespread in planted forests (61%), considerable efforts were made by institutions and initiatives to promote natural forest certification (e.g., Instituto Floresta Tropical – IFT since 1997; The Amazon Alternative – TAA since 2009; different international NGOs and internationally-supported programs). Yet the limited potential of FSC certification to address loss of natural forest values rests on the limited proportion of timber produced that is aimed at export (22% in 2009) when compared to national markets.

Chapter 3 (*Typology of the timber sector and dynamics along the natural forest certification continuum*) analyzes characteristics of the forest sector and

the dynamics of FSC certification, using data from 1994-2013. The heterogeneity of Forest Management Unit (FMU) traits that determine management decisions is analyzed for just a fraction of the FMUs in the country (N=65 out of ~ 2000), due to the wide range of coverage of timber harvesting operations (i.e. in 192 municipalities). Sampled units were located in *polos madeireiros* (i.e. regions where >100,000 m<sup>3</sup>/yr. of roundwood is industrially processed) where there was some evidence of involvement in the certification process (e.g. participation in improved forest management training sessions; scope-visits to assess baseline management conditions; and audits to verify compliance with certification standards). These decisions are, in turn, located along the *certification continuum*, a conceptual model that identifies the certification states of FMUs. Data were collected for 22 Amazonian *polos madeireiros* and used to discern groups of FMUs with several shared characteristics. Characteristics were chosen based on their potential to affect the outcomes of management operations relevant to an empirical evaluation of FSC certification impacts. The analysis revealed that most FMUs in the sample are vertically integrated (97%) and Brazilian owned (83%).

The resulting four “clusters” of similar FMUs differed in terms of: FMU area, company origin, and market outlets explained 67% of the variance. The clusters also differed in terms of the extent of their engagement with certification, with only limited engagement among FMUs in clusters 1 and 2 (53 FMUs), and greater involvement among FMUs in clusters 3 and 4 (12 FMUs).

The second part of chapter 3 presents a more detailed account of how FMU decisions on certification have evolved over time. Based on data gathered from the FMUs, and records collected by certifying bodies (CBs) and FSC over a period of 20 years, it was possible to document the FMU’s activities which indicate their interest in adopting certification (i.e., along the certification continuum). The first step along the certification continuum was defined as the participation of FMU staff in training activities related to improved forest management. Although this activity does not guarantee the FMU’s intention to proceed with FSC certification, it is the first step towards responsible forest management. Although the vast majority of FMUs surveyed (99 out of 105) had engaged in improved management training, 71% of these FMUs had made no further effort to

become certified. Temporal peaks in engagement along the certification continuum are apparent, perhaps due to external incentives to participate in the training programs (e.g. IFT training in 2001; training supported by TAA in 2009). Later peaks (e.g. 2012) may be attributable to government bonuses and benefits for FMUs adhering to international certification schemes. Just over half of all certified FMUs (14 out of 24) were still certified at the time of this study's completion.

In recent years, documented logging production in Brazil has declined from 24.4 million m<sup>3</sup> in 2004 to 11.6 million m<sup>3</sup> in 2010. Possible causes of this include market competition from abundant, illegal timber and burdensome bureaucratic procedures that restrict access to logging rights. Volumes of certified timber have also declined, from 540,000 m<sup>3</sup> in 2011 to 340,000 m<sup>3</sup> in 2012.

Experts estimated that there was potential for FSC certification in Brazil to expand by 36% by 2015. These estimates were based on the ongoing expansion of forest concessions on public lands. Understanding the motivations of FMU managers for seeking certification can enhance our understanding of how certification might expand. Chapter 4 (*Assessment of self-selection into natural forest management certification in the Brazilian Amazon*), provides insights into the factors that might motivate a company to pursue, obtain, and retain FSC certification. Semi-structured interviews were conducted with 10 stakeholders that represented a range of interests with respect to certification, out of a potential sample of 49 companies in 10 selected *polos madeireiros* that had received training in improved forest management through TAA or IFT. This information was combined with the results of reviews of documentation (e.g., IMAZON and FSC reports) and relevant scientific literature, which focused on the years 2004–2009, when 46% of all certificates were issued. A non-negligible proportion of the interviews corresponded to FMUs that had either ended operations or were no longer involved in the management or logging of natural forests (i.e. 36% of the companies that had indicated interest in certification by participating in forest management training). Each of these interviews helped to identify: the characteristics of companies/FMUs that would never consider certification, might consider certification, and would definitely seek certification; the advantages and disadvantages of certification; and recommendations for how

to promote certification. The interviews revealed that companies operating in regions with social conflicts, and those selling timber to local markets were highly unlikely to consider certification. Other companies were unable to consider certification because they lacked management and/or annual cutting plans, which prevented them from operating legally.

The ability to publicize the certified status of an FMU might facilitate its access to international markets. Despite this potential advantage, respondents pointed out that high costs of compliance with certification requirements, in addition to competition from producers of illegal timber, deters participation. This reluctance was also reported among FMUs that received initial support for certification, but were unable to cover the continued costs. According to respondents, necessary improvements to the certification system include: increased transparency, disclosure of reports, and communication with the public; as well as increased market demand and stability, including from national market outlets.

The descriptive research presented in chapter 5 (*Conclusions*) provides a comprehensive overview of the dynamics and characteristics of managed natural forests as they relate to FSC certification in Brazil. Although the adoption of certification remains modest, despite the considerable efforts of a range of individuals and organizations, FSC certification still could have a significant, potential role in maintaining forest values. Brazil is one of the few tropical countries with a specific program (implemented in 2013) to facilitate the FSC certification of forests managed by traditional and indigenous communities, and small-scale producers (i.e., Small or Low-Intensity Managed Forests [SLIMF]; < 100 ha; <5,000 m<sup>3</sup>/yr.). Community forest management in Brazil has generated a range of innovative modes of resource use. Yet, the added value of FSC certification for community managed operations remains to be demonstrated.

This report provides the foundation to implement an empirical evaluation of FSC impacts. A theory of change is now required to guide the impact evaluation's assumptions, definitions and the testing of its hypotheses, to reveal the impacts of FSC certification of Brazil's natural forests, and the overall engagement of social actors with stakes in their management.





# 1 Introduction

Claudia Romero, Francis E. Putz, Erin O. Sills, Manuel R. Guariguata, Paolo O. Cerutti and Guillaume Lescuyer

Certification of responsible/sustainable forest management has been promoted as a tool for maintaining forest values (i.e. biophysical, social, economic, and policy) for more than twenty years. We can now draw on this experience to identify the real contributions of forest management certification to the maintenance or improvement of a range of forest values, including the mitigation of forest degradation. Here we provide the foundations for such an evaluation.

Given limited budgets for promoting the conservation and the responsible management of tropical forests, it is critical to identify the most effective interventions. Nevertheless, we recognize that there is no ‘silver bullet’, but rather a range of potential interventions that work better when implemented in certain ways, in particular times and places, to achieve specific outcomes, often interacting with other programs in the process. This highlights the importance of evaluating the impacts<sup>1</sup> of any given intervention in various regions, and, in parallel, exploring heterogeneity in its implementation (i.e. due to contrasting contextual factors, including legal frameworks and the characteristics of social actors and processes). Well-structured, verifiable, and objective information about both implementation and impacts can inform negotiations, decision-making, and resource allocations for future conservation interventions (i.e. the responsible management of natural resources with multiple goals) that aim to maintain forest values.

A lack of adequate knowledge about the outcomes of past and present forest-related programs and projects deprives governments (at all levels), forest managers, suppliers of forests goods and

services, consumers, and society at large, of a solid foundation on which to base future resource management decisions. Inadequate understanding of the outcomes that lead to multi-scale impacts of forest management choices, as taken by public or private forest companies, risks creation or maintenance of an unacceptable balance of costs and benefits for those directly and indirectly affected by forest management decisions. This situation might lead to the repetition of ecological, social, economic, and policy failures.

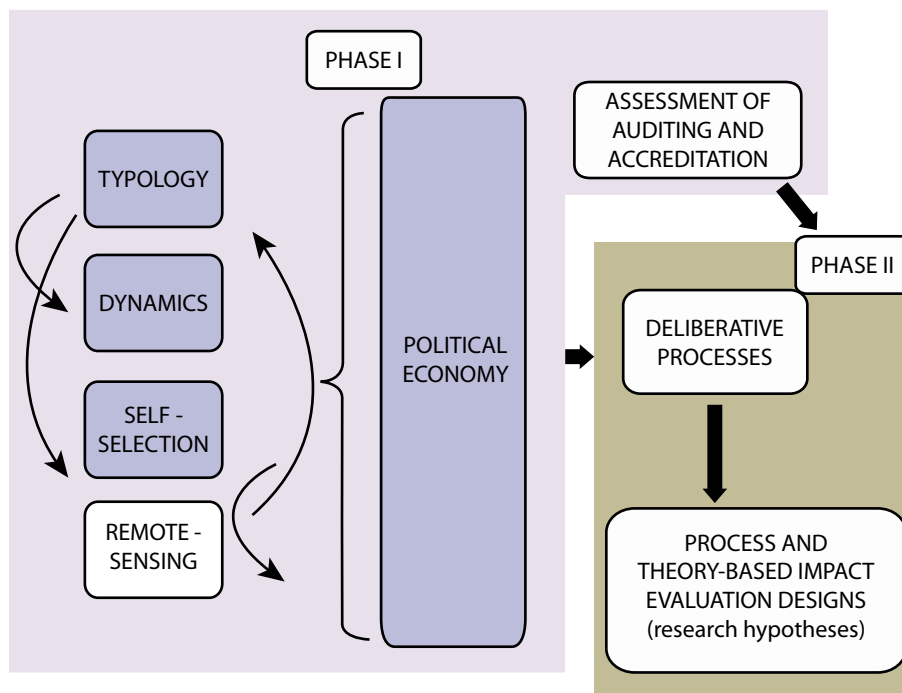
The certification of responsible forest management is a multi-layered intervention that takes place in complex contexts that are subject to constant change. Within these contexts, a range of interested parties are involved, from the early stages of accessing rights to timber resources, down the value chain to harvesting and trading these resources, and selling them to the ultimate consumers.

Lessons are most likely to be derived from impact evaluations of interventions carried out in a transparent manner, ensuring integrity and inclusiveness, and addressing accountability concerns (Farley et al. 2012; Rogers 2012). Such evaluations can generate knowledge for a range of people and institutions interested in, and affected by, its implementation (Romero and Castrén 2013; Romero et al. 2013). Evaluations can represent opportunities to promote inclusion and give a voice to those affected by, and interested in, certification. Evaluation also provides space for reflection and deliberation, and can be a tool for internalizing lessons learned from past mistakes and successes.

Those responsible for carrying out an evaluation must be independent researchers without explicit or ambiguous agendas regarding the development and potential outcomes of the assessment (GAO 2009; Gertler et al. 2011; Perrin 2012; PROFOR

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<sup>1</sup> The positive and negative, primary and secondary, long-term effects produced by a development intervention, directly or indirectly, intended or unintended (OECD 2002).



**Figure 1.1. Integration of studies to generate information (Phase I), facilitate discussions with a variety of stakeholders, and identify the key elements of process and theory-based evaluations to be carried out during the second stage of research to assess the impacts of FSC certification. Results from studies in dark purple boxes are included in this document.**

and FAO 2011; Stern et al. 2012). The necessity of independence is widely recognized in policy circles and beyond. If independence of the evaluation process can be demonstrated, this can also enhance the probability that the knowledge gained will be utilized, and will thus boost its potential to influence both policy and actions on the ground (Bamberger 2009).

CIFOR is developing an independent evaluation of FSC certification impacts<sup>2</sup> with stakeholder input, which focuses on FSC certification of natural tropical forests. This Occasional Paper (OP) addresses in *Phase I* (Figure 1.1), the preparatory stage of an empirical evaluation. The overall objective of this stage is to gather information required to design an impact evaluation that would be credible (i.e. true and technically

adequate for handling evidence), salient (i.e. relevant and of value to decision makers and other evaluation users), and legitimate (i.e. fair in its knowledge gathering, unbiased and respectful). As such, the goal of the studies contained in this volume is to build a foundation on which to design an evaluation framework to assess the impacts of FSC certification of natural forests, in a participatory manner that includes all interested parties (including institutions, organizations, communities, and individuals). We hope this framework will be sufficiently robust and at the same time, remain flexible enough to adapt to the special characteristics, certification history, and dynamics of each country it is applied to.

Four background studies (dark purple boxes, Figure 1.1) were carried out between 2013 and 2014 as first steps towards understanding the impacts of FSC certification. Studies on the *Assessment of Auditing and Accreditation* and *Remote-Sensing Analysis of FSC Impacts* (clear purple boxes, Phase I, Figure 1.1) are also part of Phase I, but their results will be reported separately. By publishing this background information, we also hope to provide a platform for information exchange, engage a

<sup>2</sup> Certification impacts are changes in the forest and surrounding areas that are attributable to the influence of certification on participating FMUs, neighboring communities, forest workers, and local and national governments. Impacts can be positive or negative, primary or secondary, direct or indirect, short or long-term, intended or unintended (OECD/DAC 2002).

greater number of people and institutions in our research, facilitate the evaluation and analysis of certification, and inform future discussions on the role of certification in forest conservation and its implications for local livelihoods.

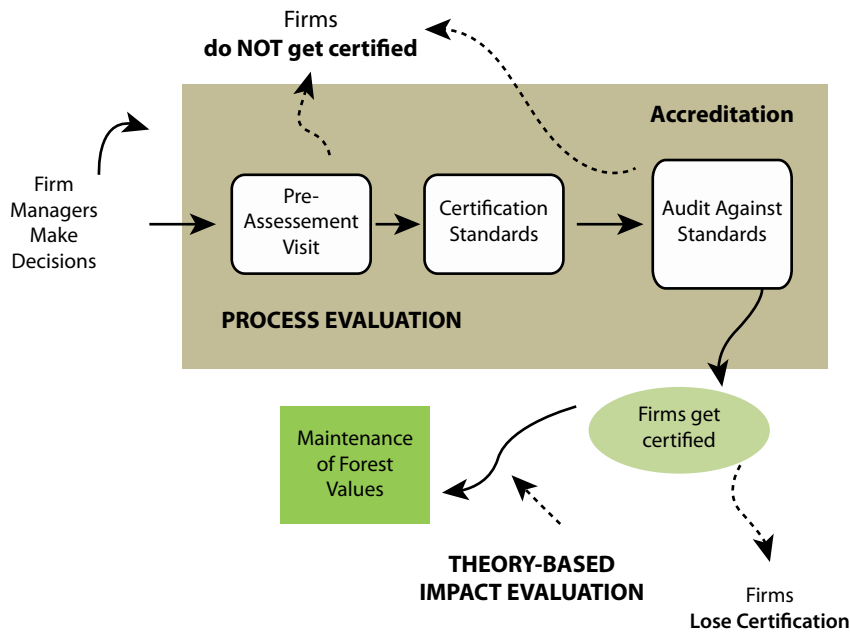
### 1.1 Evaluation rationale and activities

There are two components of the evaluation that require broad participation and discussion (Figure 1.2). First, a process evaluation (clear brown box, Figure 1.1) aims to determine if the FSC intervention was implemented by managers of FMUs according to its design. Key components of this evaluation include auditing, which provides independent verification that operations within an FMU comply with FSC standards, and accreditation, which offers independent quality assurance of the auditing process. Process evaluation requires evaluation researchers to consult with participants in the implementation of the intervention. Project partners for this type of evaluation include NGOs and other organizations locally relevant to the implementation of certification (e.g. certification coaching

institutions; sponsoring organizations); CBs; auditors; accreditation institutions (Accreditation Services International [ASI]) and personnel; FSC personnel; and managers and employees of forest harvesting operations (e.g. FMU managers).

The second component of the evaluation is a theory-based, empirical impact evaluation that aims to assess whether the FSC intervention was implemented as designed, and if it has achieved its goals. In carrying out this evaluation, field-based research must draw on the expertise, and secure the participation of, an overlapping group of partners (e.g. NGOs, FMU managers and workers, communities living adjacent to forests, local level government, and buyers).

Throughout the development of this project, we have endeavored to consolidate an active learning community referred to as a *Multi-Stakeholder Learning Platform* (MSLP; Figure 1.3). Members of this platform include representatives of organizations that help forest operations to become and remain certified; CBs; participants in audits; managers/selected workers of the forest operations; NGOs and other civil



**Figure 1.2. Schematic representation of key steps and decisions in the FSC certification process.** The light brown-shaded box indicates activities to be assessed during the process evaluation (e.g. auditing and accreditation). Once FSC certification has been implemented as designed, the theory-based evaluation assesses whether it contributes to the maintenance of forest values conditional to proper implementation.

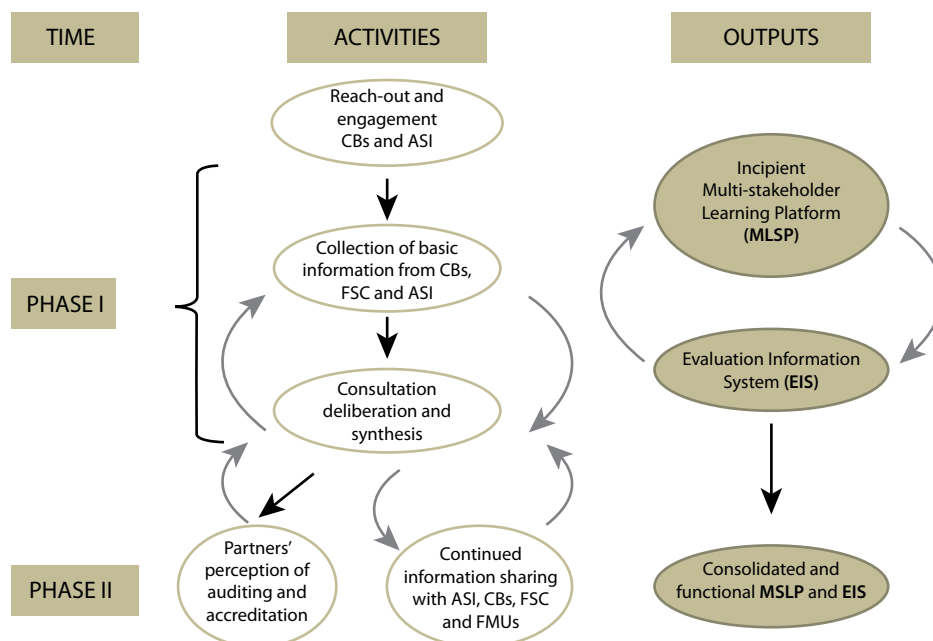
society organizations interested in tropical forest resources and their management; consumer groups; and members of the evaluation research team. An initial outcome of this platform is an *Evaluation Information System (EIS)*, which consists of the institutions (e.g. interested, participating, and affected parties), arrangements (e.g. confidentiality and other non-disclosure agreements), and processes (e.g. workshops, questionnaires, mail surveys, phone interviews) through which information has been collected, discussed, and will be shared, published, and routed back into the decision-making processes that encompass forest management.

Flows of information and understanding should be fostered throughout the process to build and reinforce trust among those involved (Chatham House and UN-REDD 2011) and enhance mutual social learning (Bidwell et al. 2013). The evaluation project should continue to strengthen the MSLP, with the overall goal of using the knowledge gained to benefit tropical forests and local communities.

## 1.2 FSC certification in Brazil

This volume presents studies that characterize Brazil's FMUs within a historical context of changing legal arrangements and other factors (e.g., supply and demand for timber and for agricultural products; construction of infrastructure; socio-economic characteristics of the forest frontier) influencing management decisions. The approaches taken by each study, and the ways in which they are integrated, provide the foundations for an empirical evaluation of FSC impacts in Brazil.

According to Ferraro and Pattanayak (2006), Pattanayak et al. (2010), and Miteva et al. (2012), evaluation studies in the fields of conservation and development are at the research frontier. The need to obtain reliable estimates of the causal effects of conservation and development programs and policies is clear; such insights are critical to practitioners and decision-makers who strive to make appropriate choices about whether or not to participate in such interventions.



**Figure 1.3. Operational model of the process throughout the various stages of FSC evaluation.** Activities related to deliberation and syntheses are to be iterated throughout. Both the MSLP and the EIS will continue to be consolidated as evaluation work progresses. Other partners also become members of the MSLP as evaluation research moves forward.

Although a number of challenges to developing robust impact evaluations for conservation programs have been identified (Romero et al. 2013; Baylis et al. 2015), recent studies have demonstrated their feasibility (e.g. Ferraro et al. 2011; Miteva et al. 2012; Arriagada et al. 2012; and references therein). As a result of these efforts, researchers involved in conservation impact evaluations now have access to tools (e.g. Pattanayak 2009; Jagger et al. 2010; Gertler et al. 2011; Rogers 2012) and examples to inform the design of their own impact studies.

A major challenge to the advancement of conservation evaluation research is a lack of randomization in the selection of units for a particular intervention or program. In settings where there is selection bias, the real cause of any reported changes, to either treatment or control groups, is blurred. The majority of conservation interventions are not carried out as randomized experiments for a variety of reasons, so it is impossible to credibly determine the extent to which the outcomes are due to the intervention rather than the characteristics of the units selected for the intervention, or other factors. The effectiveness of an impact evaluation rests on the ability to determine the causal effect of an intervention, that is, the difference between outcomes observed with the intervention, and the outcomes that would have occurred under a 'counterfactual' scenario with no intervention (i.e. counterfactual analysis; Ferraro 2009).

The starting point for these studies was to identify the relevant unit of analysis, which we defined as an FMU<sup>3</sup>. In Brazil, these are areas managed for timber harvesting on private and public lands (i.e. timber concessions). The certification of an FMU is dependent on: a) whether the FMU voluntarily decides to pursue FSC certification, and b) whether a CB audits and approves the management of the FMU (i.e. whether the standards stipulated by FSC are met in the field). Both of these decisions are likely dependent on the quality and extent of forest cover, the well-being of local populations, timber profits and their distribution, and governance aspects. Thus, in order to estimate counterfactual outcomes, we cannot simply compare certified FMUs with non-certified FMUs. Neither can we

simply compare the situation before and after certification, because that would not allow us to disentangle the effects of certification from the effects of other changes in the policy and economic context. To identify non-certified FMUs that reveal the counterfactual outcomes of certified FMUs, a detailed understanding of the factors that influence both certification and the outcomes of interest is required (i.e. the potential confounders). The four background studies presented in this volume assess the certification selection process from different perspectives, and thereby provide the groundwork for a rigorous impact evaluation.

The document is structured as follows: Chapter 2 (*Political economy considerations of the forest and timber sectors and natural forest management certification in Brazil*) provides an analysis of enabling conditions for the management of natural forests, and the responsible political, institutional, and economic factors. The contextual features that determine the fates of natural managed forests (FMUs) include institutional and regulatory frameworks that influence forested lands use (e.g. actions that pertain to land cover change and the concept of territory, its zoning, and uses). The study focuses on the largest natural forest area in the country, the Legal Amazon (i.e. the administrative region covering the states of Acre, Amazonas, Amapá, Roraima, Pará, Maranhão, Tocantins, Rondônia, and Mato Grosso, which represents 70% of Brazil's natural forest area). It maps the succession of efforts developed at federal and state levels to regulate the use of forest resources, and thereby reduce illegal activity and forest loss. Chapter 2 also offers an overview of the actors and interests that have determined how decisions regarding forested lands are made, including factors such as conflicts and ongoing sources of tension and disagreement. The contrasting visions of these actors for the extensive Amazon territory and associated policy discussions have led to: the adoption of legal frameworks for the establishment of a range of protected and special management areas (e.g. PPAs, Legal Reserves, sustainable development and extractive reserves); plans and actions to promote infrastructure development (e.g. roads, dams); pressure to mainstream the responsible management of resources, through timber rights allocation and enhanced management capacity (e.g. forest concessions, training in forest management, incentives for adoption of certification); and updated strategies to increase

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3 FMU refers to both the forest area and the entity that manages it.

monitoring and law enforcement at federal and other levels (e.g. black lists or lists of municipalities with high deforestation rates, special enforcement operations). Chapter 2 also discusses the emergence of certification, as well as its limited potential to address deforestation and forest degradation, given that land conversion for industrial agriculture is a major driver of forest loss (Börner and Wunder 2012; Pacheco 2012), and most timber is produced for domestic markets (Pereira et al. 2010). Moreover, the potential for certification to promote the maintenance of forest values, such as local livelihoods, may be at risk if novel mechanisms such as SLIMF fail to enable smallholders to share the benefits of managing their timber resources (McDermott et al. 2015).

An outline of the characteristics of FMUs operating in natural forests is provided in Chapter 3 (*Typology of the timber sector and dynamics along the natural forest certification continuum*). This chapter systematically categorizes FMUs according to their similarities and differences on attributes that influence their likelihood of becoming certified and can affect the expected outcomes of forest management and certification.

Information provided by the typology facilitates the construction of a counterfactual group. Chapter 2 and all following chapters focus on the states of Pará, Acre, Amazonas, Rondônia and Mato Grosso, where a number of FMUs are engaged in the certification process. This chapter also outlines how the concept of *polo madeireiro*, a municipality or micro-region that processes timber in volumes of at least 100,000 m<sup>3</sup> of roundwood per year (Lentini et al. 2003), was used to inform the selection of FMUs.

FMUs are located along what we define as a *certification continuum* of forest management practices (i.e. conventional logging, reduced-impact logging, silvicultural practices) that overlap with stages in the certification process (e.g. never having been engaged in FSC certification; remaining certified for several years; or having lost certification; see Romero et al. 2013). Classification of FMUs into the simple categories of certified and non-certified units fails to capture this complexity, but is nonetheless required to estimate the impacts of certification. The typology presented in this chapter helps to disentangle the relationships between groups of variables and

overall differences among FMUs. Specifically, the typology presents a static configuration of groups of FMUs that share characteristics related to forest management activities, at different stages along the certification continuum, for a single point in time when the study was developed (2013).

As involvement in certification is not a one-time choice, the second part of this chapter (*Certification dynamics*) documents the annual decisions made by FMUs along the certification continuum, which is adapted from the generic model presented by Romero and colleagues (2013), based on information availability and the nature of the FSC implementation process in Brazil. This information facilitates the identification of particular windows of time when multiple FMUs made similar choices regarding certification, due to the influence of contextual factors that either facilitated or obstructed their engagement. Among these are political and economic factors related to the timber market and other associated sectors (e.g. investments, competing opportunities, market realities, changing legal frameworks). In particular, contextual factors that operate at local, national, and international levels can influence an FMU's decision to seek certification and, once certified, to remain so. Changing market dynamics (e.g. consumer preferences and acquisition power) can also influence suppliers' decisions regarding certification. Other factors that can affect FMU decisions on certification include shifting legal frameworks and their enforcement, changes in certification standards and the implementation of certification due to new actors (e.g. new CBs, new programs), novel technical capacities, technological innovations, global/regional/national economic conditions, the availability of external support, and cost-benefit ratios (Nebel et al. 2005; Crow and Danks 2010; Chen et al. 2011).

In light of the findings of the preceding chapters, Chapter 4 assesses the motivations behind FMU decisions on certification. This chapter presents findings from interviews and literature reviews related to the factors that influenced FMUs' decisions to pursue natural forest management certification. Although certification was initially conceived as a market mechanism that would allow firms following audited, sustainable forest management practices to charge a premium, firms chose to certify their FMUs for a wide variety of reasons, many of which were not directly related

to this motivation. There are a range of private benefits of forest certification actually realized by firms, which are not consistent across time scales, regions, countries, and types of firms (Blackman and Guerrero 2012). In addition to improved management systems, studies have found that certified firms demonstrate enhanced learning and transparency, increased public confidence and social acceptance, social improvement, and greater environmental responsibility (Vidal and Kozak 2008, Araújo et al. 2009; Cabbage et al. 2010). A review of available literature on certification decisions and an analysis of the trends identified in the 'dynamics' study (Chapter 3), helped to structure this chapter's methodology. Semi-structured interviews and informal conversations were held with a range of social actors with stakes in FSC certification.

The final chapter (Chapter 5: *Conclusions*) presents an overview of the perspectives to be considered in the design of an empirical impact evaluation on forest certification. It links some of the key findings of the preceding chapters to highlight issues to consider when: refining the key outcomes to evaluate; constructing a counterfactual; and conducting field data collection. Overall, we hope that this volume will provide a foundation that will allow researchers to identify the implications of FSC certification on forests, local people, and other stakeholders, and determine how certification can contribute to maintaining forest values. We hope these studies provide an integrated representation of some of the factors associated with natural forest management that will be of use to researchers and practitioners committed to advancing responsible forest management in Brazil.

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# 2 Political economy considerations of the forest and timber sectors and natural forest management certification in Brazil

Guilherme R. Lima and Nicole Munk

## 2.1 Introduction

Brazil is a vast country with 463 million ha of forests, which represents 54.4% of its total area (851 million ha). More than 98% of all of the country's forested areas are natural forests, in different degrees of use (SFB 2013). The two main forest biomes in Brazil are the Amazon and the Atlantic Forest. The Atlantic Forest is distributed along the coast, where approximately 70% of the Brazilian population lives. It has been exploited since colonial times, with only 14.5% of its original forested area remaining. The Amazon, on the opposite side of the country, remained almost intact until the 1960s, although sporadic economic cycles had already led to the limited exploitation of its resources (e.g. the rubber boom). Nevertheless, over the last 50 years, the occupation of the Amazon, stimulated by the federal government, has led to high rates of deforestation, and it has lost approximately 14% of its original forested area (Souza et al. 2013; INPE 2014).

Over the last two decades, Brazil has witnessed intense debates surrounding the protection of its natural forests, and associated changes in land use legislation. The remarkable increase in deforestation in the Amazon during the 1990s and the early 2000s led the federal government to adopt policies and measures to reduce forest loss, including the PPCDAm (2004). However, the agricultural sector pressured the government to weaken these restrictions, and in 2012 Congress passed the NFC (May et al. 2012). One of the consequences of the government's failed efforts to reduce the unsustainable use of forest resources is the decline of timber production from natural

forests, at the expense of planted forests. Since the late 1990s, planted forests have produced the largest share of Brazil's timber, and in 2012 were responsible for 77% of national timber production. Tree plantations are concentrated in the southern states (e.g. São Paulo and Minas Gerais), close to the main consumer zones, which makes plantation timber from these areas more attractive than timber from the Amazon, which incurs higher transportation costs (Sobral et al. 2002). Although the expansion of plantations has contributed to forest certification becoming more common, certification of natural forests is largely restricted to timber exports.

The purpose of this chapter is to analyze the dynamics and evolution of political, social, and economic factors that influence forest management in Brazil, with an emphasis on natural forests. Furthermore, it seeks to examine forest certification in light of its historical context; as well as the changing dynamics of regulation, enforcement capacity, and the role of locals in forest management decisions. The chapter considers issues pertaining to planted forests, insofar as these interact with management decisions affecting natural forested lands.

The chapter is organized into five sections, including this introduction. Section 2 (*Dynamics of the institutional context of land use institutions and regulations*), analyzes the political, economic, social and cultural factors that have shaped decisions regarding land use in Brazil. Section 3 (*Forest regulatory aspects*), provides an overview of relevant legislation, such as the Law of Public Forests Management (LPFM 2006) and the NFC

(2012) as well as institutional aspects, including community participation in forestry-related activities. Section 4 (*General features of the forest sector*), presents general features of Brazil's forest sector, such as employment, production, taxes and fees, demand and supply, and transport, as well as a description of the dynamics of forest resources access and monitoring. Finally, Section 5 (*Forest certification within the country's institutional framework*), addresses the conceptual and practical aspects of forest certification in Brazil, focusing primarily on the FSC certification scheme, and providing a brief overview of CERFLOR.

## 2.2 Land use dynamics, institutions, and programs

This section provides an overview of existing regulations, instruments and institutions that are relevant to decisions on land use change and forest conversion.

### 2.2.1 Ecological and Economic Zoning (EEZ)

Ecological and Economic Zoning, or Environmental Zoning, is an instrument defined by the Brazilian National Environmental Policy (Law 6938/1981), which regulates the establishment of economic activities in particular areas. It classifies territory into various zones, taking environmental, social, economic, and cultural factors into consideration, and limits economic activities based on their potential impacts on these characteristics. The goal of the EEZ is to facilitate sustainable development by harmonizing socioeconomic development goals with environmental protection. Since 1990, the EEZ has been implemented in the nine states that constitute the Legal Amazon (May et al. 2012).

The EEZ provides guidance for conservation and development at both national and regional levels. Initiatives developed in accordance with the EEZ include the PPCDAm and its analog, the Action Plan for the Prevention and Control of Deforestation in the Cerrado (PPCerrado); the National Policy of Regional Development (NPRD); the National Plan on Climate Change (NPCC); the Program of Land Regularization in the Legal Amazon (Terra Legal); the Law of Public Forests Management (LPFM; Law 11284/2006); and the Program of Community and Familiar

Forest Management (PCFM; Table 2.1). The actions of these plans and programs (e.g. incentives for the development of agriculture, forestry, or the establishment of Protected Areas [PAs]<sup>4</sup>), must respect the territory divisions defined in the EEZ, and the land uses permitted in each area.

The Brazilian FC establishes a term of five years for the states to formulate and implement the EEZ. The FC also permits a reduction of the Legal Reserve<sup>5</sup> in the Amazon Biome (usually 80%), to 50% in cases where the state has approved the EEZ. The change in the percentage of Legal Reserve can be carried out by the state government in case 65% or more of the state's territory is occupied by PAs or Indigenous Lands, or by the federal government, exclusively through means of land regularization, when this need is indicated by the EEZ.

Responsibility for the EEZ is shared by various levels of government. The federal government is responsible for the EEZ at national and regional levels, the states must further elaborate upon it at the state level (while respecting regional and national level zoning), and municipalities must elaborate upon the Master Plans. The states must develop their EEZs according to a general methodology (Decree 4297/2002). In 2001, the Coordinating Committee of the Ecological and Economic Zoning of the National Territory (CCZEE) was established to manage the planning, coordination, and evaluation of the EEZ nationwide. In 2001, a consortium composed of 15 public institutions was created to provide technical guidance and help the CCZEE and the regional states to execute their activities, and prepare the EEZ's terms of reference. In the early 2000s, following a ministerial reform,

4 Protected Areas (PAs) are territories that are legally protected and demarcated for the purpose of preservation or conservation of nature and cultural values, and may be public or private (although, only a Particular Reserve of the Natural Heritage [PRNH] can be established by private action). PAs are a type of 'special area', which are areas with restrictions of use, and also include Indigenous Lands, rural settlements and military areas. In addition to these special areas, two other types of area, APPs and Legal Reserves, are subject to restrictions of use according to the Brazilian FC.

5 The Legal Reserve is the share of rural properties in which forest cannot be cleared. In the Amazon Biome this share is usually 80%, in the Cerrado it is 35%, and in the remaining regions, the Legal Reserve is 20%.

**Table 2.1. Plans and programs related to forested land use.**

Plan/program (year)	Description
PPCDAm (2004)	The goal of the plan is to reduce deforestation in the Amazon. During the first phase (2004-2008) the program focused on land and territorial planning.
PPCerrado (2010)	This plan seeks to reduce GHG emissions through the sustainable management of agriculture and charcoal production. Specifically, the plan promotes the restoration of degraded pastures, the integration of farming pastures and forests, an increase in planted forests, and charcoal production that does not result in the loss of natural forests. The plan prioritizes areas with remaining natural vegetation and high anthropic pressure, as well as areas that are important for biodiversity and water sources.
NPRD (2007)	The policy aims to reduce regional disparities, and to realize the potential of all of the country's regions. It establishes a legal framework for several regional programs in priority areas, to promote socioeconomic development.
NPCC (2009)	This is the main institutional framework to promote the reduction of GHG emissions in the country. Its main objectives include the promotion of biofuels, and the mitigation of deforestation.
Terra Legal (2009)	This legislation addresses the regularization of public lands occupied within the Legal Amazon.
LPFM (2006)	This law establishes rules to promote the sustainable management of Public Forests, and facilitates the establishment of logging concessions in Public Forests.
PCFM (2009)	Created to address funding and promote sustainable forest management, with a focus on traditional communities and smallholders. The plan determines that states and municipalities should receive resources for those actions.

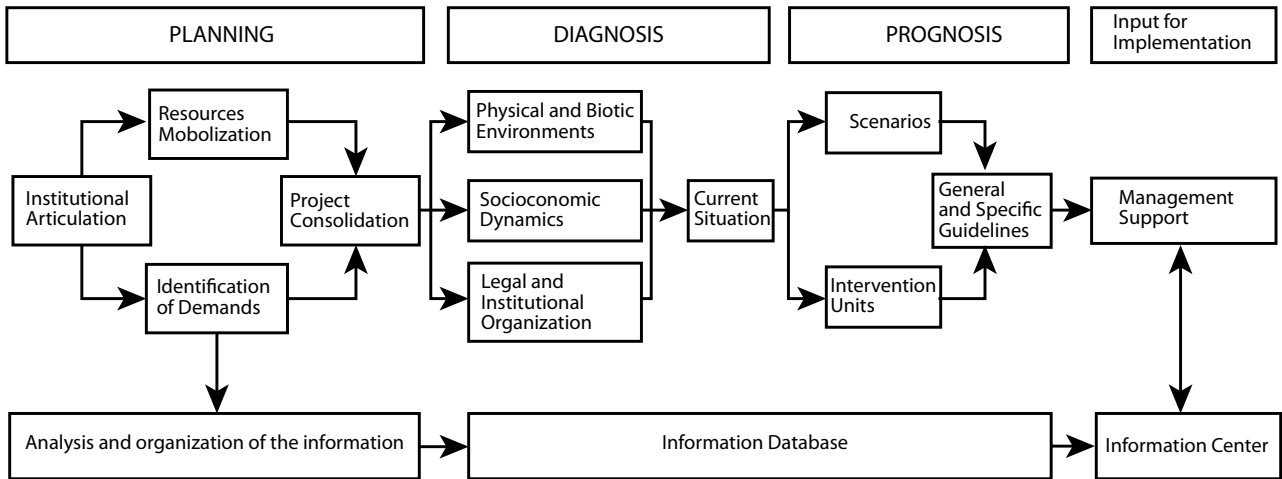
responsibility for the execution of the EEZ passed from the Secretariat for Strategic Affairs to the Ministry of the Environment (MMA). The EEZ was then integrated into the Multiannual Plan and was renamed the Ecological and Economic Zoning Program (PEEZ). A consultation process was carried out during regional and national workshops, and in 2001, this formed the basis of the *Methodological Guidelines for the EEZ in the National Territory*, which are to be regularly updated. The most recent of these methodological guidelines were published in 2006 (MMA 2006), and divides the process into four stages (Figure 2.1).

The EEZ can cover a large region, or a small, local area. At the regional level, Brazil has implemented two sub-macro EEZs: one for the Legal Amazon (approved in 2010) and the second one for the Cerrado Biome (proposed in 2012). Some states

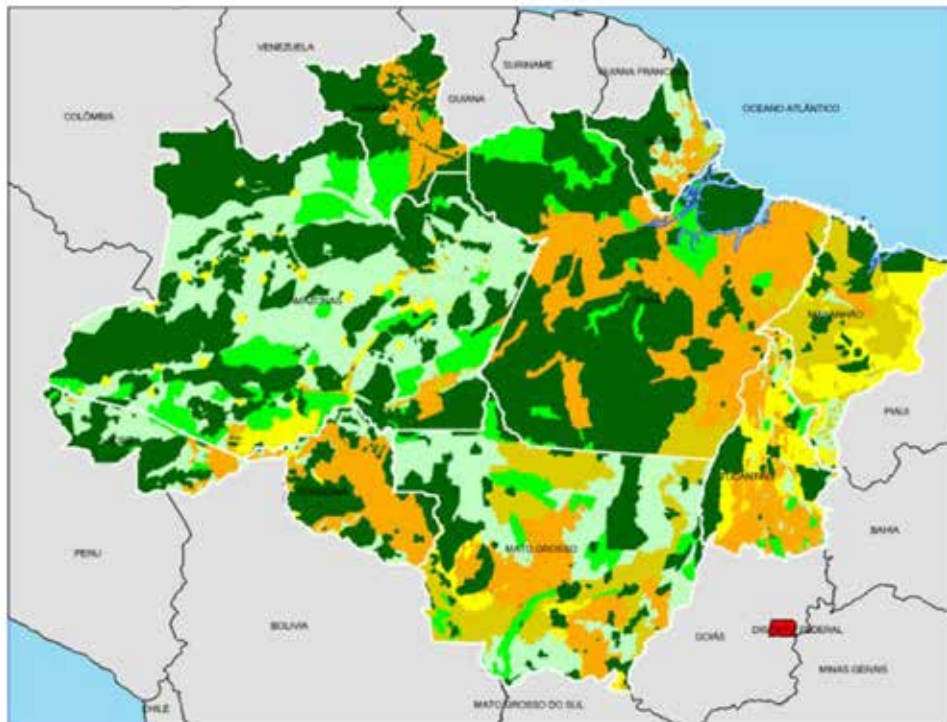
have completed their EEZs (e.g. Mato Grosso and Minas Gerais), whereas other states are still in the preparation stages (e.g. São Paulo and Pará).

### 2.2.2 Legal Amazon macro EEZ

The elaboration of the Macro EEZ for the Legal Amazon (Decree 7378/2010) was guided by the need for: social inclusion, environmentally responsible management of natural resources, and the reduction of carbon dioxide (CO<sub>2</sub>) emissions associated with land use change from forest into pastures (Smeraldi and May 2008). A working group was formed, consisting of representatives from the EEZ Consortium and the CCZEE, delegates from the nine states of the Legal Amazon, and a range of other actors (i.e. academics; environmentalists; representatives from the National Industry Confederation and National Agriculture Confederation, rural associations,



**Figure 2.1. Stages and activities of the EEZ in Brazil.**  
Source: MMA 2006.



**Figure 2.2. Ecological and Economic Zoning of the Legal Amazon approved by Presidential Decree in 2010.** White lines indicate state boundaries. The colors in the map correspond with the colors in Table 2.2.  
Source: www.mma.gov.br

banks, municipal governments, and local communities). These representatives contributed data, and participated in studies, diagnostics, roundtables, workshops, and other meetings. In 2010, this process resulted in the approval of the Macro EEZ for the Legal Amazon through

Federal Decree n. 7378. The zoning divided the region into three categories and six subcategories (Table 2.2; Figure 2.2). Of the 13 strategies that form the basis of the EEZ, those that are most related to land use are: (i) land regularization: through the adoption of measures to avoid land

**Table 2.2. Ecological and Economic Zoning of the Legal Amazon approved by Presidential Decree in 2010.**

Category	Sub-category	Concepts	Characteristics
Consolidated uses/ those that are to be consolidated	Areas with defined productive structure / those that are to be defined	Consolidated areas, or those that are in the process of being consolidated, for more dynamic productive activities, which require actions to support the maintenance and/or intensification of existing activities, focusing on ecological, social and economic sustainability.	Areas with potential for intensive exploration, defined economic and productive structure, capacity for expansion of productive activities; areas under the command of well-structured urban/regional poles, with efficient infrastructure and services to support production and a well-developed tertiary sector; high productive specialization; predominance of cultivation of grains in plateaus and extensive livestock in lowlands.
	Areas to restore or reorder	Modified or degraded areas caused by inadequate use, requiring actions for environmental restoration and/or reordering of productive activities.	Degraded or in the process of degradation, caused by one or more damaging uses; significant alterations to the ecosystems that demand changes in use, intensity of occupation, management system, or the urban infrastructure; areas in the process of concentrating land tenure; with old history of occupation and a relatively well structured tertiary sector that is capable of supporting new types of resource use; areas with a stagnant economy and a decreasing rural population.
Controlled uses	Fragile areas	Fragile areas that have been identified as appropriate for conservation, where there can be planned and limited use of natural resources under certain, controlled conditions	Areas with specific natural fragilities; limited natural resources; vulnerable to existing economic activities and manmade pressures; strategic areas for the protection of water and mineral resources.
	Areas with sustainable management	Conserved areas that have been designated as areas to be protected, where human pressure is to be limited, and where limited use of natural resources can be planned under certain conditions.	Ecologically significant areas or areas that are appropriate for environmental protection; natural resources requiring sustainable management; strategic areas for the protection of water and mineral resources; areas with potential for ecotourism; areas where human pressure on institutional areas can be reduced (e.g. PAs); areas where the forest cover (including savanna) requires protection.
Special uses	Proposed Protected Areas	Legally Protected Areas, including existing and proposed Indigenous Lands, Quilombos, Conservation Units, and lands belonging to the Army.	Areas under the National System of Protected Areas (SNUC); areas under control of the National Foundation of the Indigenous Peoples (FUNAI); areas under the domain of military forces; areas that states have put forward as potential PAs.
	Created Protected Areas		

markets and excessive ownership concentration; (ii) establishment and strengthening of PAs; (iii) planning for agricultural expansion by restricting agriculture in environmentally sensitive areas; and (iv) reduction of greenhouse gas emissions derived from land use change.

### 2.2.3 Legal frameworks affecting land use and land cover change (LULCC)

In 2004, in response to increasing rates of deforestation in the Amazon (May et al. 2012), the federal government launched the PPCDAm. This was achieved through a series of integrated measures involving federal agencies, state governments, municipal authorities, civil society entities, and the private sector. The plan was organized into three pillars: (i) tenure regularization and territorial management; (ii) monitoring and control; and (iii) sustainable production incentives. During its first phase (2004–2008) efforts were mainly related to tenure regularization and territorial management, and included the creation of over 250,000 km<sup>2</sup> of PAs, and the homologation<sup>6</sup> of over 100,000 km<sup>2</sup> of Indigenous Lands (Pacheco et al. 2012). The second phase of the PPCDAm (2009–2011) focused on increased monitoring and control, specifically, the implementation of DETER, and enforcement initiatives coordinated by the Brazilian Institute of the Environment and Natural Resources (IBAMA) and police authorities (MMA 2014). In spite of these efforts, by 2011, deforestation had almost doubled in Mato Grosso (99.8%) and increased by 29.3% in Rondônia, suggesting that the plan's success was uneven across the Amazon. As the primary focus of phase two was enforcement and control, sustainable development may have been overlooked during this period (May et al. 2012), although is expected to be promoted during the third phase of the plan (2012–2015).

Land in Brazil can be privately or publicly owned. However, there is also a third type of land, the

*Terras Devolutas*, which are lands that have never been public property, even if they are, or have been, illegally occupied. The term *devolutas* refers to land returned, or to be returned, to the state. According to the constitution, lands that are indispensable for border defense, military buildings, federal routes of communication and environmental protection belong to the federal government. Those that do not fulfill these requirements belong to the states.

The main legal framework for the colonization of the Amazon and land use is the Land Statute (Law 4504/1964), which aims to organize the use and occupation of rural territories and establish rights and obligations of rural peoples. Particularly, the Statute is an instrument to promote agrarian reform and for implementing agricultural policy, both of which are defined in article 1 of the law. The National Institute of Colonization and Agrarian Reform (INCRA) was created in 1970 to assign property rights to forested areas in the Amazon, maintain a cadaster of rural properties, and manage lands owned by the federal government and *Terras Devolutas*. The Federal Constitution of 1988 includes articles that specify that land must fulfill its social function, and recommends that those who do not comply with this rule have their lands expropriated. In the Amazon region, redistributed lands are mainly former *Terras Devolutas*. Until 2013, over 75% of the settlements created as a result of agrarian reform programs (which includes 41% of the families that were settled up until that year), were located in the mostly forested northern region, rather than in unproductive non-forested lands. Many of these settlements were created along highways in the 'Arc of Deforestation', and were concentrated in Pará, Rondônia, and Mato Grosso (Brandão and Souza 2006).

The National System of Protected Areas (SNUC) was created in 2000 with the goal of promoting long-term management at the federal, state and municipal levels. The SNUC organizes the PAs into twelve categories, which are divided into two groups: 'Integral Protection' (IUCN categories Ia, II and III) and 'Sustainable Use'. As the first group ('Integral Protection') does not address the active use of resources for commercial purposes, but rather mandates their strict protection, details are only provided for the 'Sustainable Use' group (Table 2.3).

6 Homologation refers to the legal act through which Indigenous Lands are created. The process consists of four stages: (i) the identification of the area based on anthropologic studies; (ii) the delimitation of the area and its physical demarcation; (iii) homologation through Federal Decree; and (iv) the formal registration of the area (Federal Decree 1775/1996).

## 2.3 Forest regulation

This section focuses on the evolution of legal frameworks related to the forest sector, including regulations on land use and forest concessions, as well as specific regulations related to logging. It also addresses the legal requirements for obtaining logging contracts, and the definitions of legal, illegal, and informal logging. Finally, it addresses the barriers to, and opportunities for, the implementation of such frameworks. This section addresses the dynamics of policy regulation in Brazil (Bauch et al. 2009).

### 2.3.1 Forest laws

#### Forest Code (FC)

The FC is one of Brazil's most significant pieces of legislation on the use of forest resources, particularly resources located on private property. The FC establishes "general rules for the protection of vegetation, Areas of Permanent Protection and areas of Legal Reserve; forest harvesting, supply of forest resources, the control of the origin of

forest products and the control and prevention of forest fires; and foresees economic and financial instruments to achieve its goals" (Law 12651/ 2012, art. 1º). The FC recognizes Brazil's forests and other forms of native vegetation as common goods of the nation. The FC also assigns responsibility to the individuals or legal entities that utilize forest raw materials.

Brazil's first FC, established in 1934, recognized the role of forests in maintaining the quality and quantity of water supplies and in protecting soil from erosion. This law regulated the use of forests to protect soil, water, as well as timber and coal markets. Thirty-one years later, in 1965, an updated version of the FC was approved by Congress (Law 4771/1965), and introduced measures to improve forest protection. This version of the FC limited the use of forest resources and, placed restrictions on the conversion of forests on private property, through the creation of APPs and Legal Reserves. The FC mandated that forests in these areas were to be protected from deforestation, and forests in deforested areas should be restored. Within the last decade, the FC has been weakened

**Table 2.3. SNUC categories of Protected Areas and their correspondence with IUCN categories.**

IUCN Equivalent	SNUC Category	Purpose
IV	Area of Environmental Protection	Wide area with public and private properties, where the sustainable use of natural resources is promoted. This is the least protective category.
	Area of Relevant Ecological Interest	Small area with little or no occupation; has unique natural features; established to protect natural ecosystems.
V	National Forest	A forested area where sustainable use is promoted and scientific research is conducted; has predominantly native species; allows traditional communities subsistence uses.
VI	Extractive Reserve	Area where traditional communities practice extractivism and subsistence agriculture; allows visitors and research.
	Faunal Reserve	Area with native species of animals; appropriate for research on the sustainable use of wildlife.
	Reserve for Sustainable Development	Area where traditional communities live and practice the sustainable use of natural resources; allows visitors and research.
	Particular Reserve of Natural Heritage	Area established for the protection of biodiversity; allows research, tourism and recreational and educational activities.

Source: MMA n.d.; ICMBio n.d.; IUCN 2015.

in response to numerous congressional debates (i.e. limits of forest resource use have been reduced, particularly affecting Areas of Permanent Preservation [APPs] and Legal Reserves). APPs are areas that may or may not be forested, which are protected by law, and have various environmental functions, including: the preservation of water resources, landscapes, geological stability, soil, biodiversity, and genetic fluxes of flora and fauna, thereby securing the well-being of the human population. According to the FC, APPs might include the margins of rivers, streams and lakes, and steep slopes (over 45°). As a result of revisions to the current FC, including those related to APPs, the area of vegetation along streambanks to be protected has been reduced to less than half of what was previously required. Other changes to the FC affecting APPs include provisions that allow areas with “consolidated agricultural activities” to remain as such, which removes the requirement for these areas to be restored. Finally, under the new legislation, APPs can be classified as Legal Reserve, thereby decreasing the total area that must be protected<sup>7</sup>.

The Legal Reserve is the share of each individual, rural property that must retain its natural forest. Although the natural vegetation of the Legal Reserve must be preserved, economic activities are allowed once a management plan has been approved. As such, the use of Legal Reserves for commercial purposes requires authorization, cannot reduce forest cover (i.e. land use change), nor hinder the conservation of native vegetation in any way. Permitted activities include timber harvesting and the collection of non-timber forest products (NTFPs) (e.g. fruits, vines, leaves and seeds) in limited, specified quantities. Non-commercial uses are permitted and must be reported to the environmental agency.

This FC prevailed until 2012 when the NFC (Law 12651/2012) was enacted. The main changes were related to the use of forest resources in PAs and Legal Reserves. These revisions reduced mandatory

<sup>7</sup> In the Legal Amazon, rural properties must retain 80% of forest cover on their land. Under previous legislation, if there was an APP with forest cover within a property (e.g. occupying 5% of the property), this could not be considered Legal Reserve, and 85% of the property would have to be forested. Under the new rules, the 5% of forest contained within the APP already counts towards the 80% required for Legal Reserve.

forested areas within rural properties (Table 2.4 and Figure 2.3).

### **Regulation of public forest concessions (LPFM)**

In 2006, Congress approved the LPFM (Law 11284/2006), which regulates the management of Public Forests and aims to stimulate long-term investment in sustainable forest management and conservation (Banerjee et al. 2009). Prior to this legislation, the use of forest resources in Public Forests was allowed only in National Forests<sup>8</sup> (FLONAS; or State and Municipal Forests). The law allowed the government (at federal, state, and municipal levels) to accept bids from private firms and communities for the rights to manage Public Forests to extract timber and non-timber products, and to provide tourism services. The law also decrees that if such forests are occupied by local communities, they are to be reclassified as Extractive Reserves or Sustainable Development Reserves (Banerjee et al. 2009).

The maximum concession term is 40 years. In the case of tourism and other non-extractive activities, the minimum term is 5 years and the maximum is 20 years. Timber harvesting is allowed, as is the collection of non-timber products (e.g. oils, fruits, resins, ornamental and medicinal plants). However, the concessionaire is not given the right to commercialize carbon credits, or exploit water, genetic or mineral resources, or fauna. Additionally, traditional and subsistence resources used by traditional communities are excluded from the concession.

The establishment of timber concessions is also determined by the LPFM. Forest concession is a land use model, by which entities are selected through a bidding system to manage forest products and services. Public Forests can be natural or planted, and are located throughout the country. In addition to forest concession, two other models can be applied to forests: assignment to local communities, and direct management. The assignment of Public Forests to local communities is free of cost and legally prevails

<sup>8</sup> Public Forests include every forest, natural or planted, under the domain of the federal, state or municipal government (Law n. 11284/2006), whereas National Forest is a type of Protected Area with predominantly native species, with the goal of promoting the sustainable use of forest resources (Law n. 9985/2000).

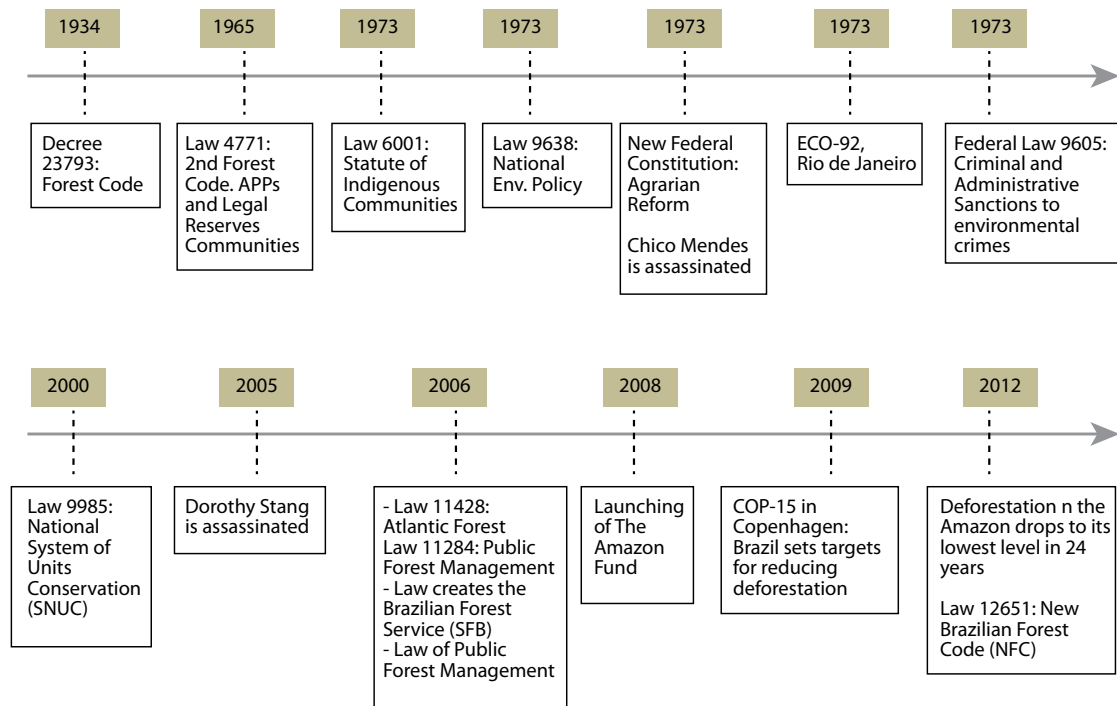


**Table 2.4. Timeline of key events related to the Brazilian forests.**

Year	Event	Description
1934	First Forest Code	Recognizes the role of forests in maintaining the provision of ecosystem services (e.g., water quality and quantity, soil protection)
1965	Second Forest Code (prevailed until 2012)	Establishes limits for the use of forest resources and defines the margins of rivers as APPs. Creates the Legal Reserve within rural properties (i.e., 20% to 50% mandatory vegetation cover). Promotes the restoration of deforested areas.
1986	Changes in APPs	Prohibits deforestation of natural forest. Increases minimum limits for APPs in margins of rivers.
1989	Compulsory Legal Reserve	Requires landowners to register the Legal Reserve in the land registry, creating a formal mechanism to document the maintenance of such areas. Mandates the maintenance of 20% Legal Reserve in the <i>Cerrado</i> Biome.
1994	Deforestation record	Deforestation in the Amazon reaches its highest annual peak (over 29 thousand km <sup>2</sup> ).
1998	Environmental Crime Law	Reclassifies several administrative infractions as environmental crimes. Infractions for farmers failing to comply with regulations come into effect, and significant fines are established. The industrial agricultural sector began to pressure for legal changes.
1999	Beginning of process of reformulation of the FC	The rural lobby in Congress prepares a bill to change the FC to allow an increase in legal deforestation in all biomes.
2001	Legal Reserve increases in the Amazon	Between 1996 -2001 at least seven Provisional Measures are enacted, increasing the Legal reserve from 50% to 80% in the Legal Amazon and from 20% to 35% in <i>Cerrado</i> areas within the Legal Amazon. Margins of water courses, both with and without forests, are defined as APPs.
2008	Sanctions through decrees	Severe penalties for crimes against Legal Reserves and APPs are established, but decrees limit the application of fines and sanctions to those who do not adhere to environmental regularization programs. Pressure to reform the FC becomes stronger.
2009	Stakeholders are against the forests	In the years leading up to 2009, there are 36 proposals in Congress try to abolish the FC. A special commission, with a rural lobby majority, is established in the Lower House to analyze projects that distort environmental legislation, rather than pursue its improvement.
2010	Commission approves the New Forest Code	The rural lobby promotes public hearings in Congress and in industrial agricultural poles. The special commission in the Lower House approves a proposal to change the FC, suspending fines and giving amnesty to those who participated in deforestation before July 2008. The lobby begins a social movement against the NFC
2011	Plenary of the Lower House and the Senate	The NFC is approved in the plenary of the Lower House and the Senate, leading to the reduction and weakening of APPs. The text satisfies the rural lobby due to a reduction in forest protection.
2012	Enactment of New Forest Code	The NFC is officially published with few presidential vetoes to Congress's proposal. A campaign calling for a presidential veto of the NFC is launched in Rio +20, mobilizing the country against regressive forest legislation.
2013	Monitoring the Forest Code on the web	Seven NGOs* launch an initiative and a webpage ( <a href="http://www.observatorioflorestal.org.br">www.observatorioflorestal.org.br</a> ) to facilitate access to information, encourage debate, stimulate social control and prevent reversals of progress made.
2014	Regulation	The federal government publishes a decree and a normative Instruction that establishes the Program of Environmental Regularization (PRA) and the Rural Environmental Cadaster (CAR).

\* Institute of Environmental Research of the Amazon (IPAM), WWF-Brazil, SOS Mata Atlântica, Instituto Centro de Vida (ICV), The Nature Conservancy (TNC), Conservation International Brazil (CI) and Instituto Socioambiental (ISA).

Source: Adapted from OdCF n.d.



**Figure 2.3. Timeline of forest laws and regulations influencing land use and forest management decisions in Brazil.**

over the concession model. Forests can be assigned through the creation of PAs, such as Extractive Reserves, Reserves of Sustainable Development, and settlement projects. Direct management of Public Forests occurs when the forest is managed by the government, either using its own staff or by outsourcing. The State Forest of Antimary in the state of Acre provides one example of direct management, as forests in this area are managed by the State Forest Secretariat (Balieiro et al. 2010).

The Brazilian FC specifies that gaining permission to exploit natural forests, whether on public or private land, depends on obtaining an environmental license, as well as developing an approved Sustainable Forest Management Plan (PMFS). The PMFS should identify exploitation techniques, and forest restoration and management practices that are compatible with the ecosystem (Law 12651/2012). It should also address the physical and biological characteristics of the area, including an assessment of existing stocks of timber, and meet sustainability criteria such as maintaining acceptable levels of logging intensity and cutting cycles. Following the PMFS's approval, government officials carry out periodic technical inspections to monitor the management,

operations and activities of the site, and the permit holder must submit annual reports to the relevant agency.

In 2008, the first three forest concessions in Brazil were granted in three FMUs in Jamari National Forest, Rondônia, covering a total of 96,361 ha. In 2011, two more concessions were granted in Pará, in Saracá-Taquera National Forest. In addition to this, five more forests, with a total area of approximately 200,000 ha are in the process of being granted as concessions. At the state level, Pará has 6 concessions covering approximately 477,000 ha, and three more concessions were expected to be granted covering a total area of 108,000 ha. In summary, Brazil has granted concessions for approximately 622,000 ha of forests, at both federal and state level, and more than 308,000 ha are expected to be granted in the near future (SFB 2013). In August 2013, the SFB published a call for the government to grant concessions in the Altamira and Amana FLONAs, both located in Pará. Furthermore, the Annual Forest Grant Plan 2015 has set aside 3.4 million ha of Public Forest for concession, located across 8 FLONAs in Amazonas, Pará and Rondônia.

### Atlantic Forest Law (AFL)

The Atlantic Forest is one of Brazil's most degraded biomes. The AFL (Law 11428/2006) regulates the conservation, protection, regeneration and utilization of the vegetation in this biome, including the associated forest formations and ecosystems. The law aims to preserve the remnants of the Atlantic Forest Biome, and create a means for its recovery in regions where it has become practically extinct. Thus, the law regulates the use, not only of the remaining primary forest, but also of forest in the initial, intermediate and advanced stages of regeneration. The AFL is guided by the principle that the most conserved areas require greater protection, degraded areas should be enriched, and deforested areas should be prioritized for use, in order to prevent the advancement of economic activities (such as agriculture, pasture, and urbanization) in areas with forest or native vegetation.

According to the law, the removal of primary vegetation, or secondary vegetation in advanced or intermediary stages of regeneration, is prohibited if:

- shelters endangered species of flora and fauna and the intervention puts their survival at risk
- is responsible for watershed protection or for the prevention and control of erosion
- forms ecological corridors between remnants of primary or secondary vegetation in advanced stages of regeneration
- protects the buffer zones of PAs
- possesses exceptional scenic value

The removal of vegetation is also illegal if the owner or occupant of the land does not comply with environmental legislation, in particular the requirements of the FC in relation to APPs and Legal Reserves.

The rules for the use or removal are different for primary or secondary vegetation, and take into account the stages of regeneration. In the case of primary, or secondary vegetation in an advanced stage of regeneration, cutting and removing vegetation is only permitted in exceptional cases, when it is necessary for scientific research, preservationist practices, or for projects and activities of public utility such as access roads and modest infrastructure, and only once an equivalent area has been identified for conservation. In the

case of secondary vegetation in the intermediary stages of regeneration, small-scale farmers and traditional communities may also cut and remove vegetation when performing agricultural, pastoral or silvicultural activities, or to meet the subsistence needs of their families, except in APPs. For vegetation in the initial stages of regeneration, cutting, removal and exploitation may be authorized by the responsible state agency in states where more than 5% of native Atlantic Forest vegetation cover remains.

### Other specific regulations

Normative Instruction 5/2006 describes technical procedures for the preparation, elaboration, implementation and technical evaluation of the PMFS in natural forests, and those in the later stages of succession in the Legal Amazon. These rules apply in cases where the landowner intends to promote sustainable forest management, rather than in general cases involving clearcutting and changes to non-forested uses.

This legislation specifies that the intensity of logging defined in the PMFS should take into account three main factors, namely: an estimate of annual productivity ( $\text{m}^3/\text{ha}/\text{yr}$ ), based on studies of commercial species in the region; a cutting cycle of at least 25 years and a maximum of 35 years for initiatives that meet PMFS *pleno* criteria<sup>9</sup>, and at least 10 years for low intensity PMFSs<sup>10</sup>; and estimates of the productive capacity of the forest, based on the available commercial stock ( $\text{m}^3/\text{ha}$ ). The legislation also defines Minimum Cutting Diameters (MCD), which must be established for each managed commercial species, through studies that should consider: the diameter distribution of the number of trees; other ecological characteristics that are relevant to their natural regeneration; and their destination.

In addition to this, Normative Instruction 5/2006 establishes the maximum cut intensities to be authorized by the responsible environmental agency. It defines a limit of  $30 \text{ m}^3/\text{ha}$  for the PMFS *pleno* category and  $10 \text{ m}^3/\text{ha}$  for low

9 PMFS *pleno*: PMFSs that use machinery for skidding and observe the legislation's technical requirements.

10 Low intensity PMFSs: PMFSs that do not meet the requirements for the PMFS *pleno* category.

**Table 2.5. Regulation of cutting cycles, maximum cut intensity and minimum cutting diameters.**

PMFS category	Cutting cycle (years)	Maximum cut intensity	Minimum cutting diameter <sup>c</sup>
Pleno <sup>a</sup>	Max 35 / Min 25	30 m <sup>3</sup> /hectare	50 cm
Low Intensity <sup>b</sup>	10	10 m <sup>3</sup> /hectare	50 cm

a Pleno: Uses machinery for skidding and meets other technical legal specifications

b Low intensity: In lowland areas it is possible to authorize cutting intensity above 10 m<sup>3</sup>/ha, limited to 3 trees/ha.

c Where there is a lack of specification, MCD should be measured at 1.3 m (DBH).

Source: SFB n.d.

intensity PMFSs, with a cutting cycle of 10 years<sup>11</sup>. The environmental agency must also analyze the intensity of logging proposed in the PMFS *pleno*, considering the means and technical ability required to reduce of environmental impacts, in accordance with technical guidelines. The law also stipulates that the environmental agency may adopt species specific MCDs when carrying out technical studies for PMFSs, but in cases where no specific MCD has been set, the law defines a standard of 50 cm for all species (Table 2.5).

## 2.4 Forest institution funding

The Brazilian forestry sector levies a fee for harvesting native timber species, which is used to promote forest conservation. However, as this is a small tax, levels of evasion and corruption are high, and political will and enforcement are weak, it has had very little impact on forest conservation (Young 2005). As forest certification continues to expand, management of the timber sector must improve if this tax is to be effective.

Federal legislation stipulates that users of forest products, and those with authority over forested areas, are responsible for repositioning forests that have been suppressed or eliminated through overuse. Repositioning must take place in the same state as the original forest. The responsible party must obtain 'credits' by repositioning the forest using techniques specified by an appointed government institution (i.e. the responsible party must develop a plantation prioritizing native species in order to receive a credit to offset the

damage caused). However, some states (e.g. Amazonas, Pará and Rondônia in the Amazon Biome, and Minas Gerais and São Paulo in the southeast) have enacted state legislation that allows the forest user to pay compensation for damaging forests, which is used for forest repositioning. In the state of Amazonas, for instance, a value of BRL 1.00 (USD 0.43) per credit has been established, and there is a fee of 20 credits per m<sup>3</sup> of roundwood, 10 credits per m<sup>3</sup> of firewood, and 15 credits per m<sup>3</sup> of charcoal (Vianna et al. 2013).

In the 1990s, conservationists scored a victory when forested lands were exempted from the Rural Territorial Tax (ITR). Prior to this, forests were classified as non-productive uses of the land, and were subject to higher taxes than land used for agriculture or cattle ranching<sup>12</sup>. These laws have since been revised, and Private Reserves of the Natural Heritage, which are private PAs, are now exempted from this tax. However, the impacts of such incentives remain limited due to fiscal evasion.

Another tax that affects the forestry sector is the Tax on the Circulation of Goods and Services (ICMS), which is a value added tax levied on interstate and inter-municipal transactions of goods and services (May et al. 2014). This tax is administered at the state level, and the value varies between states, and depends on the prices of goods and services, and transportation costs. Some states offer fiscal incentives to producers who comply with environmental protection guidelines. Furthermore, if a harvesting mill and forest belong to the same person or enterprise, the tax is calculated based on sale value of the finished product (i.e. sawn wood, rather than the

11 For low intensity PMFSs in lowland areas, the relevant environmental authority, based on studies of average tree volume, may authorize cutting intensities above 10 m<sup>3</sup>/ha, limited to three trees per hectare (Article 6).

12 The value of the ITR is directly proportional to the area of the property and the level of utilization.

log value). However, the landowner must pay the government a fee, based on the value of the raw timber, whenever timber is sold directly to a sawmill. Sawn logs for export are also free of this tax. The forestry sector's largest contributions to the ICMS are generated in the state of Pará (Merry and Amacher 2006).

Mechanisms for financing natural forests in Brazil have been developed only recently. The establishment of most of these mechanisms coincides with the launching of the National Forest Program (PNF), which was established by the federal government in 2000 (Decree 3420). The PNF is the primary institutional framework for financing the maintenance of natural forests in the country, and defines economic instruments to support the forest sector. Financial support is exclusively via public mechanisms, including regional funds in the north (FNO), northeast (FNE), and central-west (FCO) regions (Veríssimo 2006).

The PNF has collaborated with the Bank of the Amazon to improve the mechanisms of FNO-Floresta, the program to support forest management in the Amazon. These efforts have resulted in significant improvements, including to the types of activities that receive funding (e.g. forest inventories), and improvements to the loan guarantee system (e.g. inclusion of forest as a collateral of a loan; Veríssimo 2006).

The PNF has also contributed to improvements to the National Program of Familiar Agriculture Strengthening (PRONAF), a program directed to smallholders and beneficiaries of agrarian reform nationwide. This initiative led to the establishment of PRONAF Florestal, which provides support for a range of forestry activities, including extractivism<sup>13</sup>, forest management, silviculture, and agroforestry systems.

The SFB has launched incentive programs within the forestry sector, including the *Bolsa Verde* program. The program was created in 2011 (Law 12512), and offers BRL 300 (approximately USD 130) quarterly to families living in extremely poor

conditions, or in environmental conservation areas. The program receives its funding from the MMA.

Another program that supports the forestry sector is the National Fund for Forest Development (NFFD), launched in 2006, which is a public fund maintained by the federal government and managed by the SFB. The main purpose of the NFFD is to finance the development of sustainable activities, and promote technological innovation in the forestry sector. The fund is primarily financed by a share of the concession fees levied on Public Forests. In addition to this, the fund receives donations from national and international entities, both public and private. Projects willing to receive the financial support are encouraged through public bids. In 2013, six projects received USD 500,000 to USD 1 million per project<sup>14</sup>.

The Amazon Fund (Fundo Amazônia) raises donations for non-reimbursable investments to support preservation, monitoring and control of deforestation, and the sustainable use of forests (SFB 2013). The National Bank for Economic and Social Development (BNDES) is responsible for the management of the fund, the securement of financial resources, and for contracting and monitoring projects and actions supported by the fund. The Amazon Fund receives donations from international governments and enterprises, and its primary supporters are the Norwegian and German governments. Between 2009 and 2014 USD 780 million was donated to the Amazon Fund<sup>15</sup>.

The Program of Forest Credit was launched by the SFB in 2013 to provide information on how to finance forestry activities, including the reforestation of Legal Reserves and APPs, native species plantations, the implementation of agroforestry systems, and industrial plantations producing charcoal, energy, and cellulose (Tables 2.6 and 2.7). To solve these questions, SFB published a Guide for Forest Financing, which provides information on credit programs, beneficiaries, loan limits, interest rates,

13 Extractivism or extractive activity, in the case of vegetal resources, involves the rational harvesting of natural resources, such as timber, latex, seeds, fibers, fruits, and roots in a way that promotes sustainable production (IBGE 2011a).

14 For more information, see the SFB website: <http://www.florestal.gov.br/extensao-e-fomento-florestal/fundo-nacional-do-desenvolvimento-florestal/>

15 For more information, see the Amazon Fund website: <http://www.fundoamazonia.gov.br>

**Table 2.6. Main credit lines and programs for the forestry sector in Brazil.**

Credit lines and programs	Purpose	Supporting institution
Pronaf Floresta	Agroforestry systems; sustainable harvesting; restoration of APP or LR	Banco do Brasil, Banco da Amazônia, Banco do Nordeste do Brasil and other institutions of NSRC
Pronaf ECO	Silviculture; conservation practices and remediation to enhance soil fertility; environmental technology and renewable energy	Banco do Brasil, Banco da Amazônia, Banco do Nordeste do Brasil and other institutions of NSRC
BNDES Florestal	Afforestation and reforestation for energetic purposes; restoration of APP or LR; forest management in natural forests (except for the Atlantic Forest Biome)	BNDES and other financial institutions credentialed by BNDES
BNDES Forest Compensation	Acquisition of rural properties with existent forest cover or located within PAs	BNDES and other financial institutions credentialed by BNDES
BNDES - Support to Investments in Environmental issues	Ecoefficiency; ecosystem and biodiversity conservation; Clean Development Mechanisms (CDM); environmental planning and management	BNDES and other financial institutions credentialed by BNDES
BNDES Climate Fund Program: Charcoal	Charcoal production systems; auxiliary systems for improving timber efficiency, recovery, treatment, and energetic use	BNDES and other financial institutions credentialed by BNDES
BNDES Climate Fund Program: Renewable Energies	Implementation of energy generation projects using biomass (except sugar cane)	BNDES and other financial institutions credentialed by BNDES
BNDES Climate Fund Program: Combat Desertification	Restoration of biomes; certification of nurseries for forest seeds and seedlings; sustainable production activities; new machinery and equipment; construction and modernization in rural properties; monitoring, georeferencing (GIS), and fire prevention	BNDES and other financial institutions credentialed by BNDES
FCO ABC Mobility Program: nature conservation	Forest management; afforestation and reforestation; agroforestry systems for the restoration of APP or LR; regional nurseries; forest project certification; projects to support the reduction of GHG emissions; production of food using sustainable practices	Banco do Brasil
FCO ABC Mobility Program: Integration Farming-Livestock	Implementation of integrated systems combining farming and forests and silvopastoral systems; acquisition of machinery and equipment; elaboration of technical projects and georeferencing (GIS); land regularization and environmental adaptation	Banco do Brasil
FNE Verde	Forest management; reforestation; energy generation from renewable sources; environmental improvements to productive processes	Banco do Nordeste do Brasil
FNO Biodiversity - Support to degraded areas: Legal Reserves and APPs	Forest management; reforestation; agroforestry systems; forest productive chain; environmental services	Banco da Amazônia
FNO Biodiversity - Support to degraded areas: Legal Reserves and APPs	Restoration of APP and LR through reforestation; agroforestry systems; and other sustainable activities	Banco da Amazônia
FNO Amazônia Sustentável	Activities related to the industrial aspects of forest product transformation	Banco da Amazônia

Source: SFB 2013.

**Table 2.7. Number of contracts granted by programs related with the forestry sector and amount by selected credit lines between 2006 and 2010.**

Credit lines and programs	Number of contracts				Contracted amounts (USD million)				
	Harvesting year	2006-07	2007-08	2008-09	2009-10	2006-07	2007-08	2008-09	2009-10
Pronaf ECO	-	204	1,386	1,436	-	1.17	8.10	8.25	
Pronaf Floresta	5,356	2,248	1,307	919	11	5.5	3.17	2.55	
Propflora (BNDES)	992	756	458	364	32	26.89	23.53	15.73	
YEAR	2007	2008	2009	2010	2007	2008	2009	2010	
FNO Floresta	1	9	47	50	0.11	1.87	8.82	12	
FCO Pronatureza	117	229	194	54	24.3	26.04	41.94	20.65	
FNE Verde	34	40	27	19	9.96	53.37	5.43	3.07	

Source: SFB (2013).

reimbursement terms, guarantees, and the financial agents who operate these programs<sup>16</sup>.

#### 2.4.1 Legal frameworks for access to logging contracts

The LPFM is responsible for regulating public forest concessions, defining the management process, conducting surveys of potential concession sites, arranging and publicizing the bid, managing the bidding process, and coordinating monitoring activities. The concession process is also regulated by Law 8666/1993, which establishes rules for public bidding, to ensure equity, impartiality, and objectivity.

The first step in the process is the selection of forests to be allocated as concessions, which are then included in the Annual Plan for Forest Concession (PACF). This plan contains descriptions of the forests to be offered as concessions. The official announcement of the bidding process elaborates upon this information, and includes the details of the area under offer (i.e. products and services to be exploited), the size and location of FMUs, the criteria to be used in the preparation of the concession management proposal, the timber species, the minimum price of wood, among other details. The third step is the 'competition' between interested enterprises, communities and cooperatives.

These entities must submit documents to prove that the legal structure of their company or organization complies with Brazilian law, as bidders must be registered as a legal entity. They must also prove that they have never been found guilty of committing an environmental crime and that their tax payments are up-to-date, in accordance with Brazilian regulations. Qualified participants must then submit technical proposals, including the price that they are willing to pay for the timber (BRL/m<sup>3</sup>) and any other products or services obtained with the concession. They must also describe how they will fulfill the social and environmental requirements, which can significantly affect their chances of obtaining the concession. The concession contract is for a period of 40 years.

Once a year, the SFB adjusts the costs associated with forest concession contracts, including the prices of managed and residual timber, and of the mandatory 'social investment'. This was most recently updated in 2013. An example from a contract signed by AMATA is provided in Table 2.8.

#### 2.4.2 Infractions and sanctions

Law 9605/1998, or the Environmental Crime Law, defines some uses of natural resources that do not require authorization from an environmental agency. The entity responsible for assessing and enforcing fines for environmental crimes is IBAMA. This law imposes various penalties for crimes against fauna, pollution, urban planning and cultural heritage, among others. According

16 Information about the Guide for Forest Financing is available at: <http://www.florestal.gov.br>

**Table 2.8. Difference in fees paid by AMATA between 2010 and 2013.**

AMATA	Contract Reference Value (Sum of timber prices × current volume)	Minimum Annual Value (30% RVC)	Social Investment (value × 46,184.25 ha)
2010	563,332	168,999	15,955
2013	519,242	155,772	18,323

Source: SFB n.d.

to the Environmental Crime Law, those who destroy or damage protected forest areas, even during the process of succession, or cut trees without the permission of the relevant authority, can be detained for one to three years, or required to pay a fine. These penalties can also be applied cumulatively. The same sentences can also be imposed on those who violate conservation rules in the Atlantic Forest Biome, or found guilty of destroying or damaging primary or secondary vegetation in advanced or intermediate stages of regeneration. Whoever causes direct or indirect damage to PAs can be imprisoned for one to five years. If an individual receives or acquires, for commercial or industrial purposes, timber, firewood, charcoal or other products of plant origin, without checking that the seller has the required license and documentation, they can be imprisoned for six months to a year and fined. The same penalties apply to anyone who sells, offers for sale, stores, carries, or guards: wood, firewood, or other products of plant origin, without a valid license for the entire time it takes to transport or store the product.

Decree 6514/2008 details several administrative infractions and penalties for damages to the environment. For example, causing damage to forested areas or vegetation without authorization incurs a minimum fine of USD 2171, and a maximum fine of USD 21,710 per ha. The same decree establishes fines for those who harvest trees from APPs, with a minimum fine of USD 2171, and a maximum fine of USD 8695 per hectare, or USD 217 per tree. Using harvested timber to produce charcoal without authorization incurs in fine of USD 217 per m<sup>3</sup> of charcoal. The acquisition of roundwood, sawn timber, firewood, charcoal or other forest products for commercial or industrial purposes, without checking that the seller has the required license and documentation, is punishable by a fine of USD 130 per unit (i.e., m<sup>3</sup> or tons, depending on which unit is used to

measure the product). The decree also imposes a daily fine of USD 21.7 to USD 217 per ha for those who fail to maintain Legal Reserves. Finally, punishments are defined for those responsible for causing fires. In some regions, including many parts of the Atlantic Forest Biome in the southeast, the risk of forest fires is particularly high in June and July when the weather is dry. In addition to this, celebrations take place at this time of year, during which many people release sky lanterns with open flame balloons. These further increase the risk of forest fires. The law stipulates that the fabrication, transportation, or sale of such balloons will incur a fine of USD 435 to USD 4350 per unit.

### 2.4.3 Monitoring and verification systems

The harvesting of legal timber must be authorized by the relevant environmental agency, and once harvested, the owner of the timber must possess the required supporting documentation, including a transport license. Several documents are required to harvest and transport timber. To legally harvest timber, authorizations must be obtained from the PMFS. Authorizations for deforestation and changes in land use, or vegetation removal may also be required. Although these types of extraction can be performed legally, they are based on principles of conventional rather than sustainable management. Illegal logging is often performed without authorization, and is characterized by its fast, predatory, and destructive methods, which affect large areas of natural forest. In spite of this, illegal logging is common even in APPs and Legal Reserves.

The Brazilian government has launched several activities to combat illegal logging. One of them involves monitoring forest cover changes (*fiscalização*), using a range of complementary methodologies, and encouraging the participation of a range of institutional actors. In order to



determine the provenance of commercialized timber at both its source and destination, operations must be endorsed by a Document of Forest Origin (DoF).

The monitoring of Brazilian forests is conducted via the National Forest Inventory (IFN), coordinated by the SFB, with the main purpose of providing detailed information on Brazil's forest resources (SFB 2013). Such information is essential for the formulation of public policies related to the use, conservation and restoration of forest resources. The methodology of the IFN was developed through a participative process, and features a set of standard methods to be used nationally, which can also be adapted to the particularities of each biome. This methodology advocates the collection of biophysical, social, environmental, and landscape information in a systematic grid of 20 km x 20 km that covers the whole national territory (SFB 2013). The sampled forests are measured every five years, which allows the IFN to serve as an instrument for monitoring forest quality.

Another monitoring program is carried out by the National Institute for Space Research (NISR), which annually measures deforestation rates in the Amazon Biome. The program uses two operating systems, the DETER and the PRODES, which have complementary goals. DETER is a system to support the supervision and control of deforestation in the Amazon, which each month produces a map and issues warnings if deforested areas larger than 25 ha are identified. Such maps identify totally deforested areas, as well as those that are undergoing deforestation. PRODES has measured annual rates of deforestation since 1988 for increases over 6.25 ha, using remote sensing and geo-processing. Degradation is much harder to identify, and is beyond the capacity of either of these systems.

Since 2006, IMAZON has used the Normalized Difference Fraction Index (NDFI) to monitor timber extraction. Through this system, it is possible to verify whether timber has been extracted in compliance with forest regulations, the status of the management plan in a given area, and whether illegal timber harvesting has been carried out in PAs. IMAZON also uses the Deforestation Alert System (DAS), which has been active in the Legal Amazon since 2008, to detect

monthly deforestation and forest degradation, as a result of timber harvesting or fires. The system can also recognize which states and municipalities have undergone the most deforestation. The most recent report shows that in July 2014, deforestation had reached 34,400 ha and that the accumulated deforestation from August 2013 to July 2014 was 204,400 ha. The states of Pará (41.7%), Mato Grosso (20.1%), and Amazonas (15.1%) suffered the most deforestation throughout this 12 month period. In addition to this, 71,100 ha of forest were degraded during this same period, with almost 80% of degradation taking place in the state of Mato Grosso (Fonseca et al. 2014).

IMAZON also carries out analyses of logging in the states of Pará and Mato Grosso on an annual basis (August–July). Such analyses use information from each state's Secretariat of the Environment, including the Integrated System for Licensing and Environmental Monitoring (SIMLAM) and the System for the Sale and Transportation of Forest Products (SISFLORA). The information from these databases is crossed with those from the System for Monitoring Timber Harvesting (SIMEX), developed by IMAZON. The reports analyze the legally (authorized) and illegally (unauthorized) logged areas, the location of illegal logging (e.g. private lands, PAs, agrarian reform settlements), as well as the quality of logging (i.e. good, medium, or low quality; Monteiro et al. 2012; Monteiro et al. 2013).

#### **2.4.4 Legal frameworks: Barriers and opportunities**

Illegal timber harvesting in the Amazon has been facilitated by a lack of public policy and institutional presence to support the enforcement of environmental legislation (Modesto 2014). Many fines related to environmental crimes are neither imposed nor collected, especially when powerful economic actors are involved. The situation is compounded by juridical gaps, overwhelmed courts, and complex processes. In addition to these factors, there are critical staff shortages, lack of regular funding for state and federal environmental agencies, and corruption within these organizations. Furthermore, political groups linked to the timber industry are often responsible for the nomination of local officers for environmental agencies, which seriously

compromises the autonomy of such institutions (May et al. 2011).

Margulis (2003) suggests that economic instruments have significant potential to support policies to promote sustainable development in the Amazon. Examples of these instruments include tradable development rights, taxes on deforestation, and compensation for those who do not deforest. However, the author recognizes that the use of such instruments could not overcome challenges related to law enforcement. The remoteness of some parts within the region, and the difficulty of dealing with local stakeholders represent some of the barriers to effective law enforcement. Solutions include a strategy of institutional cooperation between agencies such as MMA, IBAMA, INCRA, FUNAI, the Federal Police and state governments, as well as revisions to the process of granting land tenure rights (Margulis 2003).

Nevertheless, despite the significant obstacles posed by such problems, May et al. (2011) outline the ways in which monitoring of deforestation and illegal harvesting in the Amazon continues to improve:

- IBAMA and state environmental agencies have increased the use of remote sensing for monitoring and planning. These agencies are concentrating their efforts in the most deforested areas, to unveil the main causes of deforestation (e.g. illegal livestock activities in PAs), support media coverage, and conduct operations to fight illegal activities in the Arch of Deforestation.
- IBAMA's institutional presence has increased in the Amazon, due to the decentralization of data and an increase in staff, which has boosted efforts to promote transparency and halt corruption.
- IBAMA has been working closely with other governmental agencies to fight crimes such as encroachment into Indigenous Lands and PAs.

However, significant problems related to law enforcement and forest protection and management in the Amazon persist. Obstacles include the dominance of elites within government institutions which limits the capacity of such bodies to pursue public interests; lack

of transparency; and weak organization among civil society.

Nepstad et al. (2014) suggest that 2004 marked an increase in law enforcement, due to the establishment of initiatives such as DETER, PPCDAm, the expansion of PAs in the Amazon, as well as the soy moratorium proposed and championed by Greenpeace. These initiatives contributed to a reduction in deforestation, due to the increased risk faced by those failing to comply with legislation. In addition to this, in order to gain access to credit lines through the National Policy of Climate Change, REDD+ programs, and the CAR, landowners were required to register their property boundaries with the state environmental agency, which facilitated monitoring for compliance (Brito and Barreto 2010). However, the effectiveness of command-and-control policies and law enforcement depend on the government's political will, which is heavily affected by the state of the national economy.

Further opportunities for improved forest management include simple policies to support farmers who promote sustainable production, such as the simplification of regulatory requirements, discounts for licensing procedures, and lower interest rates. In addition to this, a set of targets could be developed to reduce deforestation by aligning the supply chain and public policy initiatives, particularly with respect to industrial agriculture activities. Finally, land titles are fundamental to facilitate landowners' access to credit, to promote investment, innovation and the sustainable use of resources (Nepstad et al. 2014).

## 2.5 Forested lands in Brazil

Most of Brazil's natural forests (325.5 million ha or 71.4%) are concentrated in the Amazon Biome, while its planted forests, mainly composed of eucalypts, are primarily located in the southern states of Minas Gerais and São Paulo (SFB 2013). The Brazilian Amazon, covering nearly 420 million ha, makes up approximately 30% of all the world's remaining tropical forests.

Approximately 21.7% of the Amazon is designated as Indigenous Lands, and 22.2% as Conservation Units (14.2% of Sustainable Use and 8% of Preservation). Private areas occupy 22.7%, and

special areas represent a bit over 6% (rural settlements account for 5.6%, military lands and areas inhabited by *Quilombola* communities<sup>17</sup> occupy approximately 0.6%). The *terras devolutas*, and private lands under dispute, make up approximately 27% of the Legal Amazon.

### 2.5.1 Demographics

For centuries the occupation of the Brazilian Amazon occurred along major rivers and in coastal regions. However, since 1960, the landscape has changed due to the construction of major infrastructure (i.e. roads, planned rural settlements, airports, hydroelectric projects), the granting of rights to unoccupied lands, the provision of easy credit for agricultural activities, and the establishment of a free trade zone in Manaus (Barreto et al. 2005). Between 1960 and 2001 the total population of the Amazon grew from approximately 4 million to over 20 million, representing a 400% increase (IBGE 2002). By 1974, the population was approximately 8.2 million, and in the following 17 years it doubled again, reaching 17 million in 1991 (Lentini et al. 2003). Table 2.9 shows changes in population growth in the Legal Amazon since 1950. The table provides only a broad estimate, as data is only available for the total population of each state, and some states are not fully located within Legal Amazon boundaries (Lentini et al. 2003; Table 2.9).

### 2.5.2 Economic poles and infrastructure development

For approximately 450 years, since the beginning of European colonization in the 1500s, the occupation of Brazilian territory was restricted to coastal regions. Population and economic growth were initially concentrated in the northeast, based on the production of sugarcane, and subsequently spread to the southeast as a result of the Gold Rush (1700s) and Coffee Cycle (1800s) (Furtado 1959). Nowadays, regions within the Atlantic Forest Biome, especially in the southern states, are the

most economically developed, and are inhabited by 61% of Brazil's population (i.e. 131 million inhabitants). The southeast region, 57.4% of which is located within the original territory of the Atlantic Forest Biome, contributes 55.4% of Brazil's GDP (IBGE 2011a). The Amazon remained almost intact until the 1970s, affected only by events such as the Rubber Boom in the 1940s (May et al. 2011). A total of approximately 10 million ha of the Amazon were deforested in the years preceding 1970. In the following two decades, deforestation rates reached approximately 2 million ha per year (Fearnside 2005). To date, more than 70 million ha of Amazonian forest have been deforested (14% of the original forest cover).

Changes in forest cover were aggravated by public policies implemented during the military dictatorship of 1964–1985, which aimed to develop the Amazon region and facilitate its integration into the rest of the country. During these years, expressions such as “integrate not to relinquish” (in Portuguese this expression is a pun: *Integrar para não entregar*) and “land without men for men without land” dominated the public discourse. The first expression was coined in 1966 by President Castelo Branco, and refers to the perceived threat posed by other nations hoping to invade the Amazon, and reflects the nationalist tone of the military government. The second, related to farmers' demands for land and the desire to implement agrarian reform, was used by President Emílio Garrastazu Médici (1969–1974) to promote the occupation of the Amazon.

Forest conversion in Brazil, particularly in the Amazon, is affected by economic factors, such as inflation and credit availability. During the 1980s and the first half of the 1990s, the Brazilian economy suffered from high instability and hyperinflation. This critical juncture made land a high value asset and attractive for speculation, fueling forest clearing to prove land tenure claims (Fearnside 2005). In the early 1990s, forest clearing decreased due to a reduction in financial subsidies incentivizing deforestation (Decree 153/1991), the implementation of fines, and national economic slowdown. In 1995, the economy gained some stability following the implementation of the *Plano Real*, which introduced a new currency

<sup>17</sup> The *Quilombola* communities are an ethnic group, predominantly composed of both rural and urban members of the black population, who define themselves in terms of their relationship with the land, kinship, territory, ancestry, traditions and cultural practices. These communities have had ownership rights over their land since the 1988 Constitution.

**Table 2.9. Population dynamics in the states that form the Brazilian Legal Amazon (in thousands inhabitants).**

State	1950	1960	1970	1980	1990	2000	2010
Acre	114.8	160.2	218	306.9	417.2	557.2	733.6
Amapá	37.5	68.9	116.5	180.1	288.7	475.8	669.5
Amazonas	514.1	721.2	960.9	1,449.1	2,102.9	2,813.1	3,484
Maranhão	1,583.2	2,492.1	3,037.1	4,097.2	4,929	5,643	6,574.8
Mato Grosso	212.6	330.6	612.9	1,169.8	2,022.5	2,502.3	3,035.1
Pará	1,123.3	1,550.9	2,197.1	3,507.3	5,181.6	6,189.6	7,581.1
Rondônia	36.9	70.8	116.6	503.1	1,130.9	1,377.8	11,562.4
Roraima	18.1	29.5	41.6	82	215.9	324.2	450.5
Tocantins	204	328.5	537.6	738.7	920.1	1,155.9	1,383.4
<b>Total</b>	<b>3,844,593</b>	<b>5,752,754</b>	<b>7,838,335</b>	<b>12,034,292</b>	<b>17,208,819</b>	<b>21,038,781</b>	<b>25,474,365</b>

Source: IBGE 2011b.

and economic adjustments<sup>18</sup>. However, in the early 2000s, an increase in soybean production and the expansion of cattle ranches led to increased levels of deforestation in the Amazon.

Econometric analyses performed by Assunção et al. (2012) show a correlation between deforestation and agricultural output prices, and suggest that credit can indirectly affect deforestation (Assunção et al. 2013). The trajectory of deforestation rates, which increased until the mid-2000s, slowed down in the second half of the decade, following a similar trend in agricultural prices, suggesting that these may have some influence on deforestation. Nonetheless, the study emphasizes that this trend also coincides with the implementation of a range of conservation policies aimed at controlling and preventing deforestation in the Amazon (namely the PPCDAm, and Decree 6321 [December 2007]), particularly in municipalities with high deforestation rates. The empirical results suggest that without such policies, deforestation would have reached 119,000 km<sup>2</sup> in the 2005–2009 period, whereas a total of 57,100 km<sup>2</sup> was recorded in Pará, Mato Grosso, Rondônia and Amazonas.

18 Throughout the 1980s and the first half of the 1990s, the Brazilian economy was extremely unstable, with high inflation rates, deterioration in its Balance of Payments etc. In 1994, the government launched the Plano Real, a set of measures to stabilize the economy and control inflation, which led to the creation of a new currency, the Real.

Therefore, Assunção et al. (2012) suggest that the introduction of such policies were responsible for a 52.1% reduction in deforestation. Nepstad et al. (2014) attribute the decline in deforestation rates between 2005 and 2007 to increases in law enforcement capacity, a reduction in areas used for soy production, a rapid increase in beef yields, a reduction in cattle herds, market barriers imposed by the soy moratorium, the creation of new PAs, and restrictions on rural credit following the passing of Resolution 3545 by the Brazilian National Monetary Council.

Timber harvesting in the Amazon is a relatively recent activity, and has advanced into the forests, in what are known as forest frontiers, which have been affected by varying levels levels of industrialization (Merry et al. 2006). The 'timber frontiers' (Veríssimo et al. 2002) can be classified according to forest type, stage of occupation, age of frontier, condition of access, and type of transportation. With respect to age, frontiers can be old (more than 30 years); intermediary (between 30 and 15 years); new (less than 15 years); and estuarine, in which timber harvesting has been sporadic and selective since the 17<sup>th</sup> century.

Amazonian timber harvesting commenced following the exhaustion of resources in the southeast, stimulated by economic growth and improved infrastructure, including highways

allowing access to forested areas occupied by timber companies (SFB and AMAZON 2010). Two highways were particularly important to this process: the Belém-Brasília (BR-010) and Transamazônica (BR-230). The former, opened in 1960, agglutinates the majority of *polos madeireiros*. This highway crosses a region containing some of the Amazon's oldest *polos madeireiros*, located close to Paragominas. BR-230 was opened in 1972 and crosses from east to west across the state of Pará and part of the Amazonas. Finally, another important highway is the Cuiabá-Santarém (BR-163), which connects Cuiabá, the capital of Mato Grosso, to Santarém, a municipality in the west of Pará that was once an important site for timber production, and is now dominated by soybeans. Along this highway there are both old and new *polos madeireiros*.

### 2.5.3 LULCC beyond the forestry sector

Energy consumption in Brazil is increasingly dependent on renewable sources. The federal government is currently pursuing the expansion of hydroelectric power, already the country's main source of renewable energy, as well as increased use of biofuels. The Amazon's existing hydroelectric potential is estimated to be approximately 95 GW, which represents nearly 40% of Brazil's total hydroelectric potential (Eletrobras 2012). One of the arguments against the construction of hydroelectric dams in the Amazon is that this will lead to increased rates of deforestation, as a result of migration, increases in land value, and land speculation (Barreto et al. 2014). For example, indirect deforestation caused by the construction of the Belo Monte Dam is estimated to be approximately 5100 km<sup>2</sup> in 20 years, ten times its flooded area, and across the Tapajós River basin, deforestation levels could reach 11,000 km<sup>2</sup> (Barreto et al. 2011). Biofuels may also directly and indirectly affect deforestation, as a result of increases in biofuel prices (Gao et al. 2011), and the displacement of agricultural production into forested areas.

## 2.6 The forestry sector and timber industry

Historically, logging was restricted to the forests along the main rivers in the lowland Amazon. Practices were extremely selective and caused

minimal impacts. However, since the 1970s, following the construction of strategic access roads in the Amazon, the exploitation of timber has become a major economic activity, concentrated around the *polos madeireiros*.

The Amazon has been divided into 11 *zonas madeiras* (logging zones)<sup>19</sup>, five in Pará, three in Mato Grosso, and three in Rondônia. Although *polos madeireiros* can be found in other Amazonian states, these regions do not meet the criteria of *zona madeira* (Lentini et al. 2003). In 2009, a study developed by the SFB and AMAZON identified 2226 logging companies operating in the Amazon and 75 *polos madeireiros*, across a total of 192 municipalities (SFB and AMAZON 2010).

The most recent data from 2009, indicates that these *polos madeireiros* extracted 14.2 million m<sup>3</sup> of native timber, which is equivalent to 3.5 million trees, of which approximately 47% were logged in the state of Pará. The largest proportion of the processed timber (72%) was in the form of sawn wood with low added value (e.g., slats, beams, and planks). Another 15% was converted into floors and frames, and another 13% was transformed into laminated wood and plywood. The remaining 8.4 million m<sup>3</sup> of roundwood was considered residual material, and was used for the production of charcoal (1.6 million m<sup>3</sup>), energy generation for pig-iron smelters in Maranhão and Eastern Pará (2.7 million m<sup>3</sup>), and for other uses (2 million m<sup>3</sup>; e.g. fertilizer and firewood). Another 2.1 million m<sup>3</sup> were unused. Most timber is produced for the domestic market (SFB and AMAZON 2010).

### 2.6.1 Forest management institutions

Forest management in Brazil involves several institutions from the federal, state and municipal levels of government (SFB 2013). These institutions are organized within the National System of the Environment (SISNAMA).

The MMA promotes the adoption of principles and strategies related to the protection, restoration

<sup>19</sup> *Zonas madeiras* consist of a cluster of *polos madeireiros* with significant timber production capacity, which follow geographic patterns determined by the history of colonization and logging (i.e. the number of years that logging has taken place); types of forest; abundance of regionally valuable forest resources; and ease of access and transport costs (SFB 2010).

and knowledge of the environment, the sustainable use of natural resources, the valorization of environmental services, and the consideration of sustainable development in public policies. The MMA is responsible for granting concessions for sustainable timber production, as well as for designing policies and strategies for sustainable development. The SFB is responsible for the management of Federal Public Forests, and is tasked with advancing the sustainable use of forests, promoting training and sustainable practices in the forest sector, conducting market research for forest products and services, maintaining the National System of Forest Information and managing the National Cadaster of Public Forests.

IBAMA assists MMA with the formulation and implementation of environmental policies. IBAMA has the power to serve as an environmental police force, and is responsible for environmental licensing, environmental control, and authorizing the use of natural resources, whenever these are the responsibility of the federal government. The Chico Mendes Institute of Biodiversity Conservation (ICMBio)<sup>20</sup> is responsible for the management, protection, supervision, and monitoring of PAs established at the federal level.

The National Institute for Space Research provides support for monitoring deforestation in the Amazon through its remote sensing programs using the Brazilian geo-stationary satellite. The most widely used is PRODES, which was developed in collaboration with MMA, IBAMA, and the Ministry of Science, Technology, and Innovation (MCTI), and is also used by the federal government when spatial planning is required to inform public policies.

Three institutions are responsible for promoting the participatory management of forests at the federal level. The National Council of the Environment (CONAMA), created in 1981, is SISNAMA's advisory body. The National Commission of Forests (CONAFLO), established in 2000, provides guidance to the National Program of Forests and provides information on the participation of various groups. The

Commission of Public Forest Management (CGFLOP), created in 2006, is the advisory body for the SFB.

At the state and municipal levels, the institutional framework for forest management differs from the federal level. In general, the Secretariats of the Environment within each state are responsible for further developing state forest policies and regulations, and some institutes (e.g. the Forest Institute in São Paulo and the State Institute of Forests in Minas Gerais) are responsible for the licensing, control and supervision of forest activities. Other states have a branch within the Secretariat of the Environment that is solely responsible for forest management (e.g. Mato Grosso and Pará; SFB 2013).

## 2.6.2 Indigenous and other local communities

Community forests are those that are demarcated for use of traditional communities, indigenous peoples, smallholders, and families that were settled through agrarian reform projects. The Constitution assures the rights of indigenous peoples and *Quilombola communities* to the territory of their ancestors, and the LPFM assures the rights of local communities to the use of forest resources. In light of this, the Brazilian government has made efforts to recognize these rights, which is evidenced by the share of Public Forests allocated for community use (approximately 62% of registered Public Forests; SFB 2013; Table 2.10).

A survey conducted by IMAZON between 2009 and 2010 identified 1214 community forest management initiatives, of which, 902 dealt with timber products and 325 were focused on NTFP extraction. Estimates suggest that these initiatives have benefitted approximately 5560 families in the Amazon, managing an area of 851,000 ha (Pereira et al. 2010).

Brazil has specific arrangements for Indigenous Lands. The Constitution assures the rights of indigenous peoples over traditionally occupied Indigenous Lands, which are demarcated by Decree 775/96. According to the Constitution, lands traditionally occupied by indigenous peoples are areas that are: permanently inhabited by indigenous peoples; used for productive activities; necessary for the inhabitants' physical or cultural

20 ICMBio was named after Chico Mendes, a rubber tapper and environmentalist who was murdered in 1988.

**Table 2.10. Federal community managed forests.**

Reserves	Area (thousand ha)	Share (%)
Extractive Reserves	11,735.8	9.42
Sustainable Development Reserves	64.6	0.05
Indigenous Lands	102,807.1	82.5
Forest Settlement Projects; Agroextractive Settlement Projects; and Sustainable Development Projects	9,954.1	7.99
<b>Total</b>	<b>124,571.6</b>	<b>100</b>

Source: SFB (2013)

reproduction; or indispensable to the preservation of the environmental resources necessary for the inhabitants' well-being, according to their uses, customs and traditions. The indigenous groups maintain permanent ownership of these lands, and have exclusive use of the soil, rivers, and lakes existing therein. The use of water resources, including the harnessing of their energetic potential; scientific research; and the exploitation of mineral resources may only be carried out on Indigenous Lands with authorization from Congress, which must first consult with the affected communities and ensure their consent and participation.

Indigenous Lands are areas that are donated by a third party, acquired, or expropriated by the federal government, and rights of use are permanently transferred from the federal government to indigenous peoples. Similarly, the federal government can assign areas in any part of the country and that form part of the patrimony of the federal government for indigenous communities' use. In these lands, communities can live and use the natural resources, guaranteeing the conditions required to ensure their cultural and physical wellbeing but ownership remains in the federal government. There are also *terras interditadas* (prohibited lands), as defined by FUNAI, to protect isolated indigenous peoples.

In 2008, the MMA and the Ministry of Justice created a working group to develop a national policy for the environmental management of Indigenous Lands. Its goal was to develop strategies to protect and support indigenous peoples and their lands, focusing on sustainable development, land ownership, culture and quality of life (May et al. 2011). In 2012, these efforts resulted in the

establishment of the National Policy for Territorial and Environmental Management of Indigenous Lands (PNGATI; Law 7747/2012). The specific goals of the PNGATI are organized into seven axes, one of which relates specifically to enhancing governance and securing indigenous participation. For example, goals include ensuring the participation of indigenous peoples in the decisions and implementation of the PNGATI, and in EEZ processes that affect Indigenous Lands. However, the law is very general and does not define practical procedures to achieve such goals.

In 2009, the Federal Program of Community and Familiar Forest Management (FPCFFM) was established by Decree 6874/2009, to coordinate efforts to promote sustainable forest management, focusing on traditional communities and smallholders who depend on forests for their subsistence. The program was established in response to calls from communities in several regions, for actions to confront obstacles to community forest management, such as: lack of land tenure regularization; difficulties in obtaining credit for community forest management; the slow management plan approval process, and its inability to match its requirements to the realities faced by local communities; the small scale of community production; and poor infrastructure to facilitate the transport and processing of forest products.

Decree 6874/2009 affects smallholders, families settled through agrarian reform projects, and traditional communities and peoples. The MMA is responsible for the coordination of the program, which is implemented by the SFB, and the Ministry of Agrarian Development (MDA). These organizations are responsible for developing

an Annual Plan of Community and Family Forest Management, an instrument to support the implementation of the program, and the definition of its actions, activities, and deadlines. Financial support for the program is mainly derived from the MMA and the MDA, as well as the National Fund for Forest Development -NFFD in the Amazon, and the National Fund of the Environment (FNMA).

The most recent Annual Plan available for consultation (2011) includes a plan of action to be carried out in 187 municipalities, across 13 states in the north and northeast regions, within the Amazon and Caatinga Biomes. It was expected that approximately 21,800 families would benefit from a total of USD 17.4 million, of which, approximately USD 2.2 million was to be granted as loans. The actions projected in this plan include: training in community enterprise management; technical assistance and rural extension, with a focus on forest activities; training in community forest management; and support for product commercialization. It also includes a survey of potential credit lines and programs, an analysis of the infrastructure required to facilitate the processing and commercialization of products from local communities, and an analysis of the rules of community forest management.

The rights of *Quilombola* communities are also recognized by law. An article in the Federal Constitution of 1988 recognizes the Quilombola communities' territorial settlement rights, their rights to land, and the need to protect their culture. Other legal mechanisms to integrate and recognize local communities' rights to land management and these include the Agrarian Reform and the SNUC. The SNUC establishes Extractive Reserves (RESEX) and Sustainable Development Reserves (RDS). The purpose of these units is to protect the livelihoods and culture of traditional extractive populations, ensure the sustainable use of natural resources, improve knowledge and management techniques among traditional populations, and promote biodiversity conservation. The FLONAs also encourage the presence of traditional communities.

Smallholders also play a significant role in timber extraction in the Amazon. Smallholders traditionally gain occupation of their lands

through settlement programs promoted by the federal government, by means of INCRA. This institution has settled approximately 280,000 migrant families in the Legal Amazon since 1995, occupying a total area of approximately 28 million ha. If informal, unrecognized settlements are included in this estimate, the total area may increase by approximately 60% (Amacher et al. 2012).

### 2.6.3 Timber prices, supply and demand

Brazil is both a substantial producer and consumer of forest products. Various sectors of the Brazilian economy, including the construction, cellulose and paper, and steel industries, directly depend on the forestry sector (Pereira et al. 2010). The forest product market involves several agents, such as suppliers, workers, manufacturers, traders, each one with specific roles along the market chain. Each of these agents represent points of influence and defend the interests of their peers in the market (Filho 2008).

Processed timber from the Amazon is largely produced for the domestic market (e.g. 78% of timber was produced for the domestic market in 2009) (SFB and AMAZON 2010). The highest prices can be demanded in Pará and Mato Grosso, due to their proximity to the consumer market, whereas in other states, such as Acre and Amapá, prices are lower (Appendix I presents the average prices of roundwood per class of economic value, for 8 states of the Legal Amazon, in 2009). Prices of processed timber range from USD 265 to USD 901/m<sup>3</sup> (average price: USD 421/m<sup>3</sup>). The average prices are: USD 681/m<sup>3</sup> for high value species, USD 411/m<sup>3</sup> for medium value species, and USD 323/m<sup>3</sup> for low value species (Pereira et al. 2010). In 2009, the average price of roundwood sold in the Legal Amazon was USD 109/m<sup>3</sup>.

Since 1998, the extraction of roundwood from the Amazon has been steadily decreasing. The extraction of roundwood declined from 28.3 million m<sup>3</sup> in 1998 to 14.2 million m<sup>3</sup> in 2009 (SFB and AMAZON 2010). This is due to the substitution of tropical timber with PVC, aluminum, metal, MDF, and planted timber (Sobral et al. 2002; Pereira et al. 2010), as well as an increase in monitoring and law enforcement



that has curbed illegal logging. Furthermore, the 2008–2009 economic crisis significantly affected timber exports.

Prices of processed timber range from USD 265 to USD 901/m<sup>3</sup> (average price: USD 421/m<sup>3</sup>). The average prices are: USD 681/m<sup>3</sup> for high value species, USD 411/m<sup>3</sup> for medium value species, and USD 323/m<sup>3</sup> for low value species (Pereira et al. 2010; Appendix II). Approximately 1.2 billion m<sup>3</sup> of processed timber from the Amazon was exported in 2009, with a market value of USD 560 million. This value represents nearly 33% of Brazil's total timber exports. However, this amount represents a significant decrease in revenue, as timber exports generated an average annual income of USD 1.034 billion between 2004 and 2008 (e.g. timber exports in 2008 generated approximately USD 1 billion) (Pereira et al. 2010; Appendix III). In 2009, the largest importers of timber from the Amazon were the USA (24.1%) and France (15.6%). Other countries accounted for between 2% and 10% of exports (e.g. China, Netherlands, Belgium, Portugal, United Kingdom, Turkey, Spain, and Germany; MDIC 2010).

According to SFB (2013) there are 14 forest species at risk of extinction in Brazil, the majority of which are found in the Atlantic Forest Biome. In the Amazon there are at least four at-risk species: cherry (*Amburana cearensis* var. *acreana*), pau-roxo (*Peltogyne maranhensis*), mahogany (*Swietenia macrophylla*) and yellow-tree (*Euxylophora paraensis*). Three Amazonian tree species are protected by federal law, prohibiting their harvest: rubber (*Hevea spp.*), Brazil nut (*Bertholletia excelsa*) (Decree 5975/2006); and mahogany (*Swietenia macrophylla*)—except in the case of forest management (Decree 4722/2003). In addition to these, *Peltogyne maranhensis* and *Euxylophora paraensis* are included in the Official List of Endangered Species of the Brazilian Flora.

#### 2.6.4 Transport costs

Timber extracted from the Amazon is transported *via* rivers or roads. Waterway transportation is generally cheaper, and can involve rafts (i.e. floating the logs) or ferries. Although terrestrial access is the most expensive form of transportation, is the most widely used method in the Eastern Amazon (Barros and Verissimo 2002). Road transport costs are influenced by road

quality and by the distance between timber sources and consumer centers (SFB and AMAZON 2010). Research has shown that rafts are much cheaper than ferries, which, in turn, are cheaper than trucks (SFB and AMAZON 2010). An obvious problem with raft transportation is that it works only for timber that can float. Although ferry transport requires a substantial initial investment (Barros and Uhl 1997), large companies often invest in tugboats to transport valuable timber that cannot float (e.g. *Virola*; Stone 2000).

#### 2.6.5 Labor considerations

The forestry sector is a substantial generator of employment in Brazil. However, the number of jobs directly and indirectly related to the Amazonian timber industry decreased from 353,000 in 1998, to 344,000 in 2004, to 203,000 in 2009 (Santos et al. 2012). In 2010, approximately 204,000 new jobs were created in the Brazilian Amazon, of which, 66,000 were directly related to the industry (i.e. processing and timber harvesting), and the rest indirectly related (i.e. transportation, commercialization). At national level, however, approximately 673,000 formal jobs were created in the forestry sector in 2011 alone (SFB 2013). Almost 50% of the companies operating in the Legal Amazon are located in Pará, and employ over 90,000 people (both directly and indirectly), followed by Mato Grosso, where nearly 27% of the companies are based, providing over 50,000 jobs. It is estimated that the forestry sector generates approximately two indirect jobs for each direct job it creates (Pereira et al. 2010). In 2011, the rate of labor-related accidents in the forestry sector was 23.5 for every 1000 jobs in planted forests, 12.6 in natural forests, and 17.1 for supporting activities, compared to a national average of 10.8 accidents for all occupations. There were also a greater number of fatalities in natural forests (34.7 for every 100,000 jobs) than in planted forests (7.38), compared to a national average of 7.43. Furthermore, jobs in planted forests are more likely to have better contractual arrangements and benefits (Castral 2004; Basso et al. 2011; MPS 2012).

### 2.7 Forest certification within the country's institutional framework

This section focuses specifically on forest certification in Brazil, including both the FSC

scheme and the national CERFLOR program. This section focuses on planted as well as natural forests -- which represent a small share of Brazil's certified area. Certified natural forests are mainly located in the Amazon Biome. CERFLOR, endorsed by PEFC, has almost exclusively certified plantations. The section covers theoretical aspects of certification including up-to-date achievements and challenges regarding forest management certification in the country.

### 2.7.1 Background research on certification

The 3 part-series *Acertando o Alvo* was produced through a partnership between the Instituto de Manejo e Certificação Florestal e Agrícola (IMAFLOA), AMAZON, and the NGO *Amigos da Terra*. The first document was launched in 1999 (Smeraldi et al. 2009) and described the market of timber from the Amazon in general, and demands and expectations for certification of Amazonian timber. The second document was published in 2002 (Sobral et al. 2002) and focused on analyzing Amazon timber consumption in the state of São Paulo, the main consumer in Brazil. These two documents provide a wealth of information on Amazon timber markets, including valuable new data, and represent a significant achievement in the field of natural forest certification. Ten years later, IMAFLORA oversaw the publication of the third document in the series, which presents an analysis of existing and potential markets for certified timber from the Amazon, and identifies challenges to the expansion of certification in the region.

Other studies have also addressed the impacts of FSC certification on conventional forest management, particularly in community-based regimes. Humphries and Kainer (2006) found that the social and economic benefits of certification were perceived differently by commercial groups associated with community resource management (i.e. communities were more willing to adapt their decisions to overcome difficulties, mostly related to certification costs). Rockwell et al. (2007) found less logging damage in certified operations than in those taking a conventional management approach. Through a series of interviews, Barbosa Lima et al. (2009) concluded that FSC certification has small positive environmental and socioeconomic impacts. The authors of this study consulted with

experimental groups and comparison groups with similar land tenure arrangements and management systems in place.

Another important series of documents is the *Fatos Florestais da Amazônia*, which is based on various AMAZON studies, and published in 2003, 2005, and 2010. The aim of the studies was to collect a wide range of data on the forest sector in the Amazon, including: volumes harvested and related derived rents, associated jobs, use of forested lands, dynamics of the furniture sector, etc. The first publication briefly addresses certified areas and products in the region. The two following documents provide a more thorough analysis of this subject, and examine the evolution of FSC certification, forest management and community management practices, and the benefits of sustainable management.

These studies provide valuable information on the organization of timber markets, as well as a wide range of up-to-date data on the forest sector. However, the scope of these studies is limited to the Amazonian timber market, and as a result, they overlook the certification of planted forests. The studies also lack a theoretical analysis of the forest certification process in Brazil.

In his 2004 study, May addresses the emergence of forest certification, within an international context, as well its introduction in the Brazilian timber sector. This paper identifies some of the market drivers influencing the emergence of forest certification in Brazil (e.g. consumers' concern and competition), its organization and progress, the commercial benefits to be derived from certification (e.g. opening markets), and the financial benefits of practicing sustainable logging (e.g. more merchantable volume, minimized losses, and improvement in potential future harvests).

Araújo et al. (2009) studied the perceptions of the private sector regarding two certification schemes in Brazil: FSC and the Brazilian CERFLOR scheme. Their analysis focused on the factors that influence a company's decision to adopt certification (i.e. market, learning, and signaling), but also addressed other aspects, such as familiarity with the different schemes, and the influence of various groups on the company's decision to pursue forest certification (e.g. international consumers, NGOs, governmental agencies,

national consumers, and academics). Araújo et al. found that in deciding to pursue certification, companies were not motivated by the possibility of demanding higher prices for their products, but rather by the prospect of improved market access. In general, international consumers and shareholders had greater influence than national consumers. However, the latter had greater influence on companies involved in planted forests.

More recently, Pinto and McDermott (2013) conducted a study on forest certification in Brazil, focusing on social equity. The authors found out that FSC certification did not meet the expectations of local stakeholders, regarding, for example, the distribution of costs and benefits

### 2.7.2 Forest certification

International efforts to reduce tropical forest loss were influential in the emergence of forest certification in Brazil. A group of consumers in developed countries established in the early 90s The Woodworker's Alliance for Rainforest Protection (WARP), which published a "Good Wood List" that included a list of producers known to practice proper forest management. In 1993, representatives of NGOs, wood producers, and consumers united to establish the FSC.

The concept of certification has long been established in Brazil. Non-governmental entities responsible for independent certification have been operating in Brazil since the 1970s. In 1973, a legal framework was introduced through Law 5966, which created the National System of Metrology, Normalization and Industrial Quality (SINMETRO). This system involves public and private entities engaged in activities related to metrology, normalization, industrial quality, and conformity certification. The institute responsible for verification, supervision and certification is the National Institute of Metrology, Quality and Technology (INMETRO), which is a federal autarchy linked to the Ministry of Development, Industry and Foreign Trade (MDIC).

INMETRO is responsible for the accreditation and training of CBs of the Brazilian CERFLOR forest certification program. CERFLOR was created in 2002 by the Brazilian Silviculture Society (SBS) in association with the National Technical Standards Association (ABNT). The ABNT is a

non-profit organization founded in 1940, and was the first Brazilian institution to provide certification. The ABNT is the International Organization for Standardization (ISO) representative for Brazil, and provides certification in several fields, such as scientific, technical, industrial, commercial, and agricultural services (Smeraldi and Veríssimo 1999). The certifiers are trained and accredited by INMETRO, which also trains certifiers for the ISO scheme. Like FSC, CERFLOR provides certification for both forest management and Chain of Custody (CoC) products and, although the program initially focused on plantation forests, it has expanded to include the certification of natural forests.

The establishment of FSC forest certification in Brazil was fueled by several drivers. These included consumer concerns regarding the impacts of industrial plantations for pulp and paper, mainly related to the use of eucalypts, which can significantly impact watersheds and biodiversity, as well as concerns about charcoal production, due to the use of child labor and slave-labor conditions.

Changes in global markets also led some firms, particularly in the pulp and paper sector, to find means of promoting products and companies associated with sustainable development (May 2004). Timber companies perceived certification as a market tool that could give their products a competitive advantage, and meet consumer demands, while reducing deforestation in the Amazon. Therefore, these companies supported the creation of a transparent and credible process, including independent external audits, as means of communicating the use of sustainable practices to consumers (May 2004).

The FSC began its activities in Brazil in 1994, but their initial initiatives were hindered by doubts and conflicts among the logging industry representatives and proponents of this new scheme regarding how best to run such an initiative in the country (Amaral Neto and Carneiro 2004). In 1997, an FSC Working Group was created in tandem with the establishment of the WWF Brazil office. This group's objective was to define appropriate criteria for plantation and natural forest management in Brazil. In the same year, this group published a set of norms for plantation forests, but only completed its norms for upland forests in 2000. During the same period, FSC accredited CBs began to launch their activities in Brazil.

In 1995, the Rainforest Alliance (RA) SmartWood program, in partnership with IMAFLORA, began activities to promote FSC certification. There are 13 CBs in Brazil, which are responsible for auditing the social, environmental and economic aspects of forest management operations. These institutions are also responsible for guaranteeing the integrity of the value chain CoC through the CoC certificate. Seven of the certifiers focus only on CoC certificates, while the remaining ones focus on forest management certification particularly on planted forests. The certifiers are monitored by ASI, which is the institution responsible for auditing the activities of certifiers accredited by FSC. IMAFLORA is the only CB that certifies forest communities in the Amazon.

Although FSC International was established to promote the conservation and responsible management of *natural* forests, one year after certifying its first Amazonian natural forest in 1997, FSC International initiated the certification of planted forests (Table 2.11). Although discussions on the creation of a national initiative began in 1996, it was not until 2001 that FSC Brazil was formally established.

FSC Brazil seeks to promote and facilitate the management of Brazilian forests, while reconciling the maintenance of ecological safeguards with social benefits and economic viability. The organization's governance structure is similar to that of FSC International. The management board of FSC Brazil is composed of organizations that represent sectors involved in forest harvesting, such as the Brazilian Institute of Education (IEB), IFT, the Amazonian Workgroup (GTA), AMAZON, WWF Brazil, and others (Table 2.12). In addition to its management board, FSC Brazil's national office has a Committee for the Resolution of Conflicts, a Committee for Standards Development, and a team of operational staff that carries out FSC activities in the country.

Various initiatives have helped to cement the work of FSC in Brazil. The TAA project, which is the product of a public–private partnership launched in 2009, developed activities in Brazil for three years until 2012. The project raised awareness of the need for training and provided

some support for training activities, and also served as a stimulus to the mostly European focused export market. The objective of TAA is to promote the FSC certification of 2.5 million ha of Amazonian forest in Brazil, Peru and Bolivia, and to increase the volume of FSC certified Amazonian timber in domestic, Dutch and other European timber markets. Furthermore, TAA has developed a number of additional supporting strategies to increase efficiency and improve value chain finance. In Brazil, TAA has co-financed both direct and indirect (e.g. training; the regularization of community areas within the forest; the identification and monitoring of High Conservation Value Forest [HCVF]) FSC certification costs (Immerzeel and Hamers 2014).

In addition to timber certification, other types of certification apply to forest sector activities and products, including NTFPs. There are several standards that can guide the certification of such products, related to sustainable management, organic production, fair trade, and good agricultural practices. Joint certification (i.e. when the producer pursues two or more labels for the same product or process) is not yet well disseminated, and there are few examples in the country. Nevertheless, as many of the requirements of these types of certification are complementary, joint certification could create opportunities such as reduced auditing costs and the development of unified guidelines. As such, IMAFLORA, which carries out FSC audits in Brazil, requested accreditation by the International Federation of Organic Agriculture Movements to grant organic certification (IFOAM; Shanley et al. 2005). Some FSC affiliated CBs also offer certification for NTFPs, of which, the RA is the most active. The most widely certified NTFPs include Brazil nuts and medicinal plants.

The certification of NTFPs in Brazil has faced several obstacles, and is more complex than forest management certification. NTFP certification is complicated by: the wide range of products within this category compared to timber; the complexity of NTFP chains of custody, which can include several intermediaries; the diversity of final uses for these products; and the various, applicable types of certification (e.g. organic production, fair trade, etc.). In contrast to countries such as Indonesia, there have been no examples of joint certification between FSC and CERFLOR, even though some products have been certified by both schemes.

**Table 2.11. Timeline of FSC certification in Brazil.**

Year	Event
1993	Creation of FSC International
1997	First forest certification in the Amazon
1998	First certification of a plantation in Brazil
2000	First industry using certified timber from the Amazon
2001	Creation of FSC Brazil
2001	First certification of a community forest in the Amazon
2002	First certification of a concession
2005	Approval of FSC standard used in community forests
2010	Creation of the FSC Community Stamp

Source: Adapted from Lentini et al. 2012.

### 2.7.3 FSC Certification in the Legal Amazon

According to a study carried out by FSC Brazil, there are FSC certified FMUs in seven out of the nine states comprising the Legal Amazon (Rizek et al. 2013). Approximately 80% of the 3.5 million ha of forest certified in the region are natural forests (Table 2.13). The largest certified area is located in the state of Pará, and includes both native and plantation forests. In contrast, only natural forests have been certified in the states of Acre, Amazonas and Rondônia, and all certified FMUs in Amapá and Roraima are planted forests.

The management of both timber and NTFP extraction can be certified in Brazil's natural forests. Good examples of community managed NTFP extraction have been documented in the Baú Indigenous Lands, where nuts and oils are harvested across an area of approximately 1.5 million ha. This area of operation represents

**Table 2.12. Management Board of FSC Brazil.**

	Institution	Representative
President	Brazilian Institute of Education (IEB) (Social Chamber)	Manuel Amaral
1 <sup>st</sup> vice president	AMATA (Economic Chamber)	Alan Rígolo
2 <sup>nd</sup> vice president	Tropical Forest Institute (IFT) (Environmental Chamber)	Paulo Bittencourt
Social Chamber	Brazilian Institute of Education (IEB)	Manuel Amaral
	Amazonian Workgroup (GTA)	Rubens Gomes
	Union of Rural Workers Telêmaco Borba (STR TB)	Daniel Quadros
Economic Chamber	AMATA	Alan Rígolo
	Duratex	José Luiz da Silva Maia
	Veracel	Luiz Tapia
Environmental Chamber	Tropical Forest Institute (IFT)	Paulo Bittencourt
	Institute of Man and Environment of the Amazon (IMAZON)	Paulo Amaral
	Institute of Conservation and Sustainable Development of the Amazon (IDESAM)	Carlos Gabriel Gonçalves Koury
Financial Council	WWF Brazil (Environmental Chamber)	Max Schaefer
	Stora Enso (Economic Chamber)	Otávio Pontes / Carem Zanardo
	Center of Workers of the Amazon (CTA) (Social Chamber)	Maria José Albuquerque

**Table 2.13. Area certified by FSC in the Legal Amazon (2012).**

Natural forest		State	Planted forests	
Area (ha)	FMUs		FMUs	Area (ha)
56481	3	Acre	0	0
166030	1	Amazonas	0	0
0	0	Amapá	1	194405
2478882	7	Pará	2	436996
137254	3	Rondônia	0	0
0	0	Roraima	1	45433
25100	1	Mato Grosso	1	1298
2 863747	15	Total	5	678132

Source: Rizek et al. 2013.

approximately 50% of the total area of FSC certified natural forest in Brazil. However, NTFP certification in Brazil does not provide sufficient benefits, which is reportedly not the case in Bolivia and Peru (Duchelle et al. 2013).

#### 2.7.4 Certifying bodies

*RA SmartWood / IMAFLORA:* In Brazil, the RA is represented by the Institute of Agricultural and Forest Management and Certification (IMAFLORA), a non-profit association founded in 1995. IMAFLORA certifies both forest management and CoC. In 1997, IMAFLORA certified its first natural forest in the Amazon, and in the following year, the institute certified its first plantation. IMAFLORA is headquartered in the state of São Paulo, and employs over 60 people.

*Institute for Marketecology / Ecocert:* The Institute for Marketecology (IMO) is a Swiss CB, founded in 1989. In Brazil, the IMO is represented in Brazil by Ecocert, a French organization that provides inspection and certification, and specializes in organic products. In 2001, the organization began its operations in Brazil, initially as an association, and since 2005 as an enterprise, providing certificates of Forest Management and CoC. Ecocert has two offices in the state of Santa Catarina, and its head office is in the state capital, Florianópolis.

*TÜV Nord Group:* The Germany-based TÜV Nord Group provides certificates for CoC via its Brazilian branch, BRTÜV. The enterprise has been present in Brazil for more than 15 years, and employs more than 100 local staff. BRTÜV is headquartered in Barueri (state of São Paulo), and has more than 31 offices distributed across all regions of Brazil.

*Swiss Association for Quality and Management Systems (SQS) / Apcer Brasil:* The SQS is represented in Brazil by the Brazilian branch of the Portuguese Association for Certification (Apcer Brasil). The association launched its activities in Brazil in 2011 to provide CoC certification. The organization's head office is in São Paulo, and it has local offices in three other states.

*Control Union Certifications B.V. (CU):* CU is a Netherlands-based enterprise that specializes in transportation. In Brazil they are headquartered in São Paulo, and provide certificates for Forest Management and CoC.

*Bureau Veritas Certification Holding SAS (BVC):* BVC is involved in a number of areas, including timber certification. It provides certificates for Forest Management and CoC, and has more than 30 offices in Brazil, primarily located in the southeast.

*SAI Global Assurance Services (QMI):* This Switzerland-based firm provides certification for CoC and is headquartered in São Paulo.

*Det Norske Veritas Certification AB (DNV):* This Norway-based CB provides certificates for CoC and has three offices in Brazil.

*RINA Services S.p.A (RINA):* This Italy-based firm issues certificates for CoC through its affiliate in Brazil, RINA Brasil Servicos Técnicos Ltda. It is headquartered in São Paulo and has three other offices in Brazil.

*SCS Global Services:* This American firm is represented in Brazil by Sysflor. The organization is headquartered in the state of Paraná, and provides certification for both Forest Management and CoC.

*Société Générale de Surveillance (SGS):* The activities of this Swiss CB have been suspended until 2017, due to the loss of its accreditation in 2012 following the issuance of a questionable plantation certificate.

### 2.7.5 Linkages with other policies/instruments

Brazil's most significant forest certification law is the LPFM, which defines rules for the operation of concessions in Public Forests. Concession contracts require the concessionaire to implement sustainable forest management and NTFP harvesting practices, and comply with social requirements. The factors taken into consideration during the bidding process include:

- monitoring of forest growth and restoration dynamics
- reduction of damage to remnant forests during logging activities
- investment in infrastructure and services for local communities
- generation of local jobs
- diversity of products harvested in the FMU
- support for and participation in forestry-related research
- implementation of programs for wildlife conservation in the FMU
- inclusive gender policies
- supply of materials for local industries.

A federal program launched in 2009 defines actions to promote and fund the

sustainable management of forest resources by traditional communities in Public Forests, which could support the FSC certification of resource management practices in these areas.

### 2.7.6 Achievements and challenges to date

The volume of certified roundwood produced in the Amazon in 2011 was 596 thousand m<sup>3</sup>, whereas in the same year the volume of certified products from the Amazon was 107.7 thousand m<sup>3</sup> (18%). A large share of these certified products was exported (68%), mainly in the form of sawn timber (more than 80%; Lentini et al. 2012). By 2012, almost 40% of the certified area (approximately 7.7 million ha) corresponded to natural forest.

Certification in Brazil emerged as a market strategy to promote the sustainable management of forest products for the internal market, mainly in the southeast region, which is the largest overall consumer of timber from Amazonian natural forests. However, Smeraldi and Veríssimo (1999) suggest that the majority of intermediary and final consumers were skeptical of the possibility of distinguishing between illegally-logged, legally sourced, and sustainably managed timber. The study highlights a number of barriers to certification, including: uncertainty about the regularity and continuity of supply. Many companies that used to have forests in the North, or that used to harvest the region regularly, reduced their orders of the product and decided to pursue contacts with the suppliers by phone to strengthen credibility including quality issues of the product (e.g. dry timber). Furthermore, according to Smeraldi and Veríssimo (1999), the furniture market, which often appreciates certification, represents only a small share of total wood consumption, whereas construction, the largest consumer of wood, is less likely to respond to certification.

More recently, Lentini et al. (2012) reported that although economic factors (i.e. costs related to the adaptation to, and adoption of, certification) represent the main obstacles to FMU certification, other important factors include: illegality and corruption in the forest sector; the complex management rules that make it difficult for small producers to engage in legal management practices and operate informally (Pacheco et al.

2008; Pokorny et al. 2010); and the lack of public incentives for certified timber in the national market, which is the largest outlet for Brazilian timber. In spite of this, approximately 42% of sawmills and industries identified lack of suppliers of certified timber as the main barrier to broader adoption of certification by other FMUs wider certification (Lentini et al. 2012). However, as a significant proportion (28%) of certified timber was de-classified in 2011 (i.e., sold as non-certified; Lentini et al. 2012), wider certification seems unlikely.

Another obstacle relates to FSC principles and criteria, which are defined globally, in contrast to the indicators, which are evaluated in the field and defined locally. In cases when there are no national standards, the CBs use their own standards previous authorization by ASI. Until now this has been the case in Brazil and the result is that there are some inconsistencies between the demands of different CBs, which results in the emission of certificates for FMUs that are socially contested (e.g., Suzano and Veracel, south of Bahia).

Although this problem occurs also in other countries, FSC Brazil communicated the approval of a unique harmonized standard for the evaluation of planted forests on April 2014 to enhance FSC's and certification credibility. In this case, the standards of the four principal certifiers of plantations (i.e. BV, CU, IMAFLORA/RA, and SYSFLOR/SCS) were assessed to prepare standardized evaluation criteria. In developing these standards, FSC enlisted the participation of the Committee of Technical Specialists of the four CBs, and FSC Brazil's Committee of Standards Development, composed of representatives from the social, environmental, and economic chambers. During a 60 day public consultation process, which allowed members of the public to submit contributions and feedback via an online platform, FSC received comments on 179 indicators (FSC Brazil 2014a). The new standards became effective in July 2014, three months after their official publication. During those three months, the CBs were required to make the necessary adjustments to their methodologies, and new candidates for certification were evaluated according to the new standards. For those already certified, the new standards are to be applied upon recertification.

Although various studies suggest that there are no legal objections to the use of social and

environmental criteria for public procurement (Costa 2011; ISEAL 2013), this practice is not widespread in the public sector, which is the largest consumer of illegal tropical timber in Brazil. The lack of dialogue between timber producers and consumers, and the still inadequate recognition of public institutions in Brazil directly affects the supply of certified timber. For example, in 2012, producers were unable to harvest due to delays in state licensing, which affected planned operational schedules because of the rainy season (Rizek et al. 2013).

A recently published study by FSC Brazil (Zerbini 2014) showed that in 2012, approximately half of all native, FSC certified timber was exported. The share sold to the national market was mainly processed by sawmills and lumber yards within the same municipality where the timber was harvested from, and most had not obtained a CoC certificate. This suggests that de-classification might be more common than reported. The reasons for this phenomenon have not been clearly established, but these trends suggest that the national market is not sensitive to the origin of timber, and might not be willing to pay more for certified products.

## 2.7.7 Controversies involving FSC

FSC is perceived differently by various stakeholders in Brazil (e.g. government, NGOs, and local communities that live close to where logging occurs). The majority of concerns are related to: the perceived indifference of governmental staff towards FSC certification; irregularities in FSC auditing and certification processes, including use of the FSC label to launder illegally-sourced timber; and a lack of concern for local communities. The examples below illustrate some of these situations.

There are no documented cases of opposition to forest certification by government agencies, NGOs or private entities. In fact, the participation of NGOs in certification has mainly been related to the promotion and improvement of the incentive system; and government agencies have made indirect contributions, such as the establishment of the SFB, which coordinates the granting of logging rights in Public Forests, and monitors the extraction of legal timber from natural forests. However, it has been reported that staff from this agency have shown little willingness to cooperate directly with CBs, for instance through



partnerships for program development as certification is a market instrument over which the government has little influence. In 2002, Greenpeace published a report contesting the FSC certificate of a company called Maracaí, located in the municipality of Sinop in Mato Grosso. Their certificate had been granted by a CB called Skal, which had allegedly failed to follow standard procedures. According to Greenpeace, logging companies operating in the Amazon forest, such as Maracaí, were being granted certification, in spite of their entrenched illegal and predatory practices (Marquesini 2002). Cases such as this harm the image of FSC and the NGOs that promote certification in the region (e.g. Amigos da Terra, WWF, and Greenpeace).

The report highlighted several mistakes that had occurred during the certification process, including during the audits carried out by Skal. Among these failures were: lack of Brazilian staff conducting visits to the company; lack of knowledge of Brazilian legislation; and a rush to grant the certificate due to pressures from one of Maracaí's clients. Once the certificate had been granted, several institutions demanded further information on Skal's certification process (e.g. Greenpeace, FSC Brazil, Amigos da Terra, IMAFLORA/RA, and the certified firm Cikel).

The following were among the several technical requirements that were not fulfilled: i) the forest area was not sufficient for a 30 year management cycle (i.e. the period defined in Brazilian regulations as a sustainable harvesting cycle); ii) the certified volume of production was not compatible with the actual volume harvested by the firm, and too high for a sustainable, 30-year management horizon; iii) there was little acknowledgement of the need to suspend activities during the rainy season; iv) there had been little evaluation of environmental impacts of implemented changes in management practices, the demand for the implementation of changes in management, and strategies for the protection of rare species; and v) the report had been translated into Brazilian Portuguese very poorly. Finally, the report reveals that Maracaí had also provided non-certified timber to two other buyers, but that both certified and non-certified timber was processed in the same sawmill, without any distinction, and without any awareness of certification among employees.

More recently (2010), an investigation carried out by IBAMA uncovered the fraudulent activities of an FSC certified company called Rondobel, which resulted in the company's suspension from commercialization of timber, and fine of USD 1.6 million. The fraud related to the acquisition of 7233 m<sup>3</sup> of timber, and the sale of 5002 m<sup>3</sup>, without the required environmental license, as well as irregularities in the company's SISFLORA documentation including the Documents of Forest Origin (DOF). The company had been FSC certified by IMAFLORA/RA in Forest Management from June 2012 to August 2013, and was granted a CoC certificate that was valid from June 2012 to September 2015.

In October 2011, the weekly news magazine, *Isto É*, reported on loggers in the state of Acre who were accused of a series of irregularities in forest management, including: non-compliance with environmental law, breaches of agreements with local communities, and gaps in monitoring by state agencies. These irregularities were listed in a report prepared by environmentalists and rubber tappers, which was submitted to the Public Prosecutor's Office. Suspicions were raised by IMAFLORA/RA, which refused to certify a new area of forest management for Laminados Triunfo Ltda., the largest logging company in the Amazon. According to the article, the company exported 70% of its timber from the state using an FSC label. The first inspections found evidence of predatory harvesting, such as clogged streams and rivers, derisory payments to locals for extracted timber (between USD 10 and USD 25 for trees valued at over USD 1500), and a video that showed that the National Forest of Antimary had become a "cemetery of roundwood". The video demonstrated that a forest area of 65,000 ha near to the National Forest of Antimary had been destroyed, and locals affirmed that a company called Canaã had disappeared after extracting the timber, without paying what had been agreed with the community. Laminados Triunfo Ltda. had been granted an FSC certificate for Forest Management and CoC by IMAFLORA/RA for the years 2007 to 2013. In 2012, an audit carried out by the IMAFLORA recommended that the company's certificate be suspended.

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## 2.9 Appendices

### 2.9.1 Average prices of traded roundwood in the Brazilian Amazon (2009).

States	Average Price (USD/m <sup>3</sup> )			
	High Economic Value	Average Economic Value	Low Economic Value	Average
Acre	131	94	66	90
Amazonas	150	81	68	85
Amapá	126	93	56	92
Maranhão	0	81	70	79
Mato Grosso	159	109	81	110
Pará	170	106	78	107
Rondônia	142	79	64	80
Roraima	129	81	73	81
Legal Amazon	160	98	73	99

Source: Adapted from SFB and IMAZON 2010.

### 2.9.2 Prices of round wood of the main timber species in the Legal Amazon.

Popular name	Scientific name	Average price (USD/m <sup>3</sup> )			
		Mato Grosso	Pará	Rondônia	Average
<b>High value</b>		<b>176</b>	<b>188</b>	<b>157</b>	<b>180</b>
Ipê-amarelo	<i>Tabebuia serratifolia</i>	162	205	155	190
Ipê-roxo	<i>Tabebuia impetiginosa</i>	168	195	155	185
Cedro Vermelho	<i>Cedrela odorata</i>	163	162	185	166
Itaúba	<i>Mezilaurus itauba</i>	184	122	115	165
Freijó	<i>Cordia goeldiana</i>	149	142	166	148
<b>Medium value</b>		<b>120</b>	<b>121</b>	<b>88</b>	<b>111</b>
Amescla	<i>Protium heptaphyllum</i>	87	88	71	83
Angelim-pedra	<i>Hymenolobium petraeum</i>	131	126	93	117

Popular name	Scientific name	Average price (USD/m <sup>3</sup> )			
		Mato Grosso	Pará	Rondônia	Average
Angelim-vermelho	<i>Dinizia excelsa</i>	132	134	96	128
Breu	<i>Protium sp.</i>	81	105	74	86
Cambará	<i>Vochysia sp.</i>	102	139	76	94
Cedrinho	<i>Erisma uncinatum</i>	130	98	73	115
Cedromara	<i>Cedrela sp.</i>	100	125	77	87
Cerejeira	<i>Torresea acreana</i>	134	-	111	115
Cumaru	<i>Dipteryx odorata</i>	136	132	103	125
Cupiúba	<i>Goupia glabra</i>	116	114	81	107
Garapeira	<i>Apuleia molaris</i>	125	99	92	106
Goiabão	<i>Pouteria pachycarpa</i>	103	102	70	99
Jatobá	<i>Hymanea ourbaril</i>	120	119	91	113
Jequitibá	<i>Cariniana sp.</i>	171	100	84	96
Louro	<i>Ocotea sp.</i>	100	99	74	94
Maçaranduba	<i>Manilkara huberi</i>	107	135	99	127
Muiracatiara	<i>Astronium sp.</i>	96	118	90	109
Oiticica	<i>Clarisia racemosa</i>	101	118	80	84
Pequiá	<i>Caryocar villosum</i>	85	108	76	102
Peroba	<i>Aspidosperma sp.</i>	137	185	97	128
Roxinho	<i>Peltogyne sp.</i>	108	129	77	92
Sucupira	<i>Bowdichia sp.</i>	123	114	81	101
Tatajuba	<i>Bagassa guianensis</i>	85	117	76	109
Timborana	<i>Piptadenia sp.</i>	100	106	85	105
<b>Low value</b>		<b>91</b>	<b>86</b>	<b>72</b>	<b>82</b>
Abiu	<i>Pouteria sp.</i>	100	99	76	92
Amapá	<i>Brosimum parinarioides</i>	159	84	60	84
Amesclão	<i>Trattinnickia burseraefolia</i>	85	82	50	80
Angelim-amargoso	<i>Vataireopsis speciosa</i>	103	79	83	83
Angelim-saia	<i>Parkia pendula</i>	80	120	68	79
Caju	<i>Anacardium sp.</i>	65	76	66	73
Marupá	<i>Simarouba amara</i>	84	83	73	80
Copaíba	<i>Copaifera sp.</i>	85	85	66	80
Faveira	<i>Parkia sp.</i>	78	80	86	82
Mandioqueiro	<i>Qualea sp.</i>	93	100	50	98

Popular name	Scientific name	Average price (USD/m <sup>3</sup> )			
		Mato Grosso	Pará	Rondônia	Average
Orelha-de-macaco	<i>Enterolobium schomburgkii</i>	70	96	65	81
Paricá	<i>Schizolobium amazonicum</i>	76	76	66	72
Sumaúma	<i>Ceiba pentandra</i>	84	78	68	76
Tauari	<i>Couratari sp.</i>	93	99	72	85
Taxi	<i>Tachigali sp.</i>	93	86	69	85
Virola	<i>Virola sp.</i>	100	77	43	73

Source: Pereira et al. 2010.

\* Prices are arranged in decreasing order of economic value (2009)

\*\* Average exchange rate in 2009: USD 1.00 = BRL 1.99.

### 2.9.3 Appendix III. Volume and value of exports from the Brazilian Amazon by product type.

Products	Unit	Quantity										Amount ( 1.000 USD)				
		2008	2009	2010	2011	2012	2008	2009	2010	2011	2012	2008	2009	2010	2011	2012
Wood Pulp	1,000 t	7,202	8,586	8,793	8,880	8,912	3,901,136	3,308,862	4,750,531	4,984,783	4,700,438					
Paper and Cardboard	1,000 t	1,856	1,910	1,969	1,942	1,764	1,663,955	1,480,177	1,784,148	1,916,305	1,716,063					
Coal	1,000 t	5	6	3	1	1	1,609	2,200	1,116	560	457					
Recycled paper	1,000 t	3	2	5	27	29	1,009	437	1,459	6,682	5,432					
Other sources of cellulose	1,000 t	11	4	6	4		15,225	5,978	9,688	10,153	-					
Chips and particles	1,000 m <sup>3</sup>	5,658	4,100	4,744	4,249	4,371	142,180	91,187	110,807	10,490	116,865					
Sawed	1,000 m <sup>3</sup>	2,120	1,394	1,359	1,325	1,222	679,549	398,922	418,128	408,696	351,757					
Plywood	1,000 m <sup>3</sup>	2,144	1,496	1,447	1,217	1,348	632,173	343,453	418,259	370,360	408,101					
Fiber panels	1,000 m <sup>3</sup>	236	192	141	147	204	101,534	69,107	57,966	67,790	88,487					
Laminates	1,000 m <sup>3</sup>	120	33	42	69	55	55,978	25,571	30,290	36,091	34,427					
Agglomerate	1,000 m <sup>3</sup>	71	59	77	85	98	26,293	16,698	23,747	26,776	28,152					
Roundwood	1,000 m <sup>3</sup>	22	6	24	75	66	5,752	1,144	5,045	11,943	12,655					
Waste	1,000 m <sup>3</sup>	4	4	1	1	2	67	98	29	23	103					

Source: SFB (2013)

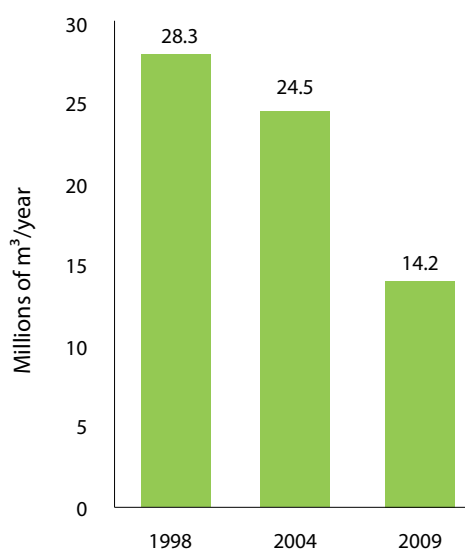


# 3 Typology of the timber sector and dynamics along the natural forest certification continuum

Luciana Maria Papp and Edson Vidal

## 3.1 Introduction

Since the mid-1990's, when Brazil's deforestation rates reached their highest point (i.e. in 1995 the annual rate reached almost 30,000 km<sup>2</sup>; INPE 2014), the management of tropical forests in the country has undergone major changes. Between 1994 and 2009 the Amazon lost approximately 15% of its territory (i.e. 53 million ha), but since 2005 there has been a reduction in the annual rate of deforestation (Santos et al. 2012; Nepstad et al. 2014; Börner et al. 2015). The Brazilian natural timber forest sector is relatively heterogeneous in terms of types and sizes of operating firms and the



**Figure 3.1. Evolution of timber demand in the Amazon for the period 1998–2009.**

Adapted from: SFB and IMAZON 2010.

areas where timber are harvested. In the 1980s, it was believed that deforestation was driven by the demands of the export market (Viana et al. 2002), although researchers have since demonstrated that only 10%–14% of the timber extracted in the Brazilian Amazon is produced for export (Smeraldi and Verissimo 1999; Lentini et al. 2012). Rather, the greatest demand for wood comes from the domestic market.

Greenpeace's report, *Face to Face with Destruction*, documented that in 1997, the cutting of trees damaged 1.5 million ha of forest, and was the main driver of forest degradation in the Amazon rainforest. In the two decades prior to 1999, the proportion of wood derived from Amazonian forests increased from 15% to 85% of national production (Cotton and Romine 1999). However, timber production from the Amazon has since decreased, and in 2010 volumes of extracted timber were 50% of what they were in 1998 (SFB and IMAZON 2010; Figure 3.1).

Government control of forest management has faced numerous challenges, given that the Amazon was a new, expanding frontier, under strong stimulus (i.e. tax breaks and other incentives) from the federal government (Lima and Munk, this volume). Attempts to regulate the forest management sector have met resistance, and it was not until 2006 that clear criteria for forest management were established (Law 11284/ 2006; Bliacheris n.d.).

Timber can only be legally harvested from natural forest that has a PMFS, or *plano de manejo florestal*

*sustentável*<sup>21</sup>, approved by IBAMA, which is the responsible government agency. Thus, companies or landowners interested in obtaining a PMFS must contract a professional forester, who develops the plan, and who is also responsible for monitoring and evaluating its compliance through full inventories; delimitation of harvest and high conservation value areas; advance planning of roads, skid trails, and harvest; and maintenance of infrastructure; Sabogal et al. 2006).

According to Sabogal et al. (2006), in 2005, IBAMA authorized the harvest of 9.4 million m<sup>3</sup> of timber from areas with PMFSs, which constituted 38% of the total volume harvested in the region. The rest of the timber originated from areas of authorized deforestation (19%), and from areas where unauthorized timber harvesting occurred (i.e. illegal harvest; 43%). The species that are most often illegally harvested, and their origins, have been identified. A characterization of the modes of illegality shows the following patterns: (i) the removal of wood, especially in PAs (particularly in conservation units and Indigenous Lands); (ii) the illegal logging of public lands; (iii) the illegal logging of private areas without the proper permits and licenses from environmental agencies, or by fraudulent means (Silva et al. 2013).

Periodic assessments on illegality suggest that the majority of the wood produced in the country does not have a PMFS (Veiga and May 2000; Banerjee and Alavalapati 2010; Modesto 2014). In 2009, for instance, it was estimated that approximately 33% of extracted Brazilian timber was illegal, and more specifically, that between 2008–2009 a considerable proportion (74%) of the area exploited for timber had no legal authorization (Adeodato et al. 2011). Regional enforcement dynamics vary. For instance, just 1% of over 400 fines issued by governmental agencies in Mato Grosso between 2005 and 2006 had been collected two years later (Brito 2009). States have sporadically taken strong action against illegality. For example, in 2005 and 2006, Operation Curupira in Mato Grosso, and similar operations that followed, tackled the illegal issuance of permits and other irregularities within administrative units, using GIS and new technologies. Among these were: Operation Matinguari in 2007, which

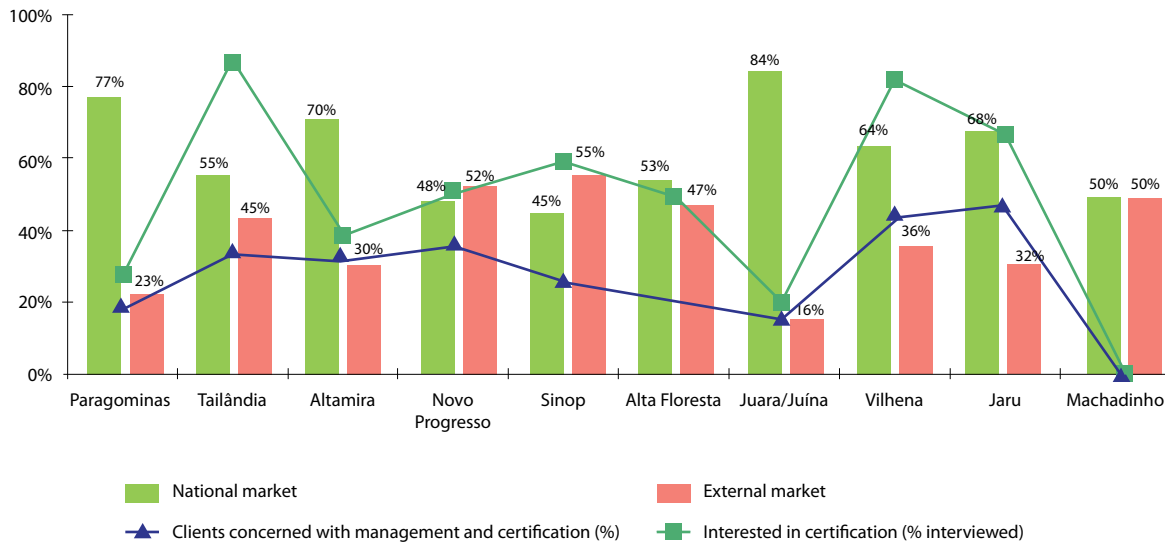
investigated the illegal extraction of timber from Xingu Indigenous territory; and Operation Arc of Fire (2008–2010), which was carried out in Pará, Mato Grosso, Rondônia, and Maranhão (Neme 2010).

A number of studies have been carried out to document illegality in the state of Pará, which produces 45% of the tropical wood extracted from the Brazilian Amazon (SFB 2010). A remote-sensing assessment, which cross-validated information from different sources (using NDFI images and timber harvest authorizations), determined that 78% of the approximately 160,000 ha of forest logged between August 2011 and July 2012 was not authorized by Secretaria de Estado de Meio Ambiente e Sustentabilidade do Pará (SEMA), the responsible agency. Using the same type of analysis, unauthorized timber harvesting was calculated to be almost double that of the equivalent period in the previous year (Monteiro et al. 2012).

Illegal operations have minimal administrative costs, as they are performed in areas that do not belong to the companies, and no payments for logging rights are made to the government. The high bureaucratic costs of compliance, and unacceptable levels of corruption, may incentivize this kind of behavior, and have led some companies to abandon logging altogether. Illegal timber decreases market prices, and creates unfavorable conditions for FMUs operating under sustainable management regimes (Herzog 2013).

Recent research demonstrates that inconsistent law enforcement; shifts in legal frameworks and associated misperceptions of legal requirements; and a sense of inequality among stakeholders, contribute to a lack of a practical legal meaning that undermines compliance (Schmidt and McDermott 2015). Effectively, subsistence farming is not independent from a significant amount of illegal activity within Legal Reserves. Certification has generated a considerable amount of controversy. Through interviews with timber industry representatives, FMU managers, forest engineers, and governmental officials, Sabogal et al. (2006) determine that there is a strong association between the proportion of products that a company sells to the international market, and their degree of interest in certification (Figure 3.2; Sabogal et al. 2006). In their 2009 study, Araújo et al. attempt to understand why FMUs certify

21 For further information, see: <http://www.ibama.gov.br/areas-tematicas/manejo-florestal-sustentavel>



**Figure 3.2. Relationship between market outlets and preferences of timber producers across different localities in the Brazilian Amazon (from Sabogal et al. 2006).**

their forests, and assert that market considerations (i.e. access to price premiums; enhanced share of markets; improved, more transparent business image) do not play a major role in becoming or remaining certified. The same study reports that businesses claimed that more than a decade after certification, they had not identified any financial returns gained as a result of joining the scheme.

In Brazil, a range of certification-related questions remain unanswered. There continues to be a lack of understanding of the processes through which FMUs operating in natural forests in the Brazilian Amazon decide to pursue certification, and further study is required to establish which factors are most influential on this decision (e.g. corporate image, market forces). This chapter aims to identify shared characteristics among FMUs that might influence their decision to become certified (*Typology Study*, Part I), and explores the dynamics of these decisions by taking a historical perspective, starting with the onset of FSC certification in the country (*Certification Dynamics Analysis Part II*).

The *Typology* and *Dynamics* studies focus on natural forest management certification, as opposed to Controlled Wood and CoC certification, which are also granted by FSC. The sample for the studies was composed of FMUs involved in natural forest management that have been certified both by FSC and CERFLOR, the national certification scheme. Individual FMUs that were excluded from the research include community-based

logging operations and plantations. The time frame for the studies spanned from the start of FMU engagement in natural forest management certification in 1994 through a certificate granted by RA to date.

### 3.1.1 General Methodological Considerations

This section describes the general sampling approaches taken in two studies (i.e. *Typology* and *Dynamics*), and outlines the general strategy for gathering information and expert advice. Methodologies specific to the collection of pertinent data for each study and their analysis are presented separately.

Choosing samples for studies on the natural forest management sector in Brazil is a challenging task, given the scale of timber exploitation, the large number of FMUs, and the size of the country. Close to 6 million m<sup>3</sup> of timber were processed by 192 municipalities in 2009 (SFB and IMAZON 2010). The vast scale of the timber trade makes it difficult to identify factors that determine the characteristics of the sector, and influence the dynamics of certification in the country.

The studies build on tried and tested methodological approaches that have been used to characterize and follow up the logging and timber exploitation activities of Brazil's forest and timber sectors. For example, Lentini's 2003

study describes the FMUs involved in Brazil's timber sector, and presents a methodology to define the *polos madeireiros* expanding on this line of work (Veríssimo and Lima (1998). According to Lima and Munk (this volume), each of these units corresponds to a municipality or micro region that processes timber in volumes of at least 100,000 m<sup>3</sup> of roundwood per year (Lentini et al. 2003). Likewise, the concept of timber frontier (*fronteira madeireira*) is defined and variations in its attributes identified. These variables include: forest type (e.g. dense, open, várzea; Veríssimo et al. 2002); the age of the frontier (e.g. old, intermediate, new); and type of access (e.g. river, road). The structural organization of *polos madeireiros* is widely used across the country, including by governmental agencies, and was thus adopted as a standard unit for these studies. This concept was further expanded to other areas in 2010 that identified 75 *polos madeireiros* (SFB and Imazon 2010) in the country.

To select the *polos madeireiros* for this study, we determined which *polos madeireiros* contained FMUs that were engaged in certification (i.e. from participating in training activities to obtaining FSC certification) between 1994 and 2013. This criterion resulted in the selection of 22 *polos madeireiros*.

## Part I.

### 3.2 Typology of the forest sector

The goal of the Typology study is to classify FMUs operating in Brazil's natural forests, based on characteristics that affect their probability of becoming certified, and influence the outcomes of their forest management decisions and activities. These results could guide the creation of comparison groups (i.e. counterfactual), to support the design of an empirical evaluation of the biophysical, social, economic, and policy impacts of FSC certification.

### 3.3 Methodology

The data collected corresponds to the following groups of variables: exogenous to the parent company (e.g. economic: origin of capital, vertical integration; political: public, private); -exogenous

to the FMU (e.g. biophysical: location, area; Social: population densities, conflicts; economic: origin of FMU; publicly traded; political: private, public, type of permits); and endogenous to the FMU (e.g. biophysical: annual area logged; volume; social: worker origin; economic: market outlet and proportion; political: management status) (Appendix I). Following the selection of the *polos madeireiros*, meetings were organized with institutional representatives from organizations with data on FMUs (e.g. AMAZON, IMAFLORA, FSC Brazil, IFT, TAA<sup>22</sup>), to support the completion of a 'Typology table' (Appendix II). Companies were characterized based on these traits, which were identified during a series of consultations with experts.

#### 3.3.1 Data collected

Data on FMU characteristics was gathered from scientific literature on the timber sector, as well as publicly available documents from a range of websites, belonging to both key governmental and non-governmental organizations (Appendix III). These organizations include: FSC (FSC Brazil and FSC International); IFT<sup>23</sup>, which supports participation of FMUs on training activities on sustainable forest management; TAA; and AMAZON. The FMUs included in the analyses were restricted to those units for which there was sufficient information in the variables of interest. The resulting sample was composed of 65 FMUs, representing 3% of all FMUs operating in natural forests in the Brazilian Amazon. Information on the following topics was collected from various databases:

- a. organizations that have obtained FSC certification in tropical forest management (source: FSC International's public database: [www.info-fsc.org](http://www.info-fsc.org))
- b. organizations that have participated in courses conducted by IFT (source: database provided by IFT)

22 TAA supported the preparation of PFMS, including for CITES listed species (e.g. mahogany), facilitated training on forest management, supported the adoption of certification, and facilitated interactions with European investors requiring FSC certification (Immerzeel and Hamers 2014; TAA n.d.)

23 The goal of IFT is to promote good forest management practices in the Amazon, contribute to the conservation of natural resources, and improve the population's quality of life (IFT 2014).

- c. organizations that have participated in courses conducted by TAA (source: database project)
- d. CERFLOR certified organizations (source: CERFLOR public database)
- e. all organizations included in the IMAZON database that do not belong to any of the previous categories. This database was compiled in 2009 and contains information on all existing FMUs in the Brazilian Amazon.

Internet searches were carried out to collect data from the following publicly available sites:

- a. IBAMA
- b. Internal Revenue Service
- c. Registration of legal entities system
- d. Certification Public Summaries
- e. FMU/companies' websites (if available)
- f. Specific research on the selected institutions (IMAFLOA, IMAZON, SFB) organizations, to identify records of legal action against the companies, penalties, specific studies conducted on the organizations, and publicly available information
- g. Timber producer associations such as Association of Timber Exporters of State of Pará (AIMEX);
- h. Databases of CBs (e.g. IMAFLORA)
- i. Other studies with similar goals to ours, to identify relevant, complementary data.

### 3.3.2 Data analysis

Quantitative and qualitative variables were used to perform a multivariate factor analysis (MFA) to define the structure of the interrelationships (i.e. correlations) between the sets of variables in the dataset, based on groups of variables. This analysis helps to establish how groups of individuals are arranged in a multivariate space, based on characteristics that relate to and define forest management practices. Only the first two dimensions were used for ease of interpretation, and to increase the stability of these dimensions (Husson et al. 2013). Variables for which there was insufficient variation across the samples, or that were tightly correlated (i.e. had a reduced separation function), and could therefore increase bias, were not included in the MFA (e.g. name of parent company, permit, management). This information was used to

interpret the final results and characteristics of the clusters identified.

An MFA was run with all selected variables (Appendix I), and those that were weakly loaded ( $<0.5$ ) in the first two dimensions were excluded from further runs. The variables were subsequently separated into *active* variables (i.e. those that would be used to construct the dimensions and inform their interpretation), and *inactive* or supplementary variables (i.e. that would help in the interpretation of the results). Inactive variables were sorted into two supplementary groups in each iteration of the MFA. One of these groups contained information pertaining to FSC certification stage along the *certification continuum* model (Romero et al. 2013). This model conveys information on the certification decisions made by FMUs. The stages considered were: *Never Engaged in Certification*, *Considering Certification* (i.e. participated in an IFT or TAA training course), *Certified*, and *Certification Lost*. The second inactive group had two variables related to *Location* (i.e. State, *Polos Madeireiros* Name, and Frontier Age).

The remaining qualitative and quantitative variables were grouped based on how they related to specific company characteristics. For instance, variables related to market characteristics of the company were grouped together (e.g. market outlets, origin of company, both of which are strongly associated with their market destinations). Iterations of different models were run and the one that explained the most inertia was selected. The resulting model includes the following variables and groups:

#### 1. Active Groups:

**AREA:** area (in ha) under the regime of each individual company

**Market:** Origin (Brazilian or other countries); Outlet (market destination of harvested timber as *Domestic*; *Export*; *Both*); Vertically integrated (*Yes*; *No*); Regime (*Private*; *Concession*)

#### 2. Inactive Groups:

**FSC:** (*Never Engaged in Certification*, *Considering Certification*, *Certified*, and *Certification Lost*)

**Location:** State (PA, AM, AC, MT, RO, RR<sup>24</sup>); Frontier Age (Old, New, Intermediate, Estuarine).

24 PA: Pará; AM: Amazonas; AC: Acre; MT: Mato Grosso; RO: Rondônia; RR: Roraima.

The second step of the analysis was to perform a hierarchical clustering of the principal components (HCPC) obtained from the MFA results. The goal was to use this methodology to quantify the structural characteristics of the MFA scores for each individual company in the two dimensions of the MFA. The information is presented as a hierarchical clustering tree (Everitt and Hothorn 2011), and depicts groups of FMUs most similar to each other, located on the same branch of the tree or cluster. Companies were sorted along the two dimensions according to their coordinates on each principal component. The clustering method used was Ward, and distances were *Euclidean*. The *k-means* procedure was used to achieve better consolidation of the clusters so that these were more homogeneous. V-tests were run on all variables to check for the extent to which they are uniform. All analyses were run in R (R Development Core Team 2008) using the FactoMineR package (Husson et al. 2013).

### 3.4 Results

FMUs presented different levels of heterogeneity in all variables (Appendix IV). A detailed description of the variables used in the analyses is given below. A general description of the remaining variables is included in Appendix V. The analysis was based on 65 companies, ~14% of which are foreign-based capital companies (e.g. Chinese, Swiss, American, and Japanese). FMU characteristics varied broadly. The area under each individual company ranged from 399–793,299 ha (median=22,132 ha; Table 3.1).

#### 3.4.1 Multivariate Factor Analysis (MFA)

The first and second dimensions explained 39.61% and 27.42% of the inertia, respectively, for a total of 67.03% (Figure 3.3).

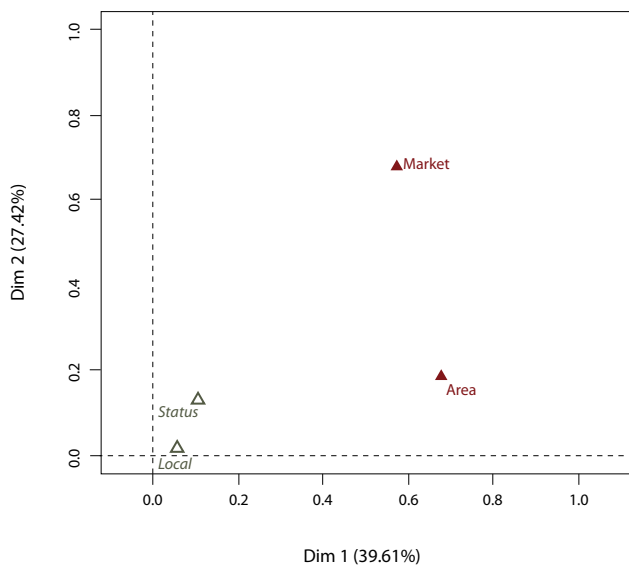
The group *Area* was highly correlated with Dimension 1. It contributed 54.2% in the construction of this Dimension with an acceptable quality of representation (0.68). The group *Market* also had relatively high correlation and contribution to this Dimension (0.57 and 45.8, respectively), but with low quality of representation (0.19). Thus, Dimension 1 can be interpreted as a gradient in the values of the variables in the group *Area* (i.e., extension under each company in this

**Table 3.1. Description of categorical variables used to construct a typology of active FMUs operating in natural forests in the Brazilian Amazon (N=65).**

Variables	# FMUs	%
<b>Origin</b>		
Domestic	56	86.2
Foreign	9	13.8
<b>Outlet</b>		
Domestic	16	24.9
Export	12	18.2
Both	37	56.9
<b>Vertical Integration</b>		
Yes	63	96.9
No	2	3.1
<b>Regime</b>		
Private	52	80
Concession	13	20
<b>Frontier</b>		
Old	34	52.3
Intermediate	28	43.1
Estuarine	3	4.6
<b>State</b>		
Acre	6	9.2
Amazonas	2	3.1
Mato Grosso	5	7.7
Pará	36	55.4
Rondônia	15	23.1
Roraima	1	1.5
<b>FSC Status</b>		
Considering	25	38.4
Certified	11	16.9
Certification Lost	13	20.0
Never engaged in Certification	16	24.7

case). The group *Market* was highly correlated with Dimension 2 (0.74), with a high contribution to its construction and a medium quality of representation (85.2 and 0.30, respectively). This Dimension then represents variation in the variables in this group (e.g. Origin of the company and Market Outlet). Dimension 2 is a function of variation in the variables in the *Market* group although the quality of representation was not high.

The inactive variables within *FSC Status* and *Location* (in terms of frontier, *polos madeireiros*, and



**Figure 3.3.** Results of a MFA on groups of variables related to Market and Area characteristics of FMUs operating in natural forests in the Brazilian Amazon (N=65). The groups Status and Location were not used in the construction of the dimensions but help in the interpretation of the MFA results.

state) did not contribute at all to the construction of any dimension and all had low correlation values and poor quality of representation (Table 3.2).

Some variables in the *Market* group were highly correlated with Dimension 1, with values for the V-test  $>|2|$ , indicating that the coordinates for the variables are significantly different from zero. These include *Origin Brazil* (negative correlation), *Origin Foreign* (positive), *Outlet Domestic* (negative), *Outlet Export* (positive). The contribution of these variables to the construction of this dimension was uneven, as was the quality

of representation. Indeed, the highest values were for *Origin Foreign* and *Brazil and Export*, and the lowest for *Outlet Both* (Table 3.3). As such, this Dimension represents variation in the extent to which companies are Brazil-based and sell their timber abroad. With respect to Dimension 2, the highest correlation is shown for *Outlet Export* and *Origin Foreign* (positive), followed by *Outlet Domestic* (positive). Negatively correlated with this dimension were *Origin National* and *Outlet Both*. The contribution of these variables to the axis is high ( $>14.8$  for all except for *Origin Brazil*). Except for *Outlet Both* (0.88), some variables had modest quality of representation ( $<0.30$ ) in spite of relatively high contributions. This dimension thus can be interpreted as a function of variation in market outlet by companies of different origins.

### 3.4.2 Hierarchical Clustering on Principal Components (HCPC)

This analysis was performed on the resulting scores for individuals from the MFA for the first two dimensions. Overall, FMUs were sorted out into four clusters (Figure 3.4; Table 3.4).

On categorical data, chi-square tests indicate that the variables *Outlet*, *Polos Madeireiros*, and *Origin* are linked to the clusters. For continuous data, one-way ANOVA results highlight that the variable linked to the clusters is *Area* (Figure 3.5).

#### Cluster 1 (Black in Figures 3.3 and 3.4, Appendix VI).

This cluster is significant and negatively correlated with Dimension 1 (V-test =  $|2.3|$ ) and significant and positively correlated with Dimension 2 V-test =  $|3.8|$ . FMUs in this cluster are characterized by qualitative variables. There is an over-

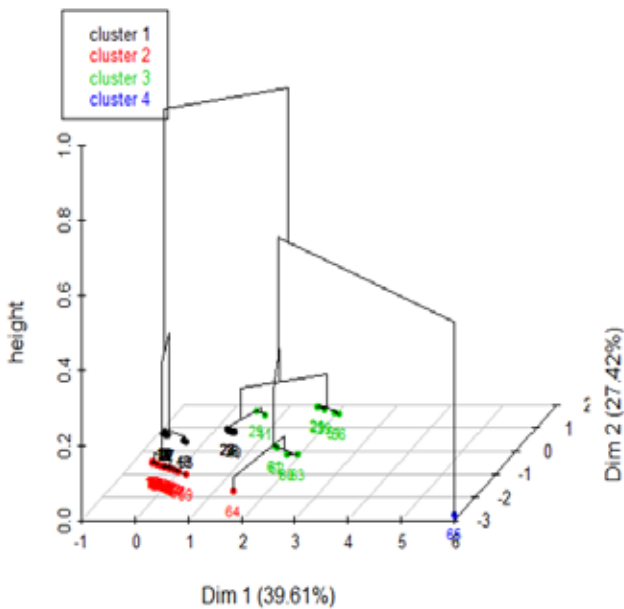
**Table 3.2.** Correlations between groups of variables and each of the two dimensions of the MFA of natural forest FMUs in the Brazilian Amazon (N=65).

Groups	Dimension 1	Contrib.	Cos <sup>2</sup>	Dimension 2	Contrib.	Cos <sup>2</sup>
<i>Area</i>	0.67	54.21	0.68	0.18	21.03	0.03
<i>Market</i>	0.57	45.8	0.19	0.68	78.70	0.27
<i>FSC Status</i> (Inactive)	0.11	—	0	0.13	—	0
<i>Location</i> (Inactive)	0.30	—	0.01	0.23	—	0

**Contrib.** represents the proportion that each variable contributes to each axis, and **Cos<sup>2</sup>** assesses the quality of information contributed.

**Table 3.3. Contribution, quality of representation, and test statistics for continuous and categorical variables used in a multiple factor analysis (MFA) grouped in Area and Market groups, for companies operating in natural forests in the Brazilian Amazon (N=65).**

Groups	Variables	Dimension 1			Dimension 2		
		Contribution	Cos <sup>2</sup>	V-test	Contribution	Cos <sup>2</sup>	V-test
Area	Area	54.21	0.680	—	21.39	0.18	—
Market	Origin Brazilian	3.91	0.67	5.60	2.38	0.20	3.63
	Origin Foreign	24.33	0.67	5.60	14.79	0.20	3.64
	Domestic market	4.10	0.16	2.469	15.12	0.28	3.93
	Export market	12.94	0.41	4.20	20.21	0.31	4.37
	Both markets	0.51	0.03	1.15	26.19	0.81	6.85



**Figure 3.4. Hierarchical tree showing the relationships among companies operating in natural forests in the Brazilian Amazon based on the scores of a multiple factor analysis on the first two axes (N=65; ~67.03% of variance explained).** Colors represent different cluster memberships. Descriptions of each cluster are provided in the text. Numbers correspond to identities of companies (Appendices V-VII).

representation of Brazilian-owned companies (100% in this cluster) and 32.1% of the Brazil-based companies in the sample are in this cluster. Companies commercializing timber domestically make up 77.8% of the FMUs in the cluster: ~ 87%

of these in the sample are in the cluster. FMUs in this cluster are located, for the most part, in RO (44.4%), followed by PA (33.3%) and one in each in the states of AC and MT. FMUs are distributed relatively evenly in *Old* and *Intermediate* frontier types (*Old*: 55.5%). There is a total of 12 *polos madeireiros* in this cluster. Santarém has 4 companies followed by Paragominas, Porto Velho, and Ji-Paraná, each with 2 companies. The other eight *polos madeireiros* have only one company each.

The age of the 12 companies for which data is available ranges from 6–27 years. Approximately 22% of the FMUs operate under a concession regime, while the remaining FMUs are private.

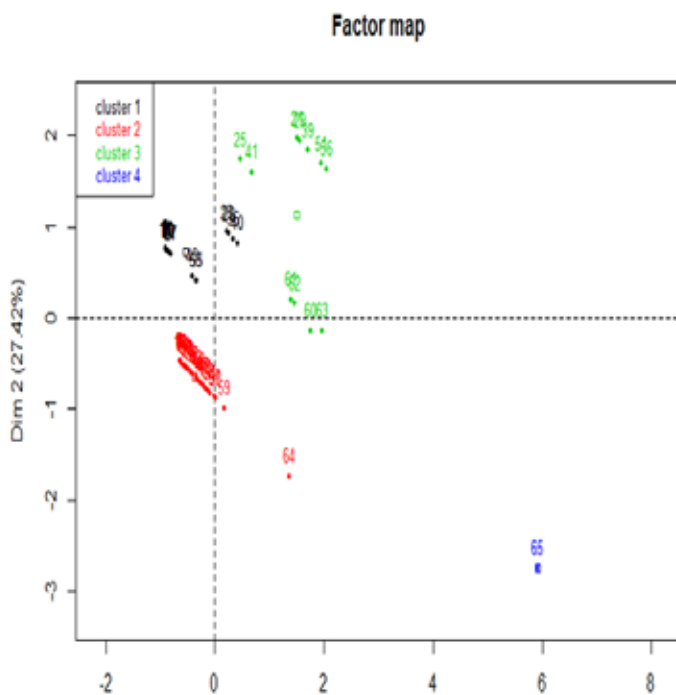
There are three FMUs that have lost their certification operating in old frontiers in PA, RO, and MT. Their areas range from approximately 5,000 to 30,000 ha. All FMUs that have considered certification are dispersed among several *polos madeireiros* (i.e. 5 in RO, 4 in PA, and 1 in AC). Their average area is three times larger than that of FMUs in the *Never Certified* group (~30,000 versus ~10,000 ha). All except one FMU in this cluster sell timber exclusively to domestic markets. Some of these companies have been accused of illegal activity (e.g. illegal exploitation of mahogany, receiving stolen timber, and attacks on members of local communities).

Five FMUs in this cluster have never engaged in certification. Three of these are located in Pará (Santarém and Paragominas) and two in Rondônia



**Table 3.4. Cluster composition in terms of status of FMUs along the certification continuum.**

Cluster	# FMUs	Never certified	Consider certification	Certified	Certification lost
1	18	5	10	0	3
2	35	6	13	8	8
3	11	0	7	2	4
4	1	0	0	1	0



**Figure 3.5. Results of a hierarchical clustering on the resulting scores of a MFA for companies operating in natural forests in the Brazilian Amazon (N=65). Companies differ in area in Dimension 1. Dimension 2 separates companies on the basis of variables related to Market characteristics (see text for explanation). Numbers correspond to identities of companies (Appendices V-VII).**

(Porto Velho), operating mostly in intermediate frontiers. Only one of these sells to export markets.

*Alex Madeiras*, a 17,000 ha company that has considered certification, and operates in an intermediate frontier in Cujubim (RO), is located closest to the center of gravity of this cluster.

*Amazon Mader (Mader Madeireira Entre Rios)*, a very small (1000 ha), new company (2008) operating in Porto Velho (RO), which has never engaged in certification, is typical of firms in this cluster.

#### **Cluster 2 (Red in Figures 3.3 and 3.4; Appendix VII).**

This cluster is negatively and significantly correlated with Dimensions 1 and 2 (V-test: -2.8 and -6.0, respectively). In terms of variables, all FMUs in the cluster sell preferentially to domestic markets, are Brazilian in origin, with an over representation of these two categories (i.e. all companies in the cluster are 100% on both variables). This is out of the 94.6% and 62.5% of companies in the sample on these categories that are in this cluster, respectively. All companies are vertically integrated.

A large fraction of companies is located in Pará in 12 *polos madeireiros* (-62), mostly in Paragominas and Santarém (six companies each), and four in Belém. This is followed by Rondônia (17.6%; four *polos madeireiros*), with the remaining companies distributed almost evenly between Acre and Mato Grosso (five companies, all of which are located in Rio Branco; and three companies in three *polos madeireiros*, respectively). In terms of management regime, close to 30% of the FMUs are under concession, the remaining ones are private.

All companies in Acre operate in old frontiers. Those located in Pará work predominantly in old frontiers (57%), although one company

in the cluster operates in an estuarine frontier. A similar number of companies in Rondônia operate in intermediate and old frontiers, while in Mato Grosso, only one of the three FMUs operates in an intermediate frontier.

Thirteen companies have considered certification. Their areas vary significantly (~400–125,000 ha). Nine of these FMUs are in Pará (seven *polos madeireiros*), operating almost evenly in intermediate and old frontiers. The remaining companies work in Rondônia, and one is based in Mato Grosso. The oldest of these FMUs started operations in 1967, which, 30 years later, is also the smallest. FMUs in this group have been accused of various illegal actions that have resulted in sanctions by IBAMA, including: the use of slave labor, and the illegal trade of mahogany (Grogan et al. 2002).

Several FMUs received training from IFT between 1998 and 2008, in some cases more than once. Only one company in this cluster received training from TAA. The average area of certified

companies is 72,291 ha (18,000–300,000 ha). The concession contract grants extraction rights to local communities. Pará and Acre each contain three companies that have lost their certification, while Mato Grosso has two (Table 3.5). Their areas range from ~7000–80,000 ha.

*LN Guerra Indústria e Comércio de Madeiras Ltda*, a company certified in 2012, is the closest to the center of gravity of this cluster. *CIKEL Brasil Verde*, another certified company, is the most typical of this cluster, and the most different from those in Clusters 1, 3, and 4.

### Cluster 3 (Green in Figures 3.3 and 3.4; Appendix VIII).

This cluster is significantly and positively correlated with Dimensions 1 and 2 (V-test: 4.8 and 4.3, respectively). FMUs in this cluster are mostly non-Brazilian in origin (72%) and ~88% of foreign FMUs in the sample are in this cluster. Although the majority of FMUs preferentially export (70%), out of the ~67%

**Table 3.5. FMUs in Cluster 2 that lost their certification. In some cases, the reason for the loss of certification could not be established (NE).**

Company	Year	State ( <i>polo</i> )	Certified (cb)	Year lost	Reason
<i>Laminados Triunfo</i>	1996	AC (Rio Branco)	2005 (RA)	2013	Problems with communities and legal management issues (i.e., accused of forest degradation).
<i>Emapa –Exportadora de Maderas do Pará</i>	1983	PA (Afuá)	2003 (SCS)	2008	NE
<i>Triângulo Madeiras</i>	1992	AC (Rio Branco)	2011 *	2012	NE
<i>IBL – Izabel Madeiras</i>	1989	PA (Breu Branco)	2004 (SCS)	2009	Land claims from local communities that have led to land invasion.
<i>Rohden Indústria Lignea</i>	1980	MT (Juruena)	2003 (SCS)	2013	Local communities' agreements for NTFPs that were broken.
<i>Rondobel Ind. e Comércio</i>	2002	PA (Santarém)	2012 (RA)	2013	Illegal trading and workers' issues
<i>Ouro Verde</i>		AC (Rio Branco)	2006 (RA)	2011	NE
<i>Guavira Agroflorestal</i>	1986	MT (São José do Rio Claro)	2003 (SGS)	2008	Fined by IBAMA

\* CERFLOR

of exporting FMUs in the sample that are in this cluster, they sell timber to a range of markets. All of the companies in this cluster are private. The age of the 8 companies for which the date of establishment could be determined ranges from 3–44 years (*Madeira Vale Verde Ltda.* in RR and *Lawton Madeiras* in PA, respectively).

The areas managed by the FMUs in this cluster range from 10,000–275,000 ha (median=76,844 ha). Most of the companies are located in Pará (~64%; six companies), followed by Amazonas with two companies, and Mato Grosso and Rondônia each with one company. The only company located in Roraima is also the newest in the cluster. FMUs operate in seven *polos madeireiros*, within which timber production has drastically decreased between 1998 and 2009 (down by 999 million m<sup>3</sup>/yr – Sinop in MT). Companies are distributed across all frontier types, primarily in old frontiers (~64%). There are two FMUs operating in estuarine frontiers in Breves, Pará.

All companies in this cluster have engaged with certification, of which seven have considered it. A number of companies have received training, either through IFT or TAA, often more than once. Five of these are located in PA, operating in old and estuarine frontiers. Several of these FMUs have been accused of illegality and fined by IBAMA, SEMA and the Public Ministry of the State (SEMA 2011).

The FMUs that lost their certification are all overseas-based. The first closed its operations due to difficulties experienced with local agencies, and business-related issues (Johnson 2005), while another had serious issues related to the invasion of their land and inappropriate timber harvesting. *Amazonia Compensados e Laminados, S.A (AMCOL)* is the company closest to the center of gravity for this cluster. *Eidai do Brasil Madeiras S/A* is the most typical FMU in this group.

#### **Cluster 4 (Black in Figures 3.3 and 3.4).**

This cluster is significant and positively correlated with Dimension 1 and negatively correlated with Dimension 2 (V-test: 5.3 and -2.9, respectively). *Jari Florestal S. A.*, established in 1967, was certified through SCS in 2004. It is an overseas-

based FMU that manages an extensive area (>700,000 ha). It has had conflicts with communities that illegally poach timber. The managers of this FMU have been accused of murder and land grabbing.

### **3.5 Discussion**

This typology was constructed using detailed information for 65 FMUs in key active logging areas in the Brazilian Amazon. The typology represents a characterization of a modest portion of the natural forest management sector in the Brazilian Amazon, given that over 2000 more FMUs have been active at various points in time. In spite of its limited coverage, the typology provides insight into companies that are active in *polos madeireiros* that have engaged in FSC certification at one point in time. Although to date, the number of active FMUs in the specific area covered by these *polos madeireiros* has not been established (personal communication from D. Santos, 2015), the typology represents a robust starting point to inform the design of a sampling strategy for the collection of empirical data.

To facilitate the development of a field-based impact evaluation, it is important that the variables used in the multivariate analyses are informative and explain a large and significant fraction of similarity among FMUs (~67%). These variables relate to key factors, some of which determine forest management decisions (e.g. area, origin of the company/FMU, and market outlet). The resulting clusters of FMUs are heterogeneous and differ in terms of area, market outlet, location, and company origin. Within clusters, it was possible to find almost all combinations of certification states, especially in Clusters 1 and 2. However, in Clusters 3 and 4, there were no companies in the *Never Certified* category. These results suggest that a counterfactual group can be created from suitable FMUs in Clusters 1 and 2, to inform the future evaluation of FSC impacts. Cluster 1 contains FMUs that sell timber domestically, with a modest number operating under the new concession regime since 2006. In contrast, Cluster 2 contains FMUs that sell timber to both domestic and export markets, although two companies specialize in exporting timber. This

cluster contains the largest proportion of FMUs operating under concession.

The cluster configuration is dynamic, and the typology results represent the most current cluster structure and characterization. Due to the importance of timescale to the evaluation study, it seems relevant to understand when various certification-related decisions were made, which is the focus of the study presented in part II of this chapter.

## Part II. Certification dynamics

This study analyzes annual choices made by FMU managers between 1994 and 2013, regarding their participation in: improved management practices; training activities related to forest management; and, more explicitly, in certification (e.g. pre-assessment, auditing towards certification). This exercise will provide key inputs for advancing the design of an empirical evaluation framework of FSC certification in the country. The questions addressed in this study include:

- a. How many FMUs have become FSC certified over this period, and when?
- b. How many FMUs lost or gave up certification, and what were their further decisions regarding certification?
- c. How many of these FMUs participated in training courses (i.e. to improve management practices and facilitate their certification, or training on more specific technical issues), and when?
- d. How many FMUs did not pursue certification and were actively operating in a particular year?
- e. Did FMUs continue to work with the same CB or switch between various bodies?

### 3.5.1 Specific methodological issues

Meetings were held with experts to help identify the factors that could have influenced the dynamics of forest certification, and motivated engagement in FSC certification in Brazil (Appendix II). Among the factors identified were: requests from donor organizations, market demands, the existence of management skills, and knowledge of the certification process. One of these factors (enhanced forest management skills), was chosen for closer examination, to better understand its potential link to the adoption of certification,

and choosing to remain FSC certified. More specifically, data were collected on FMU staff training in Reduced-Impact Logging practices (RIL), including courses offered by IFT. Once IFT course participants had been identified, it was possible to make links between this and an FMU's decision to engage in certification. Even if changes in staff have occurred over time, the FMU's training record offers some indication of their interest in certification.

TAA was an initiative that operated between 2009 and 2013, which supported training and provided funds to enable FMUs to adopt improved forest management approaches and pursue certification. The program provided training for FMU staff between 2010 and 2012, and contributed 50% of the funding required to cover certification costs. The remaining costs were covered by the FMU.

### 3.5.2 Data collected

Data for each FMU was collected from a range of sources, as outlined in the *Typology* study. The protocols used in this project were defined by Romero et al. (2013), who highlight the need to use a generic model to characterize the dynamics of FMU managers' engagement in certification. This model was adapted to the information available for Brazil, and includes data on participation in training offered by IFT and TAA. Databases from FSC Brazil, FSC International, and other CBs operating in the country were searched, to document decisions regarding certification made on a year-to-year basis. In particular, information was collected to establish when an FMU became certified, when it lost certification, or when its certificate was suspended/terminated (Figure 3.6).

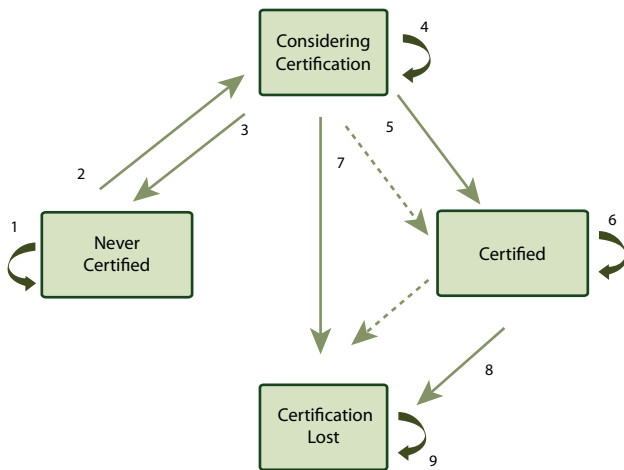
### 3.5.3 Rules for data interpretation

Transitions among different stages along the certification continuum in Figure 3.5 were numbered and are explained below (Table 3.6).

### 3.5.4 Data Analyses

The frequencies of FMU transitions are expressed on an annual basis as the proportion of FMUs that existed in the source stage at the beginning of the previous year. It was assumed that the

probabilities of transition among stages along the certification continuum (i.e. decisions vis-à-vis certification) followed a multinomial distribution, because there were situations in which there were more than two possible outcomes. Likelihood Ratio Tests (LRTs) for a multinomial distribution were performed to examine the null hypothesis



**Figure 3.6. Annual transitions (numbered arrows indicating transition number as explained in Table 3.6) between stages along the certification continuum.** Transitions represent decisions made by FMUs regarding participation in certification activities for the period of 1994–2013.

of no difference among the probabilities of these transitions. These transitions were explored annually for each group of decisions, for each stage along the continuum (e.g. null hypothesis would be equal probability of transition from *Never Certified* into either remaining in that category or moving into *Considering Certification*). In addition, simultaneous confidence intervals (CI) for the probabilities of linked decisions (i.e. getting out of the same stage into other stages along the continuum) were calculated using the Multinomial CI package (Villacorta 2015). Statistical analyses were conducted in R (R Development Core Team 2008).

### 3.6 Results

In this study, 105 FMUs, located in 22 *polos madeireiros*, were analyzed to assess the annual steps taken by each firm regarding certification, between 1994 and 2013. During this period, 16 FMUs closed operations.

#### 3.6.1 General Dynamics of FMUs engaged in certification

The Brazilian timber sector’s engagement in certification remains low. In 1998, there were 2540 timber companies operating in the Amazon (Lentini et al. 2003), and of these, only one was

**Table 3.6. Rules for assigning FMUs to different stages (indicated in italics) along the certification continuum, and for making transitions between those stages, as depicted in Figure 3.5.**

Step	Description
1	FMUs that have never taken any steps towards certification: <i>Never Certified</i> .
2	FMUs that have received specific training with IFT or TAA enter the <i>Considering Certification</i> stage.
3	FMUs that after receiving training, did not pursue any more training activities in the following year. These FMUs revert to the <i>Never Certified</i> stage.
4	FMUs that do not advance towards <i>Certification</i> , continue to receive training, and remain in the <i>Considering Certification</i> stage.
5	FMUs that become <i>Certified</i> .
6	FMUs that remain <i>Certified</i> .
7	FMUs that lose their certification the same year it is granted.
8	FMUs that lose their certification are classified as <i>Lost Certification</i> .
9	FMUs that were formerly certified, lost certification, and did not pursue certification again remain in the <i>Lost Certification</i> stage.

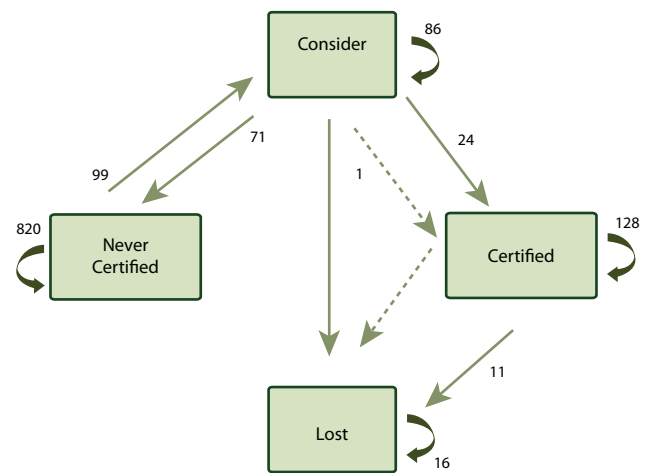
certified (0.04%). Ten years later, the total number of logging companies operating in the Amazon had decreased to 2226 (SFB 2010), and of this number, only 11 companies were certified (-0.5%).

Almost all of the certified FMUs analyzed in this study were certified under the FSC system, which is considered to be the most relevant certification scheme for tropical timbers from natural forests, although CERFLOR, which is validated by PEFC, offers a locally developed alternative. However, during the study period, only two FMUs, belonging to the same group of owners, obtained CERFLOR certification (both in 2011).

Our sample represents 9.3% of the more than 2000 operations in all *polos madeireiros* in the Amazon region. Unfortunately, the proportion of FMUs active within the *polos madeireiros* included in the study could not be established. Although a 2012 SFB assessment includes information on active FMUs, this only covers the northwest of the country (personal communication from D Santos, 2015). We observed that most FMUs were not engaged in certification (Figure 3.7). Overall, 99 FMUs considered certification throughout the study period (i.e. participated in at least one training activity), of which, only 24 progressed to obtain certification. Of the 99 FMUs whose managers took steps towards certification, 70% abandoned any intention of becoming certified during this time. In 85% of cases, this decision occurred after remaining at the *Considering Certification* stage for some years.

During 2002 and 2003, the FMUs significantly preferred not to pursue certification, compared with other years (i.e. the proportion of FMUs that remained at the *Never Certified* stage was always higher than the proportion at the *Considering Certification* stage), whereas in 2004 and 2005, and the period from 2007 to 2010, the proportion of FMUs either abandoning certification (decision D3), or moving ahead with the process (decisions D4 and D5) did not significantly change (Table 3.7).

Of particular interest is the year 2001, when LRT results show a large proportion of FMUs deciding to engage in some form of training through IFT, and thus considering certification (~47.5%; Decision D2; Figure 3.8). In the remaining years,



**Figure 3.7. Total number of times that FMUs operating in natural forests in the Brazilian Amazon (N=105) made a particular transition during the study period (1994–2013).** For example, the decision to become certified over that period of time was made 24 times.

a considerably larger significant proportion (>60%) of FMUs remained in the *Never Certified* category.

At the time of publication, 14 (Appendix IX) out of 24 FMUs in Brazil (58%; Figure 3.9; Appendix X) had retained their FSC certification. The first company to become FSC certified in Brazil was *Mil Madeiras* (1996). In the following decades, several FMUs voluntarily pursued FSC certification.

Engagement in certification gradually increased until 2006. In 2012, a new cycle started, although some of these FMUs only remained certified for a year (e.g. Rondobel). Overall, the process of FMUs entering and leaving certification over time has been relatively dynamic (Figure 3.10).

Once FMUs become certified, they can either remain certified (D6) or lose certification (D8; Figure 3.11). Once it had been lost, no FMUs attempted to regain their certification. “During the study, 10 formerly certified FMUs lost their certification LRTs show that, on an annual basis, most FMU managers made the decision to remain certified.

**Table 3.7. Results of likelihood ratio test for linked certification annual decisions made by FMUs engaged in natural forest management in Brazil, between 1994 and 2013.** Linked decisions originate from the same stage. Dark gray boxes indicate cases where only one out of all possible decisions was taken. Light gray shaded boxes indicate when the observed frequency of transition cannot be distinguished from the null model of equal probability among these decisions. White boxes indicate statistical significance and levels are specified in each case (Figure 3.5). Bold: dominant transitions for each of the possible decisions.

Years	Linked certification decisions		
	From Never Certified Remain (D1) Leave to Considering Certification (D2)	From Considering Certification Into Never Certified Remain (D4) To Certified (D5) Certified and Lost in same year (D7)	From Certified Remain (D6) Leave to Lost Certification (D8)
1996	P<0.001; <b>D1= 0.933</b> [ 0.867 - 1 ]; D2= 0.067 [ 0 - 0.178 ]		
1997	P<0.001; <b>D1=0.882</b> [ 0.824 - 1 ]; D2=[ 0.059 - 0.292 ]	D5= 1 (100%)	D8= 1 (100%)
1998	P<0.001; <b>D1= 0.815</b> [0.704-0.964]; D2= 0.185 [ 0.074 - 0.335 ]	P<0.05; D3 = 0.5 [ 0.5 - 1 ] D4 = 0.5 [ 0.5 - 1 ]	D6= 1 (100%)
1999	P<0.001; <b>D1= 0.621</b> [ 0.907 - 1 ]; D2 =0.379 [ 0 - 0.094 ]	P = 0.08; D3 = 0.167 [ 0 - 0.43 ]; D4 = 0.833 [ 0.667 - 1 ]	D6= 1 (100%)
2000	P<0.05; <b>D1= 0.72</b> [ 0.62 - 0.856 ]; D2 =0.28 [ 0.18 - 0.416 ]	P < 0.04; <b>D5 = 0.857</b> [ 0.714 - 1 ]; D6 = 0.143 [ 0 - 0.373 ]	D6= 1 (100%)
2001	P=0.75; D1= 0.525 [0.375 -0.675] D2= 0.475 [ 0.325 - 0.625 ]	P < 0.004; D3 = 0.35 [ 0.2 - 0.597 ]; <b>D4 = 0.6</b> [ 0.45 - 0.847 ]; D5 =0.05 [ 0.45 - 0.847 ]	D6= 1 (100%)
2002	P<0.05; <b>D1 = 0.688</b> [0.562 -0.865] D2 = 0.312 [ 0.188 -0.49 ]	P < 0.001; <b>D3 =0.548</b> [0.387-0.727 ]; D4 = 0.419 [ 0.258-0.598] D5 =0.032 [ 0.258-0.598 ]	D6= 1 (100%)
2003	P<0.001; <b>D1= 0.825</b> [0.725 -0.937] D2= 0.175 [ 0.075-0.287];	P < 0.001; <b>D3 =0.625</b> [0.458-0.821 ]; D4 = 0.167 [ 0 - 0.363 ]; D5 =0.208 [ 0 - 0.363 ]	P =0.30 D6 =0.75 [ 0.5 - 1 ]; D8 =0.25 [ 0 - 0.601 ]
2004	P<0.001; <b>D1=0.92</b> [ 0.86 - 0.986 ]; D2= 0.08 [ 0.02 - 0.146 ];	P = 0.7; D3 = 0.273[ 0.091 -0.632] D4 = 0.455 [0.273 0.814] D5 = 0.273 [ 0.273-0.814]	D6= 1 (100%)

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Table 3.7 Continued

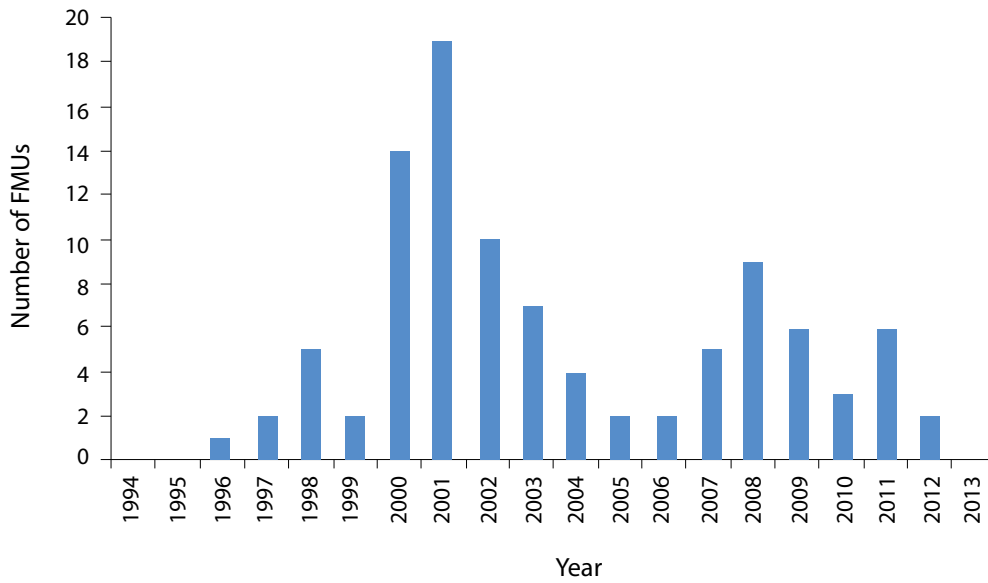
Years	Linked certification decisions		
	From <i>Never Certified</i> Remain (D1) Leave to <i>Considering Certification</i> (D2)	From <i>Considering Certification</i> Into <i>Never Certified</i> (D3) Remain (D4) To <i>Certified</i> (D5) Certified and Lost in same year (D7)	From <i>Certified</i> Remain (D6) Leave to <i>Lost Certification</i> (D8)
2005	P<0.001; <b>D1 = 0.962</b> [ 0.923 - 1 ]; D2 =0.038 [ 0 - 0.078 ]	P =0.47; D3 = 0.6 [ 0.4 - 1 ]; D4 =0.2 [ 0 - 0.724 ]; D5 = 0.2 [ 0 - 0.724 ]	P<0.003; <b>D6 = 0.909</b> [ 0.818 - 1 ]; D8 = 0.091 [ 0 - 0.242 ]
2006	P<0.001; <b>D1 = 0.968</b> [ 0.935 - 1 ]; D2 =0.032 [ 0 - 0.065 ]	P < 0.05; D3 = 0.062 [0 -0.333 ]; D4 = 0.562 [0.375 -0.833] D5 = 0.375 [ 0.188-0.645]	D6= 1 (100%)
2007	P<0.001; <b>D1 = 0.928</b> [0.884 -0.989] D2 =0.072 [ 0.029 -0.134]	P = 0.55; D3 = 0.667 [ 0.333 - 1 ]; D4 = 0.333 [ 0 - 0.687 ];	D6= 1 (100%)
2008	P<0.001; <b>D1 = 0.866</b> [0.806-0.953] D2 = 0.134 [ 0.075-0.221]	P = 0.59; D3 = 0.333 [0.167- 0.83 ] D4 = 0.5 [ 0.333 - 0.996 ] D5 = 0.167 [ 0.333-0.996]	P<0.002; <b>D6 = 0.867</b> [ 0.8 - 1 ]] D8 =0.133 [ 0.067 -0.329]
2009	P<0.001; <b>D1 = 0.908</b> [0.862 -0.983] D2 = 0.092 [0.046 -0.168]	P = 0.56; D3 =0.583 [0.417- 0.91 ]; D4 =0.417 [ 0.25 - 0.744 ]	P<0.004; <b>D6 =0.857</b> [ 0.786 - 1 ]; D8 =0.143 [0.071 - 0.352 ]
2010	P<0.001; <b>D1 = 0.956</b> [ 0.926 - 1 ]; D2 =0.044 [ 0.015 - 0.094 ]	P =0.76; D3 = 0.455 [ 0.273-0.798] D4 = 0.545 [ 0.364-0.889]	P<0.001; <b>D6 =0.917</b> [ 0.833 - 1 ]; D8 =0.083 [ 0 - 0.222 ]
2011	P<0.001; <b>D1 = 0.914</b> [0.871-0.985] D2 =0.043 - 0.156 ]	P < 0.02; D3 = 0.125 [ 0 - 0.329]; <b>D4 = 0.875</b> [ 0.75 - 1 ]	D6= 1 (100%)
2012	P<0.001; <b>D1 = 0.969</b> [ 0.938 - 1 ]; D2 = 0.031 [ 0 - 0.062 ]	P = 0.02; D3 = 0.077 [ 0 - 0.361 ]; <b>D4 = 0.692</b> [0.538 -0.976] D5 = 0.23 [0.538-0.976]	P<0.003; <b>D6 = 0.909</b> [ 0.818 - 1 ]; D8 =0.091 [ 0 - 0.242]
2013	D1= 1 (100%)	P < 0.35; D3 = 0.273 [0.091-0.628]; D4 0.455 [ 0.273 - 0.81 ]; D5 =0.182 [0.077- 0.379]; D7 = 0.091 [0.077 - 0.379]	P<0.008; <b>D6 =0.846</b> [ 0.769 - 1 ] D8 =[ 0.077 - 0.379 ]

### Certification Bodies (CBs)

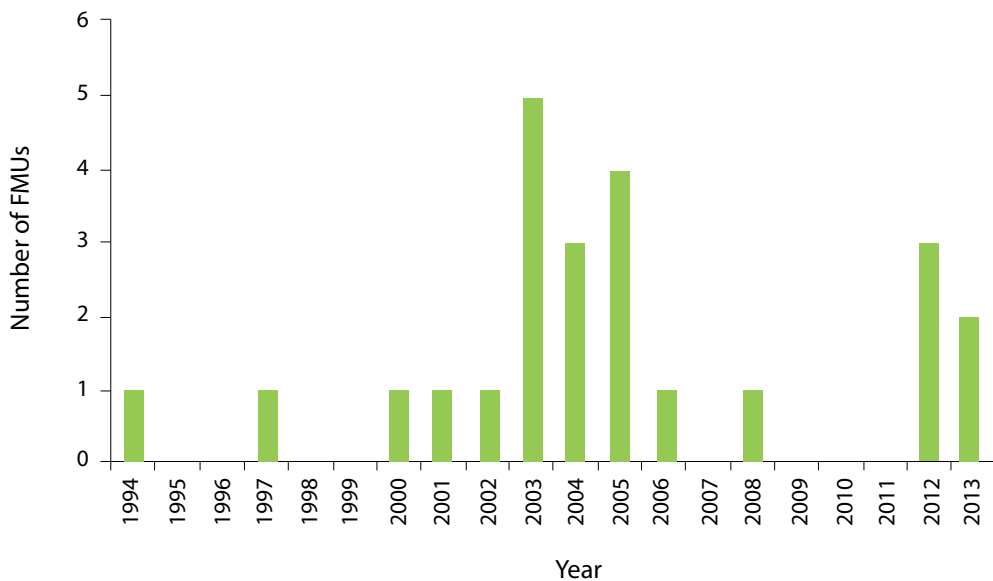
The first CB to conduct certification audits in Brazil was the RA, a US-based NGO. RA established a partnership with a local institution

(IMAFLOA) for certification purposes. Due to this organization's extensive networks, this partnership still plays a significant role in auditing and certification activities in the country (Figure 3.12).





**Figure 3.8.** Dynamics of the number of FMUs in natural forests that made the first move towards engaging in certification (made decision D2: *Considering Certification*).

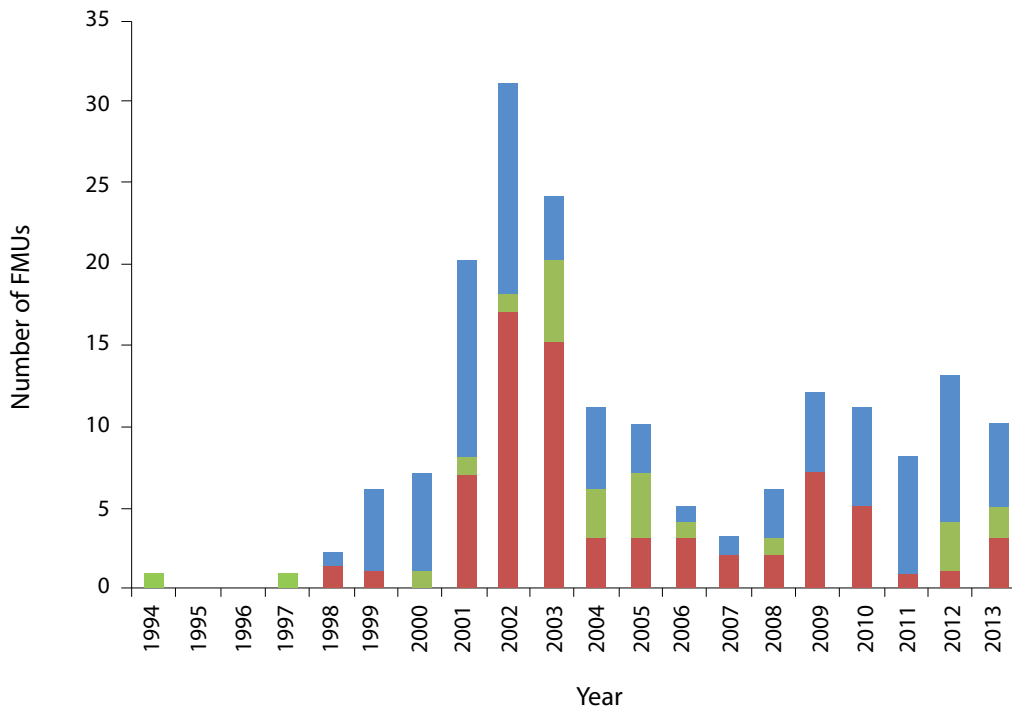


**Figure 3.9.** Number of newly certified FMUs in Brazil over the study period.

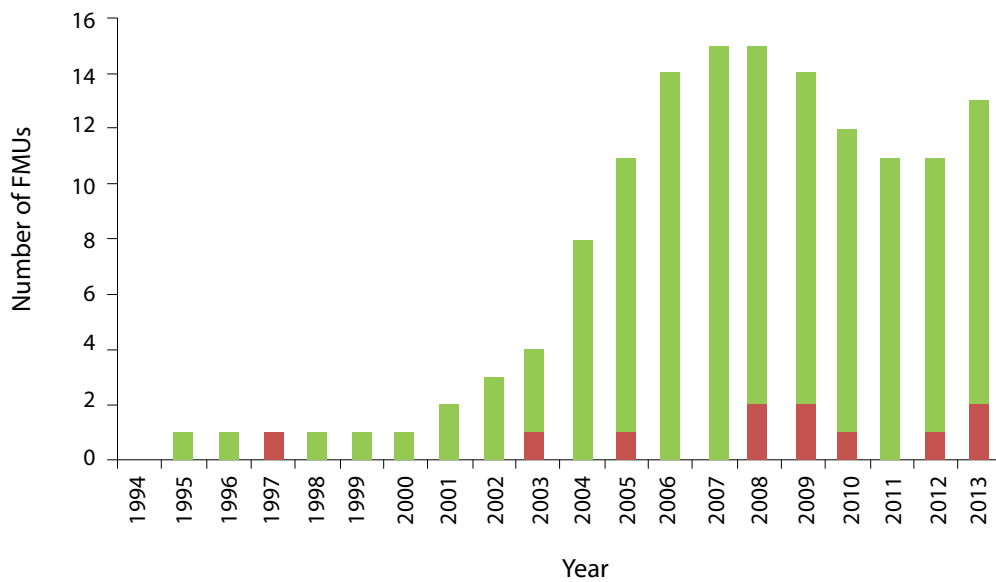
The second largest certifier in Brazil is SCS, a US-based company specializing in the certification of several globally existing schemes. It certified its first FMU in the country in 2002, and increased its activity until 2006, when its contributions to certification started to decrease (Figure 3.13).

Several CBs remained active throughout the study period (e.g. SCS, SKAL, IMAFLORA/RA and

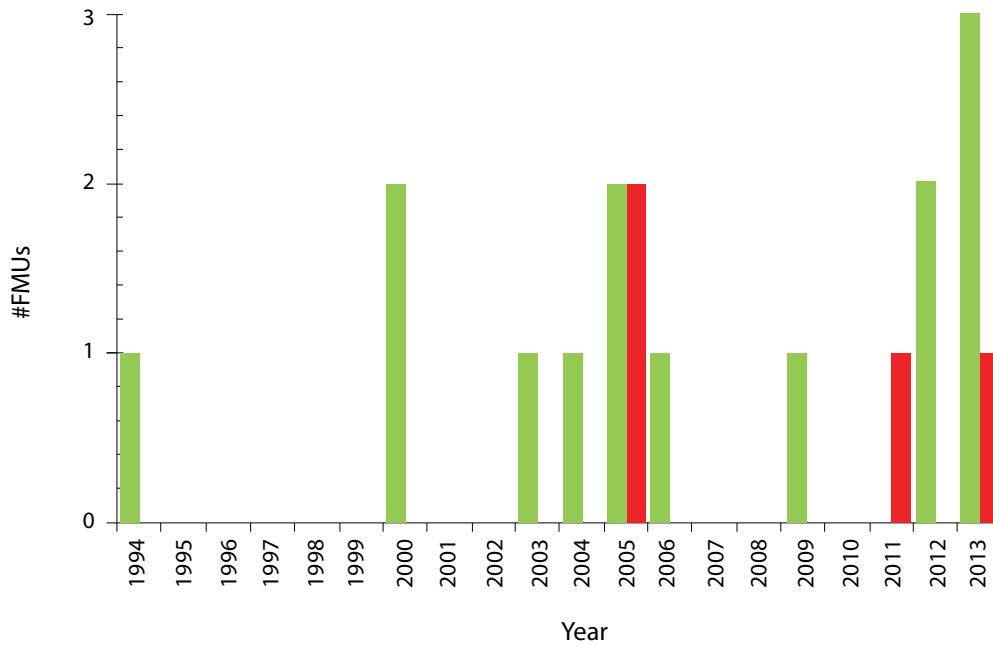
GFA). The activities of CBs have often been controversial. For instance, SGS's involvement in FSC forest management certification was suspended in 2012, due to errors in the auditing and certification processes of a forest plantation company in the country. Its activities in Brazil have then been suspended for 5 years. In 2000, SKAL also generated significant controversy, sparking protests among NGOs, when it was accused of



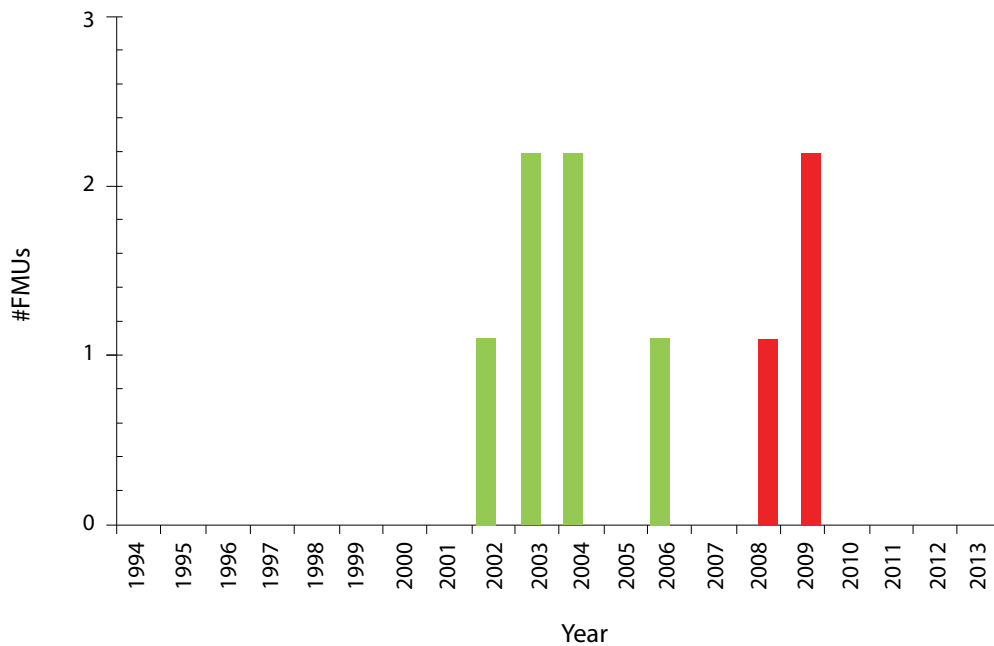
**Figure 3.10. Number of FMUs operating in natural forests in Brazil that have engaged in FSC certification over the period 1994–2013.** Colors indicate decisions made by FMU managers following the *Considering Certification* stage. These are: become *Newly Certified* (green); return to *Never Certified* stage (red); and remain at *Considering Certification* stage (blue).



**Figure 3.11. Number of FMUs that remained certified (green) and those that lost certification (red) annually, for FMUs operating in natural forests in Brazil (N=105) between 1994 and 2013.**



**Figure 3.12.** Number of FMUs certified through IMAFLORA that became certified (green) and those that lost certification (red) over the years.



**Figure 3.13.** Number of SCS certified FMUs that obtained certification (green) and those that lost it (red) over the years.

issuing illegitimate certificates in Mato Grosso. Greenpeace submitted a formal challenge to FSC International in 2002, questioning the legitimacy of one of SKAL's certificates (Marquesini 2002), due to problems with the

company's forest management practices, and lack of compliance with legal procedures required by FSC. According to audit reports, the logging company had experienced no problems related to land conflicts or local community relations,

issues that could have derailed the certification process. However, SKAL had no experience in Brazil, had failed to consult stakeholders in the process, and had neglected to ensure that pre-conditions had been met before the completion of the audit report. After termination of its certificate, it never sought certification again. This process was evaluated by FSC International's Dispute Resolution Committee and led to the cancellation of the logging company's certification, and SKAL's suspension from worldwide accreditation for 5 years. To date, SKAL has not resumed its involvement in tropical forest management certification.

### 3.7 Discussion

FMU decisions on certification have been documented for almost 20 years (1994–2013). Although a modest number of FMUs were certified during these two decades, in certain years (e.g. 2001–2004), several FMUs lost their status, and a considerable number of FMUs remained hesitant about moving towards certification. The latter finding may be due to the way in which the *Considering Certification* status was defined (i.e. FMU personnel having participated in at least one training activity related to forest management or certification), which shows the limitations of the data used in the study. Despite this, decisions on other key actions taken by FMUs vis-à-vis certification (such as becoming and remaining certified, and losing certification), are clearly mapped through time.

A small fraction (5%) of the area sampled has been certified for over 10 years; 67% between 5 and 10 years, 11% for less than 5 years, and 17% was certified for less than a year between 1994 and 2013 (Zerbini 2014). Thus, most certificates were issued between 2004 and 2009. In 2012, 47% of native certified wood was exported to countries in Europe and Japan, with only 10% remaining in the domestic market (south and southeast regions). Regional and local markets located near the Amazon region accounted for 4% and 29% of this production, respectively (Zerbini 2014).

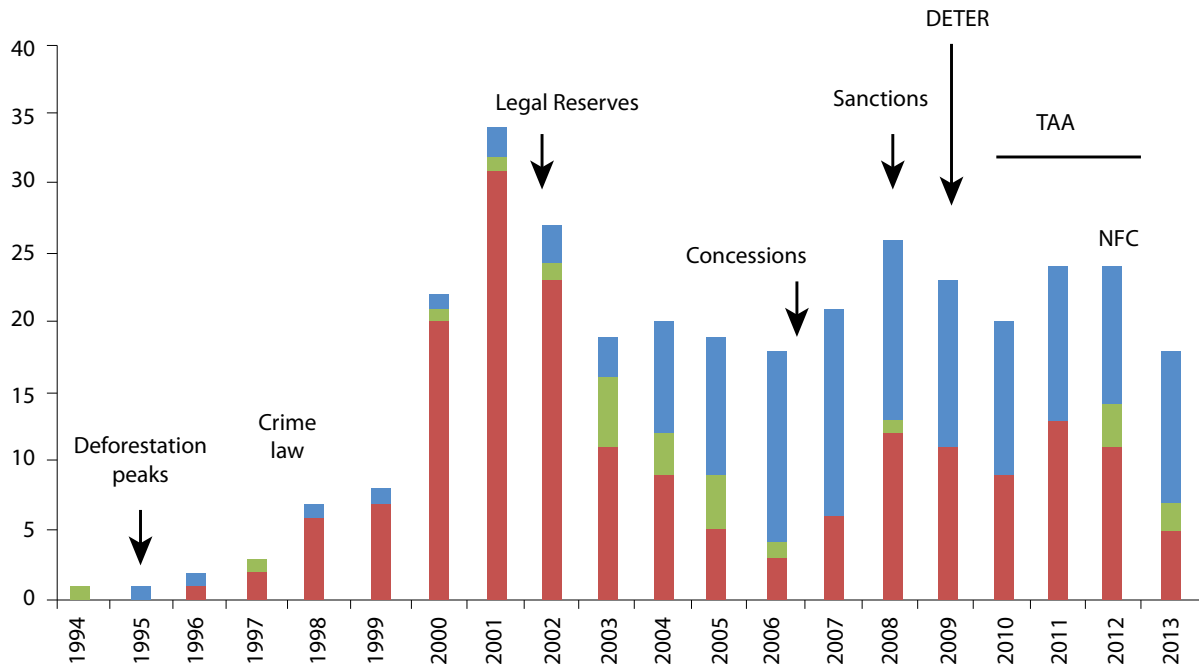
2001 saw an increase in the interest of management units in certification, possibly as a result of IFT training. However, some of this enthusiasm may have dwindled by 2004 and

2005, when a large majority of FMUs either lost interest in certification or remained undecided. The same trend is apparent between 2007 and 2009, until 2010 when there was a surge in movement towards certification. This sudden increase might be attributable to the delayed impacts of federal and state forests concessions (e.g. Amata and Sakura concession units; SFB 2014). Federal and state laws on forest concessions in Brazil include bonuses and other benefits for FMUs that obtain international certification in forest management. However, in spite of these incentives, not all FMUs have shown interest or sought certification. A 2013 increase in the number of certified FMUs could be the result of the TAA program, which provided direct support for managers interested in pursuing certification. Throughout the period, the dominant decision among certified FMUs was to remain certified.

Certification decisions need to be understood within the context of continuous changes in timber harvesting practices and preferences, and overall forest governance in the region, including the influence of international initiatives. These observations can be translated into working hypotheses, and used to guide the field-based empirical evaluation of FSC impacts. The discussion below attempts to highlight some of the proposed linkages (Figure 3.14).

Greenpeace has launched numerous campaigns calling for a halt to the illegal exploitation of tropical timber. In the nineties, such campaigns damaged Brazil's international image, and drew attention to the nation's logging crisis. Greenpeace campaigns have generated wide coverage of illegal timber harvesting in Brazil (see Greenpeace 2010), although their ability to reach consumers in the internal market has been limited (personal communication from D Santos, 2015). Recent emphasis on land use change, through REDD+ commitments and workplan formulation, has also played a role in forest management decisions. Logging has significantly declined in the Brazilian Amazon in recent years. While 24.46 million m<sup>3</sup> of roundwood was extracted in 2004 (Lentini et al. 2005), in 2010 this dropped to 11.629 million m<sup>3</sup> (SFB 2010; Silva et al. 2013), increasing slightly to 12.89 million m<sup>3</sup> in 2012 (SFB 2012).

According to Lima and Munk (this volume), a range of policies, activities and legal frameworks



**Figure 3.14. Events that might have influenced decisions made by firms engaged in the management of natural forests in the Brazilian Amazon over the years.** Some of these are changes in regulations and enforcement by the federal and state government. Other events correspond to the implementation of projects that include training activities and support for the adoption of certification. Red: *Considering Certification*; Green: *Certified*; Blue: *Remain Certified*. TAA: The Amazon Alternative; NFC: New Forest Code; DETER: Real Time Deforestation Detection Program.

(e.g. Crime Law; Law of Concessions) have been implemented to curb unauthorized timber exploitation. Support for improved forest management and certification has repeatedly increased and then dwindled (e.g. Tropical Forest Foundation - TFF; TAA). The dynamic institutional context has shaped and influenced how certification has evolved in the region.

FMUs have faced several problems, including financial difficulties, mainly due to competition from illegally harvested timber. Although the forest concession system, established in 2006, aims to combat unauthorized timber, progress has been limited, and has not affected a wide area. While there are a number of public policies in Brazil to address illegal activity (e.g. NFC, DETER program), these have generally been inefficient, and have been unable to fully prevent forest exploitation without proper legal documentation (e.g. in 2012, 78% of logging in Pará was still unauthorized; Brito and Barreto 2012).

According to data collected for our typology analyses, as well as the scientific literature (Zerbini

2014), many FMUs chose to stop their operations due to the lengthy, bureaucratic permitting process and high transaction costs. Limited take-up of certification, by only a small subset of companies, suggests that this incentive tool might primarily be of interest to FMUs that export timber. However, most of Brazil's tropical timber is sold domestically. In spite of somewhat optimistic predictions for the expansion of certification in Brazil (e.g. some sources predict increases of up to 36%, due to the expansion of certified areas; the certification of new areas; and a reduction in timber declassification; Lentini et al. 2012), unless strong incentives are introduced (e.g. governmental procurement policies, tax breaks), certification will continue to affect only a fraction of FMUs operating in the country. Federal and state government concession areas seem more willing to adopt certification. However, the subsidies provided by the government (Lima and Munk, this volume) often fail to entice companies to adopt the changes required for certification.

Various regulations and forestry-related projects have framed how decisions regarding forest

management are made. Regional dynamics of regulatory enforcement are affected by state campaigns (e.g. *Municípios Verdes*, special operations) and federal initiatives (e.g. Black List of Municipalities) to address issues of illegality. For instance, in 2005, the government commenced Operation Curupira to combat illegal logging operations in Mato Grosso. In 2007, Pará created the Forest Development Institute (IDEFLOR), with the goal of defining state policies for the development of the forest sector, towards a philosophy of sustainable production. To date, this state contains the country's largest area under forest concession regime. Acre implemented its State Forestry Law in December 2001 (Law 1426), and later in 2010 to adopt a law to maintain and restore environmental services (Law 2308/2010). The state of Amazonas has established a foundation to manage its conservation units, which focuses on the eradication of deforestation in forests deemed important for the provision of environmental services.

Other, more recent, initiatives relate to the Rural Environmental Cadaster's (CAR) NFC requirement to register private properties, which facilitates follow-up and monitoring activities by the responsible organizations. The states of Pará and Mato Grosso have made progress with their environmental registries with the support of the Amazon Fund. Furthermore, voluntary, zero-deforestation agreements have recently been marshalled through the soy and the beef moratorium (Nepstad et al. 2014; Arima et al. 2014).

The extent to which other factors (i.e. related to alternative uses of once forested lands) play a role in the adoption of FSC certification requires further study (e.g. agricultural commodity prices in global markets; changes in exchange rates; Nepstad et al. 2014; Assunção et al. 2012). As this study has revealed, the support of external projects, and the provision of complementary funding, have played a role in supporting the adoption of FSC certification. It remains to be seen whether the commitment to responsible management endures.

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### 3.9 Appendix

#### 3.9.1 Typology data collection matrix

Type of characteristic	Attribute
<b>Exogenous to the parent company/FMU</b>	
Economic	Origin of parent company/FMU (country) Origins of capital (country/ies) Vertically integrated (parent company owns milling and other processing facilities: yes/no) Publicly traded (yes/no) Multinational (yes/no)
Political	Institutional regime (e.g., Community, private, public) Legal framework (e.g., New forest code; other influential regulations: yes/no and date) Political cohesion of industry sector
<b>Exogenous to the FMU</b>	
Biophysical	Area (ha) Slope: % area >10, 20 and 30° Previously logged (%) Distance or travel time to point of harbor/mill Deforestation rate at the administrative corresponding level (e.g., District, municipality; km <sup>2</sup> /period of time within the last 10 yrs.)
Social/livelihoods	Local population density in surrounding area (e.g., District; municipality; #/km <sup>2</sup> ) population dynamics (annual rate of change for the last 10 yrs.) Dominant ethnic group(s) in area Recognized resource use and tenure rights of local communities (yes/no) Existing conflicts with communities or other stakeholders (yes/no)
Economic	Origin of FMU (country) Origins of capital (country/ies) Publicly traded (yes/no)
Political	Institutional regime (e.g., Community, private, public) Legal framework (e.g., New forest code; other influential regulations: yes/no and date) Administration regime (e.g., District, state) Type and duration of harvest permit
<b>Endogenous to the FMU</b>	
Biophysical	Annual area logged (ha/yr.) Volume harvested/yr. (m <sup>3</sup> /yr.) Logging intensity (range and mean; m <sup>3</sup> /ha) # Species marketed

Type of characteristic	Attribute
Social/livelihoods	Workers: origin, gender (#, %) Population density within the FMU Population dynamics (annual rate of change for the last 10 yrs)
Economic	Market orientation (principal outlet: europe, north america, asia) Market proportion (% national; % export) Logging subcontracted (yes/no)
Political	Management status (certificate of legality, approved management plan, RIL-certified, no official management status) FMU responsible for providing social services to communities within/around (yes/no)

### 3.9.2 People contacted for Typology and Dynamics studies

Name	Occupation
Denis Conrado	Former Research Assistant at AMAZON
Adalberto Veríssimo	Senior Researcher at AMAZON
Ana Patricia Cota Gomes	Senior Coordinator at IMAFLORA
Luis Fernando Guedes Pinto	Research Manager at IMAFLORA
Luize Bausch	Former CEO of TAA Project
Leonardo Sobral	Forest Manager at IMAFLORA
Marco Lentini	Formerly at IFT, now WWF coordinator of Amazon Program
André Monteiro	Formerly at AMAZON
Fernanda Rodrigues	FSC Brazil
Maureen Voigtlaender	Independent Consultant
Guilherme Rodrigues Lima	Researcher at Universidad Federal do Rio de Janeiro

### 3.9.3 Detailed literature on forest certification in Brazil and FMUs

#### FSC Certification Documents

Public summaries and fsc documents	Year
ACRE BRASIL VERDE INDÚSTRIAL MADEIREIRA LTDA	2005 and 2006
AMATA S/A - Unidade Jamari	2012
Mil Madeireira Itacoatiara Ltda (Precious Woods Amazon)	2006
Mil Madeireira Itacoatiara Ltda (Precious Woods Amazon)	2009
Mil Madeireira Itacoatiara Ltda (Precious Woods Amazon)	2010
Mil Madeireira Itacoatiara Ltda (Precious Woods Amazon)	2008
Mil Madeireira Itacoatiara Ltda (Precious Woods Amazon)	2002, 2003, 2004, 2005
Certification Public Letter Pampa Exportações Ltda.	2012
Certification Public Letter Jari Florestal S.A.	2013
EBATA Produtos Florestais Ltda.	2013
EBATA Produtos Florestais Ltda.	2014
EBATA Produtos Florestais Ltda.	2014
JARI CELULOSE S.A. (Previous name for Jari Florestal S/A)	2008 and 2009
Jari Florestal S/A	2013 and 2014
Jari Florestal S/A	2013
CIKEL BRASIL VERDE S.A.	2006, 2007, 2008 and 2009
JURUÁ FLORESTAL LTDA	2007, 2008 and 2009
Gethal Amazonas S.A.: Indústria de Madeira Compensada	2000, 2001, 2002, and 2003
LN Guerra Indústria e Comércio de Madeiras Ltda.	2012
Madeira Vale do Guaporé Ltda. - MADEVALE	2003, 2004 and 2005
INDÚSTRIA E COMÉRCIO DE MADEIRAS MANOIA LTDA	2005
Mil Madeireira Itacoatiara Ltda (Precious Woods Amazon)	2013
Mil Madeireira Itacoatiara Ltda (Precious Woods Amazon)	2011
Mil Madeireira Itacoatiara Ltda (Precious Woods Amazon)	2012
Mil Madeireira Itacoatiara Ltda (Precious Woods Amazon)	2007
Mil Madeireira Itacoatiara Ltda (Precious Woods Amazon)	2010

Public summaries and fsc documents	Year
Ouro Verde Importação e Exportação Ltda.	2011
ROHDEN INDÚSTRIA LÍGNEA Ltda.	2008
ACRE BRASIL VERDE INDÚSTRIAL MADEIREIRA LTDA (Previous name for Laminados Triunfo Ltda.)	2005 and 2006
RESUMO PÚBLICO DO PLANO DE MANEJO FLORESTAL SUSTENTADO DA RONDOBEL FLORESTAL S/A (company summary)	2012
Madeira Vale Verde Ltda.	2011
MADEIREIRA VALE VERDE LTDA.	2009
Mil Madeira Itacoatiara Ltda (Precious Woods Amazon)	Scope Change 2010
Ecolog Indústria e Comércio Ltda.	2004

### CERFLOR Certification Documents

INDÚSTRIA DE MADEIRAS MANOA LTDA e TRIÂNGULO PISOS E PAINÉIS LTDA	2011
Empresas Certificadas CERFLOR/PEFC	2014

### Other Documents

Title	Author	Institution	Year
Relatório sobre a certificação Skal FM/CoC-020541 na empresa Maracaí Florestal e Industrial Ltda. Mato Grosso/Brasil	Marquesini M	Greenpeace	2002
A atividade madeireira na Amazônia brasileira: produção, receita e mercados	Hummel AC, Alves MV da S, Pereira D, Veríssimo A, & Santos D	Serviço Florestal Brasileiro & Instituto do Homem e Meio Ambiente da Amazônia <sup>a</sup>	2010
Acertando o Alvo 3 – Desvendando o Mercado Brasileiro de Madeira Certificada FSC	Lentini M et al.	IMAFLOA	2012
Fatos Florestais da Amazônia 2003	Lentini M et al.	IMAZON	2003
Acertando o Alvo 2 – Consumo de Madeira amazônica e certificação florestal no Estado de SP	Sobral L et al.	IMAZON	2002
Acertando o Alvo	Esmeraldi R & Veríssimo A	IMAZON and Friends of Earth	1999

a Available at: <http://imazon.org.br/PDFimazon/Portugues/livretos/a-atividade-madeireira-na-amazonia-brasileira.pdf>

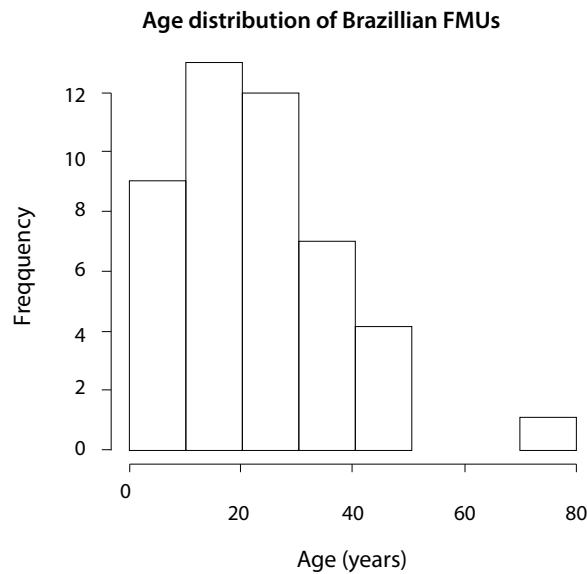
### 3.9.4 EXCEL data collected

Available upon request.

### 3.9.5 Descriptive statistics on FMU variables not included in the typology analyses

1. Age of FMUS (N= 46; for 19 FMUs year of establishment could not be determined)

Range [3–77 years]; mean=23.09 yrs



2. Qualitative variables (N=65)

Variable	YES	%	NO	%
Involved in Illegal Activities	22	33.8	43	66.2
Involved in Conflicts with Different Actors	14	21.9	51	78.1
Provides Services to Local Communities	8	12.3	57	87.7
Existence of Community Agreements <sup>a</sup>	8	12.3	57	87.7

a Logging agreements were made with extractive reserves. Agreements included the creation of job opportunities

3.9.6 Cluster 1<sup>25</sup>

#	Name	Area (ha)	Origin	Outlet	Status	State	Frontier	Polo
5	Amazon Mader (Mader Madeira Entre Rios)	1000	BRA	DOM	NEVER	RO	INT	Porto Velho
8	Stevanelli Madeiras	1500	BRA	DOM	NEVER	RO	INT	Porto Velho
11	Mavil Madeiras Vitória Ltda	3000	BRA	DOM	CONS	PA	OLD	Paragominas
13	Madefat	3000	BRA	DOM	NEVER	PA	OLD	Paragominas
14	Agropecuária Treviso	3200	BRA	DOM	CONS	PA	INT	Santarém
15	Condor Florestas Inds. Mad. Ltda	3250	BRA	DOM	CONS	RO	OLD	Ji-paraná
17	Agroflorestal Vale do Guaporé Ltda. - Madevale	4924	BRA	DOM	LOST	RO	OLD	Alta Floresta do Oeste
19	Samal Verde Produtos e Serviços Florestais	8000	BRA	DOM	NEVER	PA	INT	Santarém
20	Madeira Zimbur	8500	BRA	DOM	CONS	RO	OLD	Ariquemes
22	Laminados Catedral	11800	BRA	DOM	CONS	AC	INT	Rio Branco
23	Galletti Compensados Ltda.	12000	BRA	EXP	CONS	PA	OLD	Breu Branco
27	Alex Madeiras	17000	BRA	DOM	CONS	RO	INT	Cujubim
28	Maracai Florestal e Industrial Ltda.	17000	BRA	EXP	LOST	MT	OLD	Sinop
36	Ebata Produtos Florestais Ltda	30063	BRA	EXP	FSC	PA	OLD	Belém
40	Estância Alecrim	42000	BRA	EXP	NEVER	PA	INT	Santarém
49	Verde Brasil Madeiras LTDA	75000	BRA	DOM	CONS	RO	OLD	Ji-paraná
53	FRM Brasil - Florestal Recursos Manejo Brasil	85417	BRA	DOM	CONS	PA	INT	Santarém
55	Madeflona Industrial Madeira Ltda.	87000	BRA	DOM	CONS	RO	OLD	Alto Paraíso

25 Abbreviations for all appendices. OUTLET: DOM: Domestic; EXP: Export; BOTH: both markets. ORIGIN: BRA: Brazil; FOR: Foreign. STATUS: CONS: Considering certification; FRONTIER: EST: estuarine; INT: intermediate. STATE: RO: Rondônia; PA: Pará; AC: Acre; AM: Amazonas; RR: Roraima; MT: Mato Grosso.

## 3.9.7 Cluster 2

#	Name	Area (ha)	Outlet	Status	State	Frontier	Polo
1	Magiza Indústria, Comércio e Exportação Ltda - ME	399	BOTH	CONS	PA	INT	Uruará
2	Semadal Serraria e Madeira de Lei LTDA	471	BOTH	NEVER	PA	OLD	Paragominas
3	Rosa Madeireira	500	BOTH	NEVER	PA	OLD	Paragominas
4	DuNorte	600	BOTH	NEVER	PA	OLD	Paragominas
6	A.F.G. Oliveira	1000	BOTH	NEVER	AC	INT	Rio Branco
7	Dalsam Madeiras LTDA.	1200	BOTH	CONS	PA	OLD	Paragominas
9	Madevi	1600	BOTH	NEVER	PA	INT	Santarém
10	Promap Produtos de Madeira do Pará LTDA	2497	BOTH	NEVER	PA	OLD	Belém
12	Almeirim Industrial Ltda - GRUPO ROSA FLORESTAL AGROPECUÁRIO	3000	BOTH	CONS	PA	INT	Almeirim
16	Madeireira Litorânea (bellow to Madeflona)	4000	BOTH	CONS	RO	OLD	Ariquemes
18	Laminados Triunfo Ltda.	7498	BOTH	LOST	AC	INT	Rio Branco
24	Empa - Exportadora de Madeiras do Pará LTDA	12000	BOTH	LOST	PA	EST	Afuá?
26	Cemex-Comercial Madeiras Exportação S/A	13000	BOTH	CONS	PA	INT	Santarém
30	Triângulo Madeiras	18021	BOTH	LOST	AC	INT	Rio Branco
31	Golf Indústria, Comércio e Exportação de Madeiras Ltda	18792	BOTH	FSC	PA	INT	Santarém
32	IBL - Izabel Madeiras do Brasil	20000	BOTH	LOST	PA	OLD	Breu Branco
33	Ecolog Indústria e Comércio Ltda.	22132	BOTH	FSC	RO	INT	Porto Velho
34	Juruá Florestal Ltda	25000	BOTH	FSC	PA	OLD	Belém
35	Rohden Indústria Lignea Ltda.	25100	BOTH	LOST	MT	INT	Juruena
37	Sakura Indústria e Comércio de Madeiras LTDA	32900	BOTH	CONS	RO	INT	Cujubim
38	Rondobel Indústria e Comércio de Madeiras Ltda.	35000	BOTH	LOST	PA	INT	Santarém
42	LN Guerra Indústria e Comércio de Madeiras Ltda.	45567	BOTH	FSC	PA	OLD	Belém
43	Floresta Estadual do Antimary	47064	BOTH	FSC	AC	INT	Rio Branco

#	Name	Area (ha)	Outlet	Status	State	Frontier	Polo
44	Amata S/A. - Unidade Florestal Jamari	50044	BOTH	FSC	RO	OLD	Alto Paraíso
45	Semasa- Serraria Marajoara Indústria Comércio e Exportação de Madeiras LTDA	55630	BOTH	CONS	PA	OLD	Santarém
46	Tecanorte Emp. Florestais Ltda	60321	BOTH	CONS	MT	OLD	Sinop
25	Camargo Metais S.A.	12000	DOM	CONS	PA	OLD	Breu Branco
29	Madeira Vale Verde Ltda	17205.4	EXP	LOST	RR	INT	Boa Vista
39	Gethal Amazonas S.A.	40800	EXP	LOST	AM	INT	Itacoatiara
41	Globe Metais Indústria e Comércio S.A	45000	DOM	CONS	PA	OLD	Breu Branco
54	Amazônia Florestal Ltda.	85417.91	BOTH	CONS	PA	INT	Itaituba
57	Indústria e Comércio de Madeiras Trimaio Ltda	97000	BOTH	CONS	RO	OLD	Ariquemes
58	DALPAI S/A Indut. E Comercio	99431	BOTH	CONS	PA	INT	Santarém
59	Brascomp Compensados do Brasil S/A	125000	BOTH	CONS	PA	OLD	Belém
64	Cikel Brasil Verde S.A.	304658	BOTH	FSC	PA	OLD	Paragominas



## 3.9.8 Clusters 3 and 4

#	Name	Area (ha)	Origin	Outlet	Status	State	Frontier	Polo
21	Lawton Mad. LTDA	10000	FOR	EXP	CONS	PA	EST	Breves
25	Camargo Metais S.A.	12000	FOR	DOM	CONS	PA	OLD	Breu Branco
29	Madeira Vale Verde Ltda	17205.4	FOR	EXP	LOST	RR	INT	Boa Vista
39	Gethal Amazonas S.A.	40800	FOR	EXP	LOST	AM	INT	Itacoatiara
41	Globe Metais Indústria e Comércio S.A	45000	FOR	DOM	CONS	PA	OLD	Breu Branco
51	Amazônia Compensados e Laminados, S.A (AMCOL)	76844	FOR	EXP	LOST	PA	OLD	Belém
56	Eidai do Brasil Madeiras S/A	91000	FOR	EXP	CONS	PA	OLD	Belém
60	Mil Madeiras Preciosas Ltda.	166030	FOR	BOTH	FSC	AM	INT	Itacoatiara
61	Batista & Cia Ltda (Batisflor Florestal Ltda)	190000	BRA	EXP	CONS	RO	OLD	Vilhena
62	Madenorte – PA	200000	BRA	EXP	CONS	PA	EST	Breves
63	Coimal-Comércio e Ind. de Madeiras Ltda	274269	BRA	EXP	CONS	MT	OLD	Sinop
65**	Jari Florestal S.A.	793299	FOR	BOTH	FSC	PA	OLD	Almeirim

\*\* Cluster 4

### 3.9.9 FSC certified natural forest management operations

Certificate Code	Organization Name	1st date	Area	City	State
RA-FM/COC-006169	Amata S/A. - Unidade Florestal Jamari	30/11/2012	50044	Itapuã do Oeste	RO
RA-FM/COC-005147	CKBV Florestal Ltda. - Unidade Rio Capim	01/09/2006	199168	Paragominas	PA
RA-FM/COC-006333	Ebata Produtos Florestais Ltda	16/08/2013	30063	Oriximiná	PA
SW-FM/COC-001196	Ecolog Indústria e Comércio Ltda.	12/04/2004	22132	Vista Alegre Abunã	RO
SW-FM/COC-001670	Floresta Estadual do Antimary	21/10/2005	47064	Rio Branco	AC
RA-FM/COC-006313	Florestal Santa Maria S/A.	07/03/2013	71714	Colniza	MT
RA-FM/COC-006564	Golf Indústria, Comércio e Exportação de Madeiras Ltda	16/08/2013	18792	Oriximiná	PA
SW-FM/COC-001732	Indústria de Madeiras Manoa Ltda.	30/12/2005	65078	Cujubim	RO
SCS-FM/COC-00075N	Jari Florestal S.A.	07/12/2004	793299	Monte Dourado	PA
SCS-FM/COC-00045N	Juruá Florestal Ltda.	12/06/2002	9407	Ananindeua	PA
RA-FM/COC-006091	LN Guerra Indústria e Comércio de Madeiras Ltda.	01/10/2012	45567	Belém	PA
RA-FM/COC-000019	Mil Madeiras Preciosas Ltda.	01/06/1997	166030	Itacoatiara	AM

### 3.9.10 Terminated FSC natural forest management certificates

Certificate Code	Organization Name	1st date	Area	City	State
SW-FM/COC-284	Agroflorestal Vale do Guaporé Ltda. - Madevale	15/09/2003	4924,00	Alta Floresta D'Oeste	RO
SCS-FM/COC-00061N	EMAPA - Exportadora de Madeiras do Para LTDA	11/09/2003	12000	Afuáá	PA
SW-FM/COC-119	Gethal Amazonas S.A.	01/10/2000	40800	Itacoatiara	AM
SGS-FM/COC-1472	Guavira Agroflorestal e Indústria Ltda.	25/08/2003	80000	Rio Claro	MT
SCS-FM/COC-00068N	IBL - Izabel Madeiras do Brasil	29/03/2004	20000	Breu Branco	PA
SW-FM/COC-001586	Laminados Triunfo Ltda.	26/07/2005	7498,00	Rio Branco	AC
GFA-FM/COC-001250	Madeireira Vale Verde Ltda	18/01/2008	17205,40	Boa Vista	RR
SKAL-FM/COC-020541	Maracai Florestal e Indústria Ltda.	01/01/2002	17000	Sinop	MT
SW-FM/COC-002130	Ouro Verde Importação e Exportação Ltda.	28/12/2006	75000	Rio Branco	AC
SW-FM/COC-182	Precious Woods Belém Ltda.	01/03/2002	43776,00	Icoaraci	PA
SCS-FM/COC-00063N	Rohden Indústria Lígnea Ltda.	11/10/2003	25100,00	Juruema	MT
RA-FM/COC-005959	Rondobel Indústria e Comércio de Madeiras Ltda.	05/06/2012	7386,00	Santarém	PA

# 4 Assessment of self-selection into natural forest management certification in the Brazilian Amazon

Maureen Voigtlaender

## 4.1 Introduction

The Brazilian Amazon contains 325.5 million ha of natural forest, of which 92% is public, with *de jure* tenure rights held by the federal or state governments (SFB 2013). Of this, 282 million ha are in State and Federal PAs, including National (FLONA) and State (FLOTA) Forests designated for multiple use management including timber production. However, historically, most logging in the Amazon occurred on private lands or on undesignated public lands.

Until the mid-1960s, the Amazon territories belonged primarily to the federal government and the states. Of the total registered land in 1960, 87% was covered in forests, including areas exploited by thousands of *mestiços* and riverside inhabitants for plant and animal extraction; 11% was natural pastures used for grazing cattle, and only 2% was in crop production (with only half of this area with private property titles; IBGE 1960).

The post-1964 military government offered tax incentives to big businesses and national and international economic groups wanting to invest in the region. These tax incentives allowed large companies, engaged in a range of productive activities (e.g. cattle, timber, mining), to put some, or all, of their income tax towards establishing new companies in the region.

In order to legalize the acquisition of fraudulently demarcated or purchased land (i.e. purchasing land that belongs to the government or a private owner, or by using false documentation), often through the use of these subsidies, the federal government regularized tenure by means of Provisional Measures (005 and 006, 06/06/1976). Legal instruments to legalize unlawfully occupied land

were introduced, which promoted the expulsion of former residents (Loureiro and Pinto 2005).

While the rate of forest destruction, and the agents involved, have varied over the years, loggers have played an increasingly important role. In the 1970s, loggers typically harvested timber from large ranches that were converting forest to pasture. Since the 1980s, loggers have played a more active role in advancing the deforestation frontier in various parts of Amazonia, including through the construction of logging roads to harvest wood from remote areas.

Between 1970 and 1980, public lands, which had been inhabited by settlers, natives, Indians and *mestiços* for centuries, were offered for sale to new investors, who acquired the land directly from government agencies or private 'landowners' (in fact, many of the individuals who sold lots did not own the land but were instead just 'selling' public land, and even when privately held land was sold, the new owners often laid claim to a larger area than they were entitled to). By 1970, land grabbing had become common practice. Due to the implementation of neoliberal policies in the 1990s, and the consequent restriction of land agency budgets, the government has invested very little in the clarification of land tenure. As a result, it has become ever more difficult to distinguish public from private land (Loureiro and Pinto 2005).

The opening of the Amazon region caused logging to become more closely related with the advance of the agricultural frontier. In the early 1990s, 85% of the wood used in the timber industry in the Santarém region in Western Pará originated from newly opened and occupied upland areas (Ros-Tonen 1993 cited in Ros-Tonen 2007). There is also a strong relationship between colonization and

logging, as evidenced by the emergence of *polos madeireiros* in new frontiers in Novo Progresso in Western Pará, and a decline in production in the former border areas of Southern and Eastern Pará, where forest resources were increasingly being degraded and over-exploited (Ros-Tonen 2007). Thus, logging has been emphasized as the primary driver of deforestation (Marquesini and Edwards 2001), in spite of recent evidence highlighting the role of other factors (e.g. Fearnside 2006; Nepstad et al. 2014; Arima et al. 2014). It is clear that certification, once proposed as a market mechanism to support sustainable forest management (Ros -Tonen 2007), is unable to solve the problem of illegal logging, nor is that its primary goal (Freris and Laschefski 2001; Ribeiro 2008). Land tenure problems remain, and the recent CAR and regional planning efforts should help to move this issue forward (Carneiro 2007; Remor 2009; Loureiro 2012; Lentini et al. 2012; Lima and Munk, this volume).

Lentini et al. (2012) determine, based on data from 2009, that the production of certified timber could increase by up to 134,000 m<sup>3</sup> (from 596,000 to 730,000 m<sup>3</sup>). In the same study, the authors found that companies not yet certified, but with the potential to become certified, could increase the total certified area by 36%. This could supply the market with an additional 316,000 m<sup>3</sup> of certified timber (Lentini et al. 2012; Papp and Vidal, this volume).

However, timber production has decreased in recent years. Oscillation in volume can be attributed to several related factors, most notably instability in demand, and the difficulty of obtaining permission for the legal harvest and sale of timber (Zerbini 2014; Papp and Vidal, this volume). The need to reduce the increasing proportion of certified timber sold as non-certified timber (i.e. declassified; 28% in 2011, 50% in 2013; Lentini et al. 2012; Zerbini 2014) also remains a challenge beyond the control of timber producers.

In spite of widespread illegality (Lima and Munk; Papp and Vidal this volume), there are high expectations for increased sustainable forest management and legal timber production in Public Forest lands through concessions (Lentini et al. 2012). Through the forest concession policy, the federal, state, and local governments can better

manage their forests in order to combat land grabbing, avoid predatory exploitation of existing resources, and prevent the conversion of forested lands for other purposes (e.g. livestock and agriculture). Under the forest concession policy, private and public parties establish an agreement that guides the government's relationship with those companies that obtain rights and responsibilities over forested areas. The concession regime is a mechanism to promote a sustainable, economic forest management model that considers costs and benefits in the long-term. As such, Drigo (2010) and Carneiro (2011) suggest that the forest concession regime and certification share an analogous principle, and encourage companies to make responsible management commitments. The first concessionaire to obtain FSC certification (AMATA) manages 50,000 of the 225,000 ha of the Jamari National Forest in Rondônia (Zerbini 2014).

This study explores the motivations of FMU managers and parent companies operating in natural forests, for seeking and maintaining forest management certification. It aims to determine the reasons behind the certification-related decisions identified by Papp and Vidal (this volume). Our goal is to determine the observable characteristics that distinguish companies that have been certified, from those that have not obtained FSC certification. Additionally, we want to gain insight into the factors that might make a company more likely to have an 'interest' in certification, to obtain certification, and to retain their certificate. These stages reflect the various steps along the *certification continuum*, which include: *Never Certified*, *Considering Certification*, *Certified*, and *Certification Lost* (Papp and Vidal, this volume, Figure 3.5 and Table 3.6). The information for the analyses was obtained through 10 semi-structured interviews with key informants who had been involved in certification in the 2000s, and with staff from companies at different stages of the certification continuum (Appendix I), as well as from a review of relevant documentation and scientific literature.

## 4.2 Methods

A combination of strategies was employed to understand the motivations for pursuing certification. In all cases, the period of analysis was

between 1993 and 2014, with a focus on 2004–2009 when 46% of certificates were issued.

Activities included:

1. A review of the English and Portuguese literature, including scientific publications and research reports on natural forest management certification.
  - Keywords for the search were:
    - [certificação florestal|forestry certification] or [FSC] or [CERFLOR]
    - [floresta nativa|natural forest] and [Amazônia|Amazon] and [Brasil|Brazil] and [manejo florestal sustentável|sustainable forest management].
  - A keyword search was conducted using the Web of Science (accessed through CAPES - Coordenação de Aperfeiçoamento de Pessoal de Nível Superior and Scielo - <http://www.scielo.br>) databases, to locate both national and international journal reports and publications. The following databases were also used to search for relevant theses and dissertations:
    - The CAPES Bank of Theses and Dissertations ([www.periodicos.capes.gov.br](http://www.periodicos.capes.gov.br))
    - The IBICT Database of Dissertations and Theses (<http://www.ibict.br>)
    - UNICAMP digital library (<http://www.bibliotecadigital.unicamp.br>).
  - The materials identified through this search were reviewed for information on topics including the evolution of certification in the Amazon; adoption of certification, motivation for certification, and the characteristics of the companies that have sought certification; bottlenecks and other barriers to certification, factors that discourage certification, and the stagnation of the certification of natural forest; impacts of certification and ways to amplify those impacts; demand for certified products and factors that discourage expansion of the market; and tools for certification.
2. Semi-structured interviews were conducted with two types of respondents:
  - Key informants from different sectors (i.e. consultants and NGO representatives) engaged in the forest certification process since FSC's establishment in 1993 to

the present. These key informants were identified based on our knowledge of the Amazon timber sector and FSC certification in Brazil and through informal snowball sampling. (Appendix II). A total of six key informants were interviewed.

- Representatives of companies located in 10 of the 22 polos madeireiros (Lentini et al. 2003; Papp and Vidal, this volume; Appendix III) included in the associated studies for the design of an empirical evaluation of FSC impacts (Romero et al. 2013). This subsample of 10 *polos madeireiros* was selected because it contained: (a) at least one company that was currently certified for natural forest management or had either terminated or suspended certification status; and (b) non-certified companies whose staff attended courses between 1997 and 2014 offered by TAA and/or IFT26. Training activities included building capacity in forest management practices, including RIL. Following Papp and Vidal (this volume), we used participation in these courses as an indicator of interest in forest certification, and as a means of categorizing FMUs as *Considering Certification* (Figure 3.6). However, as Papp and Vidal note, some companies sent their staff for training only *after* becoming certified. This calls into question the use of participation in training as a proxy for active interest in certification. Nonetheless, this was still judged to be the best observable indicator of interest in certification, prior to any interactions with FSC auditors.

Following these criteria, the selected *polos madeireiros* were: (1) Alta Floresta do Oeste (RO), (2) Alto Paraíso (RO), (3) Belém (PA), (4) Breu Branco (PA), (5) Cujubim (RO), (6) Paragominas (PA), (7) Porto Velho (RO), (8) Rio Branco (AC), (9) Santarém (PA) and (10) Sinop (MT). Within each *polos madeireiros*, companies in the *Certified* and *Certification Lost* categories were identified using FSC and IMAFLORA records. Companies that were at the *Considering Certification* stage were

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26 The goal of the Tropical Forest Institute is to promote good forest management practices in the Amazon, to contribute to the conservation of natural resources and to improve the population's quality of life (IFT 2014).

identified using TAA and IFT records. Due to the lack of a sampling frame, interviews were not conducted with companies with no demonstrated interest in certification. This procedure resulted in a potential sample of 49 companies in the 10 selected *polos madeireiros*. We succeeded in contacting representatives from all of these companies between July and August 2014.

The largest number of companies was found in the Paragominas *polo madeireiro* (ten companies), followed by Rio Branco (nine companies), and Belém and Santarém (six companies each). The remaining *polos madeireiros* (Porto Velho, Breu Branco, Cujubim, Sinop, Alta Floresta, and Alto Paraíso do Oeste) had fewer than five companies each (Appendix IV). Contact was made with these companies by phone and email, using contact information available on the FSC website and in TAA and IFT records. If contact could not be established, assistance was sought from regional timber processing associations (i.e. SINDUSMAD, SINDUSCON and SINDISERPA).

Among the 49 selected companies, nine are certified, six lost certification (i.e. they did not renew their certification before the deadline), one is suspended (for not having presented evidence to prove that substantial irregularities identified in the 2011 monitoring audit have been addressed), and 33 have considered certification (i.e. staff had attended IFT/TAA training). From contact with industry associations, it was determined that 12 (36%) of the 33 companies that had considered certification had ceased operations, and 2 (6%) were no longer engaged in the management or logging of natural forest (e.g. the company still exists but is engaged in the management of planted forests). No contact information was found for 8 of the companies (24%), suggesting that they were no longer active in the management or logging of forests (at least not legally). Only 11 (34%) companies were classified as active. Thus, two-thirds of the companies that had sent staff to IFT or TAA courses were no longer engaged in natural forest management and logging. As a result, we only made contact with staff from 25 (51%) of the 49 companies (i.e. 16 *Certified*, *Certification Lost* or *Suspended* and nine *Considering Certification*). Initial contact with the 25 companies was made via email, phone and/or Skype to discuss the questionnaire (see

Appendix V), but only four companies answered the questionnaire.

The final sample consisted of six key informants (four consultants and two NGO representatives) who had participated in certification at some point, and four company representatives (three from *Certified* companies and one from a company *Considering Certification*; Appendix VI). Each participant responded to a questionnaire that focused on: (i) characteristics of companies or FMUs that would never consider certification, might consider certification, and would definitely seek certification (considering 11 factors); (ii) advantages and disadvantages of certification (again, considering 11 factors); and (iii) recommendations for how to promote certification (open-ended question eliciting the respondents' views on the three most important actions). The answers to each question were classified based on how often they were mentioned by respondents (stratified by the type of respondent: consultant, NGO member, and company) and grouped into themes related to the content of the survey (e.g. characteristics of a company that would never certify its operations, advantages of certification, stimulus to increase certified areas).

All of the companies identified as *Considering Certification*, *Seeking Certification*, *Certified*, or with *Certification Suspended* (Appendix IV) had at some point during the study period participated in training courses offered by IFT or TAA. FSC in Brazil does not require training courses as a prerequisite to certification. The training needs were detected using a pre-certification assessment, paid for by TAA, which, using these results, subsequently implemented an action plan with specific deadlines and costs. The first companies in our sample obtained certification in 2002.

### 4.3 Results

Out of the 49 companies identified in the ten selected *polos madeireiros*, there are 13 certified companies, 11 companies that have lost certification, and 1 company with a suspended certificate. The termination of one of the certificates was on account of a formal complaint filed by Greenpeace in 2002 involving the Dutch certifying body SKAL (Papp and Vidal, this volume).

FSC terminated other certifications in later years (e.g. 2007, 2008, 2009, 2011, and 2013). Only one of these companies reported that they had ceased their involvement in the active management of natural forests, but did not specify the reasons. The only company that remained suspended in 2012 had failed to present evidence of compliance, following the identification of irregularities during a monitoring audit in 2011 (i.e. the problems identified were considered significant non-conformities, and as these remained unresolved after three months, the company was suspended).

Out of the seven companies with concessions in FLONAs in the Amazon, only two companies had never sought certification. One of the non-certified companies manages the 33,000 ha forest concession FMU II Flona Jamari (RO). In March 2014, the operation of this concession was suspended due to a breach of contract terms (i.e. the company did not pay the minimum annual timber fee to the government). Another concession manages FMU I in FLONA Jamari (RO), covering approximately 17,000 ha. In a phone interview, the manager of this FMU suggested that the company had never sought certification because compliance with the requirements of forest concessions already “guarantees” good forest management (i.e. in order to obtain a forest concession, FMUs must demonstrate compliance with various legal requirements).

Two companies are currently undergoing a public consultation process for FSC certification, one of which sent staff for training with IFT or TAA in 2007–2008. The other company was certified in 2005, but had since then lost its certification. Neither of these companies has been awarded concessions in national forests.

#### 4.3.1 Main reasons for pursuit of forest certification

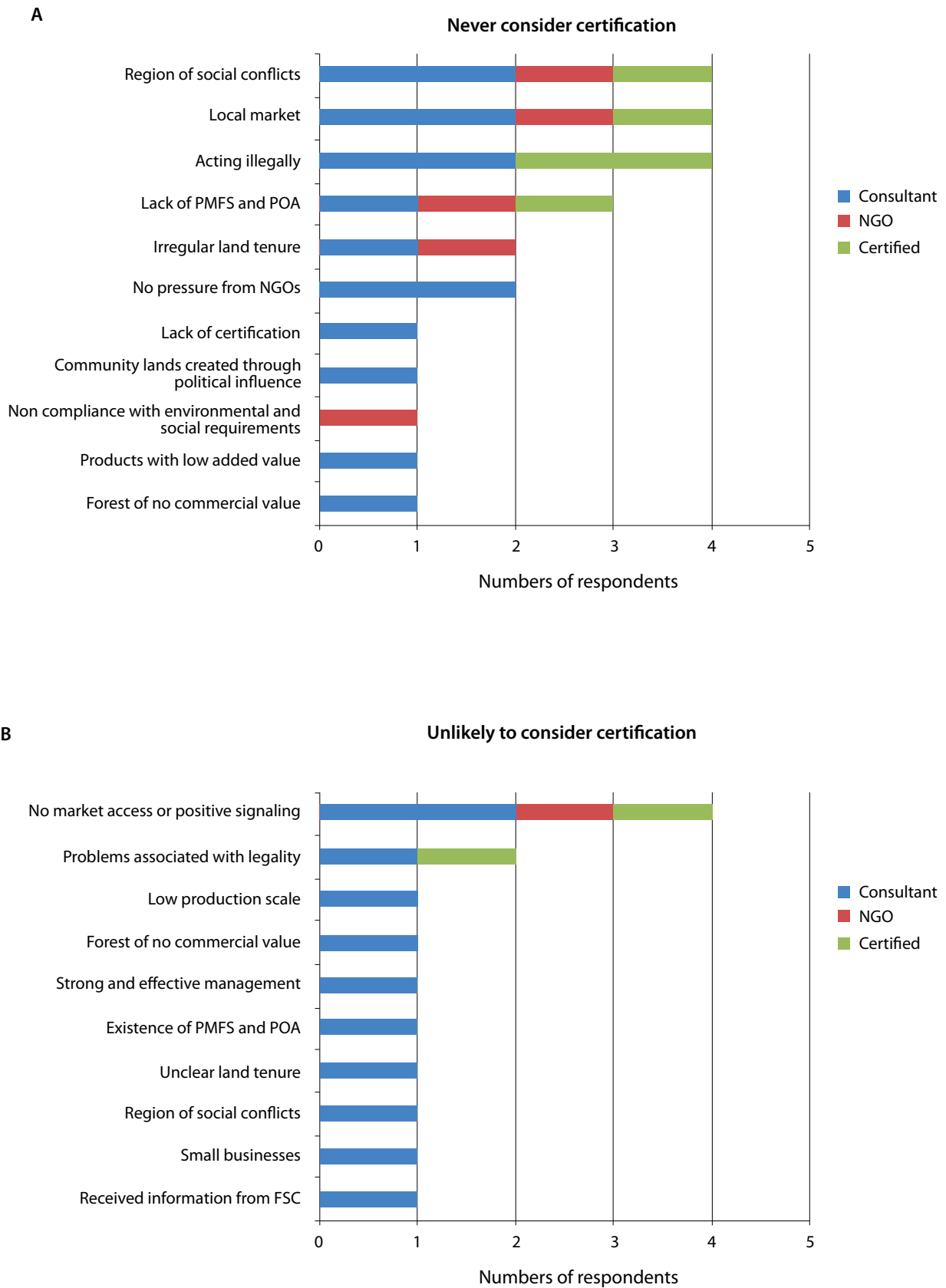
During the interviews, respondents were asked to characterize companies likely to certify, and companies not likely to certify, their forest management areas. Figures 4.1A and 4.1B show how different types of respondents characterized companies at different stages along the certification continuum. Each characteristic indicated by the respondents is further explained in Appendix VII. The three types of respondents (i.e. consultant, NGO member, and certified company) agreed on

two key factors that influence the choice of whether to pursue FSC certification: (i) operating in regions with social conflicts, and (ii) selling timber to local markets, both of which, they suggested, were likely to discourage the company from becoming certified.

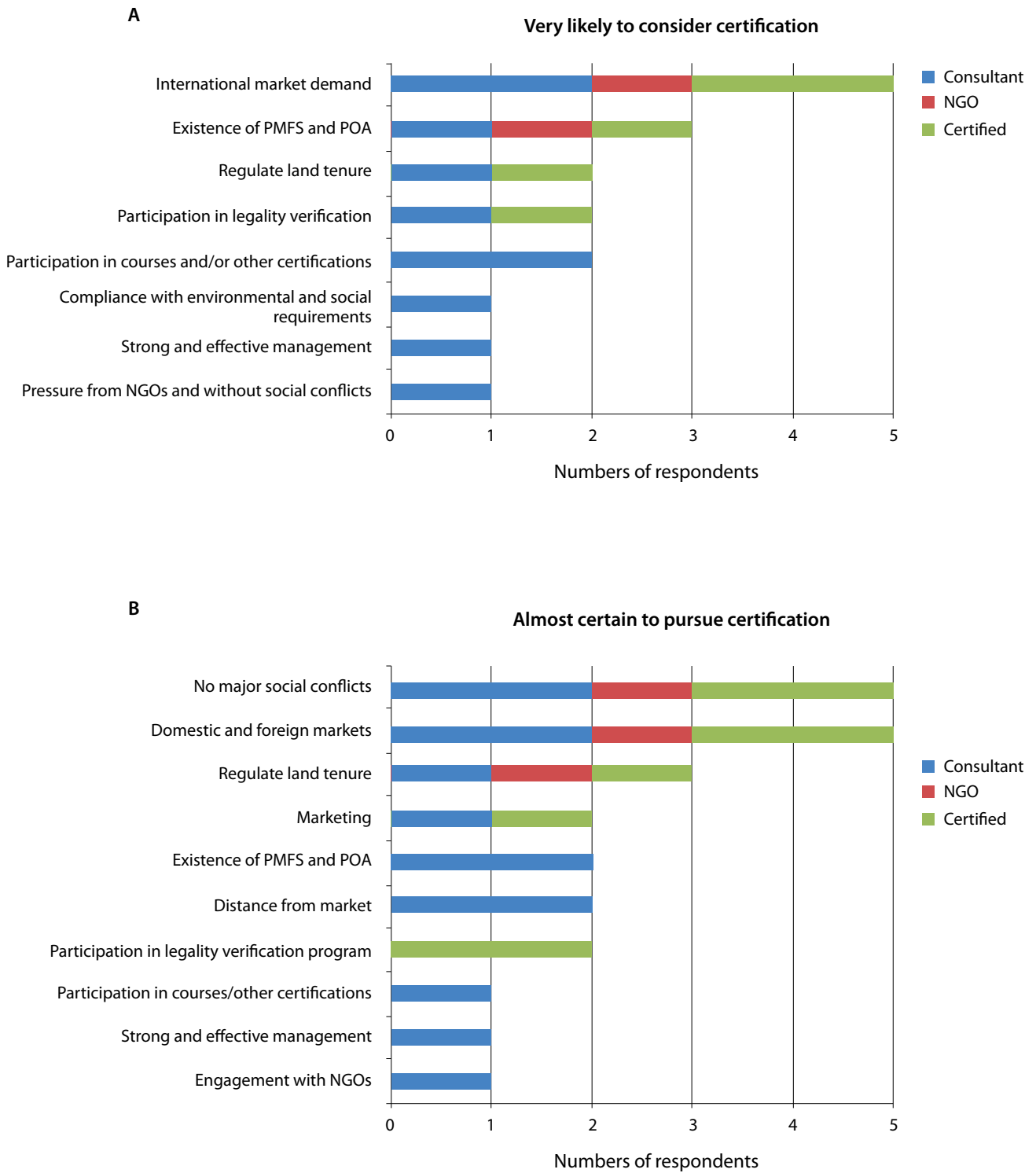
Companies require a PMFS and an Annual Operation Plan (POA: *Plano Operacional Anual*) to operate legally in the Brazilian Amazon. Companies that lack these documents, and therefore operate illegally, are ineligible for certification. The PMFS specifies harvesting methods and actions that are in accordance with ecological, social, and economic management objectives. As such, the PMFS guides timber production to ensure profitability and the full utilization of resources; reduce the impacts of logging and risks to workers; and promote sustainability. The PMFS must fully describe the management system, including: the harvest cycle; production volume; pre-harvest, harvest, and post-harvest activities; environmental impacts; and mitigation measures. Based on this information, the required roads can be planned, and the areas to be harvested each year can be defined. A PMFS is required for any logging beyond the 20% of each property that is allowed to be deforested and converted to other land uses. The document designates a specific Area of Forest Management (AMF), which typically includes up to 80% of the property, but can include more if the owner decides not to deforest the 20% that is permitted. The AMF can be subdivided into annual harvest areas, or UPAs (Unidades de Produção Anual) that the company has the capacity to harvest in one year. For each UPA, the company must present a POA, including the results of a forest inventory to inform the harvest plan (e.g. number of trees, their location and species, and estimated volume of each tree). The PMFS and POA are typically developed by a consulting forester, who is contracted by the company. In the case of operations in federal lands (e.g. PAs, federal Public Forests), these plans are approved by their respective environmental agency (e.g. SEMAS for PA) and/or IBAMA; Greenpeace Brazil 2014).

According to consultants, the prevalence of illegal logging in the region is another factor that reduces rates of certification. The unauthorized exploitation of natural forests is still widespread (e.g. without PMFS and licenses to remove the wood). This illegal timber depresses market





**Figure 4.1. Results of semi-structured interviews depicting the main reasons why a company seeks certification of forest management.** Panel A: Would never consider certification; Panel B: Unlikely to consider certification (N=10).



**Figure 4.2. Main reasons why a company would seek certification in forest management based on semi-structured interviews in Brazil.** Panel A: Very likely to consider certification; B: Almost certain to pursue certification (N=10).

prices, discouraging investment in sustainable production and certification by companies that would like to operate in accordance with legal

requirements. Issues of land tenure (i.e. a lack of land title legalization) and pressure from NGOs (e.g. the 2005 and 2006 demonstrations regarding

biodiversity and other threats of logging of natural forests) were also cited by key informants as factors that deterred certification. Respondents from certified companies did not cite pressure from NGOs as an important factor, possibly as this has reduced recent years (Figure 4.1A).

The three types of respondents indicated that companies currently without a consolidated market for certified products may be slightly more likely to pursue certification if they receive some sort of market signals. The second most often cited characteristic relates to strong competition from illegal logging operations (Figure 4.2B). Respondents suggested that this is a key factor in the decision to seek certification, and it is clear that the majority of companies that harvest timber from the Amazon in a legal and sustainable way (i.e. following all of the environmental rules and the most rigorous environmental and social standards) are at a competitive disadvantage.

Respondents in all three categories agreed that companies with international markets, and with PMFSs and POAs, are strong candidates for certification, but such operations do not produce a significant proportion of the total volume of timber harvested. Consultants believed that participation in training courses (e.g. courses focusing on management, IFT training courses) or other types of certification (CERFLOR or ISO), considerably increase a company's likelihood of becoming certified. Respondents in two of the categories (consultants and certified companies) mentioned clarity of land tenure and participation in programs of legality (e.g. Forest Law Application Initiative in the Amazon - ALFA<sup>27</sup>) as characteristics associated with higher probability of certification (Figure 4.2A).

Most respondents indicated that companies operating in exceptional conditions, such as in regions where there are no social conflicts with local communities, and those that have secure internal and external markets, are most likely to seek certification. Other factors associated with a high likelihood of interest in certification include

clear land tenure (verified and recognized land ownership), and sufficient marketing resources, in order to leverage and publicize their certified status in their marketing to consumers (Figure 4.2B).

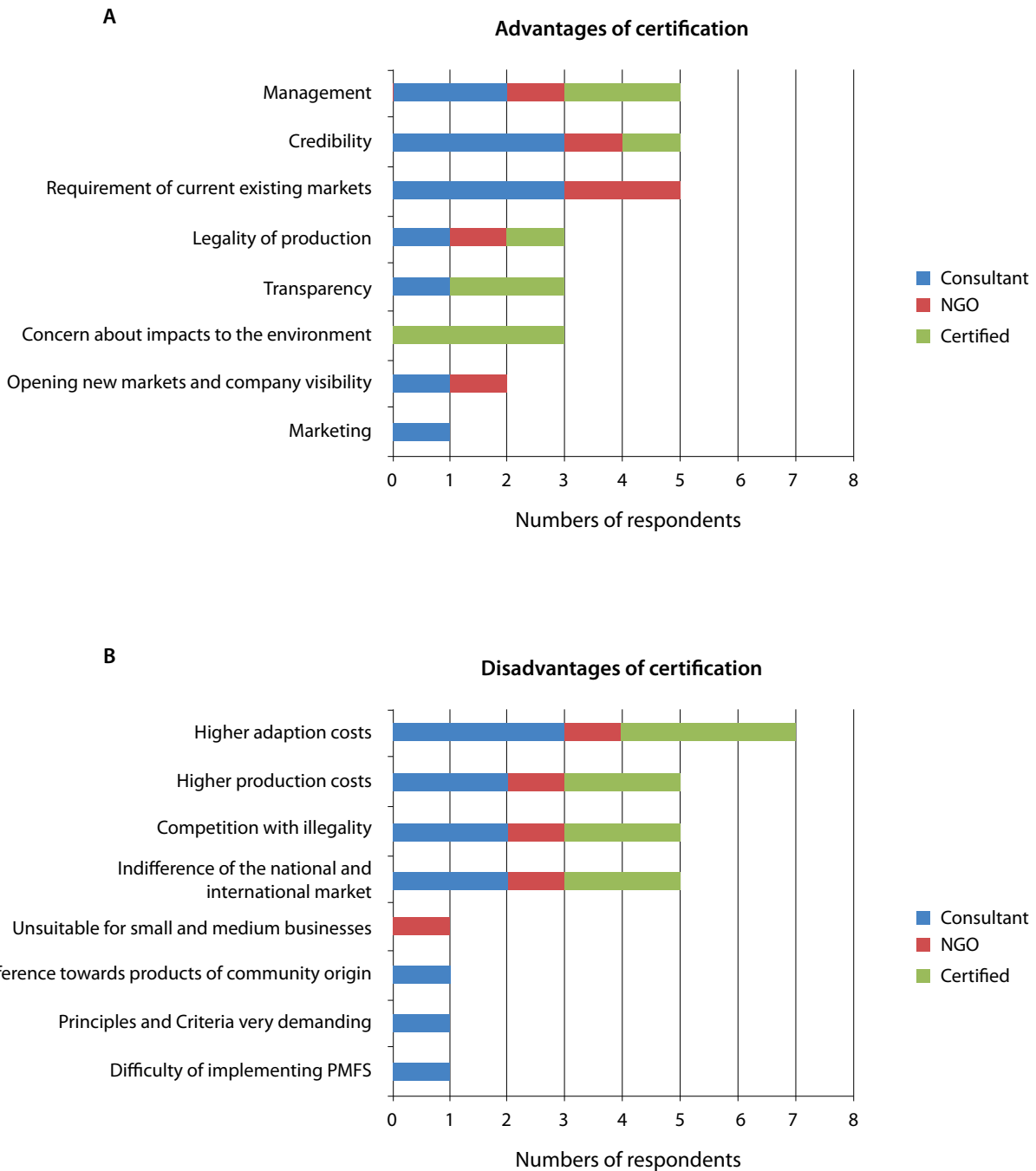
#### 4.3.2 Advantages and disadvantages of forest certification for producers and stimuli for the increase of certified areas

A large number of respondents, including representatives from all three groups, stated that the main advantages of certification are (i) the principles of management (i.e. better control over harvesting operations and planning) and (ii) enhanced credibility (i.e. the company's image in the eyes of stakeholders), especially in the Amazon region, where there is always the suspicion of illegal logging. Both of these factors could help to improve corporate image, and meet the requirements of today's mostly international markets for certified products. The three types of respondents also stated that certification serves to verify and guarantee legality, for example, by establishing the veracity of PMFS and POA documents (Figure 4.3A).

Most respondents felt that the disadvantages of certification include its high compliance costs (e.g. job training, careful advance planning of forest operations, preparation of maps, hiring qualified foresters), as well as the high costs of legal production, including the adoption of low-impact methods (PMFS). Most believe that companies in compliance with environmental regulations cannot compete with wood of unclear origin (Figure 4.3B).

With respect to the stimuli required to increase the number of certified areas, suggestions included: evaluation of the institutional issues that lead to illegality, and greater dissemination and adaptation of Principles and Criteria (P&C) to local realities. But in that respect, FSC has already set a national standard for Brazil's natural forests since 2010. All representatives of certified forest management companies emphasized that significant investment is required to support the promotion of certified wood. One consultant argued that certification can also be stimulated by technical activities focused on the training of managers, especially engineers, to improve the management of the company and the timber resource. The consultant also emphasized that well-structured technical courses help staff

<sup>27</sup> ALFA is an initiative started in 2006 by the member countries of the Amazon Cooperation Treaty Organization, in order to build and implement a regional agenda to increase sustainable development and the application of federal legislation in the Amazon.

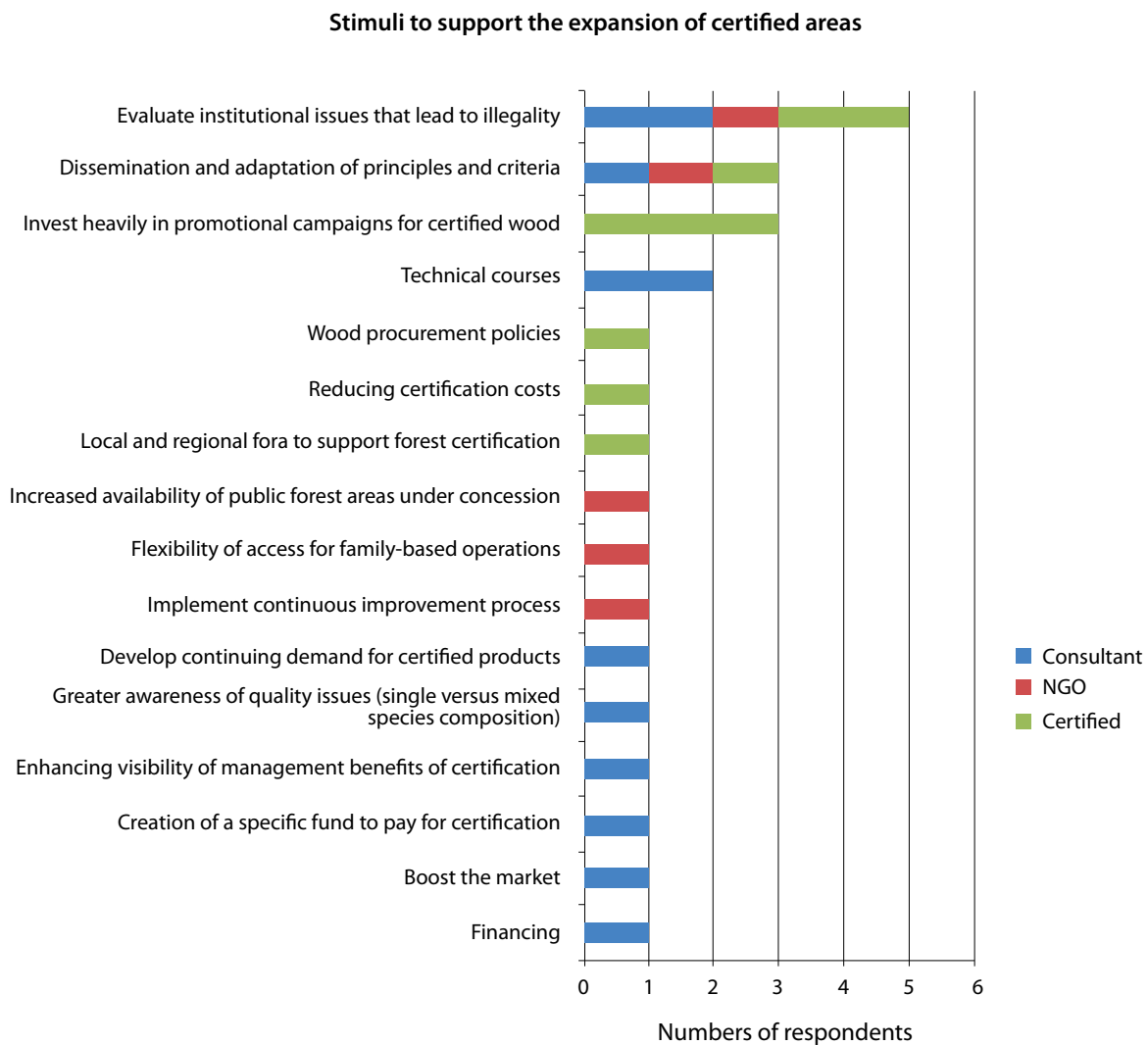


**Figure 4.3. Advantages (Panel A) and disadvantages (Panel B) of certification for companies that manage certified natural forests in Brazil.**

members to understand the importance of good management and recognize opportunities for improvement (Figure 4.4).

The two factors that were deemed to be the most important in encouraging companies to remain certified in the long-term were: the availability of regional, national or international markets and

larger forest areas under long-term management, as the law allows the harvest of a set volume of each species per hectare per year. Respondents also pointed out that distance from market influences investment in certification: companies without easy access to more structured markets are less likely to stay certified (Figure 4.5). Respondents in all categories indicated that a company is more likely



**Figure 4.4 Actions to facilitate and encourage the increase of areas of natural forest management under FSC certification in the Brazilian Amazon.**

to abandon certification after being suspended, or following the expiration of their certificate, if their suspension or termination is due to social conflict or market fragility, given that it is already difficult for these companies to compete with unauthorized and other low cost producers.

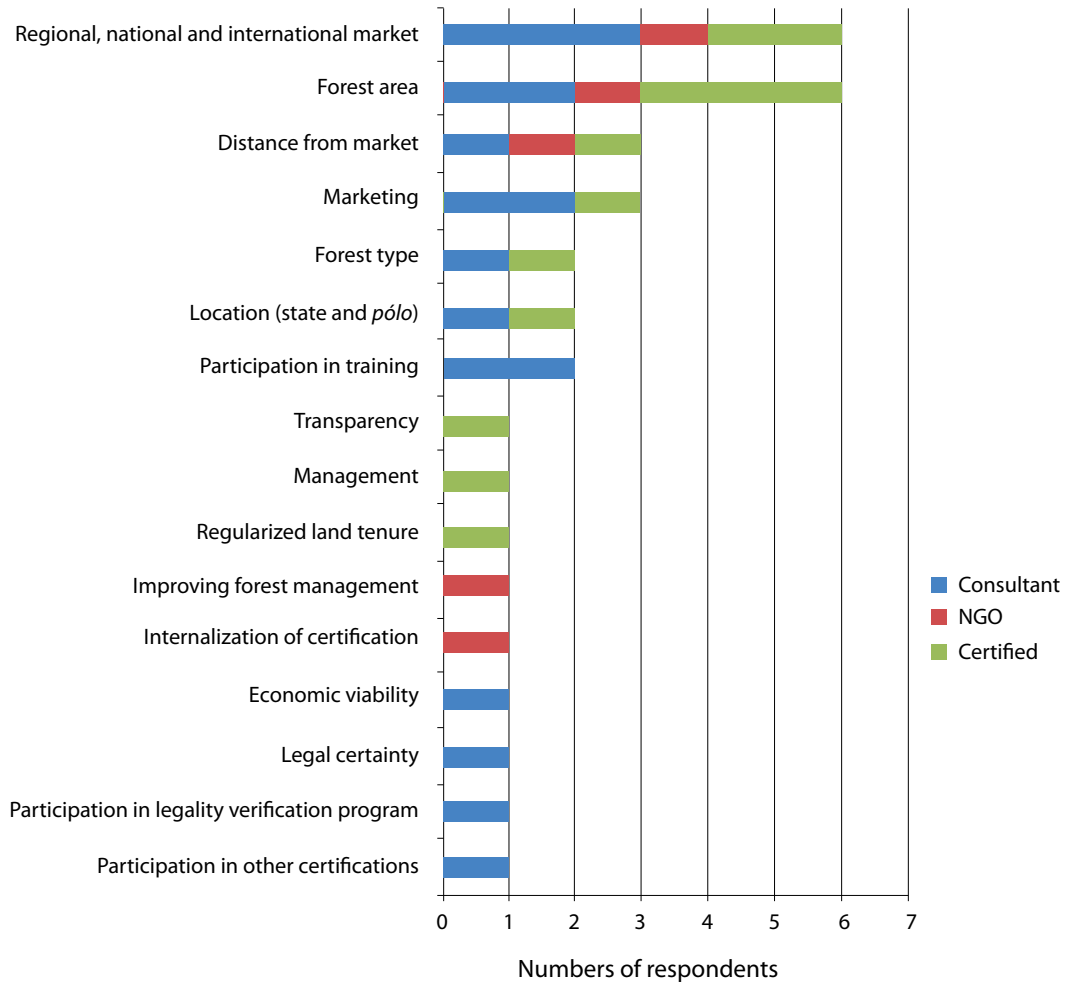
According to interviewees, a core reason for abandoning certification is a lack of sustained economic viability. As the initial costs of certification are often partially paid by an external organization (e.g. TAA), a company may be willing to take the first step, but may then be unable to assume the on-going expenses associated with good management, or even the costs of the certificate itself. An inability to secure a differentiated new market that is willing to pay more for certified

products might also deter companies from remaining certified (Figure 4.6).

#### 4.3.3 Current image of FSC and necessary changes to the certification system

When asked to identify necessary improvements to the FSC certification system, two groups (consultants and NGOs) mentioned the need to better prepare and train auditors in natural forest management. Other concerns included: a lack of strategic governmental policies to ensure the maintenance of forest resources and the well-being of local communities; a lack of transparency in the certification process, including a lack of clarity regarding requirements for public disclosure of annual monitoring reports, communication of

**Characteristics associated with long-term FSC certification**



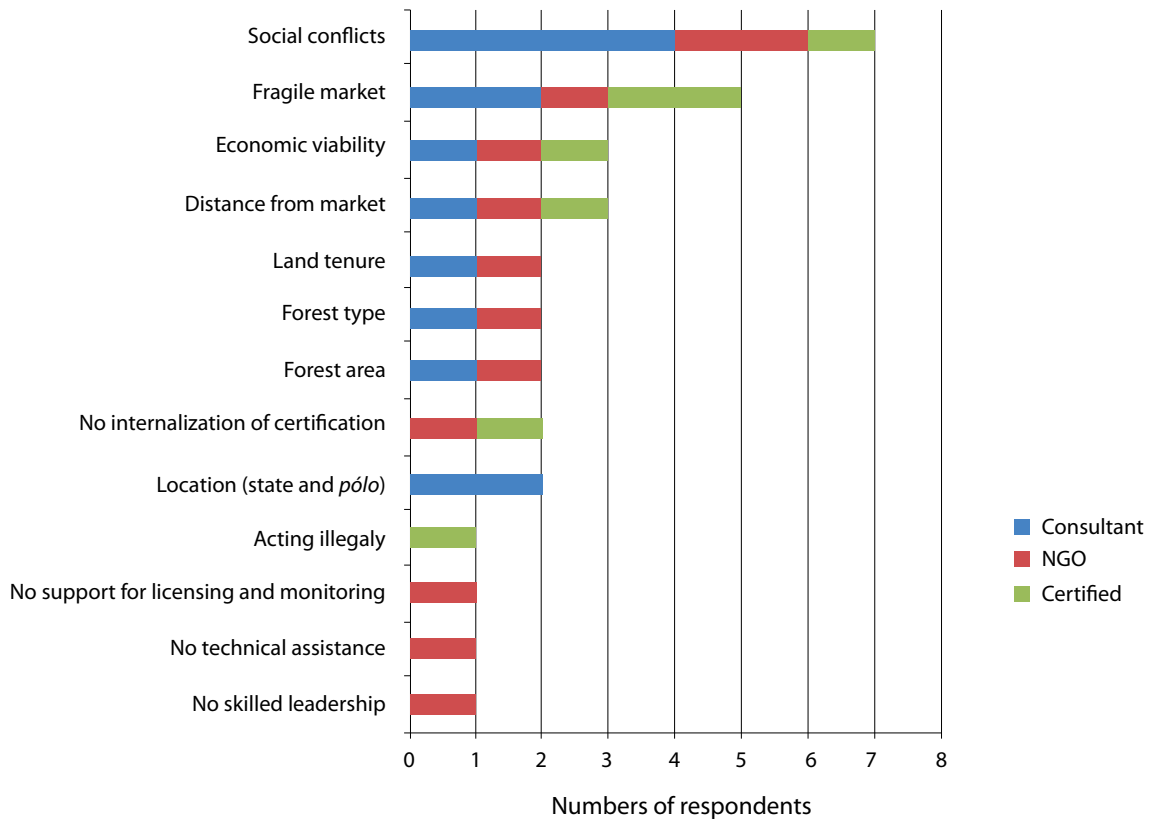
**Figure 4.5. Characteristics that respondents of semi-structured interviews (N=10) associated with companies opting for long-term FSC certification of natural forest management in Brazil.**

the certification processes and activities with the general public and the media; and the lack of an effective strategy to combat the trade of unauthorized timber

Representatives of certified companies highlighted the need for greater stability of FSC rules, noting that these have undergone numerous changes, with many requests for stakeholder comments, within a short period of time. Respondents from certified companies also called for greater efforts to raise awareness of certification among consumers. Consultants emphasized the need to strengthen economic sustainability, given that the criteria/indicators used to assess this certification standard are

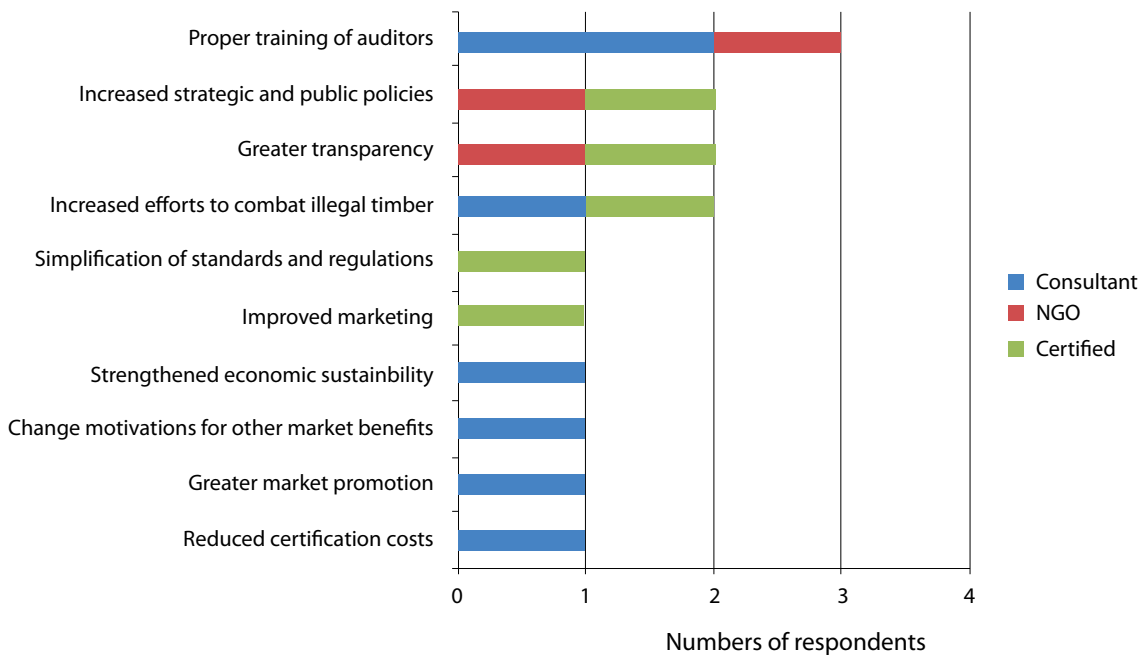
superficially evaluated by auditors who often lack the required skills. One respondent called for a return to the FSC’s original mandate, that is, the promotion of sustainable forest management rather than the commercialization of products with the FSC seal. However, respondents also expressed concerns about the lack of promotion of certified products. One respondent suggested that FSC should reduce the direct costs of certification, especially for small and medium size companies (i.e. the annual payment to FSC International required to maintain certification), which is an interesting suggestion given the approval of the Small or Low-Intensity Managed Forest (SLIMF) FSC standard in 2013 (Figure 4.7).

**Characteristics associated with companies that abandon FSC certification**



**Figure 4.6. Characteristics associated with companies that abandon FSC certification after the suspension or termination of their certificates, based on semi-structured interviews in Brazil (N=10).**

**Necessary improvements to the FSC certification system**



**Figure 4.7. Necessary improvements to the FSC certification system, as suggested by respondents of semi-structured interviews in Brazil (N=10).**

#### 4.4 Discussion

The following section discusses the primary observable characteristics that distinguish a company with no interest in FSC certification, from one that is highly likely to be interested in certification. Intrinsic characteristics include the lack of a PMFS and POA, and irregular land tenure. External issues include the existence of social conflicts in the surrounding FMU, local markets as the outlet for timber produced, and the preponderance of illegally sourced timber. Indeed, certification has been seen as a key differentiator that provides access to new markets, and allows producers to charge a premium for their products (Almeida 2012).

Due to the high short-term costs of improved management, and the widespread lack of knowledge of improved forest management techniques (including RIL) among professional foresters, the adoption of these techniques is assumed to increase costs of timber exploration. The profitability of conventional logging in the short-term, even if inefficient in the long-term, ensures that it is still the most widespread practice (Veiga Neto and May 2000; Freris and Laschefski 2001; Carneiro 2007; Holmes 2015).

Carneiro (2012) proposes that the establishment of forest concessions can address conflicting land use issues. In 2006, Brazil passed the LPFM, which facilitates the establishment of forest concessions in Public Forests (Lima and Munk, this volume; Papp and Vidal, this volume). The implementation of timber concessions began in 2010, with the granting of management rights to forest in the Jamari National Forest (98,350 ha), located in Rondônia (Carneiro 2011). While incipient, the adoption of forest concessions in the Brazilian Amazon has had positive influence on certification. Currently, approximately 55% of certified companies manage concession areas. However, one company manages a concession area that is not currently certified by FSC (the Jamari National Forest). A respondent from this company explained that the government sets economic and technical criteria for the management of concessions, and that the winning bid must ensure: “best price, lower environmental impact, higher socioeconomic benefit, greater efficiency and greater aggregation of local value,” which are very similar to the goals of FSC certification (i.e.

demonstrate credibility and the supply of legal timber to the market).

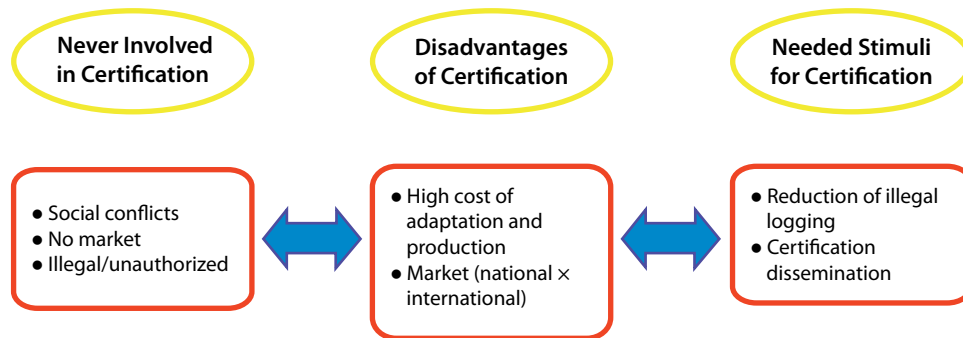
The size of the managed forest area is an important factor in determining whether an FMU remains certified in the long-term. Data indicates that only 5% of companies remain certified for more than 10 years, and these companies usually manage extensive areas (>160,000 ha; Zerbini 2014), which makes them more likely to stay on the market. Therefore, the Law of Forest Concessions, which provides new areas for sustainable forest management, may allow more companies to remain certified in the long-term, as it provides opportunities for companies to manage large areas over a long period of time.

Only a marginal portion of timber is extracted from sustainably managed forests (less than 1.5 million ha) (Lentini et al. 2012). According to Lentini (pers. com 2015; a former IFT member), this area is alarmingly small, as the Amazon would need between 35 and 40 million ha of forests to be certified to supply current volumes of extracted timber, if it were produced in a sustainable way (Adeodato et al. 2011).

Our interviews indicate that social conflict is an external factor that acts as a barrier to certification. Such struggles gained visibility in the Amazon starting in the 1960s, driven by major development projects that accelerated urban-industrial expansion, and generated conflict throughout the region. These conflicts were exacerbated by increased immigration from northeastern Brazil, caused largely by the urgent need for land reform, combined with the disastrous drought of 1970, leading to a geopolitical strategy that combined exploration programs and economic infrastructure in the Amazon with colonization and the settlement of landless farmers from the northeast.

The Amazon region has been seen as an escape valve for unresolved social conflicts. New lands in the Amazon were made available as an alternative to land reform, consistent with the government's strategy of development through economic exploitation of the Amazon region (Kohlhepp 1979 cited by Kohlhepp 2002). The conflict between the exploitation of natural resources as the basis of regional development in the Amazon, and the sustainable use of forest resources for the benefit of humans and biodiversity, continues, as





**Figure 4.8.** General model that describes the interacting factors that discourage the FSC certification of natural forests management in Brazil.

illustrated by the parallel activities of the *Avança Brasil* program<sup>28</sup> (2000–2003) and the Pilot Program to Conserve the Brazilian Rainforests (PPG-7, mid-1990s; Kohlhepp 2002; Lima and Munk, this volume).

Another factor that limits the widespread adoption of certification is the lack of market demand, especially within the country, where the majority of harvested timber is consumed (Lentini et al. 2012). Demand for certified products depends on the final consumer's awareness of wood and market regulations (Kohlhepp 2002; Ribeiro 2008). A growing number of wood consumers, especially in Europe and the United States, require certification. In general, companies have not received better prices for certified products, but are satisfied with their improved market access (Araújo et al. 2009).

There are currently no interventions that integrate strategies to combat illegality and false legality (Lentini et al. 2012). This lack of initiatives to combat illegal activity disadvantages certified units. The Document of Origin (DoF) system often hurts legal suppliers of tropical timber, and rewards those who are involved in false management plans, bogus claims, illegally obtained credits, fraudulent credit transfers, and the over-exploitation of approved plans.

Unauthorized logging is more common in remote parts of the Amazon, and is characterized by: the use of fake licenses; indiscriminate tree felling (regardless of whether the species is protected by law); harvest volumes that are greater than permitted by law; felling outside of timber concessions and inside PAs and indigenous reserves (Pereira 2014). Recently, it has been common for illegal loggers to launder illegal timber, obtaining false legality through virtual credits. Virtual credits are generated when there is request for a forestry permit (AUTEF), and the wood extraction and further commercialization is monitored using a credit-based system that assigns points to managements. Credits are transferred from the SIMLAM system to the SISFLORA (or DoF) systems. Each time the timber moves along the supply chain, it must be accompanied by a *Guia Forestal* (GF). The GF is generated by the SISFLORA (or DoF) system. When a GF is generated, the amount of wood specified for each species is deducted from the sender's credit and credited to the recipient. A producer is not allowed to sell wood for which they have no credits, and a factory or exporting company cannot trade wood that has no forest credits (Hummel 2014).

#### 4.4.1 The greatest challenges to certification

The high costs of obtaining and maintaining certification, including the costs of modified production practices, as well as weak demand from both national and international markets, are major barriers that influence decisions on certification.

<sup>28</sup> The *Avança Brasil* program was part of an Amazon integration strategy and the South American regional integration and consolidation policy.

Furthermore, the illegal procurement of timber complicates market dynamics (Figure 4.8).

Lima and Munk (this volume) note that, in contrast with other countries, there seemed to be no timber cartels operating in Brazil's forestry sector. However, according to Modesto (2014), an illegal timber extraction cartel in Pará obtains licenses for transportation and harvest, and approximately 1.7 million m<sup>3</sup> of timber was stolen in 2008 (Rural News 2014).

## 4.5 Conclusions

This assessment is based on limited consultations and interviews with representatives associated with the timber industry in the Amazon. The scope of this study was somewhat limited by the difficulty of contacting respondents, and their failure to return questionnaires, resulting in a small sample. Unfortunately, other institutions that could have provided additional insight could not be included in this study due to lack of resources (e.g. Amigos da Terra, IMAFLORA, *Fundação Amazonas Sustentável*, SOS Atlantic Forest, regional loggers associations, previously certified companies).

Certification, which was initially conceived as a market instrument, is often promoted as a means of accessing a range of market advantages. However, this did not appear to be the primary motivation of companies choosing to pursue certification. The prevalence of illegality and unauthorized timber harvesting represent the most fundamental challenges to the wider adoption of sustainable forest management practices. Certification is often perceived as yet another level of bureaucracy with which forest managers must comply (Sabogal et al. 2006). Papp and Vidal (this volume) suggest that the basic requirements of operating legally are cumbersome, forcing some firms to abandon forest exploitation altogether. Further obstacles include frail public sector governance, and weaknesses in the enforcement and control systems, which exacerbate government losses (due to smaller taxes revenues), and erode the goodwill of Brazilian society, who see a public good turn into private profit for a limited few.

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## 4.7 Appendix

### 4.7.1 Rules for Assigning FMUs to Stages along the Certification Continuum.

Stages along the certification continuum (indicated in italics) and rules for making transitions between those stages correspond to Figure 3.6 from Papp and Vidal, this volume).

Step	Description
1	FMUs that after getting training at one point in time never pursued further steps for certification - <i>Never Certified</i> .
2	FMUs that receive specific training with IFT or TAA are classified enter the stage <i>Considering Certification</i> .
3	FMUs that after having received training in one year did not pursue any more training activities in the following year. These FMUs will revert to <i>Never Certified</i> .
4	FMUs that do not advance towards <i>Certification</i> , continue receiving training, and remain in <i>Considering Certification</i> .
5	FMUs that became certified are classified as <i>Certified</i> .
6	FMUs that remain certified.
7	FMUs that lost their certification the same year it was granted.
8	FMUs that lost certification are classified as <i>Lost Certification</i> .
9	FMUs that were formerly certified, lost certification, and did not pursue certification again remain in <i>Lost Certification</i> .

### 4.7.2 Key informants from different activities

(Consultants and NGOs members) engaged in the forest certification process since FSC's establishment in 1993 to present.

#	Actors	Contact	Institution	Answers
1	Ana Franzeres	(61) 3344-3894	Consultant	No
2	Áurea Nardelli	aurea.nardelli@terra.com.br	Diretora Regional da RSB	Yes
3	Adalberto Veríssimo	betoverissimo@uol.com.br	IMAZON	No
4	Camila Nardon	c.nardon@tft-forests.org	TFT	No
5	Fernando Ludke	fludke@ig.com.br	Consultant STCP	Yes
6	Garo Batmanian	gbatmanian@woldbank.org	World Bank	Yes**
7	Jon Jickling	jjickling@ra.org	RA	Yes*
8	Leonardo Sobral	leonardo@IMAFLOA.org	IMAFLOA	Yes*
9	Luis Fernando Guedes Pinto	luisfernando@IMAFLOA.org	IMAFLOA	Yes**
10	Lineu Siqueira	lsiqueira.jr@gmail.com	Consultant	Yes

#	Actors	Contact	Institution	Answers
11	Luise Bauch	luise.marta@uol.com.br	Consultant - TAA	Yes
12	Manuel Amaral	manuel@iieb.org.br	IIEB	No
13	Marcelo Marquesini	marcelomarquesini@gmail.com	Escola de Ativismo	No
14	Marco Lentini	mwlentini@gmail.com	WWF	Yes
15	Mário Mantovani	(11) 3262-4088	SOS Mata Atlântica	No
16	Mauro Armelin	mauro@wwf.org.br	WWF	No
17	Paulo Amaral	pamaral@IMAZON.org.br	IMAZON	Yes
18	Richard Donovan	rdonovovan@ra.org	RA	No
19	Roberto Smeraldi	smeraldi@amazonia.org.br	Amigos da Terra (Programa Amazônia)	No
20	Roberto Waak	roberto@amatabrasil.com.br	Amata	Yes
21	Rubens Gomes	rubensoela (skype)	GTA	No
22	Tasso Rezende de Azevedo	skype	Consultant	No
23	Virgílio Viana	virgilio.viana2@fas-amazonas.org	FAS	No

Yes\*: confirmed participation but not sent the questionnaire by the end of the study

Yes \*\*: responded and suggested the appointment of another person to interview

#### 4.7.3 Representatives of companies located in the 10 *polos madeireiros*

Data available upon request

#### 4.7.4 Companies identified in the 10 *polos madeireiros* according to the type of classification

[certified, terminated, suspended or participated in TAA/IFT courses].

#	Pole	Company	Status
1	Alta Floresta do Oeste (1)	Agroflorestal Vale do Guaporé Ltda. - Madevale	Terminated
2	Alta Floresta do Oeste (1)	Apidiá Planejamento Agropecuário	TAA IFT course
3	Alto Paraíso (2)	Amata S/A. - Unidade Florestal Jamari	Certified
4	Alto Paraíso (2)	Madeflona Industrial Madeireira Ltda.	TAA IFT course
5	Belém (3)	Juruá Florestal Ltda.	Certified
6	Belém (3)	LN Guerra Indústria e Comércio de Madeiras Ltda.	Certified
7	Belém (3)	EMAPA - Exportadora de Madeiras do Pará LTDA	Terminated

#	Pole	Company	Status
8	Belém (3)	Brascomp Compensados do Brasil S. A.	TAA IFT course
9	Belém (3)	Cikel Brasil Verde Madeiras Ltda	TAA IFT course
10	Belém (3)	Lawton Madeiras LTDA	TAA IFT course
11	Breu Branco (4)	IBL - Izabel Madeiras do Brasil	Terminated
12	Breu Branco (4)	Camargo Metais S.A.	TAA IFT course
13	Breu Branco (4)	Galletti Compensados Ltda.	TAA IFT course
14	Breu Branco (4)	Globe Metais Indústria e Comércio S.A	TAA IFT course
15	Cujubim (5)	Indústria de Madeiras Manoa Ltda.	Certified
16	Cujubim (5)	SAKURA Indústria e Comércio de Madeiras Ltda	TAA IFT course
17	Cujubim (5)	Alex Madeiras	TAA IFT course
18	Paragominas (6)	CKBV Florestal Ltda. - Unidade Rio Capim	Certified
19	Paragominas (6)	Almeirim Industrial (Grupo Rosa)	TAA IFT course
20	Paragominas (6)	COMAL PA	TAA IFT course
21	Paragominas (6)	DALSAM Madeiras Ltda	TAA IFT course
22	Paragominas (6)	Indústria e Comércio de Madeiras Oratório	TAA IFT course
23	Paragominas (6)	Lumapal Madeiras LTDA.	TAA IFT course
24	Paragominas (6)	Madecali Madeiras Calegari LTDA	TAA IFT course
25	Paragominas (6)	Mavil Madeiras Vitória Ltda	TAA IFT course
26	Paragominas (6)	Serraria Andiroba	TAA IFT course
27	Paragominas (6)	Serraria Timborana	TAA IFT course
28	Porto Velho (7)	Ecolog Indústria e Comércio Ltda.	Certified
29	Porto Velho (7)	Batista e Cia Ltda.	TAA IFT course
30	Porto Velho (7)	Universal Timber Resources Brasil	TAA IFT course
31	Porto Velho (7)	MAB - RO Soluções em Madeiras Ltda	TAA IFT course
32	Rio Branco (8)	Floresta Estadual do Antimary	Certified
33	Rio Branco (8)	Laminados Triunfo Ltda.	Suspended
34	Rio Branco (8)	Ouro Verde Importação e Exportação Ltda.	Terminated
35	Rio Branco (8)	Agrocortex Madeiras do Acre AgroFlorestal Ltda.	TAA IFT course
36	Rio Branco (8)	Jotas Móveis	TAA IFT course
37	Rio Branco (8)	Laminados Cathedral	TAA IFT course
38	Rio Branco (8)	Madeira JR	TAA IFT course
39	Rio Branco (8)	Madeirei Nova Canaã	TAA IFT course
40	Rio Branco (8)	Verdasca da Amazônia	TAA IFT course
41	Santarém (9)	Ebata Produtos Florestais Ltda	Certified
42	Santarém (9)	Golf Indústria, Comércio e Exportação de Madeiras Ltda	Certified
43	Santarém (9)	Rondobel Indústria e Comércio de Madeiras Ltda.	Terminated

#	Pole	Company	Status
44	Santarém (9)	Agropecuário Treviso	TAA IFT course
45	Santarém (9)	CEMEX -Comercial Madeiras Exportação	TAA IFT course
46	Santarém (9)	CICOMOL Carvalho	TAA IFT course
47	Sinop (10)	Maracai Florestal e Industrial Ltda.	Terminated
48	Sinop (10)	Madeireira Slomp	TAA IFT course
49	Sinop (10)	Taiga Industrial	TAA IFT course

#### 4.7.5 Questionnaire for FSC certification self-selection of natural forest in Brazil

Data available upon request.

#### 4.7.6 Key informants and companies that answered the questionnaire

#	Actor/Company	Contact	Institution/Position	Status
01	Áurea Nardelli	aurea.nardelli@terra.com.br	Regional Director of RSB	Consultant
02	Fernando Ludke	fludke@ig.com.br	STCP	Consultant
03	Lineu Siqueira	lsiqueira.jr@gmail.com	Consultant	Consultant
04	Luise Bauch	luise.marta@uol.com.br	Consultant	Consultant
05	Marco Lentini	mwlentini@gmail.com	WWF	NGO
06	Paulo Amaral	pamaral@IMAZON.org.br	IMAZON	NGO
07*	Madeflona Industrial Madeireira Ltda.	madeflona@gmail.com	Administrator/ Forest Management Manager	Interested (IFT/ TAA course)
08	Ecolog Indústria e Comércio Ltda.	robson@ecologflorestal.com.br	Manager of Administration and Finance	Certified
09	Amata S/A. - Unidade Florestal Jamari	rigolo@amatabrasil.com.br; roberto@amatabrasil.com.br	Coordinator of Certification and Risk Management; Chairman	Certified
10	Floresta Estadual do Antimary	marky.brito@ac.gov.br	Director of Forest Development	Certified

\*Partially answered

#### 4.7.7 Terms and definitions of survey tool

Data available upon request.

# 5 conclusions

Claudia Romero, Francis E. Putz, Erin O. Sills, Manuel R. Guariguata, Paolo O. Cerutti and Guillaume Lescuyer

Brazil's natural tropical forest cover is nearly three times wider than that of the world's next most forest-rich region, the Congo Basin. It has experienced considerable forest loss, especially over the last two decades. Most of the forests are located in the Amazon Basin, which includes a variety of forest types.

Brazil has been the site of dynamic political-economic and social experiments over the past few decades, with interactions occurring among new institutional regimes, legal frameworks and associated policies, and social actors, infrastructure development, and demography. These interactions have shaped the development of forested landscapes, and have helped to establish the complex context that influences decisions on the use of forested landscapes.

A political economy analysis of land cover change, and aspects of both the forest and timber sectors, is the departure point of this study. This analysis reveals the vibrant dynamics that characterize decisions affecting forested landscapes, and the diversity of policies, underlying interests, and actors that have stakes in the fate of these areas in Brazil.

Brazil has a history of regulating access to Amazonian forests that dates back to the enactment of the first FC in 1934. However, contrasting visions for this extensive region failed to foster consistent policy formulation and implementation, and created a space characterized by a lack of enforcement. Collusion of interests were exacerbated by the arrival of new settlers in the Amazon, who were resettled through agrarian reform initiatives, or were prompted to migrate by incipient infrastructure development. New land uses were dominated by agricultural activities at the expense of the forest. Ecological and economic zoning plans remain to be fully implemented in

the Amazon region, but there are hopes that zoning will serve to consolidate development goals and allowed activities, through agreed-upon processes that negotiate different perspectives from a range of actors.

Brazil has made several attempts to address social conflicts in the Amazon and associated forest losses. A succession of modifications to the FC (first in 1965, and more recently in 2012) established PAs in riparian zones, legal reserves in private properties, and in the 2000s, led to the expansion of PAs.

Accelerated deforestation in the 1990s prompted NGOs, both national and international, to boost efforts to control forest loss and illegality. Pressure from NGOs may have been a catalyst for the formulation of even more stringent regulations (e.g. Environmental Crime Law; expansion of the legal reserve system from 50% to 80% of property area, and the registration of these areas; the establishment of forest concessions on Public Forested lands) and actions (e.g. land regularization and rural environmental cadastral registry), as well as increased efforts to reduce corruption, and enhance forest governance through increased transparency. Institutional transformations have taken place at all levels (e.g. the creation of the SFB, and IDEFLOR in the state of Pará; strengthening of IBAMA), including the establishment of inter-institutional partnerships to support the work of national research institutes such as IMAZON and IPAM. These institutions have been central to building knowledge on the characteristics of forest assets, the effects of management approaches and natural disturbances on forests, and have established a quality baseline for biophysical and social information. However, the timber sector continues to present changes. Although a number of timber companies have ceased their operations, new companies continue



to emerge and repositioning themselves to profit from the Amazon's timber resources.

Enforcement efforts have come in waves, often in the form of state-led, special operations. However, many stakeholders are dissatisfied with the reach of the FC, and there continue to be debates over its modification, and even talk of its abolishment, prompted by powerful agricultural lobbies and other interests. The PRODES satellite and the DETER program provide day-to-day information on land cover changes. These initiatives represent significant technological innovations, which have significant potential to influence forest land use decisions and facilitate enforcement across areas affected by deforestation. Various states have also assumed leadership roles in the fight against deforestation (e.g. Mato Grosso and Pará). Although there have been numerous efforts to curb deforestation, led by a range of actors (e.g. the soy and beef moratoria led by Greenpeace), using various incentives (e.g. PES), as well as combinations of incentives and disincentives (e.g. changes to credit systems), Brazil's forests are still under threat. In addition to agricultural expansion, Brazil's forests are now threatened by the impacts of gold mining and hydroelectric dam construction.

The studies included in this document illustrate that decisions regarding forest land use have changed over time, and have been subject to a range of forces operating at different scales. Brazil has developed a strong regulatory and monitoring system, which does not yet have the power to fully prevent unauthorized logging, but has made significant strides towards achieving this goal. The *typology analysis* establishes that variables such as FMU area, FMU and parent company origin, and market outlet, explain 67% of the differences among clusters of FMUs. The resulting four clusters contain a mix of FMUs, at different stages along the certification continuum. This information can guide discussions on counterfactual construction for an empirical evaluation. However, this configuration of FMUs is dynamic, and is the result of past decisions made along the certification continuum. Thus, the *certification dynamics* study documents the decisions made by FMUs over a 20-year period. All transitions along the continuum are unequivocal, except for entering into certification (i.e. FMU participation in a forest management training

activity is used as an indicator of interest). Spikes in certification interest and adoption could be associated with external factors, such as: pressure and lobbying from international NGOs; certification-support programs; and regulatory changes (i.e. benefits for concessions that move towards certification; improved monitoring systems). Similarly, increased enforcement could play a role in reducing unauthorized logging, and thus incentivize certification adoption. Finally, the *self-selection into certification* analysis, though based on a limited consultation process, identified the main motivations and deterrents behind FMUs' decisions to adopt certification. Motivations to pursue certification include the development of governmental programs to establish a clear property regime (CAR), which has eased social conflicts and resolved claims. External support has also helped FMUs to cover the costs of certification (i.e. training and inventories), and government incentives have encouraged the certification of FMUs operating under concession regimes. Barriers to certification relate to: the pervasiveness of illegality and unauthorized timber harvesting, the general perception of certification requirements as yet another step in the bureaucratic chain of duties, and the high costs of certification.

There are clear regulations and processes for the granting of logging rights, and applicants are required to prepare forest management plans. However, there is insufficient institutional capacity to manage Brazil's substantial timber sector (over 2000 companies operate in the Amazon), and its vast tropical forests. Authorities are frequently overwhelmed by the sheer number of management plans they must review, and companies may face a lengthy waiting period before they are granted approval. Consequently, many companies choose to abandon their attempts to exploit timber legally.

The adoption and evolution on FSC certification in Brazil has been determined by this dynamic context. The concerns of international buyers of timber, and the activities of other stakeholders, including international NGOs, have shaped the development of certification. These stakeholders include the RA, through its SmartWood program; Imaflo; IFT, which facilitated training in RIL and other improved management practices; several donors and NGOs that supported the implementation of improved forest management practices (e.g. WWF through its Global Forest

Trade Network [GFTN]); and the TAA, which facilitated links with international markets. In spite of these efforts, only a tiny proportion of the timber sector has ever engaged in certification (less than 1%). This may be because a large share of Amazonian timber is sold through national markets to consumers who are reportedly unable or unwilling to pay premium prices for responsibly produced timber.

The limited number of areas operating under certified forest management (or even approved management plans), in addition to the fact that most deforestation still occurs as a result of land-use conversion to industrial agriculture,

suggest that FSC, and forest certification more broadly, is currently limited in its ability to address deforestation in Brazil. However, new incentives and market dynamics (e.g. public-private partnerships, more concerned public markets, consumer actions, etc.) may encourage wider certification. Forest certification could lead to a gradual change in the behavior of timber companies, by promoting the prevention of forest degradation, and the maintenance of other forest values and resources that might be more rewarding than timber. These issues require further examination, based on an empirical assessment of the impacts of FSC certification in Brazil and other tropical geographies.

*CIFOR Occasional Papers* contain research results that are significant to tropical forest issues. This content has been peer reviewed internally and externally.

Management decisions on appropriate practices and policies regarding tropical forests often need to be made in spite of innumerable uncertainties and complexities. Among the uncertainties are the lack of formalization of lessons learned regarding the impacts of previous programs and projects. Beyond the challenges of generating the proper information on these impacts, there are other difficulties that relate with how to socialize the information and knowledge gained so that change is transformational and enduring. The main complexities lie in understanding the interactions of social-ecological systems at different scales and how they varied through time in response to policy and other processes. This volume is part of a broad research effort to develop an independent evaluation of certification impacts with stakeholder input, which focuses on FSC certification of natural tropical forests. More specifically, the evaluation program aims at building the evidence base of the empirical biophysical, social, economic, and policy effects that FSC certification of natural forest has had in Brazil as well as in other tropical countries. The contents of this volume highlight the opportunities and constraints that those responsible for managing natural forests for timber production have experienced in their efforts to improve their practices in Brazil. As such, the goal of the studies in this volume is to serve as the foundation to design an impact evaluation framework of the impacts of FSC certification of natural forests in a participatory manner with interested parties, from institutions and organizations, to communities and individuals.



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