

THE GLOBAL-LOCAL NEXUS AND  
SUSTAINABLE FOREST MANAGEMENT

institutional  
translations in Brazil and

# CAATINGA BIOME

Joana Mattei Faggin

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**CAATINGA  
BIOME**

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## PROPOSITIONS

1. Many aims of Sustainable Forest Management (SFM) that are articulated at the global level are 'lost in translation' at other levels of governance.

*(this thesis)*

2. Local adoption of SFM institutions occurs when multiple stakeholders work together.

*(this thesis)*

3. International food markets cause environmental degradation in the Global South.

4. Conservation biology does not take human-environmental relations sufficiently into account.

5. The social impact of a PhD thesis only happens through actions performed by the one who wrote it.

6. Formal laws and bureaucracies reinforce the exclusion of already marginalised populations in many developing countries.

Propositions belonging to the thesis, entitled:

**The global-local nexus and Sustainable Forest Management:  
institutional translations in Brazil and Caatinga biome**

Joana Mattei Faggin  
Wageningen, 2nd November 2018

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**THE GLOBAL-LOCAL NEXUS AND  
SUSTAINABLE FOREST MANAGEMENT:  
INSTITUTIONAL TRANSLATIONS IN BRAZIL  
AND CAATINGA BIOME**

**Joana Mattei Faggin**

**Thesis**

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**For the people from *Caatinga***

E não há melhor resposta  
que o espetáculo da vida:  
vê-la desfiar seu fio,  
que também se chama vida,  
ver a fábrica que ela mesma,  
teimosamente, se fabrica,  
vê-la brotar como há pouco  
em nova vida explodida;  
mesmo quando é assim pequena  
a explosão, como a ocorrida;  
como a de há pouco, franzina;  
mesmo quando é a explosão  
de uma vida Severina.

**João Cabral de Melo Neto**  
*Morte e Vida Severina*

## **ACKNOWLEDGEMENTS**

When I took the decision to start a PhD research project, I was willing to move from a previous career path to enrich my understanding about challenges faced during that career. This ‘moving’ included a wish to explore different ways to continue my contribution to positive changes in so many hard and unfair realities known through my previous professional experiences, which I believed to be a result of a historical lack of consideration of local populations’ practices and needs in Brazilian national development plans. Leaving a stable job, good friends, having my family close by, and beautiful landscapes to relax once in a while was not easy. The challenges I faced did not only include the cold winters and the Dutch (permanent) rainy season, but also changing my perspective from the practical side of the coin to a more reflective one. These last years brought me the opportunity to understand that breaking for reflection is also necessary to improve practice. Facing these challenges and the PhD path would not have been possible without the support of a lot of people, who were on my side but sometimes also far away from me!

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## LIST OF ABBREVIATIONS AND ACRONYMS

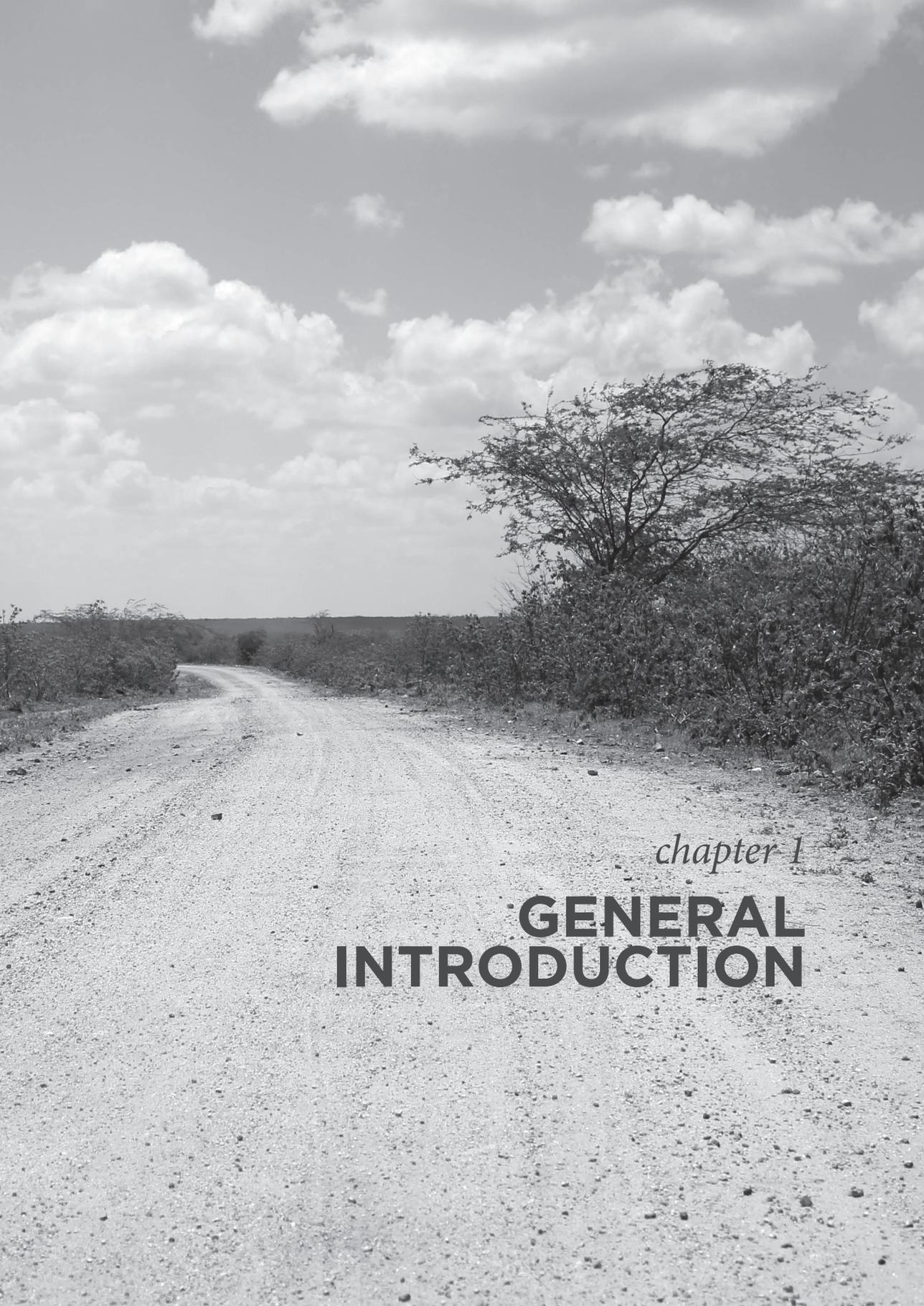
APNE	Associação Plantas do Nordeste ( <i>Northeastern Plants Association</i> )
APP	Área de Preservação Permanente ( <i>Permanent conservation area</i> )
ASA	Articulação para o Semiárido ( <i>Articulation for the Semi-arid</i> )
AUTEX	Autorização para Exploração ( <i>Licence for Exploitation</i> )
CAR	Cadastro Ambiental Rural ( <i>National Rural Environmental Database</i> )
CBD	United Nations Convention on Biological Diversity
CDM	Clean Development Mechanism
CEPIS	Centro para a Produção Industrial Sustentável ( <i>Centre for Sustainable Industrial Production</i> )
CFM	Community Forest Management
CI	Critical Institutionalism
CITIES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CONAFLOR	Comissão Nacional de Florestas ( <i>National Commission for Forests</i> )
CONAMA	Conselho Nacional do Meio Ambiente ( <i>National Council for the Environment</i> )
COP	Conference of the Parties
CPF	Collaborative Partnership on Forests
CPRH	Agência Estadual de Meio Ambiente do Pernambuco ( <i>Environment Agency of Pernambuco State</i> )
DLDD	Desertification, Land Degradation, and Drought
DOF	Documento de Origem Florestal ( <i>Document of Forest Product's Origin</i> )
ENREDD+	Estratégia Nacional para Redução das Emissões de Gases de Efeito Estufa provenientes do Desmatamento e da Degradação Florestal, Conservação dos Estoques de Carbono Florestal, Manejo Sustentável das Florestas e Aumento de Estoques de Carbono Florestal ( <i>National Strategy for REDD+</i> )
EU	European Union

FAO	Food and Agricultural Organisation of the United Nations
FEM	Forest ecosystem management
FLEGT	Forest Law Enforcement, Governance, and Trade Initiative
FNDF	Fundo Nacional para o Desenvolvimento Florestal ( <i>National Fund for Forestry Development</i> )
FSACEF	Fundo Socioambiental da Caixa Econômica Federal ( <i>Socio-environmental Fund of the Federal bank</i> )
FSC	Forest Stewardship Council
FUNAI	Fundação Nacional do Índio ( <i>National Foundation for the Indigenous People</i> )
GEF	Global Environment Facility
GFFFN	Global Forest Financing Facilitation Network
GGP	Green Grant Programme ( <i>Programa Bolsa Verde</i> )
GOV	Government representatives
IAF	International Arrangement on Forests
IBAMA	Instituto Brasileiro do Meio Ambiente e dos Recursos Naturais Renováveis ( <i>Federal Environmental Agency</i> )
IBGE	Instituto Brasileiro de Geografia e Estatística ( <i>Brazilian Institute of Geography and Statistic</i> )
ICMBio	Instituto Chico Mendes de Conservação da Biodiversidade ( <i>'Chico Mendes' Institute for Biodiversity Conservation</i> )
IFF	Intergovernmental Forum on Forests
IICA	Inter-American Institute for Cooperation in Agriculture
INCRA	Instituto Nacional de Colonização e Reforma Agrária ( <i>National Institute for Colonization and Agrarian Reform</i> )
IND	Industries representatives
INPE	Instituto Nacional de Pesquisas Espaciais ( <i>National Institute for Space Research</i> )
IPCC	Intergovernmental Panel on Climate Change
IPF	Intergovernmental Panel on Forests
ISA	Instituto Socioambiental ( <i>Socio-environmental Institute</i> )
ISPN	Instituto Sociedade, População e Natureza ( <i>Institute for Society, Population, and Nature</i> )
ITTA	International Tropical Timber Agreement
ITTO	International Tropical Timber Organisation

IUFRO	International Union of Forest Research Organisations
LC	Local community
LMPF	Law for the Management of Public Forests
MCTI	Ministério da Ciência, Tecnologia e Inovação ( <i>Ministry of Science, Technology, and Innovation</i> )
MDA	Ministério do Desenvolvimento Agrário ( <i>Ministry for Agrarian Development</i> )
MDGs	Millennium Development Goals
MLG	Multi-level governance
MMA	Ministério do Meio Ambiente ( <i>Ministry for the Environment</i> )
MRV	Measurement, Report and Verification
NFBD	National Programme for Biological Diversity
NFCC	National Fund for Climate Change
NFP	National Forest Programme
NG	Non-governmental organisations representatives
NGO	Non-governmental organisation
NLBI	Non-Legally Binding Instrument on All Types of Forests
NPBP	National Policy for Biodiversity Protection
NPCC	National Policy for Climate Change
NPCCA	National Plan for Climate Change Adaptation
NPCD	National Programme to Combat Desertification and Mitigate the Effects of Drought
NWFP	Non-wood forest product
NYDF	New York Declaration on Forests
OBC	Observatório do Clima ( <i>Climate Observatory</i> )
P1MC	Programa 1 Milhão de Cisternas ( <i>Programme for One Million Cisterns</i> )
PCP	Programme to Combat Poverty ( <i>Programa Brasil Sem Miséria</i> )
PEFC	Programme for the Endorsement of Forest certification
PES	Payment for Environmental Services
PFM	Participatory Forest Management
PGPMBio	Política Nacional para a Garantia de Preços Mínimos para Produtos da Sociobiodiversidade ( <i>Policy for the Guarantee of Minimum Prices for Sociobiodiversity Products</i> )
PNAE	Política Nacional de Alimentação Escolar ( <i>National Policy for</i>

	<i>School Nutrition)</i>
PNPCT	Política Nacional para o Desenvolvimento Sustentável de Povos e Comunidades Tradicionais ( <i>National Policy for the Sustainable Development of Traditional Populations and Communities</i> )
PPG7	Programa Piloto para a Proteção de Florestas Tropicais no Brasil ( <i>Pilot Program for Tropical Forest Protection in Brazil</i> )
PPP-Ecos	Programa de Pequenos Projetos Ecosociais ( <i>Small Grant Programme</i> )
RED	Reducing Emissions from Deforestation
REDD	Reducing Emissions from Deforestation and Forest Degradation
REDD+	Reducing Emissions from Deforestation and Forest Degradation and the role of Conservation, Sustainable Management of Forests and enhancement of Forest Carbon Stocks in developing countries
RL	Reserva Legal ( <i>Legal reserve</i> )
SDGs	Sustainable Development Goals
SES	Social-ecological System
SES	Social-ecological System
SFB	Serviço Florestal Brasileiro ( <i>Brazilian Forest Service</i> )
SFM	Sustainable Forest Management
SMF	Sustainable management of forests
SocioBio	Programa Nacional para a Promoção das Cadeias de Valor de Produtos da Sociobiodiversidade ( <i>National Plan for the Promotion of Value Chains linked to Sociobiodiversity Products</i> )
Sudema	Superintendência Estadual de Meio Ambiente da Paraíba ( <i>Environment Agency of Paraíba State</i> )
TEC	Technician
TFCA	Tropical Forest Conservation Act
UFC	Universidade Federal do Ceará ( <i>Ceará Federal University</i> )
UFCG	Universidade Federal de Campina Grande ( <i>Campina Grande Federal University</i> )
UFRPE	Universidade Federal Rural de Pernambuco ( <i>Pernambuco Federal Rural University</i> )
UN	United Nations
UN-EMG	United Nations Environment Management Group
UNCCD	United Nations Convention to Combat Desertification

UNCED	United Nations Conference on Environment and Development
UNDP	United Nations Development Programme
UNESCO	United Nations Education, Scientific, and Cultural Organisation
UNFCCC	United Nations Framework Convention on Climate Change
UNFF	United Nations Form on Forests
UNFI	United Nations Forest Instrument
UNSPF	United Nations Strategic Plan for Forests
USAid	United States Agency for International Development
VPA	Voluntary Partnership Agreement
WMO	World Meteorological Organisation
WWF	World Wide Fund for Nature



*chapter 1*

# **GENERAL INTRODUCTION**

## **1.1. THE GLOBAL-LOCAL NEXUS OF SUSTAINABLE FOREST MANAGEMENT**

The Food and Agricultural Organisation of the United Nations (FAO) defines forest as: “land spanning more than 0.5 hectares with trees higher than 5 meters and a canopy cover of more than 10 percent, or trees able to reach these thresholds *in situ*” (FAO 2012, p.3). Following the FAO’s definition of forests, there are more than five hundred different forest eco-regions in the world spread over tropical, subtropical, temperate, and boreal climate regions (Olson et al. 2001). Similarly, almost half of global forest cover is part of the territory of only four countries: the Russian Federation, Brazil, Canada, and the United States of America (FAO 2016). Natural forests, including primary and naturally regenerated forests still represent as much as 93% of total global forest cover today, even when the share of planted forest is growing (FAO 2016).

The deforestation of natural forests decreased from 8.5 million hectares per year in the 1990s to 6.6 million hectares per year between 2010 and 2015 (FAO 2016). Notwithstanding this recent decrease in deforestation rate, large stretches of natural forests continue to be lost each year. This is especially true for tropical countries, which are home to the most biodiverse forests in the world (Brockerhoff et al. 2017). Amongst tropical countries, Brazil presents the highest rate of absolute deforestation: close to a 1 million hectare per year between 2010 and 2015 has been lost. The scale of deforestation in Brazil is only mirrored in the world by Indonesia, with close to 0,7 million hectares per year loss of forest cover in the same period (FAO 2016). More recently, Brazil has been recognised for good efforts towards and positive results in decreasing deforestation, with deforestation rates dropping sharply after 2005 and being more or less stable until 2015 (Tollefson 2015). However, Brazil has started to report an alarming increase in deforestation again since 2016 (Fearnside 2017a).

Academic literature addresses deforestation in tropical regions in three broad themes: (1) how forests are governed, (2) pressure from land use change, and (3) social vulnerability of forest-dependent communities. These themes address deforestation from the perspectives of (a) policy responses to halt or reduce deforestation, (b) social and economic drivers of deforestation, and (c) the role of local people in forest conservation and use, respectively. First, the

multiple ways in which forests are governed around the world are strongly shaped by recent changes in global forest governance where “countries without large areas of forests want to conserve the world’s forests, and countries with large forests want to keep the right to decide how to use their forests” (Visseren-Hamakers and Glasbergen 2007, p.408). In this context, tropical countries emphasise sovereignty rights in governing their forest resources (Eikermann 2015) while being pressured by the international community to adopt effective policy frameworks (Ongolo and Karsenty 2015). Studies are showing that the forest governance in tropical countries is strongly shaped by the interest and actions of networks of different actors, including governments, markets, and civil society, across multiple policy levels (Arts 2014). Thus, the way in which forest resources are governed is highly dependent on international, domestic, and local governance contexts.

A second theme in literature discussing high deforestation rates in tropical regions is land use change and socio-economic drivers of deforestation. Land use pressures from livestock and agriculture are especially relevant (Carter et al. 2017; Hoogeveen and Verkooijen 2011; Nolte et al. 2017), and deforestation is strongly linked to activities that may give an immediate (not necessarily a long-term) and higher economic return than the maintenance of forest cover (Ferretti-Gallon and Busch 2014). In tropical regions, land use change towards agriculture is linked to 80% of instances of deforestation, while mining, infrastructure, and urban expansion are linked to the other 20% (Hosonuma et al. 2012; Kissinger et al. 2012). As drivers of land use change, the relative share in the contribution of global commodities (i.e. cattle, soybean, and palm oil) and subsistence agriculture to deforestation varies from region to region depending on economic, social, and environmental conditions (Carter et al. 2017). In Latin America, agriculture linked to global commodities (mainly cattle and soybean) contribute to 68% of the deforestation and agriculture linked to subsistence only to 12%; while in Africa, these contributions are reported to be 35% and 45%, respectively (Hosonuma et al. 2012). Even while the extraction of forest products (i.e. timber, firewood, charcoal, and livestock grazing) causes 70% of forest degradation in the tropics (Kissinger et al. 2012), the extraction also indirectly contributes to deforestation linked to commercial agriculture. This contribution is explained by the land use change cycle: it starts with forest products extraction and is subsequently followed by pasture for cattle, and finally by crop plantations (FAO 2006; WWF 2011).

The social vulnerability of local communities in many tropical regions is a third theme in literature that is connected to deforestation dynamics, discussing the role of communities both as forest managers and as social groups subject to the negative consequences of deforestation. Many local communities base their livelihoods on the use of forest resources. Accordingly, these communities are both implicated as agents of deforestation (whether justified or not) and are most vulnerable to the effects of deforestation and forest degradation (Olsson et al. 2014). Understanding how these local communities are connected to the management, degradation, and conservation of forest resources has been increasingly the focus of forest-related studies. Most of the countries in tropical regions still face poverty in urban and rural areas (Roser and Ortiz-Ospina 2018). In rural areas, some studies emphasise the strong link between poverty and deforestation, where increased poverty increases deforestation, thus creating a negatively reinforcing cycle (Ioris 2014; McDougall et al. 2013). Other authors instead emphasise the alternative model that community-based forestry can be used to implement sustainably managed forestry, as ‘guardians of the earth’ (Michon et al. 2007).

Although the poverty-deforestation cycle has been refuted by various authors (Khan and Khan 2009; Waquil et al. 2004; Zhen et al. 2014), deforestation still persists, especially in poor tropical countries (Sloan and Sayer 2015). Studies emphasise that income support linked to the maintenance of forest cover may have positive results for efforts to halt deforestation, as was found for some initiatives of Payment for Environmental Services (PES) (Börner et al. 2017). However, other studies found that the halting or the slowing down of deforestation only occurs when higher income was simultaneous with improvements in education, property rights, and employment (Ferretti-Gallon and Busch 2014; Hübler 2017). Moreover, local communities may also have developed their own sustainable form of management of common forest resources via social learning processes, and the local communities are key-actors on forest governance on the ground (Agrawal 2014). While the role of local communities as forest managers is a complex issue, it is also a highly relevant one.

Deforestation is mostly concentrated in tropical regions; however, it is closely linked to environmental problems that occur on a global scale, including climate change, biodiversity loss, desertification, and poverty. Deforestation and related land use change, when combined, comprise the second main cause of

climate change after the burning of fossil fuels (Smith et al. 2014; van der Werf et al. 2009). Biodiversity loss is also strongly concentrated in tropical forests, as these areas represent some of the most biodiverse ecosystems in the world (Brocknerhoff et al. 2017; Sarukhán and Whyte 2005). Desertification is a threat that is especially relevant to tropical dry forests, as well as one of the leading causes of soil degradation (Stavi and Lal 2015; UNCCD 2014). As poor people in tropical forests are often dependent on those forests for their livelihoods, they are also one of the groups most vulnerable to the effects of deforestation and environmental degradation (IPCC 2014; Olsson et al. 2014). Partly in response to an understanding of these links between tropical deforestation and broader global environment concerns, global forest debates have strongly focused on the need to decrease the deforestation of natural tropical forests.

Within global forest policy debates, strategies linked to strengthening the sustainable use and conservation of forest resources have gained increasing attention over the last decades (Agrawal et al. 2008; Gregersen et al. 2017; Winkel et al. 2017). Within many international initiatives, Sustainable Forest Management (SFM) is an especially dominant and central concept. The United Nations Forum on Forests (UNFF) defines SFM “as a dynamic and evolving concept, [which] aims to maintain and enhance the economic, social and environmental values of all types of forests, for the benefit of present and future generations” (UNFF 2007III(4), p.4). Through maintaining the provision of forest ecosystem services, SFM objectives include decreasing deforestation, improving biodiversity conservation, increasing income generation, and strengthening the livelihood of local populations (Adams et al. 2004; Brocknerhoff et al. 2017; Canadell and Raupach 2008; CBD 2009; Hickey 2008; MacDicken et al. 2015; McDougall et al. 2013). The concept of SFM becomes part of forest governance as a ‘package’ of laws, regulations, technical parameters, and criteria and indicators that guide its implementation on the ground (Behagel et al. 2017). Between the level of international policy and implementation on the ground, different actors shape this package according to the economic, social, and environmental values that are given to forests in these different levels of governance and in different social-ecological contexts (Agrawal et al. 2008; Angelstam et al. 2004; Hickey 2008; Quine et al. 2013). Finally, on the local level, social norms and beliefs linked to forest practices further shape SFM implementation on the ground. SFM may thus have different manifestations when being implemented in different

localities and different types of outcomes in terms of avoided deforestation and biodiversity loss, as well as poverty reduction.

Investigating how SFM ‘travels’ from a global to a specific local context can explain why SFM achieves different results in different parts of the world (MacDicken et al. 2015). Tracing how SFM is translated to a tropical context specifically may help explain the relations between policy responses, drivers, and community aspects of deforestation in the tropics (Nasi and Frost 2009). For example, the decrease of deforestation in Brazil between 2005 and 2015 resulted from a combination of strategies: command and control law enforcement, economic sanctions targeting deforestation, supply chain interventions, and an increase of protected areas (Nepstad et al. 2014). Still, while these efforts resulted in a decrease of deforestation, specifically in the Amazon (Tollefson 2015); deforestation in other regions, including the Cerrado biome (savannah) and the Caatinga biome (tropical dry forest), has continued (Beuchle et al. 2015). Furthermore, this combination of strategies is not always sustained over longer periods of time or aimed at strengthening policies to promote the sustainable use of forest resources or SFM. Examples include the recent increase of deforestation in Indigenous areas in Brazil, which are still vulnerable to illegal practices linked to deforestation and forest degradation (ISA 2017), such as illegal logging and artisanal mining, and the recent increase of deforestation in the Amazon (Fearnside 2017a).

Based on the discussion of the previous paragraphs, a clear understanding of how the sustainable use of forest resources as a strategy to combat deforestation in tropical forest affects social and environmental outcomes in specific contexts remains mostly absent. This is especially true for tropical forest biomes such as the Cerrado and Caatinga, in Brazil, that have been subject to little academic study across disciplines (e.g. biology, ecology, forestry, and social sciences) but that are subject to on-going, high rates of deforestation. Accordingly, studying how SFM is translated from global policy debates to implementation on the ground may assist in providing a better understanding of why deforestation in tropical countries is so persistent. To do so, this thesis focuses on the analysis of SFM and spans from global policy debates to local realities in Brazil. Brazil is the second highest country in forest cover in the world, the first highest country in natural tropical forest cover, and the place where the biggest global share of the deforestation of the last decades has happened (FAO 2016).

## 1.2. PROBLEM DEFINITION AND KNOWLEDGE GAPS

In international policy debates, SFM is considered as a strategy that can balance environmental, social, and economic values of forests through its sustainable management. As a concept, SFM thus has the flexibility that allows the domestic policy level to have the role of defining more specific goals within its national laws and forest policy frameworks, such as in relation to biodiversity conservation or economic development. This flexibility also allows a more particular narrowing of the focus of SFM to specific values of forest resources in different social-ecological contexts, for example highlighting environmental objectives over social values when defining technical criteria for forest management. Finally, SFM may be shaped by the specific interests of the actors involved in its implementation on the ground, such as when an environmental non-governmental organisation (NGO) that is interested in species conservation seeks to combine SFM implementation with the introduction of new norms and ideas about nature conservation. In this global-local ‘travel’, the question of how actors ‘translate’ SFM across different levels of governance until its implementation on the ground is a field of research that this thesis explores.

‘Translation’, from Latin ‘*translatiō*’, means ‘the transfer of ideas from one context to another’ (Oxford 1968). Thus, in the scope of this thesis, translations are understood as an illustration of how the SFM concept ‘travels’ across different levels of governance until its implementation on the ground in the form of laws, regulations, technical criteria, norms, and beliefs. The thesis explores three main contexts where global-local translations of SFM are found to happen: forest governance, social-ecological settings, and local practices. First, the thesis explores how global concerns linked to forest governance influence SFM in a domestic forest governance context. Second, the thesis explores how forest resources use and land-use changes influence translations of SFM within a specific social-ecological context. Finally, the thesis explores how practices of local actors influence translations of SFM on the ground. By doing so, the thesis addresses the knowledge gap about how SFM integrates global issues linked to forests, such as climate change, biodiversity, and desertification, and how it contributes to the achievement of social, economic, and environmental goals on the ground.

### *1.2.1. Global forest governance and SFM*

Global forest governance is complex (Rayner et al. 2010). First, in the absence of a unique single international ‘forest convention’, forests issues are instead part of multiple international forest-specific and forest-related policy instruments. These instruments include legally binding, non-legally binding, trade, and market instruments, such as multiple United Nations (UN) conventions on environmental issues, bilateral and multilateral timber trade agreements, and forest certification schemes (Arts et al. 2010; Kleinschmit et al. 2016). Second, global forest governance needs to address the multiple roles that forest resources have in different socio-economic and environmental governance domains (Eikermann 2015; Giessen 2013; Haberl et al. 2013). Third, because of the multiple non-state actors in forest governance, including environmental NGOs, private industries, and non-state agencies, new forms of interactions on the global level are shaping policy frameworks and forest governance outcomes on the ground (Mwangi and Wardell 2012). Consequently, forest issues are increasingly being addressed through global-local initiatives that include multiple actors across a multi-level governance context (Stephenson 2013).

Over the last two decades, global forest governance has reshaped the role of states, civil society, and private actors in forest policy, rearticulating both where decisions are made and where the action is taken. As attempts to agree on global forest convention has repeatedly failed in the 1990s, states adopted a ‘non-legally binding instrument’ on forests in 2007 (Hoogeveen and Verkooijen 2011), thus agreeing on adopting forest management principles rather than agreeing on legally binding objectives. The role of the international domain in laws to be adopted on the national level of forest governance is thus weakened, while states still have an important role in forest conservation and policy frameworks (Arts 2014). NGOs are also increasingly taking on a mediating role of connecting local and national issues into global debates, building up ‘glocal’ networks that focus on local actions to address global concerns (Arts 2004). Markets have also adopted a new role in forest governance in the last decades, linking global market concerns to local practices, which forest certification schemes and trade agreements are some examples (Arts 2014). This global-local nexus of forest governance is thus considered as an opportunity to improve the way in which local realities are considered in strategies to address global concerns. At the same time, the

complexity of global forest governance also produces new risks and pressures to local practices (Asiyanbi 2015).

How the concept of SFM travels across the multiple levels and the dimensions of forest governance has thus far not been studied intensively. In addition, most multi-level forest governance analyses are mainly focused on the role of vertical interactions amongst levels of governance, such as how international policy frameworks influences policies in regional, national, and sub-national contexts (Mwangi and Wardell 2012; Stephenson 2013). Even so, some analyses also highlight that this ‘traveling’ process is affected by vertical and hierarchical interactions and by the agency and interest of actors who use more horizontal interactions (Mwangi and Wardell 2012; Stephenson 2013). For example, studies that address the ‘global-local nexus’ consider how global problems and initiatives to solve these problems travel from the global to the local level of governance via direct, horizontal interactions between global and local actors (Arts et al. 2016). Consequently, an investigation on how the SFM concept ‘travels’ through different levels of forest governance should consider both vertical and horizontal interactions.

### *1.2.2. Social-ecological contexts and SFM on the ground*

Forests around the world are both socially and environmentally very different. While the consideration of these different social-ecological contexts is relevant for determining the effectiveness of forest governance, they still are underestimated in research and are mostly considered from a natural science perspective (e.g. Potapov et al. 2017). The implementation of SFM on the ground, for instance, challenges how to align domestic policies with different social-ecological contexts within a national territory (Arts et al. 2016; Maguire 2013). Therefore, the type of resources, the way in which they are used, and their associated governance systems also affect how actors interact and what social and environmental objectives are achieved on the ground (McGinnis and Ostrom 2014; Ostrom 2009). More specifically, how different elements within a specific social-ecological context shape actor’s behaviour and in turn contribute to the shaping of the SFM ‘package’ should be explored further.

Forest resources are part of different social-ecological contexts around the world; thus, there are different factors influencing forest management in these contexts. For example, land use change pressures on forests are directly linked to the value given to forest resources in these different social-ecological contexts. In tropical and sub-tropical regions, the climate, geographical, and ecological conditions are favourable for activities such as agriculture and livestock; thus, the pressure of land use change on forest resources are higher (Schmitz et al. 2013). National development strategies and interests from markets and other forest-related sectors also contribute to how forests are valued. In particular, activities such as agriculture and livestock in many tropical regions may give higher economic returns in a short-time scale when compared with activities linked to forest management (Ferretti-Gallon and Busch 2014). In the context of tropical and sub-tropical regions, the focus of many SFM criteria is therefore strongly linked to the decreasing the pressure of land use change on forests in these regions. In temperate and boreal regions, where there are less favourable conditions for agriculture and livestock throughout the year, forest resources may be linked to better economic return either through forest products or other forest ecosystems services (MacDicken et al. 2015). Consequently, in these regions, the pressure of land use change on forest areas is currently lower. In the context of temperate and boreal forests, SFM criteria are therefore more strongly linked to the need to improve the sustainability of a pre-existing use of forest resources.

Tropical and sub-tropical regions may also present relevant differences amongst countries and between different types of tropical forest. Forest management strategies in the southern hemisphere are mostly focused on tropical rainforests, such as the Amazon. The dominant focus of research on tropical rainforests in the Amazon can be explained by its role either in articulating strategies for forest conservation (starting in the 1970s) or, more recently, in strategies aiming to mitigate and adapt to climate change (starting in the 1990s) (Hajer and Versteeg 2005; Lemos and Agrawal 2006; Martinez-Alier et al. 2016). In Brazil, the country with the most extensive area of Amazon, however, sustainable use of forest resources of other types of forest, such as savannah (Cerrado biome) and tropical dry forests (Caatinga biome), has been receiving less attention until recently (Blackie et al. 2014). These Brazilian biomes, Caatinga and Cerrado, are also relevant for biodiversity conservation, climate regulation, and combating desertification (Beuchle et al. 2015), and Caatinga, for instance, has 54% of its

territory covered by forest (Brasil 2014a; MapBiomias 2018; SFB 2013). Another important fact to consider is that the largest share of the Brazilian population (partly) depends for their livelihoods on forests live in these two biomes (IBGE 2010) and not in the Amazon.

### *1.2.3. The role of local communities in SFM strategies*

Many studies highlight the central role that local actors have in forest management (Agrawal 2005; Agrawal and Gibson 1999; Lemos and Agrawal 2006). Many of those studies explore how external interventions, specifically from governments and civil society organisations, seek to balance the objective of strengthening the livelihood of local communities with achieving forest conservation objectives (e.g. Barnes et al. 2017). Studies that discuss this role of local communities are focused on several forest management strategies, with Participatory Forest Management (PFM) and Community Forest Management (CFM) being two important examples (Arts and de Koning 2017). However, research on SFM with a focus on local networks of actors, including local communities, is still relatively absent.

Much has been done to understand how external interventions can result in better practices of local communities and how they can realise positive outcomes for local livelihoods and forest conservation objectives (Barnes et al. 2017). Studies on CFM moreover suggest that forest management strategies are 'negotiated' through the articulation of externally introduced ideas and norms with locally embedded practices, making local communities thus a part of a multi-level governance context (Arts and de Koning 2017; De Koning 2014). Thus, local communities are considered one of the stakeholders interacting with other actors within forest governance across levels, bringing in their own interests and needs, as well as their own practices in using forest resources. While such research is invaluable for contributing to build better policies and programmes to support the sustainable use of forest resources, the focus on communities and external interventions from higher governance levels often tends to neglect the important role that other local actors have in forest governance.

The ways in which these local networks of actors, including communities, reject, adapt, and/or integrate SFM implementation strategies to their local practices is a field that still needs to be better explored (Cleverly 2012).

A practice-based approach to forest governance, for example, assumes that when CFM strategies are locally implemented, local actors will draw on their local practice to exercise agency and create new forms of forest governance (Behagel et al. 2017). Consequently, understanding how SFM is implemented also requires knowledge about how local practices are actively shaped by local agencies (Ostrom 2009; Rametsteiner 2009). Investigating social processes in which SFM strategies are reshaped by local practices may thus contribute to understanding why SFM implementation is more effective in one case than another to achieve improved livelihoods and/or forest condition.

### **1.3. OBJECTIVES AND RESEARCH QUESTIONS**

This thesis investigates how SFM is translated while ‘travelling’ across different levels of governance, including its implementation on the ground. These translations processes are performed by actors across different levels of governance and determine how SFM becomes part of (1) international forest governance, (2) domestic forest policy frameworks, (3) specific social-ecological context, and (4) local practices. By investigating these translations, this thesis contributes to a better understanding of the global-local nexus of SFM in multi-level forest governance (Arts et al. 2016; Mwangi and Wardell 2012; Stephenson 2013). In other words, this research explores the global-local nexus of SFM by identifying how SFM is translated across multiple levels of governance, within social-ecological contexts, and through local practices. The main question (MQ) of the research is therefore the following:

*(MQ) How is SFM translated within the global-local nexus of forest governance?*

To answer the MQ, the analysis is organised into four main blocks of analysis that are linked via three research sub questions (SQ). The first block ‘sets the scene’ and has the specific goal of exploring approaches of SFM at either side of the global-local nexus, hence in international policy on the one hand and in Caatinga biome, Brazil, on the other hand. While this first block aims at finding

(dis)similarities between global and local SFM approaches, the other blocks focus on each layer of the global-local nexus and on the mechanisms behind SFM translations. The second block of analysis has the specific objective of analysing to what extent global forest governance has affected SFM translations in Brazilian forest governance, thus linking the global to the domestic level:

*(SQ1) How is sustainable forest management translated from global forest governance to the Brazilian national level of forest governance?*

The third block of analysis explores to what extent elements of a specific social-ecological setting, such as typical forest resources and the needs and interests of local actors, may re-shape SFM approaches that ‘trickle down’ from the national level. This thesis identifies Caatinga biome in Brazil as the case to explore this relationship, thus linking the domestic to the sub-national level:

*(SQ2) How is sustainable forest management translated within the social-ecological setting of the Caatinga biome in Brazil?*

Finally, the fourth block of analysis focuses on how local actors in Caatinga biome respond to SFM implementation strategies and to what extent these processes shape forest governance outcomes. Here, again, the thesis assumes that translation processes occur from the sub-national to the local level:

*(SQ3) How do local actors translate sustainable forest management into their social practices?*

## **1.4. THEORETICAL FRAMEWORK**

Governance is a key concept in this thesis, and its understanding informs the theoretical choices made. A first understanding of governance that informs this thesis is “the many ways in which public and private actors [...] govern public issues at multiple scales, autonomously or in mutual interaction” (Arts and Visseren-Hamakers 2012, p.242). In this sense, governance refers to interactions amongst different actors who define common problems and design

joint solutions. More specifically, global forest governance is the process by which different actors interact while aiming at a better management and conservation of forest resources around the world. Global forest governance is thus directed at changing local practices via creating ‘pressures for positive change’ at different levels, from national to sub-national and local levels of governance (Mwangi and Wardell 2012). Rather than being isolated state interventions, these pressures are increasingly originating from multi-level interactions amongst actors to address global concerns linked to forests, from biophysical to socio-economic concerns (Berkes 2008).

The term ‘multi-level governance’ (MLG) describes how policy frameworks are developed by politico-administrative structures spread over different levels of governance (Stephenson 2013). Although MLG literature often considers the relevance of different actors beyond the state, the analysis of MLG frameworks specifically discusses innovations in (inter)governmental policy-making. A prime example is the European Union (EU), where so-called ‘framework directives’ are used to set broad policy objectives at the supranational level of the EU, whereas member states have discretionary powers to define national programmes and measures within that context (Hooghe and Marks 2003). Therefore, analyses of MLG are mostly focused on vertical interactions mainly occurring through formal (inter)state structures. Also, in forest governance, the MLG approach considers, for instance, how an international policy is ‘translated’ to regional, national, sub-national, and local policies mainly through vertical interactions amongst governments (Rametsteiner 2009). However, non-state actors are becoming more frequently considered relevant in the MLG literature. For example, Hooghe and Marks (2003) distinguish between Type I and Type II MLG. The first type refers to federal governmental systems that are stable and neatly layered, while the second refers to multiple ‘spheres of authority’ (SOAs), including those beyond the state, that are irregularly disperse over various territories.

This thesis, however, prefers to use the concept of ‘global-local nexus’ instead of MLG as an overarching term. This notion better expresses the horizontally organised interactions and social networks amongst non-state actors (Berkes 2008) that can include the vertically organised, government-oriented MLG Type I at the same time. The global-local nexus of forest governance thus connects global issues to local actions either through vertical layers of formal policies and

structures or through informal social interactions and networks, or through both in hybrid arrangements (Mwangi and Wardell 2012). Nonetheless, governmental organisations can also be part of such networks, but as mere participants, just like non-state actors, and not as formal authorities that are hierarchically positioned above others.

Within governance and MLG studies, including environmental governance research, the institutional approach has been very influential (Hooghe and Marks 2003; Kjær 2004; Lemos and Agrawal 2006; Ostrom 1990). This is no surprise, since many studies have shown that institutions have a key role in guiding the behaviours of actors toward managing or protecting public goods, such as the environment or natural resources (Paavola 2007; Young 2013), and more specifically toward forest goods and services (De Koning 2014; Maguire 2013; Monroy-Sais et al. 2016). An institution may be defined as a set of rules, norms, and beliefs that guide the behaviours of actors and consequently the interactions amongst them to either achieve or avoid a specific expected outcome (Amenta and Ramsey 2010; Scott 2010). In this sense, institutional theory has been used as a central approach to explore the behaviour and interactions of actors with regard to forests. This thesis continues that tradition and uses an institutional approach to investigate its object of study, drawing on new institutionalism and critical institutionalism.

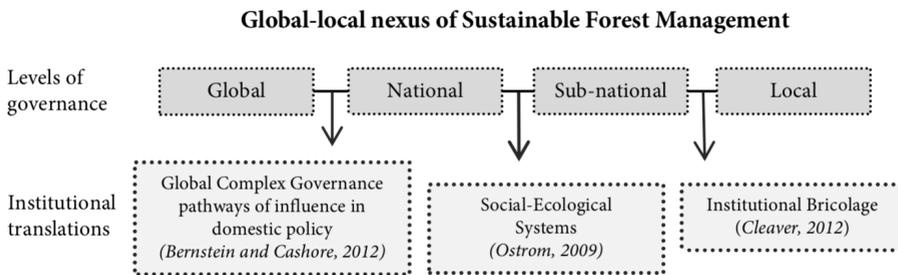
Traditional institutionalism focuses on the role of somewhat stable, formal bureaucracies in state policies that regulate and guide in a governmental setting the behaviours of actors (Hall and Taylor 1996; March and Olsen 1984). In contrast, new institutionalism operates by understanding that behaviours of actors are guided by formal rules and by a more complex system of social norms and cultural beliefs that are moreover considered (rather) dynamic in nature (Hall and Taylor 1996; March and Olsen 1984). As such, new institutionalism articulates the need to consider informal and dynamic institutions in addition to formal and stable institutions when investigating the behaviours of actors based on a governmental context (Lowndes and Roberts 2013; Nielsen 2016; Peters 2012). Formal SFM institutions, as mentioned in this thesis, may thus be exemplified as laws, regulations, and technical guidelines shaping SFM implementation on the ground, whereas informal institutions may be exemplified by social norms and cultural beliefs linked to local practices of forest governance, management and use.

Different analytical approaches are part of new institutionalism and are generally grouped as rational choice, historical, sociological, and discursive institutionalism (Lowndes and Roberts 2013; Schmidt 2010). These different approaches diverge on their definition of institutions (for example, including or excluding ideas), on the key factors that shape institutions (interests, path dependencies, cultures or discourses, respectively), and on how they might change across scales and over time (small-, large-scale; short-, long-term). However, they also share the fundamental idea that formal and informal institutions are always subject to certain degrees of change and guide the behaviours of actors in producing governance outcomes (Lowndes and Roberts 2013). Critical institutionalism as the next step in institutional thinking builds on these insights, but it goes one step further in assuming that the agency of an actor is the key factor in understanding how formal and informal institutions perform in practice (Cleaver 2012; Cleaver and De Koning 2015). It therefore focuses on the role of so-called 'bricoleurs': actors who reshape, refashion, and recombine rules, norms, and beliefs through local bricolage practices to match those with their needs and interests. Critical institutionalism exhibits a much more open attitude than the older institutionalisms towards social and ecological factors and mechanisms to explain governance outcomes, besides purely institutional outcomes (De Koning and Benneker 2013; Ostrom 2009). The more open attitude matches this thesis very well because it focuses on such factors and mechanisms (such as social networks in the global-local nexus and the social-ecological setting in Caatinga biome).

This thesis builds upon a set of analytical frameworks that focus on different aspects of new and critical institutionalism. By doing so, multiple types of translations of SFM in the global-local nexus are explored in this thesis. The thesis thus explores how SFM, as a concept and as an institutional package, travels through the global-local nexus, being reshaped by multiple actors at multiple levels. First, the thesis analyses whether global forest governance affects domestic translations of SFM, and if so, through which pathways, including formal rules, discourses and norms, markets, and direct interventions by global actors (Bernstein and Cashore 2012). Second, the thesis investigates how characteristics of specific Social-Ecological Systems (SES), including resources, actors, and governance sub-systems, contribute to sub-national translations of SFM (McGinnis and Ostrom 2014; Ostrom 2009). Finally, the thesis analyses how bricolage practices lead to

SFM translations in local forest management (Cleaver and De Koning 2015) (See Figure 1). All these three analytical frameworks ('pathways of influence', 'SES', and 'institutional bricolage') may be broadly situated within the school of new or critical institutionalism and combine insights from the various strands within it (role of ideas, interests, norms, values, path dynamics, and local agency).

Figure 1. A Global-local nexus of Sustainable Forest Management and analysis blocks



*Elaborated by the author.*

Figure 1 summarises the argument so far and introduces the notion of 'institutional translation' (so far, only referred to as 'translation'). Institutional translations are understood as processes through which institutional elements, such as rules, norms, and beliefs related to SFM, are changed while 'travelling' from one setting to another. The institutional translation includes the transfer process from one context to another itself and change processes that occur while 'travelling' from one setting to another. Mechanisms behind these transfers and changes identified in this thesis are pathways of influence, SESs, and bricolage practices (see Figure 1).

### *1.4.1. Institutional translations from global to domestic forest governance*

New institutionalism is commonly used as an analytical approach to investigate how international rules and regulation, often coined as ‘international regimes’, influence domestic institutions guiding the behaviours of actors in a domestic level of decision-making (Agrawal et al. 2008; Mwangi and Wardell 2012; Ostrom 2011; Young 2013). In addition to such vertical, hierarchical influence of international regimes on domestic policy frameworks, global governance also affects national, sub-national, and local governance systems through horizontal interactions, such as through social networks and institutional ‘packages’ that travel from one locus to the other (Arts et al. 2016; Behagel et al. 2017). This thesis applies the following ‘four pathways of influence’ of Bernstein and Cashore (2012) to analyse how global institutions that have incorporated SFM are ‘translated’ within the domestic level of governance: (1) international rules, (2) global norms and discourse, (3) international markets, and (4) direct access to policy-making processes through the presence of international organisations within countries (Bernstein and Cashore 2012).

International rules have a direct influence on national laws, policies, and programmes in response to legal obligations that countries have once they have signed and ratified an international agreement (Bernstein and Cashore 2012). International rules may also originate from non-governmental actors who for example create standards that are integrated into national policies; one might think of forest certification (Visseren-Hamakers and Glasbergen 2007). International norms and discourses of forest governance “prepare the way for other pathways to occur” (Burns and Giessen 2016, p.495) while competing with other global and domestic discourses (Behagel and Arts 2014). International markets may also directly affect national policies through trade sanctions, for instance, or indirectly through market-based mechanisms, such as payments for environmental services and certification schemes (Bernstein and Cashore 2012). In addition, international markets involving products other than timber may also influence domestic forest policies, especially in countries that depend on the trade of international commodities (Soares-Filho et al. 2014). Finally, direct international access to domestic policy-making processes is subject to sovereignty rights, but direct access is the pathway through which global governance most

directly influences domestic politics (Bernstein and Cashore 2012). This may occur through direct international support to national organisations, for example through technology transfer. Alternatively, direct access to policymaking can occur through direct financial support to a specific governmental programme, such as a National Forest Programme (NFP).

The previous topic of how SFM as an ‘institutional package’ affects domestic forest governance should however also entail the analysis of the pre-existing institutional setting on a national level (Singer 2008). Accordingly, this thesis analyses how the four pathways of influence interact with the domestic governance context that may be equally characterised by complexity. This analysis includes how national actors translate global SFM institutions into the national forest policy framework, how domestic discourses constrain or strengthen the uptake of international norms, how national interests translate SFM while responding to incentives from international markets, and how national actors respond to SFM initiatives of international organisations within their domestic context.

#### *1.4.2. Institutional translations within Social-ecological Systems*

One of the largest contributions to deforestation in the tropics comes from increasing pressure from land use change (Carter et al. 2017; Hoogeveen and Verkooijen 2011; Nolte et al. 2017). Thus, it is of interest to understand how these uses and pressures in a specific context influence the translations of SFM. However, the use of forest resources by actors within a socio-ecological setting may be unique. Consequently, SFM translations are also influenced by such socio-ecological particularities. In Brazil, for instance, SFM translations in the Amazonian tropical rainforest may substantially differ from other regions, such as the savannah of Cerrado biome or the tropical dry forest of Caatinga biome. However, governance studies and institutional analyses have for too long failed to consider the role of forest ecology in their frameworks explicitly. Recognising this research gap, the importance of SES perspectives in institutional analysis has been increasingly advocated in the field of common pool resource management, amongst others (Hinkel et al. 2014; Ostrom 2009; Schlüter et al. 2014). In particular, the SES framework explicitly draws attention to how forest ecology,

resource use, governance structures, and social networks are intimately entwined in an SES (McGinnis and Ostrom 2014). This thesis also uses the SES framework to understand how the social-ecological context of a specific forested biome, such as Caatinga, and its linked governance systems affect translations of SFM.

A SES is defined by its sub-systems of resources, resource units, users, and governance in a specific SES (Arts 2014). The general understanding of a SES is that the interaction amongst those sub-systems entails and is guided by formal and informal institutions (Hinkel et al. 2014). In the scope of this thesis, the considered actors are those from local communities, governments, markets, non-governmental organisations, research institutions, and universities who are directly or indirectly involved in managing forest resources. Forest resources comprise forest products such as wood (timber, firewood, and charcoal) and non-wood forest products (e.g. fibres, oil, fruits, and extracts) and other forest ecosystem services, such as biodiversity, climate regulation, and soil conservation (Sarukhán and Whyte 2005). Accordingly, governance is considered the outcome of the interactions amongst actors, resources, and their uses that entail and are guided by formal and informal institutions (Ioris 2014; McDougall et al. 2013).

While specifically exploring SFM in a SES, the thesis also uses critical institutionalism to distinguish between techno-bureaucratic and socially embedded institutions (Cleaver and De Koning 2015). Techno-bureaucratic institutions include formal rules and norms that, even if not formalised in rules, may be recognised as codes of conduct guiding the behaviours of actors (Scott 2008). Socially embedded institutions are more diffuse in their articulation and less likely to travel across different contexts than techno-bureaucratic institutions because they are anchored in historical, cultural, and political beliefs (Peters 2014). The choice of using the SES analytical framework to investigate how SFM institutions are translated sub-nationally in a specific biome, for instance, is based on the understanding that formal and informal institutions (rules, norm, and beliefs) are specific to a social-ecological context guide interactions amongst users, resources, and governance sub-systems (Hinkel et al. 2014). In this sense, while using the SES analytical approach, the thesis emphasises that translations of SFM institutions are influenced by international and national forest governance contexts and by social and ecological interactions linked to a specific biome. In addition, the thesis intends to contribute to answering the questions of why and how SFM is differently implemented around the world with varying outcomes.

### *1.4.3. Institutional translations through local bricolage processes*

Although formal and informal institutions are generally stable over time, they are equally subject to dynamics and change over space, time, and levels of governance (De Koning and Cleaver 2012). Within ‘new institutionalism’, each different approach (sociological, historical, rational choice, or discursive) understands institutional change through a different lens: a social process of adapting to new cultural norms; an historical process of path-formation; a rational process of re-calculating net benefits; or the institutionalising of new ideas through communication, respectively (Lowndes and Roberts 2013; Schmidt 2010). Critical institutionalism seeks to do more justice to the agency of actors and their various logics of action (social, historical, rational or communicative) within a setting of multiple formal and informal institutions. Here, the assumption is that local actors, once confronted with such a multitude of rules, norms, and beliefs, ‘reshape’, ‘recombine’ and ‘refashion’ institutions through local practices built on local needs and interests that are also shaped by the availability of goods and services, for instance, that are linked to forest resources (De Koning and Cleaver 2012). The gap between ‘new institutionalism’ theories and multiple behavioural outcomes in socio-ecological localities is analysed, and this critical approach assumes that institutions are subject to ‘bricolage processes’ at a local level (Cleaver 2012). Institutional bricolage thus concerns the reshaping and reshuffling of formal and informal rules, social norms, and cultural beliefs by local actors to fit their needs and interests (Cleaver 2012; Cleaver and De Koning 2015).

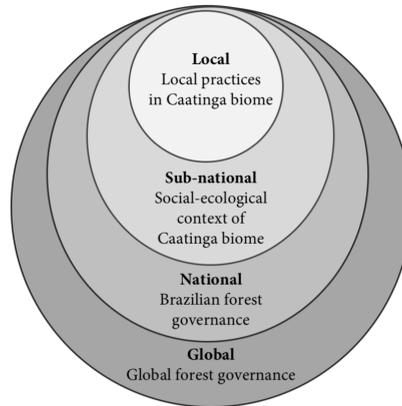
Institutional bricolage was operationalised into triple-A, ‘aggregation’, ‘alteration’ and ‘articulation’ by De Koning (2014) and Cleaver and De Koning (2015). Aggregation occurs when newly introduced formal institutions are integrated into pre-existing socially embedded institutions (De Koning 2014). An example is when a technical standard on SFM is easily compatible with a local norm. Alteration is linked to the necessity to change a newly introduced formal institution to ensure its social applicability (De Koning 2014). Such might occur when an SFM rule contrasts a customary rule. Finally, articulation is the rejection of a newly introduced institution through resistance informed by traditional identities and culture beliefs (De Koning 2014), and an example of articulation is when a forest regulation is not followed because it is in direct conflict with a local taboo.

In the scope of this thesis, 'institutional bricolage' is adopted to analyse how SFM institutions are translated through local practices. Such an analysis shows how local actors reuse, rework, and refashion institutions in a performative manner (Behagel et al. 2017; Cleaver 2012). In other words, the analysis highlights the agency that different actors and networks of actors have in shaping SFM on the ground and how that agency brings about institutional dynamics and change. This also draws attention to the more horizontal interactions within the global-local nexus, as an analysis of bricolage processes focuses on the role of local actors in institutional translations within a broader social network. In a sense, bricolage is therefore both the final step and the first step of the translation of SFM in a global-local nexus of forest governance depending on whether a vertical or a horizontal perspective is used.

## **1.5. METHODOLOGICAL DESIGN**

The present thesis investigates the global-local nexus of SFM, specifically exploring SFM institutional translations happening across different levels of governance shaping outcomes and practices on the ground. This research is based on qualitative methods Qualitative research covers different disciplines and may be applied through different tools (Snape and Spencer 2013). In this thesis, the qualitative research approach provides and interprets an understanding of a social phenomenon (Ritchie 2013). In particular, the research explains how actors translate SFM institutions across different levels of governance, and the methodological design of the research builds upon a nested case study. The nested case study is used to analyse different cases as part of a broader case study, breaking down the broader unit of analysis in smaller units that integrate the object of study (Thomas 2011). In this thesis, the global-local nexus of SFM institutions is the broad object of study, and SFM institutional translations happening across different levels of governance between global and local levels, are integral parts of this broad object of study (see Figure 2).

**Figure 2.** Nested case study: the global-local nexus of SFM: the case of Caatinga biome, Brazil



*Elaborated by the author.*

The nested case study organises the research into three blocks of analysis of translations of institutions linked to SFM occurring from a global level to a national level of governance, from a national level to a sub-national level of governance; and from a sub-national level to a local level of governance. First, the research focuses on the analysis of the influences of the global forest governance context SFM institutional translations in the Brazilian forest governance context. Brazil is chosen as the domestic level of governance to be analysed due to its central role in global forest governance debates (McDermott et al. 2010). Moreover, its territory has more than 50% of native forest cover (SFB 2017), including other tropical forest types besides the rainforest of Amazon biome, such as Atlantic Forest biome (coastal tropical rain forest), Cerrado biome (savannah), and Caatinga biome (tropical dry forest). Within the Brazilian territory, the research focuses on whether interactions amongst governance, forest resources, and actors influence SFM institutional translations in the specific social-ecological context of the Caatinga biome. The Caatinga biome, in northeastern Brazil, is mainly covered by tropical dry forests where challenges regarding biodiversity loss, climate change, desertification, and poverty become aggregated (Gariglio et al. 2010). Finally, the analysis of the local level of governance focuses on the influence of institutional bricolage processes on SFM institutional translations specifically linked to SFM implementation in rural settlements in Caatinga biome, where, according to the Brazilian government, SFM has been achieving the most positive results within the Brazilian territory (SFB 2013).

### 1.5.1 Data collection

This thesis builds upon primary and secondary qualitative data. The primary data were collected through fieldwork performed in Brazil in two different periods: the first period was from March to May 2016, and the second period was from April to May 2017. Before collecting data, the researcher developed a fieldwork plan identifying its structure, aims, sources, and risks. The Ethical Committee of Wageningen University approved the fieldwork plan before the first visit to Brazil. In addition, a formal consent form (in both English and Portuguese) asking permission to record the conversation and guaranteeing anonymity, if desired, was used and explained before all interviews. In the case of local populations, all interviewees were made anonymous by default when presenting the results. In both periods of the fieldwork, the researcher personally conducted face-to-face interviews with key actors and visited local organisations, industries, and communities (rural settlements) (see Table 1). The collection of secondary data was performed through the analysing literature, official documents, reports, laws, and legislation from the international, national, sub-national, and local levels of governance.

Table 1. Interviews and visits in international, national, sub-national, and local levels

Type of organisation / Level of governance	International and National	Sub-national	Local	Total
<b>(a) Interviews</b>				
International	4	-	-	4
Federal Government	10	6	-	16
Civil Society	5	4	-	9
State Government	-	2	-	2
University	-	2	-	2
Field technicians	-	-	3	3
Ceramic and Plaster Industries	-	-	4	4
Rural settlements	-	-	5	5
<b>Total</b>	<b>19</b>	<b>14</b>	<b>12</b>	<b>45</b>
<b>(b) Visits</b>				
Plaster industry	-	-	1	1
Ceramic industries	-	-	3	3
Rural Settlements	-	-	5	5
<b>Total</b>	<b>-</b>	<b>-</b>	<b>9</b>	<b>9</b>

*Elaborated by the author.*

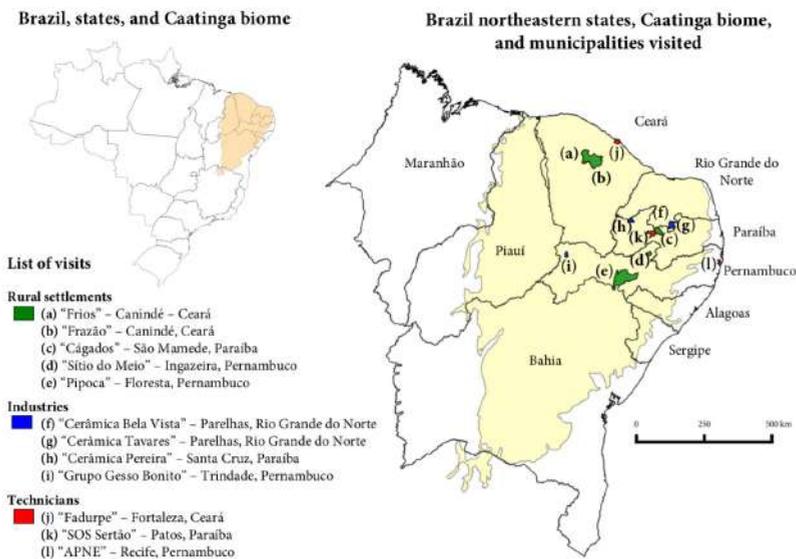
The first and second blocks of analysis are primarily based on the primary data collected in the first phase of the fieldwork held in Brazil between March and May 2016 when the researcher interviewed 33 people, which the details are presented in Table 1, the ‘international and national’ and ‘sub-national’ interviews. The third block of analysis was mainly based on primary data collected on the second phase of the fieldwork held on April and May 2017 that included 12 interviews and visits to 1 plaster, 3 ceramic industries, and 5 rural settlements in different municipalities within the Caatinga biome, Brazil. The secondary data contributed to all blocks of analysis.

The primary data were collected in the form of semi-structured interviews and site visits. Semi-structured interviews, also known as in-depth interviews, are used to build an interpretation of the social world from the interviewee’s perspective, helping to map the issues to be explored by the researcher (Legard et al. 2013). The semi-structured interviews were based on a list of questions to stimulate the first answers followed by probing to explore further information about central issues (Ritchie 2013). Appendix 1 of this thesis presents the list of key-questions used in the semi-structured interviews. The interviews had an average duration of one hour each, and the local visits had an average duration of two hours each. A detailed list of the interviewees, including the organisation and the place (city) where the interview occurred, is presented in Appendix 2 of this thesis.

To select the actors interviewed and the local organisations, industries, and communities visited, documents were analysed based on their relevance for SFM in a national context and on their links to SFM in the Caatinga biome. To do so, the researcher drew on her previous professional background as a forest policy officer in the Brazilian Forest Service, including specifically working in Caatinga biome. In addition, snowball sampling was used to improve data sampling by identifying other documents to be analysed; key-actors to be interviewed; and local organisations, industries, and communities to be visited. Snowball sampling is a strategy to improve the frame of the data collection when it is difficult to identify, in the first moment, all the relevant key sources of data related to the focus of the research (Arts et al. 2016).

The nested case study method divided the primary data collection into three phases, and the snowballing method expanded the sample in each phase. Data collected through interviews of the first block of analysis, for instance, were also considered and helped to identify key actors to be interviewed and secondary data to be collected for the second and third blocks of analysis. Considering the results from the first and second blocks of analysis, the selection of the local case studies of the third block of analysis was based on the following criteria: (1) for technicians, they should be involved in an initiative of SFM implementation in rural settlements in Caatinga biome; (2) for industries (ceramic/plaster) they should be located in Caatinga biome and consume (or interested in consuming) firewood from an SFM plan for their energy supply; (3) for local communities (rural settlements), they should be located in Caatinga biome and have a SFM plan implemented or in implementation involving a group of families through a community-based approach. Figure 3 shows the location of the local data collection for the third block of analysis. The local visits to industries and rural settlements included visits to forest areas and industrial installations in addition to the personal interviews.

Figure 3. Brazil, northeastern states, Caatinga biome, municipalities visited, and list of visits



### *1.5.2. Data analysis*

All the interviews were recorded (audio), transcribed in the original language (Portuguese), and stored at the Wageningen University database according to the established data management guidelines. All the primary data collected are confidential and were strictly used for this research. The data analysis was based on the inductive method of grounded theory, which consists of open, axial, and selective coding to examine concepts and develop an explanatory framework (Starks and Brown Trinidad 2007). For each block of analysis in the research, the inductive method was combined with coding for sensitising the concept to approach the empirical data (Bowen 2006). The sensitising concepts used for the data analysis were drawn from the theoretical framework: for the first block of analysis, the ‘four pathways of influence of complex global governance in national policies’ (Bernstein and Cashore 2012); for the second block of analysis, the ‘SES analysis framework’ (Lowndes and Roberts 2013; Schmidt 2010); and for the third block of analysis, ‘institutional bricolage’ (Cleaver 2012; Cleaver and De Koning 2015).

Only the analysis of the data linked to the background chapter of this thesis (chapter 2), which was based on secondary data, followed a previously structured conceptual framework articulated before the data collection was performed and focuses on institutional arrangements of SFM in the international policy context and in the Brazilian governance context specifically linked to Caatinga biome. The data analyses for the rest of the chapters (chapters 3, 4, and 5) were developed as follows: (a) the first round of data analysis from interviews consisted of reading the transcriptions and highlighting interesting parts for the analysis and/or explicitly linked to sensitising concepts of the analysis block; (b) the second round of data analysis consisted of reading the previously highlighted parts and re-coding them, relating these new codes to the content of all the interviews; (c) the third and last round of the data analysis consisted of organising the codes in a storyline, linking the storyline to the sensitising concepts of each block of analysis and translating the most important quotations from the interviews to English.

The three rounds of analysis of data from interviews resulted in theme structures for each of the analysis blocks: [first block] (a) international

conventions and SFM in Brazilian policies, (b) SFM and the Brazilian ‘new’ Forest Code, and (c) SFM and the Brazilian biomes; [second block] (a) forest resources uses in Caatinga, (b) techno-bureaucratic institutions linked to SFM in Caatinga, and (c) socially embedded institutions linked to SFM in Caatinga; and [third block] (a) legal and sustainable use and trading of native forest resources through the implementation of a SFM plan in Caatinga, (b) SFM implementation and social organisation of local population in rural settlements in Caatinga, and (c) the provision of technical assistance services for SFM implementation in rural settlements in Caatinga. These themes were concurrently used to organise and present the results in the various chapters.

## **1.6. THESIS OUTLINE**

The thesis is organised into six chapters, including the present introduction. The second chapter sets the scene of the thesis, investigating the background of SFM institutional arrangements and whether it is possible to identify convergences and divergences between these arrangements in the international policy context and in the Brazilian national policy framework specifically linked to Caatinga biome. For this investigation, the second chapter analyses SFM in the three ‘Rio Conventions’, in international non-legally and legally binding forest instruments, and in trade and market-based instruments. The chapter then analyses SFM in the Brazilian national policy framework specifically linked to Caatinga biome. Finally, the second chapter discusses the convergences and divergences between SFM institutional arrangements in these two levels of governance, building up a background of the global-local nexus of SFM.

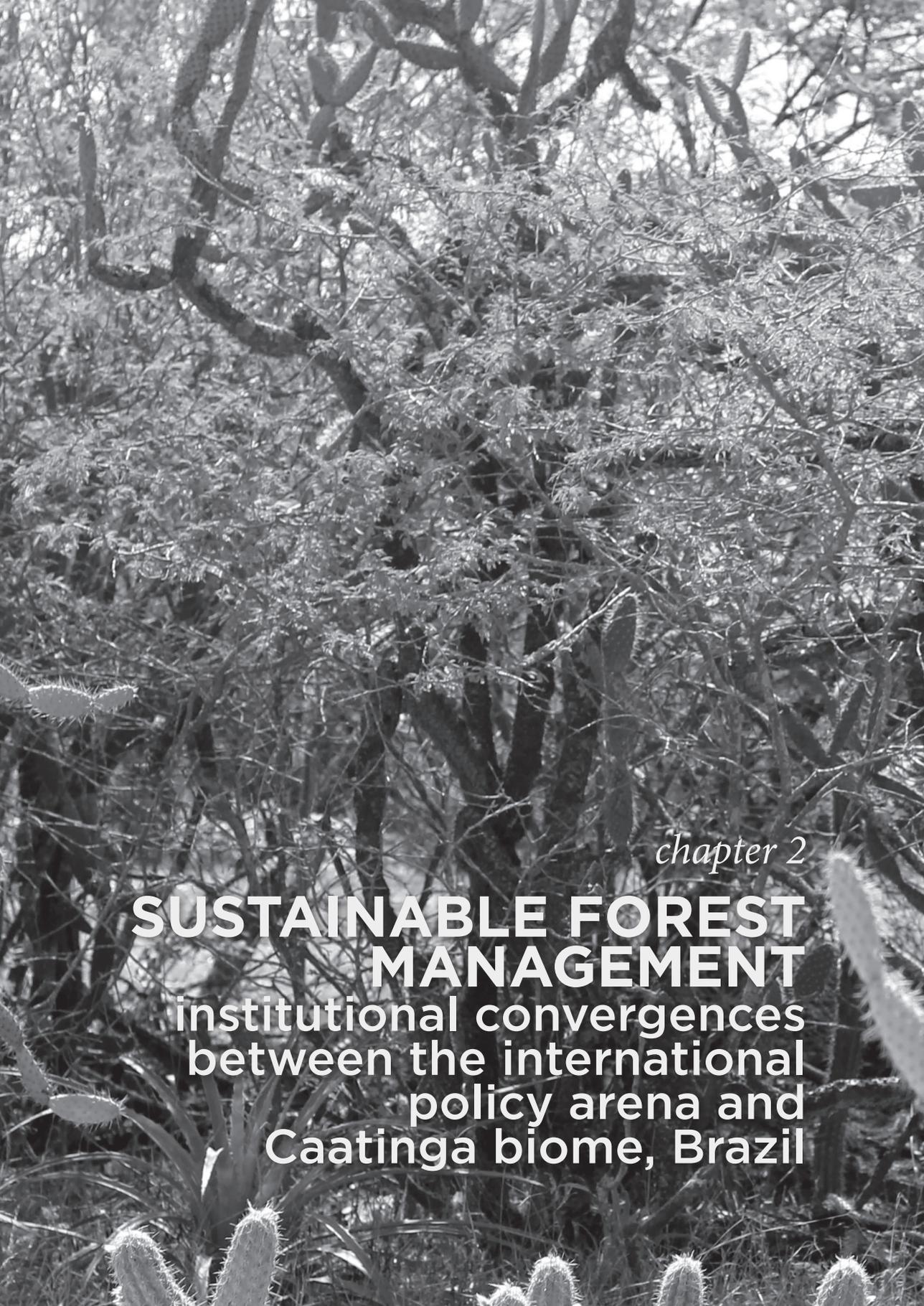
The third chapter explores how global forest governance influences SFM institutional translations within Brazilian forest governance. More specifically, the chapter investigates these influences through four pathways: international rules, global norms and discourses, international markets, and direct access to domestic policy-making processes by international organisations. Finally, the

third chapter discusses how SFM institutional translations within the Brazilian governance context steer different environmental domains, such as climate change, biodiversity, and desertification in the four Brazilian biomes.

The fourth chapter discusses through a SES analytical framework whether the specificities of Caatinga biome influences SFM institutional translations in this context. For this purpose, the chapter analyses whether the interplay of forest governance, forest resources use, and actor networks influence translations of SFM techno-bureaucratic and socially embedded institutions in Caatinga biome. Finally, the chapter discusses the role of each one of the elements of the SES (governance, resources, and actors) in influencing SFM institutional translations in the Caatinga biome social-ecological context.

The fifth chapter investigates whether SFM institutional translations in Caatinga biome are influenced by institutional bricolage processes of ‘alteration’, ‘aggregation’, and ‘articulation’, resulting in (un)expected forest governance outcomes on the ground. Through an institutional bricolage lens, the chapter analyses interactions between a new set of formal and techno-bureaucratic institutions linked to SFM implementation strategies and a pre-existing set of local and socially embedded institutions. The chapter discusses, finally, whether the success of SFM implementation is shaped by institutional bricolage processes resulted from interactions amongst networks of local actors within the Caatinga biome social-ecological context.

Finally, the sixth chapter presents the synthesis and conclusions of the research discussing the global-local nexus of SFM through the three analysis steps. First, the chapter discusses how SFM institutions are translated from the global to the Brazilian forest governance context. Second, it discusses how interactions amongst resources, actor networks, and governance systems occurring within the social-ecological context of Caatinga biome shape translations of SFM institutions in this specific context. Third, the chapter discusses how institutional bricolage processes by local networks of actors translate SFM institutions to local practices, shaping economic, social, and environmental outcomes of SFM implementation on the ground. Then, the chapter presents reflections on the research approach and considerations for future research. Finally, the chapter discusses research implications and policy recommendations.



*chapter 2*

**SUSTAINABLE FOREST  
MANAGEMENT**

institutional convergences  
between the international  
policy arena and  
Caatinga biome, Brazil

## Abstract

Sustainable Forest Management (SFM) aims at using forest resources in a manner that incorporates the conservation of forest-related ecosystem services and balances the economic, social, and environmental values of forests. In international policy, a unique 'forest convention' is absent. Accordingly, SFM is part of several international environmental policies, and each policy emphasises different aspects. These policies guide SFM implementation strategies on the ground. This chapter explores the global-local nexus of SFM by comparing its institutional arrangements in international policy and in the specific social-ecological context of Caatinga biome, Brazil. Through this comparison, the chapter highlights how these institutional arrangements of SFM converge between these levels. The chapter concludes, first, that the most relevant convergences of SFM institutional arrangements are between the 'Rio Conventions' and its linked national policy framework. Second, the chapter concludes that although the forest governance is characterised by complexity on the global level, the complexity of SFM institutional arrangements on the domestic level is also shaped by specificities of different social-ecological systems within the national territory. The chapter concludes by highlighting the need to explore the global-local nexus of SFM to understand how SFM is adapted, changed and integrated by actors across different levels of governance from international and national policy to implement strategies and produce beneficial forest outcomes on the ground.

**Key-words:** International forest policy; Brazilian forest governance; Global-local nexus of SFM.

Part of this chapter is based on the following publication:

**Faggin, J. M., & Offermans, A.** (2016). Sustainable Forest Management as a potential integrative approach in international public policy. In: Ron Cörvers, Joop de Kraker, René Kemp, Pim Martens, Harro van Lente (Eds.). *Sustainable Development Research at ICIS - Taking stock and looking ahead*. Maastricht University, Maastricht, pp.189-201.

## 2.1. INTRODUCTION

Deforestation is one of the leading causes of climate change and is closely linked to biodiversity loss, land degradation, desertification, and poverty (Dudley et al. 2014; FAO 2016; UNCCD 2014). The loss of forest cover directly impacts the provision of forest ecosystem services such as wood and non-wood products, water quality, soil fertility, biodiversity, and climate regulation (FAO 2016; Mori et al. 2017; Sarukhán and Whyte 2005). The conversion of forests into other land uses also connects more frequent extreme weather events (such as prolonged droughts and floods), increasing land degradation, poverty, and migration of local populations (Pokorny et al. 2013; UNCCD 2014).

The sustainable use of forest resources is crucial for addressing challenges on biodiversity conservation, climate change, desertification, and poverty, and promoting more sustainable strategies of using forest resources is especially relevant for arid and semi-arid regions (Chenery et al. 2009; FAO 2016; UNCCD 2017), where 20,2% of the global population live (UN-EMG 2011). In this context, sustainable forest management (SFM) appears as a central concept in international policy to balance the environmental, economic, and social values of forest resources through its uses and the continuous provision of forest-related ecosystem services (Arts and Buizer 2009; Gale and Cadman 2014; Hickey 2008). While there are more concepts that refer to the sustainable use of forest resources, including sustainable management of forests (SMF) and forest ecosystem management (FEM), SFM is the most commonly used term in international and national policy frameworks.

The current literature on forest governance shows that forest issues are included in multiple international policies. While many policies include SFM as an implementation strategy, this 'fragmented' policy field is also suggested to lead to implementation challenges (Haberl et al. 2013; Hahn and Knoke 2010; Quine et al. 2013). The lack of an international binding instrument, or a 'forest convention', leads to complexity: international forest governance is composed of multiple hierarchical and horizontal connections between global governance and local practices (Arts et al. 2016). Hierarchical connections are made via implementing multiple international environmental conventions. Horizontal connections between global and local dimensions, for example, those mediated by actors who

travel between global and local policy arenas, add to this complexity. Accordingly, institutional arrangements on the international level may differ significantly from local institutional arrangements when considering forest policy and SFM.

By exploring institutional arrangements of SFM in the global and a specific level of governance and looking for convergences between them, this chapter provides insight into the global-local nexus of forest governance (Arts and Babili 2013). This global-local nexus is here understood as the amalgam of vertical (or hierarchical) and horizontal connections that captures the complexity of forest governance. By focusing on SFM in forest governance, this complexity can be analysed via the multiple interactions between institutions and actors that surround the concept of SFM (Paavola 2007). Accordingly, this chapter aims to explain how global ideas connect to local needs and interests.

The chapter analyses whether it is possible to identify convergences between institutional arrangements of SFM in international policy and the specific social-ecological context of Caatinga biome, Brazil. Caatinga is in the semi-arid region of northeastern Brazil and is one of the most biodiverse tropical dry forests in the world (Blackie et al. 2014; Brasil 2007b; da Silva et al. 2003). The Brazilian semi-arid region is also the most susceptible region to desertification (IBAMA 2011; Santana 2007), the poorest region within the national territory, and the home of 27 million people (Brasil 2011c). Caatinga biome represents a particularly interesting case through which it is possible to explore the global-local nexus of SFM because the Caatinga forest issues aggregate challenges on biodiversity, climate change, and desertification, just as the forest is part of international policies on the same issues.

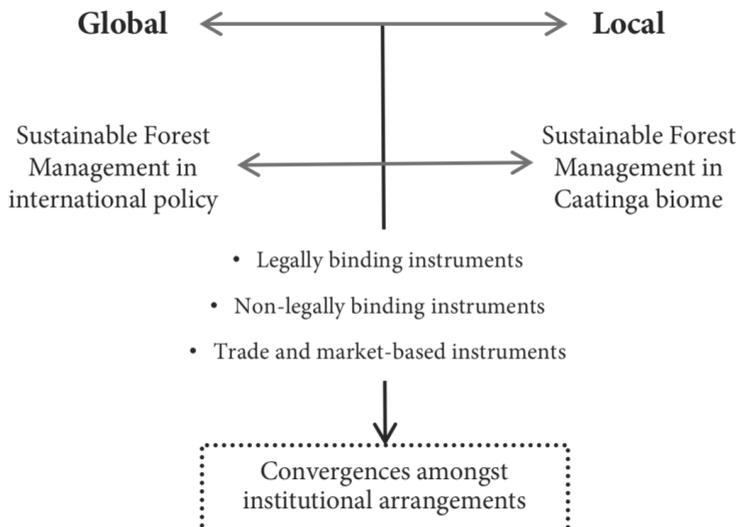
## **2.2. MATERIAL AND METHODS**

This chapter's analysis is divided into two main parts: one part focuses on the international policy arena, while the other focuses on the specific policy context of Caatinga biome in Brazil. The first part draws on literature analysis and a review of United Nations (UN) documents and reports linked to

SFM. The analysis is focused on exploring institutional arrangements of SFM in international forest policies and involves an examination of SFM in important legally binding instruments – including the conventions on Biological Diversity (CBD), on Climate Change (UNFCCC), and to Combat Desertification (UNCCD). In addition, this second part analyses the role of SFM in international non-legally binding instruments, and trade and market-based instruments.

The second part of the analysis includes a review of the literature, as well as of the Brazilian governmental documents and reports, linked to SFM in Caatinga biome. Accordingly, the analysis describes the institutional arrangement of SFM in Caatinga by exploring how the uses of forest resources are steered by legally binding and non-legally binding instruments, as well as trade- and market-based instruments. The chapter concludes with a discussion on how and where institutional arrangements of SFM in international policy and the social-ecological context of Caatinga biome converge, exploring the global-local nexus of SFM (see Figure 4).

**Figure 4.** A Global-local nexus of SFM: international policy and Caatinga biome.



*Elaborated by the author.*

## **2.3. SUSTAINABLE FOREST MANAGEMENT IN INTERNATIONAL POLICY**

The concept of sustainability has been present in forestry debates for more than three centuries (Schmithüsen 2013; Wiersum 1995). The early concept of ‘Sustainable Yield’ introduced the need to balance human needs and the production capacity of forests, mostly focusing on timber production (Hahn and Knoke 2010). Later, the concept of ‘Sustainable Forestry’ included other forest services and non-wood forest products (NWFPs) (Hahn and Knoke 2010), as well as social participation (MacDicken et al. 2015; Schmithüsen 2013). The context of sustainable development also introduced the need to adapt the management of forests to changes in social and economic scenarios over time (Schmithüsen 2013). Therefore, the term ‘Sustainable Forest Management’ (SFM), strongly articulated during the UN Conference on Environment and Development (UNCED) in Rio de Janeiro in 1992, introduced the cross-sectoral approach of sustainable development to forestry, including its economic, ecological, and social aspects (Hahn and Knoke 2010; Schmithüsen 2013).

This section explores institutional arrangements of SFM in international policy after the UNCED was established in 1992, allowing the integration of sustainable development in forestry issues to become dominant. First, the section explores how SFM is part of legally binding instruments, in particular how it is integrated into the three ‘Rio Conventions’ (CBD, UNFCCC, and UNCCD). Afterwards, the section analyses SFM in forest-related and forest-specific non-legally binding instruments. Finally, the section explores how SFM is part of trade and market-based instruments.

### *2.3.1. Sustainable Forest Management in international legally binding instruments*

The complexity of the international policy arena regarding forests became evident after the UNCED was held in Rio de Janeiro in 1992. On the one hand, the UNCED failed to yield an agreement on a unique United Nations Convention on forests (Bernstein and Cashore 2004; Lipschutz 2000; Ruis 2001). While on the other hand, the UNCED yielded the United Nations Conventions

on Biological Diversity (CBD), on Climate Change (UNFCCC), and to Combat Desertification (UNCCD) – now known as the ‘Rio Conventions’. Although the ‘Rio Conventions’ are not explicitly focused on forests, they each approach forest issues according to their own objectives. Doing so, they contribute to the complexity of the forest governance (Bernstein and Cashore 2012; Giessen 2013) and, consequently, to multiple understandings of SFM in international policy.

### *2.3.1.1. Sustainable Forest Management and the United Nations Convention on Biological Diversity (CBD)*

The CBD, adopted in 1992 during the UNCED, directly impacts forest policy frameworks and SFM strategies regarding the conservation and sustainable use of forest biodiversity (UN 1992a). The CBD defines sustainable use as “the use of components of biological diversity in a way and at a rate that does not lead to the long-term decline of biological diversity, thereby maintaining its potential to meet the needs and aspirations of present and future generations” (CBD – Article 2) (UN 1992a). Also, the CBD is particularly relevant for recognising the need to guarantee the rights of indigenous and local populations in using and receiving shared benefits from natural resources. Thus, the CBD highlights traditional knowledge as an essential tool to promote the sustainable use of natural resources (Decision V/6-B.6 - COP 5) (CBD 2000).

To promote the sustainable use of natural resources, the CBD defines the ecosystem approach as “a strategy for the integrated management of land, water and living resources that promotes their conservation and sustainable use in an equitable way” (Decision V/6-A.1 - COP 5) (CBD 2000). In the context of the Ecosystem Approach, SFM is considered a strategy that includes ecological indicators and indicators for the social and economic values of forest ecosystem services according to the interests of the involved actors. Social and economic benefits from forest ecosystems services change over time, as well as the demands from actors; thus, defining appropriate indicators for SFM as part of the Ecosystem Approach is challenging (Wagner et al. 2014).

As the CBD recognises the rights of local populations, SFM in the context of the CBD is closely associated with the Community Forest Management (CFM) approach that highlights the inclusion of local populations and consideration of their livelihoods in forest management (Newton et al. 2015; Persha et al. 2011;

Wollenberg et al. 2007). Consequently, the CBD supports strategies that promote SFM for biodiversity conservation and poverty alleviation, especially of local populations with livelihoods that are directly dependent on forest resources (CBD 2008). The Aichi Biodiversity Targets (Aichi Targets), established in 2010 (CBD 2010), are also relevant for forest issues even if they present ambiguities and lack clarity (Butchart et al. 2016). Aichi Target 11, for instance, states that “by 2020, at least 17 percent of terrestrial and inland water areas, and 10 percent of coastal and marine areas, especially areas of particular importance for biodiversity and ecosystem services, are conserved through effectively and equitably managed, ecologically representative and well-connected systems of protected areas and other effective area-based conservation measures, and integrated into the wider landscapes and seascapes” (CBD 2010). Although the CBD highlights the role of local populations in conserving biodiversity through the sustainable use of forest resources, the Aichi Target 11 focuses on protected areas. This focus creates some tension, as the governance of protected areas often does not include community forest management or SFM focused on the livelihood of local populations (Adams et al. 2004).

#### *2.3.1.2. Sustainable Forest Management and the United Nations Framework Convention on Climate Change (UNFCCC)*

The UNFCCC, also established during the UNCED in 1992, connects forest issues to an urgent need to decrease deforestation rates as part of climate change mitigation policies. While the UNFCCC strategies for conserving or restoring forests as carbon sinks explicitly mention SFM, its implementation for this purpose is not clearly regulated. In the Kyoto Protocol, SFM is mentioned with afforestation and reforestation as a strategy to maintain, recover, or implement forest carbon sinks (Article 2, 1a-ii) (UNFCCC 1998). The Clean Development Mechanism (CDM) allows parties of the Kyoto Protocol to implement afforestation and reforestation activities as part of the commitment to mitigate climate change (Article 12, 3-a and 3-b) (UNFCCC 1998), but CDM does not include SFM in its scope. One of the main reasons for the exclusion of SFM from the CDM is the difficulty to quantify the exact contribution that SFM initiatives could have in reducing greenhouse gases emissions (Eikermann 2015; Thomas et al. 2010) and thus in mitigating climate change.

The UNFCCC officially mentioned the strategy of ‘Reducing Emissions from Deforestation’ (RED) in its agenda for the first time in 2005 because of debates on strengthening the contribution of forest conservation to climate change mitigation (den Besten et al. 2014). Later, the inclusion of forest degradation in the scope of RED led to a renaming of the strategy to ‘Reducing Emissions from Deforestation and Forest Degradation’ (REDD). In 2009, a UNFCCC decision included for the first time forest conservation, sustainable management of forests, and enhancement of forest carbon stocks in the scope of REDD (UNFCCC 2010), leading to REDD+. The policy instrument of REDD+ is based on a financial mechanism through which developed countries may mitigate their emissions of greenhouse gases by providing monetary incentives to developing countries that maintain forest cover or use it sustainably, generating carbon credits that may be traded through a carbon market (den Besten et al. 2014).

After almost 13 years since its first appearance in the climate change policy framework, REDD+ initiatives are still actively debated. Following the logic of Payment for Environmental Services (PES), REDD+ is a market-based approach to forest conservation (see section 3.3). Accordingly, the UN REDD+ programme is criticised for approaching conservation and sustainable use of forest resources through a market-based lens (Fletcher et al. 2016). The financial incentive for REDD+ initiatives is based on a ‘Measurement, Report, and Verification’ (MRV) system that barely includes co-benefits for biodiversity or local communities, although such co-benefits currently represent ‘conditions’ that need to be fulfilled by REDD+ initiatives (Turnhout et al. 2017). Today, even while Article 5 of the UNFCCC’s 2015 ‘Paris Agreement’ enhances the importance of REDD+, the perspective for a functioning international carbon market for REDD+ initiatives remains distant (Hein et al. 2018). At the same time, many current REDD+ initiatives have been contributing effectively to a better valuing of forest resources when compared to other land uses and have stimulated the uptake of SFM strategies (Angelsen et al. 2017).

### *2.3.1.3. Sustainable Forest Management and the United Nations Convention to Combat Desertification (UNCCD)*

The UNCCD, established in 1994, is of interest for arid and semi-arid regions, because it discusses the importance of forest resources in these ecosystems. The UNCCD specifically includes deforestation and loss of biodiversity

in its definition of 'land degradation' (Article 1 (f)) (UN 1994). The internationally adopted UNCCD 2007 Strategy moreover focuses on combating Desertification, Land Degradation and Drought (DLDD) through more sustainable land management initiatives. The focus of UNCCD on combating DLDD includes SFM as a tool for the conservation and sustainable use of forest ecosystem services (Decision 3 - COP 8) (UNCCD 2007).

Under the UNCCD, SFM is part of a proactive and preventive strategy that aims to build or improve ecosystems' resilience in response to drought events and to decrease land degradation and, consequently, desertification vulnerability (Sivakumar et al. 2014; Wilhite et al. 2014). However, more than two decades after the implementation of the UNCCD, most of the public policies regarding drought in arid and semi-arid regions still focus on 'crisis management'. Public policies that are considered as 'crisis management' focus on combating the outcomes from desertification (e.g. water scarcity, and loss of livelihoods), instead of focusing on preventions or addressing the causes of desertification (Wilhite et al. 2014).

Policies that aim to build an environment's resilience capacity are also discussed under the UNCCD and have shown more positive results than the still dominant 'crisis management' approach (Gutiérrez et al. 2014). The starting point of discussions on strategies for building ecosystems' resilience to desertification is the maintenance of environmental services, such as biodiversity (including forest resources), water, and soil (Sivakumar et al. 2014). As part of those strategies, SFM is a strategy aiming at the development of the capacity of social and natural environments to rapidly respond to effects of extreme weather events while contributing to the livelihoods of local populations on the long-term (Sivakumar et al. 2014).

### *2.3.2. Sustainable Forest Management in international non-legally binding instruments*

In addition to its role in the 'Rio Conventions', SFM has emerged as a strategy that is adopted in many non-legally binding instruments (Alix-Garcia and Gibbs 2017). While the UNCED in 1992 did lead to a 'forest convention', which was an intended outcome, it led to the 'Non-legally binding authoritative statement of principles for a global consensus on the management, conservation, and sustainable

development of all types of forests, which the consensus is known as the ‘forest principles’ (UN 1992b). The ‘forest principles’ emphasise that the management of forest resources needs to consider “the multiple functions and uses of forests, including traditional uses, and the likely economic and social stress when these uses are constrained or restricted” (Preamble c) (UN 1992b).

After the UNCED, other attempts to establish a ‘forest convention’ were made by the Intergovernmental Panel on Forests (IPF) in 1995/1996, the Intergovernmental Forum on Forests (IFF) in 1997/1999, and finally, the United Nations Forum on Forests (UNFF) in 2000 (Hoogeveen and Verkooijen 2011), all of which failed. The UNFF Secretary, the Collaborative Partnership on Forests (CPF), the UNFF Global Forest Financing Facilitation Network (GFFFN), and the UNFF Trust Fund compose the International Arrangement on Forests (IAF) that supports the implementation of forest instruments including the negotiation process for achieving a consistent international forest policy framework.

In the absence of a unique ‘forest convention’, the negotiation process led by the IAF tends towards an international policy framework on forests based on the “lowest common denominator” (Humphreys 2015, p.385). Conflicts between the interests of the North and the South, between the respective importers and the exporters of timber and other forest-related products, and between groups defending strict forest conservation and those defending forest conservation through the sustainable use of forest resources also contribute to the complexity of forest governance (Hoogeveen and Verkooijen 2011). This complexity had led some actors to adopt more horizontal strategies, as shown by an increase of bilateral and multilateral agreements involving government, the private sector, and local communities (Arts et al. 2016). In this context, policy instruments that touch forest issues mainly focus on the urgency of addressing illegal logging, deforestation, and forest degradation. Most of trade- and market-based instruments on forests are linked to timber trade and illegal logging (Cashore et al. 2016) and are discussed in the next section (see Section 2.3.3).

Amongst non-legally binding instruments in the international context, the United Nations Forests Instrument (UNFI), the United Nations Sustainable Development Goals (SDGs), the New York Declaration on Forests (NYDF), and the United Nations Strategic Plan for Forests (UNSPF) are especially relevant.

The ‘Non-legally binding instrument on all types of forests’, a revision of the ‘forest principles’, was adopted in 2007 by the UNFF and recently renamed as the UNFI (UNFF 2007). The UNFI is considered internationally to be the most authoritative forest instrument, even if it is non-legally binding. The UNFI defines SFM as “...a dynamic and evolving concept, aim[ing] to maintain and enhance the economic, social and environmental values of all types of forests, for the benefit of present and future generations” (UNFF 2007).

The 2030 Agenda for Sustainable Development, established in 2015, defines Sustainable Development Goals (SDGs), 17 goals and 169 targets, for the period between 2015 and 2030, and is a successor to the Millennium Development Goals (MDGs), which covered the period between 2000 and 2015 (UN 2015). The MDGs inaugurated an agenda for the promotion of public policy debates on poverty, health, education, gender, and environment, which was also incorporated by non-governmental organisations (NGOs) and civil society (Sachs 2012). One of the SDGs explicitly includes forests: Goal 15 is to “Protect, restore, and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation, and halt biodiversity loss” (UN 2015). However, the SDGs have been criticised for presenting inconsistencies amongst the simultaneous achievement of its goals and targets (Nilsson et al. 2016). An emblematic case is the ‘Belo Monte’ dam in the Brazilian Amazon that is part of a strategy to strengthen the renewable energy source of the country (Goal 7 – “Ensure access to affordable, reliable, sustainable, and modern energy for all”) (UN 2015). The construction and operation of the ‘Belo Monte’ dam negatively impacted the local ecosystem, permanently damaging lands used by local and indigenous communities (Fearnside 2017b; Swamy et al. 2017).

The NYDF was presented in 2014 during the United Nations Climate Summit as part of preparations for the ‘Paris Agreement’ of the UNFCCC (UN 2014) and includes objectives to halt deforestation and promote sustainable land use and SFM. However, the absence of countries in the NYDF that are protagonists in the international negotiations on forest issues, such as Brazil, decreased expectations for a precise and clear commitment on forests through the ‘Paris Agreement’ of the UNFCCC (Zarin et al. 2016), although it has an entire article dedicated to REDD+ (See section 3.1.2 above). Finally, in 2017, the UNFF agreed on the United Nations Strategic Plan for Forests 2017-2030 (UNSPF), aiming to unify forest-related goals

from international instruments, such as the SDGs, the Paris Agreement, and the Aichi Biodiversity Targets (UNFF 2017).

### 2.3.3. Sustainable Forest Management trade- and market-based instruments

In the absence of a legally binding forest convention, and in addition to other policy instruments, trade- and market-based mechanisms have increasingly become part of forest governance contexts, such as partnerships between NGOs, the private sector, and local communities (Arts and Buizer 2009). ‘Forest certification’ schemes, originated in the 1990s, in particular aim to ensure the sustainability of forest management and value-chains linked to forest products (Rametsteiner and Simula 2003). Table 2 shows how forest certification is distributed by region under the two most prominent market-based forest certification schemes: the Programme for the Endorsement of Forest Certification (PEFC) and the Forest Stewardship Council (FSC).

Table 2. Distribution of forest area certified by region

Region	Forest area certified (million ha*)		Percentage certified forests (%)
	PEFC**	FSC***	
North America	164,40	69,08	46,41
Europe	95,90	97,38	38,42
Oceania	24,30	2,64	5,36
Asia	14,00	8,80	4,54
Central & South-America	5,60	13,80	3,85
Africa	-	7,15	1,42
<b>Total</b>	<b>304,20</b>	<b>198,85</b>	<b>100,00</b>

*Elaborated by the author.*

From the total 1,68 billion hectares that are covered by a forest management plan (FAO 2016), 503 million are managed under a 'forest certification' scheme of either the PEFC, FSC, or both (Table 2). From this total of certified forests, 69 million hectares, or 13,74%, are double-certified by these two certification schemes (PEFC and FSC 2017). However, approximately 85% of the certified forests are in North America and Europe, which means that forest certification, and thus SFM, is most likely to be implemented in forests of boreal and temperate domains, not achieving significant rates in tropical and sub-tropical zones. Although roughly 65% (approximately 130 million hectares) of FSC certifications are reported to be on management of natural forests (FSC 2018), in Brazil the country with the most extensive natural forest cover in the tropics (FAO 2016), only 1 million hectares of natural forests are certified, with 8 out of 22 initiatives under community-based management regimes (Imaflora 2016).

Countries that face the highest rate of deforestation of natural forests consider illegal logging as a common problem. Illegal logging and its associated activities, such as pressure for land use change, are the primary drivers of deforestation and forest degradation in tropical countries (Schmitz et al. 2013; Zarin et al. 2016). Certification schemes comprise part of an effort to regulate the timber market through implementing SFM. However, as previously discussed, certification is hardly implemented in tropical countries where most of the deforestation linked to illegal logging happens. Still, many trade- and market-based instruments on forests that are in force touch upon this issue. Trade instruments include the International Tropical Timber Agreement (ITTA), and the Forest Law Enforcement, Governance, and Trade Initiative (FLEGT). The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) is not analysed in this work because it focuses only on the illegal trade of specific endangered tree species.

The International Tropical Timber Organisation (ITTO), which is the organisation behind the ITTA, was one of the first organisations to define SFM in international policy, as "The process of managing forest to achieve one or more clearly specified objectives of management with regard to the production of a continuous flow of desired forest products and services without undue reduction of its inherent values and future productivity and without undue undesirable effects on the physical and social environment" (ITTO 1991, p.2). Despite citing social and

environmental values of forests, ITTO's definition of SFM mostly focuses on forest products and its productivity. The ITTA, which was agreed on in 1994 and again revised in 2006, has collaborations between producer and consumer countries as its main focal point to regulate the trade of wood and non-wood forest products and points to SFM as a strategy to constrain illegal logging (ITTA 2006). ITTA presents obligations for both kinds of signatories' countries (producers and consumers) by following linked international and national laws.

International regulation of the timber trade is highly connected to national policy frameworks, including shared responsibilities between producer and consumer countries (Kleinschmit et al. 2016). The FLEGT initiative aims to support the development of legal frameworks of 'producers' countries to strengthen the legality of the timber trade. More specifically, the European Union FLEGT Action Plan operates by combining the European Timber Regulation with bilateral Voluntary Partnership Agreements (VPAs) between European countries (consumers) and producer countries. Currently, VPAs operate in nine countries and are under negotiation in other nine other countries (EU-FLEGT 2018). The support of consumer countries to develop a national policy framework of producer countries facilitates the legality of logging through traceability and verification systems. However, VPAs do not guarantee law compliance and hardly addresses other issues such as land tenure conflicts and crimes linked to illegal logging (Cashore et al. 2016; Kleinschmit et al. 2016).

Current commitments that aim for 'zero deforestation', such as commitments from the NYDF and the SDGs, have also been made the context of markets and trade. For example, the Brazilian soy moratorium for 'zero deforestation' was established in 2006 through a partnership between the private sector and NGOs; and in 2008, the moratorium was also incorporated by the Brazilian government. However, although the soy moratorium resulted in the expansion of only a small part of the Brazilian soy production in newly deforested areas of the Amazon (Fearnside 2017b; Lees et al. 2016), there was a significant expansion of other agricultural activities in these areas (Gibbs et al. 2015). The case of the Brazilian agreement on 'zero deforestation' of cattle production is even more complicated because it is difficult to monitor all the properties where these cattle were placed during their entire life cycle before being processed to be sold (Alix-Garcia and Gibbs 2017; Kastens et al. 2017).

PES schemes, the main inspiration for the REDD+ mechanisms (see section 3.1.2), are another type of relevant market-based instrument linked to forests. PES is based on a financial incentive by a ‘user’ that is offered to a ‘producer’ for the provision of certain environmental services, either for profit or non-profit goals through public or private partnerships (Wunder 2015). Many studies identify possible conflicts in the implementation of PES initiatives and its effective contribution to environmental and social co-benefits through an economic-based incentive (Börner et al. 2017; Ezzine-de-Blas et al. 2016; Fletcher and Büscher 2017). In addition, critiques indicate that when PES focuses on a specific service, other environmental services may be hindered (Börner et al. 2017), such as when a PES initiative promotes forest plantations. The financial incentive or the ‘commoditisation’ of environmental services linked to forests may also increase social inequality, dispute for land uses, and land tenure conflicts (Fletcher and Büscher 2017), especially in tropical countries where many local populations rely on forest resources for their livelihoods.

## **2.4. SUSTAINABLE FOREST MANAGEMENT IN CAATINGA BIOME**

Caatinga biome, in northeastern Brazil, is covered mainly by tropical dry forests that have a key role in supporting the livelihoods of the local population and acts as a source of forest biomass for energy supply (Pareyn 2010b). Native forests still cover around 49% of the Caatinga territory (IBAMA 2011) and have been included in debates on SFM in the national territory (SFB 2013). Caatinga is also where the three ‘Rio Conventions’ converge in the Brazilian territory because it aggregates issues on biodiversity, climate change, desertification, and poverty. This section shows how legally binding and non-legally binding policy instruments in Caatinga influence forest governance and SFM. In addition, this section details how specific types of forest use and markets relate to SFM implementation.

### *2.4.1. Policy instruments linked to Sustainable Forest Management in Caatinga biome*

The National Policy for Biodiversity was established in 2002 (Decree 4.339) (Brasil 2002) because of the Brazilian commitment to the CBD, and the National Programme for Biological Diversity (NPBD) was established in 2003 (Decree 4.703) (Brasil 2003). These two regulations indicate 11 priority areas for SFM implementation in Caatinga (Brasil 2003). The NPBD emphasises that the promotion of biodiversity conservation in Caatinga must address the lack of strategies for the sustainable use of environmental resources in regional development plans and the lack of an efficient system for the establishment of protected areas in the biome; currently, less than 5% of its total area is covered by forest-protected areas (Brasil 2007b). A relevant international initiative is the Global Environment Facility (GEF) Small Grant Programme (Portuguese acronym PPP-Ecos) that has operated in Brazil since 1995 mainly in Cerrado biome, and has also operated in Amazon and Caatinga biomes since 2013. Through the PPP-Ecos, organisations of local communities elaborate projects to strengthen SFM practices aimed at biodiversity conservation and income generation through the consolidation of local, regional, and even national markets (ISPN 2018). The PPP-Ecos is an outstanding programme linked to the sustainable use of forest resources focusing on non-wood forest products (NWFPs) and their role for biodiversity conservation and livelihood of local populations (Lobo et al. 2010).

The National Plan for Climate Change, established in 2008, aims for the mitigation and adaptation of climate change effects in the national territory. This National Plan focuses, first, on the reduction of greenhouse gases emissions and then on the minimisation of the socioeconomic costs of climate change adaptation (Brasil 2008). Consequently, the National Policy for Climate Change (NPCC) was established in 2009 (Law 12.187) (Brasil 2009e), officialising the Brazilian legal commitment to the UNFCCC. This group of policies regulates Brazil's answers to climate change in the national context, and in Caatinga biome, the group includes actions to strengthen SFM especially linked to the improvement of the local and regional energy supply systems, which is primarily based on the use of forest biomass (firewood and charcoal) (Brasil 2010b). However, a draft version of the National Plan for Climate Change Adaptation (NPCCA) (Brasil 2015a), available for public consultation in 2015, does not mention SFM.

The National Policy for the Control of Desertification officialised the Brazilian commitment to the UNCCD in 1997 (Brasil 1997a). A consequence of this policy was the establishment, only in 2005, of the National Programme to Combat Desertification and Mitigate the Effects of Drought (NPCD) (Brasil 2005). The NPCD defines the susceptible areas to desertification as priority areas for research on combating desertification and drought effects in Caatinga, and presents four action themes: (1) reducing poverty and inequality; (2) sustainable expansion of productive capacity; (3) democratic management and institutional strengthening; and (4) preservation, conservation, and sustainable management of natural resources (Brasil 2005). In the context of actions to combat desertification, the most relevant initiative in Caatinga is the Programme for One Million Cisterns (Portuguese acronym P1MC). The P1MC has its beginning in the 1990s from an initiative of civil society organisations named Articulation for the Semi-arid (Portuguese acronym ASA) and is based on the construction of cisterns for water supply from the rain in rural properties (Neves et al. 2010). The P1MC has been recognised as one of the most important initiatives to combat desertification through increasing the adaptability of the livelihood of local populations to semi-arid conditions (Nogueira 2017). The P1MC, with financial support from the federal government since 2003, is closely linked to the water supply for human consumption and food production mainly through agroecology strategies (Diniz and de Lima 2017), and the strategies include NWFPs but rarely touch upon SFM focused on wood products.

In 2000, the Brazilian National Forest Programme (NFP) established the National Commission for Forests (Portuguese acronym CONAFLO) to discuss its implementation strategies with the participation of representatives from the Federal Government, the States' environmental agencies, industry sectors, civil society organisations, NGOs, Universities, and research centres (Decree 3.420) (Brasil 2000). In 2017, the coordination of the NFP was transferred from the Ministry of the Environment to the Brazilian Forest Service (Decree 8.975) (Brasil 2017), which was established by the National Law for the Management of Public Forests (LMPF) in 2006 (Law 11.284) (Brasil 2006a). Thus far, the Brazilian Forest Service is the governmental institution that aggregates most of the actions directly linked to forest issues in Brazil: the coordination of the public-private forest concessions; the implementation of the National Environmental Database

(Portuguese acronym CAR) linked to the National Forest Code (Law 12.651) (Brasil 2012a); the implementation of the National Programme for Community Forest Management (Decree 6.874) (Brasil 2009f); and, recently, the coordination of the NFP.

Although the Brazilian Forest Service executes most of the Brazilian forest policies, the environmental policy framework linked to forest resources in Brazil is complex, and it is distributed amongst different governmental structures and policy instruments. The conservation and use of forest resources in private areas must follow the National Forest Code (Law 12.651) (Brasil 2012a), which is at the centre of disputes amongst agribusiness, conservationists, and groups for the sustainable use of forest resources (Brancalion et al. 2016; Soares-Filho et al. 2014). Forest resources that may be used through sustainable practices by local populations living in public forest-protected areas are coordinated by the ‘Chico Mendes’ Institute for Biodiversity Conservation (Portuguese acronym ICMBio). The use of forest resources in rural settlements that are part of the National Programme of Agrarian Reform or the National Programme of Land Tenure Credit is coordinated by the Special Secretary for Familiar Agriculture and Agrarian Development and the National Institute for Colonization and Agrarian Reform (Portuguese acronym INCRA). Finally, the use of forest resources in indigenous lands also needs to follow the regulations of the National Foundation for the Indigenous People (Portuguese acronym FUNAI).

#### *2.4.2. Trade- and market-based instruments linked to Sustainable Forest Management in Caatinga biome*

International trade and market-based forest instruments, such as the ITTA, FLEGT, and certification schemes, have an important role in forest governance in Brazil; however, they do not focus on Caatinga biome. The use of forest resources in Caatinga does not have an active link to international markets and are more strongly attuned to regional and local markets for energy supply, for formal and informal trading of NWFPs, and as part of the livelihood of local populations (Pareyn 2010a; Riegelhaupt and Pareyn 2010). Accordingly, this section explores some of the national policies that address trade and market-based instruments for NWFPs and wood forest products in Caatinga.

The National Policy for the Sustainable Development of Traditional Populations and Communities (Portuguese acronym PNPCT) (Decree 6.040) (Brasil 2007a) combines governmental initiatives that aim to strengthen the lives of local populations who strongly depend on environmental resources, including traditional and settled communities, indigenous people, and ‘quilombolas’ (communities self-identified as descendants from African slaves). The following governmental initiatives linked to the PNPCT can be highlighted: the National Plan for the Promotion of Value Chains linked to Sociobiodiversity Products (Portuguese acronym SocioBio) (Inter-ministerial Ordinance 239) (Brasil 2009c), the Policy for the Guarantee of Minimum Prices for Sociobiodiversity Products (Portuguese acronym PGPMBio) (based on the Law 11.775) (Brasil), and the National Policy for School Nutrition (Portuguese acronym PNAE) (Law 11.947) (Brasil 2009d).

The SocioBio programme identified and supported the production of NWFPs focusing on good practices for its extraction, processing, and trading. The PGPMBio established a policy to guarantee that public resources cover the difference between the defined minimum price of NWFPs and the trading price if the second is lower than the first. Moreover, the PNAE establishes that from all the food offered in public schools, 30% should be bought from rural settlements, traditional communities, ‘quilombolas’, or indigenous communities. The combination of such governmental initiatives is part of the most recent approach of Brazilian policies for rural development focusing on market consolidation linked to environmental and social sustainability (Grisa and Schneider 2014).

Based on the Brazilian Programme to Combat Poverty (PCP) (Portuguese acronym ‘Brasil Sem Miséria’), the Green Grant Programme (GGP) (Portuguese acronym ‘Bolsa Verde’) (Law 12.512) (Brasil 2011b) operated from 2011 to 2017 (it is not included in the federal budget of 2018). The GGP is a PES initiative from the federal government based on a financial incentive to vulnerable populations that have their livelihoods based on the sustainable use of forest resources. Through a ‘conditional cash transfer’ mechanism, families that contribute for the sustainable use or conservation of forests in public areas are eligible for receiving the grant, which is also linked to programmes building technical capacity for sustainable productive systems (Shiki et al. 2015). While addressing economic and social vulnerabilities of target families, it still is a challenge to monitor the efficiency of the GGP in terms of environmental co-benefits. In general, it is

difficult to assess the impact of the GGP in Caatinga, as its main focus is on the Amazon with 78% of its beneficiaries; with around 18% of beneficiaries located in northeastern Brazil (MMA 2018), including the coastal area of the Atlantic Forest biome and areas of Cerrado biome.

In the context of using native forest biomass for energy supply, which in Caatinga is mainly used by regional and local pottery and plaster industries, the Brazilian government directly supports SFM initiatives focused on strengthening the legal and sustainable production of firewood and charcoal through research, policies, and regulations. Some examples are initiatives of the Brazilian government started in the 1990s that were funded by the Food and Agriculture Organisation of the United Nations (FAO) (FAO 2010), and initiatives established in the 2000s by the GEF in partnership with the United Nations Development Programme (UNDP) (GEF 2014) to support research on SFM focused on firewood and charcoal for energy supply. These initiatives were of high relevance for consolidating the Normative Instruction from the Ministry of the Environment, in 2009 that defines technical and legal parameters for the development, approval, and implementation of SFM plans specifically for the production of firewood and charcoal in Caatinga (Normative Instruction 1) (Brasil 2009a).

## **2.5. SFM: CONVERGENCES AND DIVERGENCES BETWEEN INTERNATIONAL POLICY AND THE SOCIAL-ECOLOGICAL CONTEXT OF CAATINGA BIOME**

This chapter explored the global-local nexus of SFM by analysing how and in what ways institutional arrangements in the international policy context and in the specific social-ecological context of Caatinga biome converge. The following section presents a discussion on how legally binding, non-legally binding, and trade and market-based instruments in international policy converge with forest

policy and SFM implementation in the Caatinga biome (Table 3 summarises the discussion).

Institutional arrangements of SFM linked to the legally binding instruments present the most relevant convergence between the international policy context and national policies linked to Caatinga biome. In the international context, each of the 'Rio Conventions' approaches SFM according to its own goals and interests. The CBD highlights the important roles of local communities in the sustainable use and conservation of biodiversity at the same time that it recognises the role of biodiversity in their livelihood (Persha et al. 2011). The UNCCD focuses on the SFM as part of a broad strategy to strengthen the environmental resilience of ecosystems, and consequently, the social and economic resilience of local populations (Sivakumar et al. 2014). In the scope of the UNFCCC, REDD+ focuses on the environmental value of forests resources for climate change mitigation through an economic mechanism, even while it has positive impacts for biodiversity and the livelihoods of local populations (Turnhout et al. 2017). These approaches of SFM by the 'Rio Conventions' are reflected on and converge with Brazilian national policies. The only exception is that SFM in national policies for climate change mitigation in Caatinga biome aims to strengthen the use of forest biomass as a renewable source of energy through SFM, which is not an evident objective when analysing the UNFCCC in an international policy context. Global forest governance is also characterised by the absence of a legally binding instrument on forests in the international context (Giessen 2013). In contrast, national policies linked to forest governance, such as the National Forest Programme and the Forest Code, are relevant for SFM in Caatinga. At the same time, forest regulations are part of a complex context of disputes between economic and environmental interests and it is spread over different governmental structures, representing a similar level of complexity that prevents a forest convention in the international policy arena.

Table 3. Convergences between institutional arrangements of SFM in international policy arena and in Caatinga biome

Institutional arrangements of SFM	International policy	Caatinga biome
<p>Legally Binding Instruments (LBI)</p>	<ul style="list-style-type: none"> <li>- CBD: 'Ecosystem Approach': emphasises the role of biodiversity for the livelihood of local population and their role for biodiversity conservation.</li> <li>- UNFCCC: 'REDD+': environmental value of forest resources for climate change mitigation through an economic mechanism. Less focus on the role of forests for climate change adaptation.</li> <li>- UNCCD: combating 'Desertification, Land Degradation and Drought': building resilience linked to social, environmental, and economic values of forests linked to the livelihood of local vulnerable populations.</li> </ul>	<ul style="list-style-type: none"> <li>- CBD: SFM is a strategy for biodiversity conservation, but it lacks articulation with regional development programmes.</li> <li>- UNFCCC: SFM as a strategy to improve the regional energy supply system through the use of firewood and charcoal, not including SFM in climate change adaptation strategies.</li> <li>- UNCCD: SFM as part of a broader strategy to face social, environmental, and economic vulnerability of local populations to the effects of droughts.</li> <li>- The National Forest Programme (NFP), Forest Code, and regulations on SFM in Caatinga biome are spread over different governmental structures.</li> </ul>
<p>Non-legally Binding Instruments (NLBI)</p>	<ul style="list-style-type: none"> <li>- United Nations Instrument on Forests (UNIF): the most authoritative non-legally binding instrument in the absence of a unique 'forest convention'.</li> <li>- New York Declaration on Forests (NYDF): agreement amongst private sector, civil society organisations and different levels of governmental representative.</li> <li>- Sustainable Development Goals (SDGs): articulation of goals on poverty, health, education, gender and environment, but inconsistency to simultaneous achievement of its 17 goals and 169 targets.</li> <li>- United Nations Strategic Plan on Forests (UNSPF): tries to articulate forest issues amongst other forest-related international instruments.</li> </ul>	<ul style="list-style-type: none"> <li>- Governmental initiatives supported by FAO (1990s) and by GEF/UNDP (2000s) are relevant in research for SFM specifically focused on the production of forest biomass (firewood and charcoal) for energy supply.</li> <li>- The GEF Small Grant Programme (in Brazil known as PPP-Ecos) focuses on strengthening the social organisation of local communities around the production and trade of NWFPs from socio-biodiversity.</li> <li>- The National Programme to Promote the Value-Chain of NWFPs from socio-biodiversity (SocioBio) is a relevant governmental initiative for developing good-practices for the extraction and the organisation of local, regional, and national markets for these products.</li> </ul>
<p>Trade and market-based Instruments (MBI)</p>	<ul style="list-style-type: none"> <li>- Certification schemes (FSC, PEFC): so far do not demonstrate considerable success in improving the management of natural tropical forests.</li> <li>- Trade agreements (ITTA, FLEGT, 'Zero Deforestation'): not effective in addressing crimes linked to illegal logging and deforestation.</li> <li>- Payment for Environmental Services (PES): monetisation of the forest, and when strictly focused on the 'payment' for the provision of one forest ecosystem service can harm the provision of others.</li> </ul>	<ul style="list-style-type: none"> <li>- Although none of these MBIs analysed in the international policy relate to Caatinga biome, SFM supported by governmental initiatives has been focused on the economic value of forest resources linked to regional industries (ceramic and plaster) that depend on forests for energy supply.</li> <li>- Programme to guarantee a minimum price for products from Sociobiodiversity (PGPMBio) and the National School Nutrition Programme (PNAE) guarantying the acquisition of products from local communities.</li> <li>- The Green Grant Programme (known in Brazil as Bolsa Verde) operates through a 'conditional cash transfer' benefiting local communities that are socially and economically vulnerable and that contribute for forest conservation through sustainable use of its resources linked to their livelihood.</li> </ul>

*Elaborated by the author.*

The international non-legally binding instruments on forests can give forest governance the capacity to be flexible enough to be adapted to different national policy frameworks and local social-ecological contexts where SFM initiatives have been implemented (Arts 2012; Gregersen et al. 2017). Governmental initiatives supported by international organisations such as the FAO and the GEF/UNDP have supported the development of technical parameters for SFM since the 1990s. These parameters are focused on the production of biomass for energy supply, which is one of the main uses of native forest resources in Caatinga. These initiatives were of relevance for the elaboration of regulations for SFM focused on wood products in Caatinga. The use of native forest resources to produce NWFPs linked to the livelihood of local communities in Caatinga receives support from international initiatives as well, such as the GEF Small Grant Programme (Portuguese acronym PPP-Ecos) and national policies, such as the National Programme for the Promotion of Value-Chains of Products from Socio-biodiversity (Portuguese acronym SocioBio). These initiatives show that there is some convergence between non-legally binding instruments in the international context, specifically in terms of their goals and targets for sustainable use of forest resources. Moreover, international initiatives have inspired national policy and programmes that aim to strengthen the sustainable use of native forest resources.

The analysis of international forest market-based instruments showed that although forest certification of SFM focused on the management of natural forests are increasing, it is still difficult to recognise its relevance for strengthening SFM in the tropics, in particular SFM focused on the livelihood of local populations (Romero et al., 2015). On the one hand, forest ecosystem services that have a precise market value, such as wood products and forest biomass, are commonly those aimed for in forest management implementation strategies, and consequently, have clear indicators (Hahn and Knoke, 2010; Sayer and Maginnis, 2005). On the other hand, ecosystem services that are hardly valued from an economic perspective, such as biodiversity and social values, lack local indicators and are rarely the main focus of SFM strategies. In the case of Caatinga, initiatives of SFM, including research initiatives funded by international organisations and governmental regulation for SFM, are mainly focused on the provision of firewood and charcoal for the energy supply of households, and regional and local industries and business. Finally, there is little convergence between PES schemes in the international context and

the analysed linked programme in Brazil, the Green Grant Programme (GGP) (Portuguese acronym Bolsa Verde). While international PES schemes are mostly focused on conserving biodiversity, the GGPs main goal in Caatinga is decreasing poverty of local populations that live in public forest areas of environmental relevance, such as forest protected areas, rural settlements, and ocean and river-based communities (Shiki et al., 2015). Despite this lack of convergence, the GGP does appear to have a positive impact both on decreasing poverty and on releasing the pressure on environmental resources through supporting SFM initiatives.

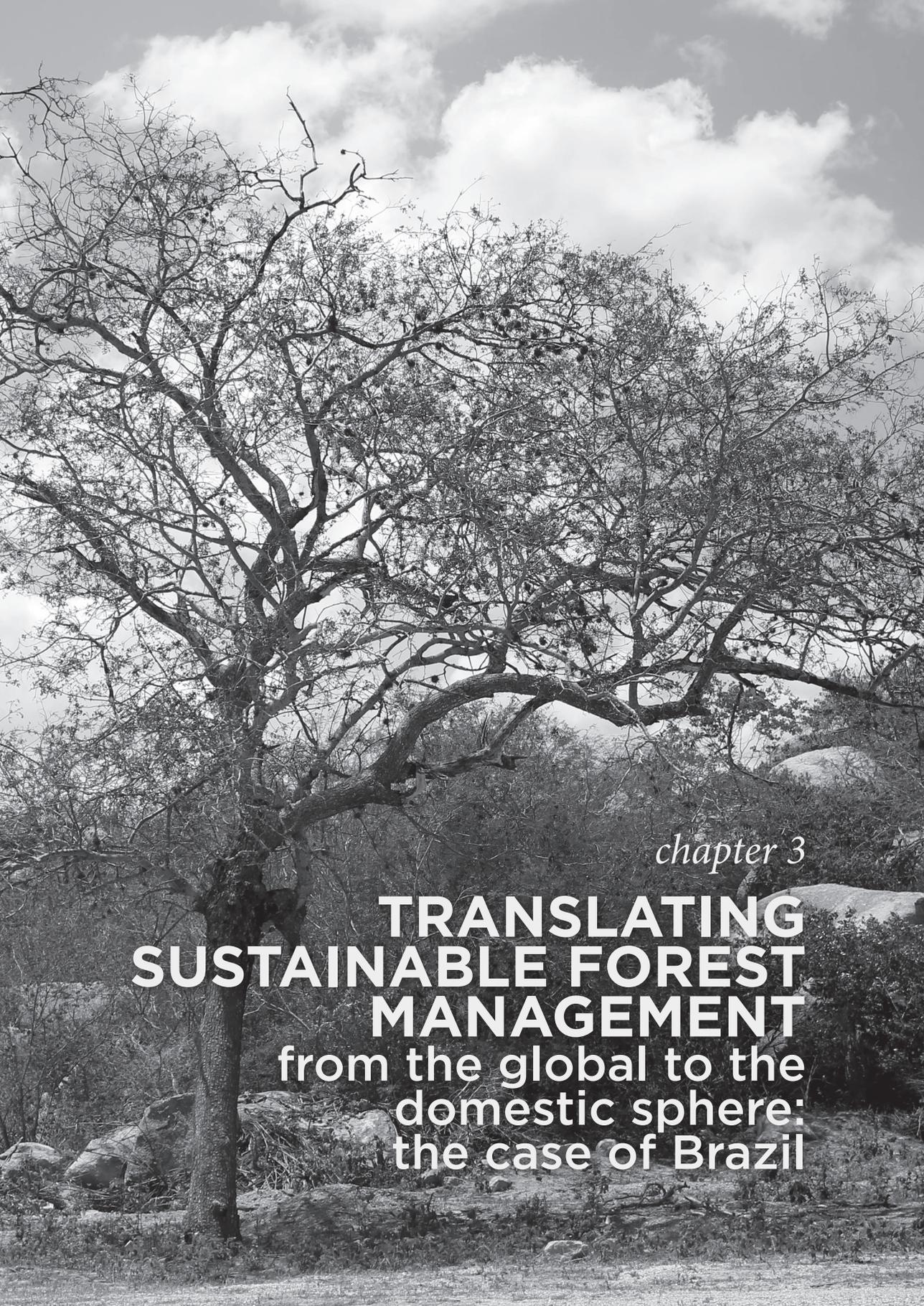
## 2.6. CONCLUSIONS

First, the chapter concludes that the most relevant convergences between SFM institutional arrangements in the international policy and in the Brazilian national context are linked to the 'Rio Conventions'. These convergences may be explained by the presence of hierarchical connections within the global-local nexus, where international forest-related binding instruments directly influence national forest policy frameworks. However, even if the international forest-related conventions and national policy frameworks converge on their SFM institutional arrangements, is on the local level that these institutional arrangements are shaped. Local implementation of national policies often results in unexpected forest outcomes on the ground (Rametsteiner 2009). Consequently, there is still an additional step of analysis needed to understand how the convergence between international conventions and its linked policies in national contexts are reflected in forest governance outcomes.

Second, the chapter concludes that complexities of global forest governance are often reflected in the local context, but they do not necessarily also lead to the convergence of institutional arrangements on forest policy. While the complexity of forest governance in the international domain has similar characteristics to forest governance in Caatinga, the policy and trade instruments on the two levels of governance often highlight very different policy objectives and technical parameters for SFM. Horizontal relations within the global-local nexus

in which international actors directly engage with SFM in Caatinga seem to an important factor to explain this, amongst others (Bernstein and Cashore 2012). However, how the interests of local actors and the specific characteristics of the social-ecological context of Caatinga shape institutional arrangements of SFM certainly remains to further investigation.

Finally, the chapter illustrates that a comparison between institutional arrangements of SFM in international policy and in a specific social-ecological context is a good starting point to analyse the global-local nexus of SFM. While countries are part of a global governance context, they formulate national policies and action plans according to national interests and the particularities of different forest-related social-ecological systems within their territories (Singer and Giessen 2017; Wiersum et al. 2013). Because SFM is a broad concept in international policy there is an opportunity (and a challenge) to shape SFM strategies according to the social-ecological context where it is implemented (Ostrom 2009). A better understanding of how SFM institutions are translated from the global to the local level of governance may thus provide insight into the elements and relations that comprise the global-local nexus of forest governance. These translations are explored in the subsequent chapters of this thesis.



*chapter 3*

**TRANSLATING  
SUSTAINABLE FOREST  
MANAGEMENT**

**from the global to the  
domestic sphere:  
the case of Brazil**

## Abstract

In the context of fragmented global forest governance, Sustainable Forest Management (SFM) has gained force as a strategy to improve forest conditions and livelihood outcomes. Accordingly, SFM related ideas and norms are translated across different environmental domains, levels of governance, and social-ecological systems. This article discusses how SFM related rules, norms, and discourses are translated from the global to the domestic level of Brazil. Results show how international forest governance is translated to multiple forest policy contexts of Brazil. First, international conventions related to forest lead to specific translations of SFM into national policies. Second, international discourses on SFM have failed to have much influence on the main piece of domestic forest legislation, the Brazilian Forest Code. Third, the confluence of international ideas and norms of SFM with the social-ecological systems of different Brazilian forest biomes produces a set of very different SFM translations on the domestic level. We conclude that translations of SFM, from the global to the domestic level, are shaped by domestic policy and social-ecological systems. Thus, the role of domestic policies and the specificity of forest ecosystems deserve more attention in global forest governance than is currently the case.

**Key-words:** Forest Governance; pathways of influence; SFM translations; Forest Code; Complex Governance.

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### **3.1. INTRODUCTION: SUSTAINABLE FOREST MANAGEMENT AND FOREST GOVERNANCE**

Global forest governance is concerned with a broad number of goals and environmental domains, including climate, desertification, biodiversity, and poverty reduction (Humphreys 2009). At the same time, there is no unifying legally binding instrument on forests on a global scale (Eikermann 2015). Consequently, forest issues are globally addressed in other environmental conventions (i.e. climate change, biodiversity, and desertification), as well as by non-legally binding instruments and declarations (Giessen 2013). This inherent complexity and the lack of a legally binding instrument on forests is usually what described global forest governance as ‘fragmented’ (Wiersema 2014).

Over the last decades, Sustainable Forest Management (SFM) has gained global traction as a strategy that can achieve environmental, social, and economic goals by using forest resources while maintaining the provision of related ecosystem services (Nasi and Frost 2009; Quine et al. 2013). In fragmented global forest governance, SFM is a key concept that is part of and central to many conventions and instruments; including the United Nations Framework Convention on Climate Change of 1992 (UNFCCC), the United Nations Convention on Biological Diversity of 1994 (CBD), the United Nations Convention to Combat Desertification of 1995 (UNCCD), and the Non-Legally Binding Instrument on All Types of Forests (NLBI), which the United Nations Forum on Forests (UNFF) agreed on in 2007. The NLBI offers the most recent internationally agreed definition of SFM: [...] “a dynamic and evolving concept, [aiming] to maintain and enhance the economic, social and environmental values of all types of forests, for the benefit of present and future generations” (UNFF 2007).

Considering the role of SFM in global forest governance, it is important to explore its ability to overcome the drawbacks of policy fragmentation and lack of a legally binding instrument on forests. The UNFF definition of SFM offers a broad understanding of social, economic and environmental goals (Nasi and Frost 2009; Quine et al. 2013), allowing a broad scope of interpretation when applied to domestic policy contexts (Eikermann 2015). How this flexibility translates to national or domestic realities is unclear: does it steer forest policy

and management towards the realisation of a full range of objectives (social, economic, environmental) for an equally broad range of policy fields (climate, desertification, biodiversity)? Or, alternatively, does the broad definition of SFM reflect the weakness of a non-legally binding status of the NLBI, leading to very little influence on national forest management?

Domestic policies play a crucial role in how global rules, norms, and ideas are translated in results 'on the ground' (Arts et al. 2013; Burns and Giessen 2016). Literature points out that fragmentation in for example global biodiversity policy is related to a lack of implementation efforts on the domestic level (Jóhannsdóttir et al. 2010). Studies of how international forest regimes influence domestic policies are however scarce and mostly focus on climate policies (cf. Chia et al. 2015). Specific studies that do show empirically how a set of international forest rules and ideas are translated to a domestic context are missing for many countries, including a country of global importance such as Brazil (but compare Burns and Giessen (2016) for an analysis of Argentina). In addition, social-ecological context is often overlooked in explaining domestic translations of international policies, while the valuation and use of forest-related ecosystem services also depend on forest type and the socio-economic conditions of actors involved (Agrawal et al. 2008; Ostrom 2011).

In this article, we discuss SFM at the domestic policy level as a result of a translation that is understood as the confluence of global governance, national policies, and social-ecological systems. We do so in order to shed light on the mechanisms by which SFM is included – or not – in national forest policies, programmes, and projects and thus how SFM shapes results 'on the ground'. By understanding SFM translations, we may moreover explore in what situations the integrative ambitions that are articulated for SFM can be achieved in practice.

Below, we apply the concept of SFM translations to the case of Brazil. We first describe the concept of translations by drawing on literature on global forest governance, forest institutions, and social-ecological systems. Next, we argue for Brazil as a case study. Our findings discuss SFM translation in Brazil in relation to international treaties, national forest law and policy debates, and the four major forest biomes of the country. We conclude by reflecting on how SFM translations are shaped in the interaction of the influences of global forest governance, national policies, and social-ecological systems on the domestic level of Brazil.

## **3.2. ANALYTICAL FRAMEWORK: SFM TRANSLATIONS FROM INTERNATIONAL TO DOMESTIC LEVEL OF GOVERNANCE**

Translations between the international and the national level of forest policy are discussed in literature as complex interactions and in terms of multi-level governance (Armitage 2008; Berkes 2008). Several analytical approaches can be applied to describe these multi-level interactions. First, discourse analysis is one way to understand how international forest policies influence domestic decision-making (Leipold 2014), as norms and discourses can give rise to new, domestic institutions or influence domestic actors' behaviour directly by settings social norms. Second, institutional analysis can explain how national institutions are adapted to international rules and regulations. Institutions play a key role in steering actor's behaviour by setting collective constraints (Goodin 1996) and operate on different scales of decision-making (Agrawal et al. 2008; Bernstein 2011; Mwangi and Wardell 2012; Ostrom 2011; Young 2013). Third, regime theory is an influential perspective on the interactions between global and domestic forest policy (Giessen 2013). While it addresses rules and norms that shape decision-making, it also places focus on the interests of the state and non-state actors in actively accepting or rejecting these rules and norms (Singer and Giessen 2017). Thus, multi-level governance "involves complex interactions of state, private, and civil society actors" (Mwangi and Wardell 2012), that shape translations from the international to the domestic level.

According to Bernstein and Cashore (2012), global complex governance influences domestic policy through four different pathways. These pathways of influence from the global to the domestic level are (1) international rules; (2) international norms and discourses; (3) markets; and (4) direct access to domestic policy-making processes (Bernstein and Cashore 2012). These four pathways help explain the complexity of global governance, in particular the idea that global governance is not limited to legally binding conventions, and include discursive norms and transnational actors as important influences on domestic policies (Bernstein and Cashore 2012).

To analyse SFM translations, we first draw on discursive intuitionism (Schmidt 2006) and the policy arrangement approach (Arts and Buizer 2009; Arts and Leroy 2006) to understand how the pathways of influence of Bernstein and

Cashore (2012) affect domestic policy. In particular, we understand discourses to “prepare the way for other pathways to occur” (Burns and Giessen 2016), while discourses also enter into competition with other global and domestic discourses (Behagel and Arts 2014). We consider the ‘international rules’ pathway in terms of the legal obligations that countries take on to transpose agreements into national law, policies, and programmes. The ‘markets’ pathway includes direct and indirect actions that “work with or leverage market to create domestic policy change” (Bernstein and Cashore 2012). In this sense, forest governance is also influenced by non-forest related markets, such as agriculture and cattle (Kröger 2017). The ‘direct access to domestic policy-making processes’ pathway is related more directly to the role that international and national actors play in policy articulation and implementation, including international donors.

Second, our analysis of SFM translations includes the role of domestic policies, discourses, and actors. Understanding the interactions of international and domestic levels of governance implies understanding how influence emanates from both levels (Singer 2008). That is to say that domestic policy discourses can either contest or strengthen international discourses; that national rules and institutions co-shape how international agreements are transposed to national law; and that national actors can link to and/or crowd out transnational actors in policy networks. In particular, we consider SFM to be a prime example of ‘complex governance’, as it is discursively articulated in both international fora and national policy debates, part of both international rules such as the CBD and national forest laws, and supported by both transnational development agencies and national NGOs.

Third, we hold that the social-ecological systems differ per country and within a country per type of forest ecosystem. Domestic policy articulations and programmes that relate to specific natural resource, governance, and user systems should be understood as the result of social-ecological interactions (Ostrom 2009), and hence also lead to specific SFM translations. In particular, insights from political ecology point out that human-environment relations have important effects on cross-scale interactions and whether international rules, norms, and ideas are ultimately adopted or rejected (Adger et al. 2005; Armitage 2008). Considering social-ecological systems in SFM translation therefore also provides an antidote to ‘blueprint thinking’, i.e. the idea that international norms and principles may be translated in every context in the same way (Ostrom and Cox 2010).

To conclude, we define SFM translations as the result of a confluence of international pathways of influence, national policies and debates, and social-ecological systems. In other words, we hold that international SFM rules, norms, and beliefs establish themselves as part of national forest policy contexts that are more or less related to a specific forest ecosystem. To study these translations, we consider the various national policies and debates that are expected to be shaped by international pathways of SFM. Finally, we theorise that social-ecological contexts shape SFM translation on the domestic level through the role that natural resources, governance, and user systems (Ostrom 2009) play in adopting or rejecting international influence. Figure 5 visually illustrates our analytical framework.

Figure 5. Sustainable Forest Management translations in Brazil



*Elaborated by the author.*

### 3.3. MATERIAL AND METHODS: SUSTAINABLE FOREST MANAGEMENT IN BRAZIL AS A CASE STUDY

Brazil is the third most forested country in the world and has 59.17% of the largest tropical rainforest, Amazon, within its territory (Charity et al. 2016) while accommodating also five other natural biomes (see Table 4). The Brazilian biomes are based on environmental conditions of the region and are close to the international definition of ecoregions (Olson et al. 2001). In addition, the Brazilian biomes are often recognised as regions with similarities on cultural, economic and social contexts (Aguiar et al. 2016) and can thus be considered social-ecological systems (Ostrom 2011).

Table 4. Forest cover projection for 2015 amongst the Brazilian biomes

Biomes / 'Natural' forest cover	Hectares	Of the total forest cover in Brazil (%)	Covered by original (native) vegetation (%)
Amazon (Rainforest)	342.027.340	70.40	85.00
Cerrado (Savannah)	69.235.988	14.25	51.16
Caatinga (Dry forest)	40.582.671	8.35	53.38
Atlantic Forest (Rainforest)	21.770.466	4.48	22.25
Pantanal (Wetland)	8.975.022	1.85	88.70
Pampa (Grassland)	3.210.486	0.66	41.32
<b>Total</b>	<b>485.801.973</b>	<b>100.00</b>	-

*Adapted from the Brazilian Forest Resources Assessment (Brasil, 2014) and the National Database of Public Forests (SFB 2016).*

Brazil faces large deforestation rates related to land use change (Nepstad et al. 2014). Accordingly, halting deforestation and forest degradation entail Brazil's most significant contribution to global efforts in combating climate change, biodiversity loss, and desertification vulnerability. More than half of the Brazilian territory is covered by forest, which almost all is primary and naturally regenerated forest ('natural' forest cover) (see Table 5). For the remainder of this article, we therefore only focus on 'natural' forest in Brazil. systems (Ostrom 2011).

Table 5. Forest cover projection for 2015

<b>Forest cover</b>	<b>Hectare</b>	<b>%</b>
<b>Brazilian Territory</b>	<b>851.576.705</b>	<b>100.00</b>
'Natural' Forest Cover	485.801.973	57.05
Forest Plantations	7.735.772	0.90
<b>Total Forest cover</b>	<b>493.537.745</b>	<b>57.95</b>

*Adapted from the Brazilian Forest Resources Assessment (Brasil, 2014).*

Data collection was carried out in several phases. In the first phase, we analysed official documents and literature on SFM in the context of global forest governance. Second, we analysed Brazilian official documents and policies related to SFM, including literature on SFM within the international and the Brazilian contexts. Third, we carried out a total of 17 semi-structured interviews with representatives of: [a] Brazilian government (8) – Ministry of the Environment and Ministry of Agrarian Development; [b] international organisations (3) – Food and Agricultural Organisation of the United Nations (FAO), Inter-American Institute for Cooperation in Agriculture (IICA), and United Nations Development Program (UNDP); [c] non-governmental organisations (NGOs) (5) – Instituto Socioambiental (ISA), Instituto Sociedade, População e Natureza (ISPN), Adapta Sertão, Climate Observatory (OBC) and Fundo Brasileiro para a Biodiversidade (Funbio); and [d] one expert (1) – a former director of the Brazilian Forest Service. Fourth, a public hearing was attended at the Brazilian Supreme Justice Court on the judgement of Actions of Unconstitutionality of the Forest Code, including the presentation of 22 experts from academy, public and private sectors.

The findings of our case study on Brazil are presented in the next sections. Our data analysis consisted of retroductive coding of the results in several rounds, where we moved between empirical detail and theoretical concepts (Glynos and Howarth 2007). Our results are organised to discuss SFM in three domestic policy contexts: (1) domestic policies related to international treaties, conventions, and non-legally binding instruments; (2) domestic policy debates on the Brazilian New Forest Code (Law 12.651, 25th May 2012) (Brasil 2012a); and (3) domestic policy articulation and programmes on the four major Brazilian forest biomes.

We scored influence of global governance on translations of SFM to the Brazilian level of governance on the following qualitative categories: positive [+], negative [-], mixed [+/-] and no [0] influence. Positive scores refer to when international regulations, discourses, markets, or actors positively contribute to SFM translations on the domestic level. Negative influence is the opposite, when international influences actively contribute to a weak or absent translation of SFM on the domestic level. A mixed influence was used to classify situations where both positive and negative influences were identified. Finally, no influence was used to classify the absence of influence of global governance on SFM translations in a domestic context.

## **3.4. RESULTS: SUSTAINABLE FOREST MANAGEMENT TRANSLATIONS TO BRAZILIAN POLICY CONTEXTS**

### *3.4.1. International conventions and Sustainable Forest Management in Brazilian policies*

This section details the influence of international forest governance on SFM institutions in Brazil by specifically focusing on the three ‘Rio conventions’: UNFCCC, CBD, and UNCDD. Results show that ‘International norms and discourses’ presented a mixed influence on national policies directly related to the analysed conventions. ‘International rules’ had a positive influence on SFM translations within national policies. We did not find relevant influences from ‘market’ in these national policies. Finally, we found that ‘direct access to policy-making processes’ only influenced SFM translations on national policies on climate change. We discuss these influences in detail below.

#### *3.4.1.1. Sustainable Forest Management and Climate Change*

International norm and discourses on climate change mostly negatively influenced SFM translations on domestic policies. Since climate discourse mainly focuses on combating deforestation, the incorporation of sustainable use of forest

resources in domestic climate policies has been failing. Consequently, actions are mainly linked to forest restoration and combating deforestation caused by land use changes. Specifically, SFM has not been considered a central strategy or as an alternative for land use change. Cultural perception is a major problem in this context:

In the context of combating deforestation it is hard to establish trust in using natural resources (...) the concerns about combating deforestation made us, and the media that is accessed by most of the population, consider a truck full of wood as an environmental crime, even though the results of SFM might also be trucks full of woods (Interviewee-1[GOV], p.5).

The ‘international rules’ pathway plays a central role in SFM translations on domestic policies on climate change. This is primarily visible in the establishment of a group of national policies that incorporate UNFCCC rules. The National Policy on Climate Change (NPCC) - Law 12.187, 29th December 2009 (Brasil 2009e) established the National Fund for Climate Change (NFCC) - Law 12.114, 10th December 2009 (Brasil 2009b). The NFCC supports projects on mitigation strategies – focusing on forest restoration and on combating deforestation – and projects on adaptation strategies, such as those including SFM. Moreover, the NFCC also realizes policy goals related to other conventions when supporting adaptation strategies that include SFM. According to an interviewee from the Brazilian Environment Ministry:

The National Fund for Climate Change has a very close partnership with the department to combat desertification, supporting, for instance, initiatives related to adaptation of local communities promoting sustainable practices in using natural resources, including SFM (Interviewee-2[GOV], p.1).

Nevertheless, mitigation strategies that play a central role in national policies on climate change are mainly focused on combating deforestation and on forest restoration rather than on SFM (Rodrigues Filho et al. 2016). The dominance of mitigation strategies is evidenced by the NPCC focus on combating deforestation in the Amazon, and recently in the Cerrado biome (Di Gregorio et al. 2016). Even though the National Plan for Climate Change Adaptation (Brasil 2015a) is still under development, its draft version does not clearly consider SFM as an adaptation strategy for climate change.

SFM translations of global climate policy also occur through the ‘direct access to policy-making processes’ pathway of influence, with mixed influence. Brazil played a central role in the discussions about a global compensation mechanism for countries that are mitigating climate change through strategies to combat deforestation, such as Reducing Emissions from Deforestation and Forest Degradation (REDD+) (The-REDD-Desk 2011). As a direct result, in 2008, the Amazon Fund was launched in Brazil with financial resources from the Norway government that is focused on combating deforestation and forest degradation (Forstater et al. 2013). As part of the Amazon Fund, in 2015, a National Strategy for REDD+ (Portuguese acronym ENREDD+) was approved citing SFM as part of its scope (Brazil et al. 2015).

#### *3.4.1.2. Sustainable Forest Management and Biodiversity Conservation*

In the context of the CBD and global biodiversity discourse, we see that SFM is related to the provision of a broad range of ecosystem services, including biodiversity, environmental balance, and local communities’ livelihoods (Hahn and Knoke 2010; Sayer and Maginnis 2005). International norms and discourses related to the CBD that are translated to Brazilian policy mainly concern benefit-sharing and combating bio-piracy. This is because international policies aiming at biodiversity conservation often have to compete with domestic development projects (agriculture, dams, mining, roads, etc.), resulting in a weak SFM translation on biodiversity policies. In the words of a representative of FAO’s Brazilian Office:

On the one hand, the Brazilian focus on the CBD is still very much linked with sharing benefits and combating bio-piracy, both connected to the empowerment of local communities. On the other hand, agribusiness, together with mining and hydropower sectors, continue to be a central driver of environmental degradation. While the national development project is still based on unsustainable practices there remains a lack of dialogue with strategies for biodiversity conservation (Interviewee-3[IO], p.4).

In Brazil, the National Policy for Biodiversity Protection (NPBP) – Decree 4.339, 22nd August 2002 (Brasil 2002) translates international rules and Brazilian’s commitments on the CBD to national policies. As part of the NPBP, the National Program for Biological Diversity – Decree 4.703, 21st May 2003 (Brasil 2003) indicates “priority areas for biodiversity conservation in Brazil” where SFM

might be implemented to promote biodiversity conservation and sustainable forest use, and to improve livelihoods of local populations (Brasil 2007b). The National Plan for Promotion of Value-chains of Products from Socio-Biodiversity (Brasil 2009c) is also relevant for SFM. This Plan positively influences local communities accessing local and regional markets mainly related to non-wood forest products (Interviewee-4[GOV]).

#### *3.4.1.3. Sustainable Forest Management and Desertification*

The UNCCD is of particular interest for arid and semi-arid ecosystems touching upon the importance of forests in these ecosystems. The UNCCD ‘Strategy’ (UN 2007) defines SFM as a component of a sustainable land management strategy to combat Desertification, Land Degradation and Drought (DLDD). In this discourse, SFM is understood as a proactive and preventive type of management, aiming to maintain a broad range of environmental services and to contribute to a more resilient ecosystem (Sivakumar et al. 2014).

The discourse of ‘coexistence with semi-arid conditions’ is thought to originate from social movements of the Caatinga biome in Brazil and later incorporated into the international agenda. Regional movements in Caatinga dating back to the early 1990s made an important contribution to the international scenario of combating desertification. The ‘Brazilian Semi-arid Declaration’ (ASA 1999), a document signed by social organisations during the third UNCCD Conference of the Parties in 1999 (Recife, Brazil), influenced both the Brazilian strategy to deal with desertification and international desertification debates (Interviewee-1[GOV]). The ‘coexistence with semi-arid conditions’ discourse is an example of positive influence of a regional discourse, from Caatinga biome, on international norms and discourses.

Established 18 years after the Brazilian ratification of the UNCCD, the Brazilian National Policy to Combat Desertification and Mitigate Droughts Effects - Law 13.153, 30th July 2015 (Brasil 2015b) is the most important national policy related to the UNCCD. It presents a strategy that focuses on coexistence with semi-arid conditions and aims to build ecosystem resilience, rather than strategies focused on management of desertification impacts. This is in line with international norms and discourses on combating desertification and land degradation:

Brazil has a broad conceptualization of actions to combat desertification, working on integrated actions for sustainable development, including SFM, and focuses on a strategy strongly based on the coexistence with semi-arid climate conditions (Interviewee-1[GOV], p.3).

### *3.4.2. Sustainable Forest Management and the Brazilian 'New' Forest Code*

In the absence of an international forest treaty, one may expect that international norms and discourses will still influence SFM translations on national forest-related policies and regulations (Arts and Buizer 2009). However, there is hardly any evidence of international influences supporting SFM in the most important piece of Brazilian forest-related policy: the Forest Code. The absence of such influences can be explained by national discursive dynamics playing an important role in shaping forest law, as discussed below.

To understand the 'New' Forest Code ('Law of Primary Vegetation Protection' - Law 12.651, 25th May 2012) (Brasil 2012a), it is important to highlight that Brazilian forest governance results from a historical, discursive struggle amongst social actors. These actors can be grouped as (1) agribusiness, (2) conservationist (mainly conservationists NGOs), and (3) forest sustainable use (NGOs and local communities organisations). These three 'discourse coalitions' defend the respective ideas that: (a) forest cover is a 'land use' that means a lost area for agriculture and other productive activities; (b) standing forests have an intrinsic conservation value; and (c) standing forests have both conservation value and sustainable use value.

Important changes in Brazilian policy favouring forest conservation came after the Earth Summit in 1992 (or 'Rio 92'), which coincided with an era of important economic development and stability in the country (Siqueira and Nogueira 2004). The first change in the Forest Code since 1965, made in 1996, was the increase of the 'Legal Reserve' area from 50% to 80% in properties with more than 100 hectares in the Legal Amazon states, including Amazon biome and transitions areas within Cerrado biome. As an area specially created to provide ecosystem services at local scale, including its sustainable use, 'Legal Reserve' is a key concept to understand SFM discussions in the scope of the 'New' Forest Code.

The increase of the 'Legal Reserve' area aimed to halt agribusiness expansion into Amazonia and its transition borders by increasing obligations on forest conservation in these areas.

However, the aim to halt agribusiness expansion also led to debates over the idea that 'Legal Reserves' were untouchable, thus strengthening the agribusiness discourse of seeing the forest as an unproductive area. Even though environmental interests drove changes in the Forest Code of 1996, most interviewed people identified the 'agribusiness discourse' as having become increasingly dominant over time:

If you analyse environmental governance in Brazil along the years, is all about making changes in favour of agribusiness, one of the main drivers of the country development project (Interviewee-5[NG], p.8).

An important change in the Forest Code in 1998 was the possibility of being prosecuted for not following the mandatory maintenance of the 'Legal Reserve' by including it in the Law of Environmental Crimes – Law 9.605, 12th February 1998 (Brasil 1998). An additional change, however, was the introduction of the possibility to compensate for deforested 'Legal Reserves' of one property in another area in the same watershed, and with ecological similarities. As a result of this possibility, the agribusiness sector was able to maintain its expansion plans in forested borders.

Surprisingly there was introduced the possibility for compensation of the lack of 'Legal Reserve' of one property in other areas, but in the same watershed and respecting the same ecological characteristics. And this is an example of agribusiness interests winning against the valorisation of standing forest (Interviewee-5[NG], p.5).

Many conservationists groups were still satisfied with the possibility to guarantee the maintenance of forest cover wherever it could be in the same watershed. Nevertheless, the option to compensate deforested areas in other properties weakened the potential of a 'Legal Reserve' to guarantee forest ecosystem services at a local scale. Compensation elsewhere also excluded the idea of regulating sustainable use of these 'Legal Reserves' by local communities as part of their livelihood. Moreover, a series of amnesty actions were approved to remove obligations of compensation of previous deforestation, specifically, deforestations from before 1998, and nowadays from before 2008 (Soares-Filho et al. 2014).

‘Legal Reserves’ should ensure sustainable use of natural resources, assist the rehabilitation of ecological processes and promote the conservation of biodiversity. Is it possible to fulfil this function compensating the lack of Legal Reserve in an area thousands of kilometres from the property in question with the only criterion of being in the same biome, in a country where the smallest biome is greater than Greece and the largest is equivalent to almost the entire length of the European Union? (Interviewee-6[NG], p.1).

National debates around the formulation of the New Forest Code reflected political pressure to consider the needs of the agricultural sector over calls to guarantee national improvements in forest conservation (Fayad and Caldani 2012). Accordingly, we observed a clear opposition between agribusinesses discourse on the one hand and nature conservation discourse on the other, leaving little room for the idea of integrating SFM in the New Forest Code.

It is important to highlight that the Forest Code defines different sizes of ‘Legal Reserves’ related to the location of the property within the Brazilian biomes, which in general is: 80% for Amazon and transitions areas; 35% for Cerrado; and 20% for Atlantic Forest, Caatinga, Pampas, and Pantanal (Brasil 2012a). As such, forest governance in Brazil is strongly influenced by the social-ecological specificities of the Brazilian biomes.

### *3.4.3. Sustainable Forest Management and the Brazilian biomes*

In this section, we analyse how domestic policy articulations and programmes are shaped by social-ecological systems in relation to international pathways of influence. These SFM translations are analysed for four biomes: Amazon, Cerrado, Atlantic Forest and Caatinga. We found the four major forest biomes to play an important role in translations of SFM from the global to the domestic level. Each biome shapes these translations differently as a result of interactions between social-ecological specificities and different pathways of influence, as is discussed below.

#### *3.4.3.1. Sustainable Forest Management and the Amazon biome*

SFM strategies focused on the Amazon are an “alternative for deforestation, a strategy to protect forest, and part of a conservation strategy” (Interviewee-7[NG], p.1). As such, SFM translations happen in three different manners for the Amazon biome. The first translation is linked to an international

discourse on sustainable timber production, mostly used by external actors, and not properly articulated to local communities' practices in using forest resources (Medina et al. 2009). This can be related to SFM experiments inspired by what was happening in other regions of the world in the 1970s, such as Malaysia, Indonesia, and Central America (Interviewee-7[NG]). More recently, this SFM approach is being linked to influences mainly from timber markets shifting towards sustainability (Saunders and Yadlapalli 2010).

The second SFM translation is strongly influenced by transnational actors, in particular by the social movement of the rubber communities, and later the murder of its leader, Chico Mendes, in 1989. Rubber communities' protests were inspired by community-based SFM focused on land access rights and regulation of non-wood forest products, including also a biodiversity protection perspective. As such, this movement mobilised international attention for human rights of local populations. One of the direct consequences of this social movement was the establishment, in 1990, of the Extractive Reserve as a domestic category of nature conservation focused on the forest-related livelihoods of local populations. Transnational influence also occurred through the 'Pilot Program for Tropical Forest Protection in Brazil' (Portuguese acronym PPG7), a partnership between the Brazilian government and governments from the G7 group (Germany, Netherlands, Italy, Spain, France, Japan, Canada, United Kingdom, United States, and the European Commission). The PPG7 Program was launched in 1992 during the Earth Summit and was finalised in 2009. It was focused on the Amazon and Atlantic Forest biomes in order to provide examples of SFM that could be directly translated to national policies.

One of the most relevant international initiatives related to SFM in Brazil is the 'Pro-Management', in the scope of the PPG7. The project was very important in creating models of SFM and in inserting, at least in the Amazon context, the discussions around sustainable use of forest resources (Interviewee-5[NG], p.11).

The third way in which SFM translations relate to the Amazon biome concerns international rules and discourses that express the urgency to decrease deforestation rates. In the beginning of the 2000s, a significant increase of deforestation rates in Amazon occurred with records close to 2 million hectares per year (INPE 2016), strongly linked to the land use change cycle that begins with illegal logging and ends with agriculture and cattle expansion (Nepstad et al. 2014).

Public forests represent 84% of the forest cover in Amazon biome and consequently most of the deforestation happens there (INPE 2016). To decrease deforestation in public areas promoting sustainable forest management, a political discussion emerged that led to the Law for the Management of Public Forests (LMPF) – Law 11.284, 2nd March 2006 (Brasil 2006a), including the implementation of public-private forest concessions and support for community-based forest management.

After 10 years of the establishment of the LMPF, which also created the Brazilian Forest Service and the National Fund for Forest Development, public-forest concessions under operation are still few: from the total of 17.822.300 hectares (Brasil 2016b) of National Forests in Amazon, only 842.000 hectares are under public-private forest concessions (Brasil 2016a). At the same time, community-based forest management has been facing challenges such as a lack of technical support, access to market, credit programmes and human capacity. As a result, deforestation caused by illegal logging and land use change in public forests, especially in Indigenous lands, increased in the last two years (INPE 2016; ISA 2017).

#### *3.4.3.2. Sustainable Forest Management in Cerrado biome*

Today, Cerrado is the biome that is most affected by agribusiness expansion in Brazil, which is linked to an increase in its deforestation rates in the last three years (Beuchle et al. 2015). The Brazilian agribusiness sector is strongly shaped by the international market's focus on cost-efficiency and large-scale agriculture, leading to a negative influence on SFM initiatives that are more focused on small-scales production and local population's livelihoods. In addition, agribusiness discourses are much stronger than forest conservation discourses with regard to this biome.

In the context of climate change, considering the expansions of agriculture and cattle, the Cerrado biome is strongly linked to GHG emissions from land use change and degradation (OBC 2014). As part of the Brazilian strategy to combat Climate Change, the 2010 Action Plan to Combat Deforestation and Fire in Cerrado (Brasil 2011a) was established followed by the Program of Low-Carbon Agriculture (Brasil 2012b), established in 2012. Neither of these national programmes includes SFM as part of its strategy to strengthen the value of standing forests, even though both are translations of international climate change rules.

Biodiversity programmes for the Cerrado biome do show a significant accumulation of positive results related to SFM and non-wood forest products by local communities. For example, an initiative by the Global Environment Facility (GEF) – the Small Grant Program – has been carried out since the 1990s by a national NGO, and is focused on sustainable use of natural resources through the strengthening of local communities’ social organisations (Interviewee-8[NG]). The GEF Small Grant Program constitutes a ‘direct access to the policy-making process’ pathway of influence, as it is responsible for the generation of most of the technical information on best practices to manage non-wood forest products in the biome.

#### *3.4.3.3. Sustainable Forest Management in Atlantic Forest biome*

The Atlantic Forest biome has only 4% of the national ‘natural’ forest cover and is the Brazilian biome with the highest rate of forest degradation when compared to its original cover (see Table 4). Covering the coastal region where most Brazilian urban centres are located, including Rio de Janeiro and São Paulo, the Atlantic Forest biome has the advantage of having a stronger public visibility and higher capacity to draw attention from national and international organisations.

The NGOs from Atlantic Forest biome are stronger in conservation strategies and more articulated, with a higher power to pressure and influence central government decisions (Interviewee-9[GOV], p.9).

International initiatives of forest conservation in the Atlantic Forest biome are examples of how the ‘direct access to policy-making processes’ pathway influences SFM translations, however not linked to international norms and discourse in sustainable use of forest resources, such as SFM, but to strict conservation strategies. In 1991, for instance, the first Brazilian UNESCO Biosphere Reserve was established in the Atlantic Forest, unifying efforts from environmental agencies, the scientific community, NGOs, and social organisations for nature conservation (UNESCO 2017). The Critical Ecosystems Partnership Fund is also an example of international translations shaped by the Atlantic Forest biome: it is a partnership to conserve biodiversity hotspots amongst Conservation International; the EU; the World Bank; the GEF; and the Japan Government. Another example is the conversion of Brazilian national debts by the United States of America government in exchange for tropical forest conservation including Atlantic Forest

and Caatinga, the Tropical Forest Conservation Act. These initiatives are mostly related to forest restoration, and SFM is rarely mentioned as part of its strategies.

The above and other initiatives resulted – at least partly - in the Law of the Atlantic Forest in 2006 - Law 11.428, 22nd December 2006 (Brasil 2006b), which defines very strict conditions for the management of natural forest cover. These strict rules make discussions on the promotion of SFM in this biome very difficult. The degraded condition of the biome as a whole, thus, favoured a conservationist discourse, making it stronger than discussions on SFM (Interviewee-7[NG]).

#### *3.4.3.4. Sustainable Forest Management in Caatinga biome*

Caatinga biome is located in the second most populated and poorest region of Brazil (IBGE 2010). The use of forest resources in Caatinga biome has a very specific context: a huge part of its domestic and local industry demands firewood and charcoal for energy (Pareyn 2010b). On the one hand, the use of forest resources in Caatinga is a threat as it represents one of the main drivers of deforestation in the biome in addition to land use change for agriculture and livestock pastures in forest areas (Brasil 2011c). On the other hand, the presence of a very active local and regional value chain for firewood and charcoal and the high resilience capacity of the managed species (Gariglio et al. 2010) makes SFM an opportunity for continuous income generation for local population through a sustainable use of forest resources (Interviewee-1[GOV]).

SFM in Caatinga is easier because through clear cutting all the species sprout again after a relatively short cycle. The resilience capacity of a managed forest in Caatinga is high if you don't use the area for other purposes, such as animals or plantations, and if the management follows certain rules of cutting and other practices (Interviewee-10[IO], p.3).

SFM in Caatinga can provide income generation for local population facing poverty, help to combat deforestation, contribute to biodiversity conservation, and decrease desertification vulnerability. Even so, SFM strategies in Caatinga have been based mainly on the results from an initiative from the FAO. In the 1980s, FAO was establishing its office in Brazil and started a project in the northeastern focused on charcoal production for energy:

The approach of SFM in Caatinga biome was a top-down initiative; the local populations were not initially involved. The FAO project was focused on research of better practices in using forest resources for firewood and charcoal as an energy source (Interviewee-7[NG], p.10).

Using forest resources for firewood and charcoal, especially through clear cutting, produces an image that is socially and culturally linked to forest degradation, even if it is part of a SFM plan. This social and cultural negative valuation of using forest resources and the challenges in regulating and monitoring SFM plans contributed to a very slow uptake of SFM implementation in Caatinga biome (Interviewee-1[GOV]). Meanwhile, households and industries continue to consume forest as an energy source, which is supplied mainly by illegal forest management.

In Caatinga biome it is possible to identify strategies of SFM focused on non-wood forest products as part of a broader strategy of coexistence with semi-arid conditions. In this sense, SFM translations focused on non-wood forest products in Caatinga biome link to Brazil's strategy to combat desertification within the UNCCD, and its strategy of improving social-ecological resilience can be found on a domestic policy level.

### **3.5. DISCUSSION AND CONCLUSIONS**

Our analysis on translations of SFM from the global to the Brazilian domestic level of governance was guided by the 'pathways of influence of global complex governance on domestic policies' by Bernstein and Cashore (2012) – international rules, international norms and discourses, markets, and direct access to policy making processes. Our results illustrate how these pathways are also shaped by domestic policy contexts that include social-ecological systems. More specifically, our analysis led us to identify international influences in three different domestic policy contexts: domestic policies related to international conventions;

the Brazilian New Forest code; and domestic policy articulations and programmes on the four major forest Brazilian biomes. For each domestic policy context, we showed how international influences follow certain pathways more than others. We identified how the pathways differently influence SFM translations in the three analysed domestic policy contexts and qualitatively assessed these as: [+] positive influence; [-] negative influence; [+/-] mixed influence; and [0] no influence. Table 6 visualises these results in a simplified manner.

First, we analysed SFM translations on the Brazilian policies linked to forest-related international conventions, more specifically the UNFCCC, CBD and UNCCD. While in global governance we observe that SFM is a central strategy of using forest resources while aiming to maintain its related ecosystem services (Quine et al. 2013), we also observe that SFM plays different roles within these forest-related international conventions (Giessen 2013). These different roles are reproduced in translations of SFM to the Brazilian domestic level, as SFM takes on different meanings and applications in national policies on climate change, biodiversity, and desertification. This means that SFM is able to achieve a broad range of objectives on the national level. However, it also means that institutional fragmentation on the international level is being reproduced on the national level (Jóhannsdóttir et al. 2010).

Our analysis showed that the non-legally binding status of the NLBI correlates with a weak SFM translation on national policy. International norms and discourses associated with the NLBI and the Rio conventions did influence, positively or negatively, SFM translations in national policies on climate change, biodiversity, and desertification. However, the relative absence of international influences in Brazil's major piece of forest policy, the Brazilian New Forest Code, shows the limited influence of international conventions or discourses alone (Jóhannsdóttir et al. 2010). Specifically, findings show that SFM translations on the New Forest Code are not influenced by any of the pathways considered in our analysis. International norms and discourse on SFM – such as those promoted by the NLBI – have not proven to be able to overcome Brazil's domestic policy context in regulating the use and conservation of forest resources within the national territory (Eikermann 2015), as it was crowded out in a conflict between nature conservation and agribusiness discourse. We would expect that perhaps forest

certification schemes from international markets could have a positive influence on translations of SFM to a domestic level of governance. However, around 78% of the forest products remain in the domestic market, and of the timber that goes to international markets only 3% is certified under SFM plans (SFB and Imazon 2010). Accordingly, national agribusiness discourse has had a dominant voice in shaping the Forest Code (Kröger 2017).

When we consider the international influences in the context of domestic policies directly related to the analysed Brazilian biomes – Amazon, Cerrado, Atlantic Forest and Caatinga –, we can confirm that social-ecological context matters. International influences do not only lead to SFM translation on a generic national level, but more actively target specific social-ecological systems in the case of Brazil. Moreover, certain amounts of interplay between different pathways of influence become visible within these social-ecological contexts.

The Amazon biome, for instance, is the focus of many different international attempts to regulate forest conservation and management through conventions, discourses, and transnational actors (Medina et al. 2009; Nepstad et al. 2014), which results in a noticeable influence of all the pathways on SFM translations in this specific social-ecological context. For Caatinga biome, SFM translations are also influenced by all the pathways, but for different reasons. Here, high suitability of the ecological conditions for SFM, the historical types of forest uses, such as a source of energy (firewood and charcoal), and diverse attempts related to strategies to improve the social-ecological resilience of local communities livelihoods made SFM translations contributing to both biodiversity conservation and decreasing desertification vulnerability. While for the Amazon interplay of influences from international conservation discourses and timber markets results in a SFM translation that is focused on decreasing deforestation, the influence of transnational actors on translations of SFM is much more focused on local livelihoods. In Caatinga, we see multiple pathways re-enforcing another, with only international discourse linked to decreasing deforestation having negative influence on the translation of SFM.

Table 6. A Global complex governance pathways of influence on SFM translations in the Brazilian level of governance

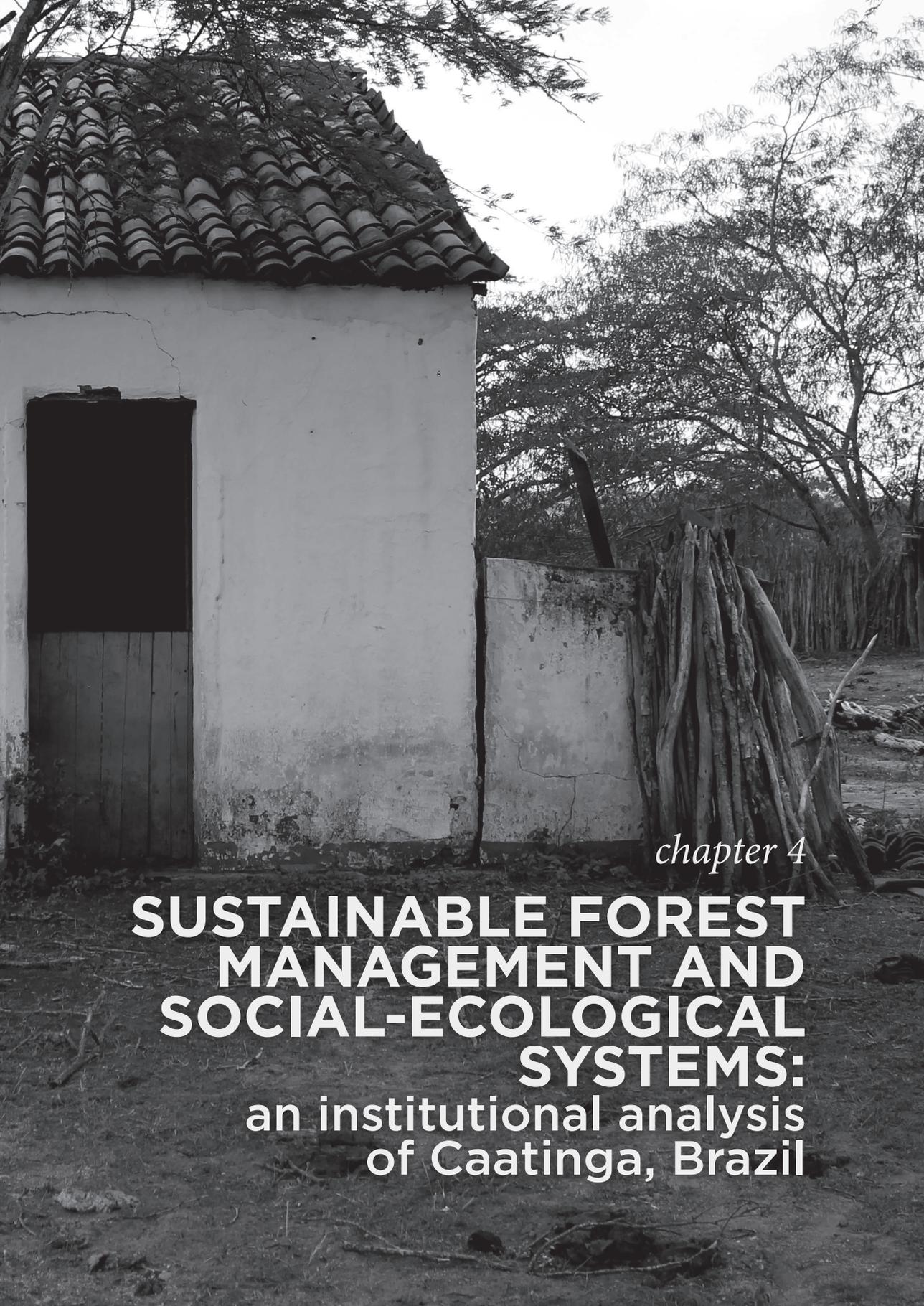
		Pathways of influence*				SFM Translations
		IND	IR	M	DAPM	
International Conventions in domestic policies	UNFCCC	-	+/-	0	+/-	National policies are more focused on Climate Change mitigation strategies (forest restoration and combating deforestation) than on adaptation strategies (SFM).
	CBD	+/-	+	0	0	SFM as part of the Ecosystem Approach focused on non-wood forest products linked to livelihood of local population. General weak translation of SFM due to discourses dispute within the national development project.
	UNCCD	+	+	0	0	SFM as part of a strategy to promote coexistence of local population' livelihood with semi-arid conditions, aiming to decrease desertification vulnerability in the semi-arid region (Caatinga biome).
National forest governance and policies	Brazilian Forest Code	0	0	-	0	National dynamic of dispute between agribusiness and conservationist discourses are stronger than any other pathways of influence and favoured a weak translation of SFM. International agriculture-related market negatively influences translations of SFM in national forest-related policies and regulations.
Domestic policy programmes related to the specificities of the Brazilian biomes	Amazon	+	+	+/-	+	SFM as a strategy to combat deforestation through implementation of public-private forest concessions and community-based forest management, however, both has been facing challenges and failures.
	Cerrado	+/-	+/-	-	+	Agribusiness discourse and international agriculture-related market negatively influence SFM translations, even though there is a positive influence on translations of SFM related to biodiversity conservation and livelihood of local population.
	Atlantic Forest	-	-	-	-	Due to the high rates of forest degradation SFM translations are not part of strategies that aim, mostly, at forest conservation and restoration.
	Caatinga	+/-	+	+	+	Top down SFM translation from international to governmental initiatives focus on firewood and charcoal production for energy supply. SFM focused on non-wood forests products is part of the strategy of coexistence of local population's livelihood with semi-arid conditions.

(\*) IND: International Norms and Discourses; IR: International Rules; M: Market; DAPM: Direct Access to Policy-making Processes / Elaborated by the authors.

For the Cerrado biome, domestic SFM translations are mainly shaped through the biomes importance for agribusiness discourse. This results in a weak translation of SFM, which is negatively reinforced by agribusiness-related markets, and by rules focused on decreasing deforestation. Finally, the Atlantic Forest biome leads to more translations of international rules and discourses of forest conservation than of discourses supporting SFM, as the former resonated better with a more degraded, urbanised, and industrialised social-ecological system than the latter. For these reasons, international conservation NGOs in Brazil are also predominantly engaged with conservation action and much less so with sustainable use.

The different ways in which domestic policy contexts shape international influences on SFM translations show that domestic contexts play an important role in translating rules, norms, and discourses from the global to the domestic level of governance. What is moreover relevant is that translations of SFM from the international to the domestic level of governance include complex human-environment relations that are expressed in competing discourses, specific policies, and actor networks (Adger et al. 2005), which vary according to the specific characteristics of different social-ecological systems (Ostrom and Cox 2010).

Policy dynamics not directly related to forest are key to understanding translations of global forest policy to the domestic level. Political dynamics linked to the Brazilian agribusiness sector, for instance, shape forest governance strongly and more so than other forest-related discourses, mainly due to its central role in the national development project. We argue that the starting point for analysing influences of global forest governance on domestic policy contexts needs to be an understanding of pre-existing policy dynamics, and the need to pay special attention to the complex human-environment relations that are expressed in discourses, policies, and actor networks. Finally, it is important to consider that different social-ecological systems within a country can play a central role in the shaping SFM translations on the domestic level, especially in countries such as Brazil where forest ecosystem services and its social, economic, and cultural values strongly vary within the national territory.



*chapter 4*

**SUSTAINABLE FOREST  
MANAGEMENT AND  
SOCIAL-ECOLOGICAL  
SYSTEMS:  
an institutional analysis  
of Caatinga, Brazil**

## Abstract

Sustainable Forest Management (SFM) has globally gained support as a strategy to use and manage forest resources while maintaining forest ecosystem services. However, type, relevance, and utilisation of forest ecosystem services vary across eco-regions, countries, and policy implementation pathways. As such, the concept of SFM is subject to a series of translations within the social-ecological context in which it is implemented. This article discusses translations of SFM in Caatinga biome – a tropical dry forest in the northeastern semi-arid region of Brazil. Our analysis is based on a qualitative analysis of 24 semi-structured interviews and 30 documents. We discuss SFM and the interplay of resources, governance, and actors. Results for Caatinga show that (1) a technical approach to SFM that focuses on firewood and charcoal production is dominant; that (2) SFM implementation practices hardly address the needs and interests of local populations; and that (3) local actors show little support for the implementation of SFM. We conclude that the social-ecological context of Caatinga shapes translations of SFM mostly in a techno-bureaucratic rather than a socially embedded way. As a result, local practices of forest use are excluded from the regional SFM approach, which negatively affects its implementation.

**Key-words:** Critical Institutionalism; Institutional Translations; SFM; Caatinga biome; Brazil.

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## 4.1. INTRODUCTION: TRANSLATIONS OF SUSTAINABLE FOREST MANAGEMENT WITHIN A SPECIFIC SOCIAL-ECOLOGICAL CONTEXT

Today, debates on implementing Sustainable Forest Management (SFM) to combat deforestation are especially focused on natural forests in tropical regions. Since the early 1990s, SFM has gained global support as a strategy that simultaneously promotes the use of forest resources and the conservation of forest ecosystems (Arts et al. 2010; Hickey 2008). More recently, SFM has become part of strategies aiming to protect natural forest resources against deforestation pressures resulting from land use change (Nasi and Frost 2009). This support for SFM implementation in natural forest contexts follows the broad application of SFM within several international environmental policies.

Natural forests in tropical regions are often hotspots of deforestation, harbour high levels of biodiversity, and play a key role in regulating global climate (Hickey 2008; Nasi and Frost 2009). As such, natural tropical forests are targeted by an international forest regime consisting of multiple international agreements and policy instruments in which SFM plays a key role (Faggin and Behagel 2017; Giessen 2013). Natural forests are also subject to a diversity of domestic governance regimes linked to international policy debates, including climate change, biodiversity, desertification, poverty, and human rights (Sonwa et al. 2012). Moreover, SFM is likely to be shaped by the social-ecological context in which it is implemented. This brings challenges to the implementation of SFM on the ground, including how to align domestic governance regimes with the needs and specificities of local social-ecological systems (Arts et al. 2016; Maguire 2013).

Located in northeastern Brazil, Caatinga biome <sup>1</sup>, hereafter called Caatinga, harbours one of the most biodiverse tropical dry forests in the world (Gariglio et al. 2010; Santos et al. 2011). In Caatinga, forest resources are central to the livelihoods of local populations and an important source of biomass for energy

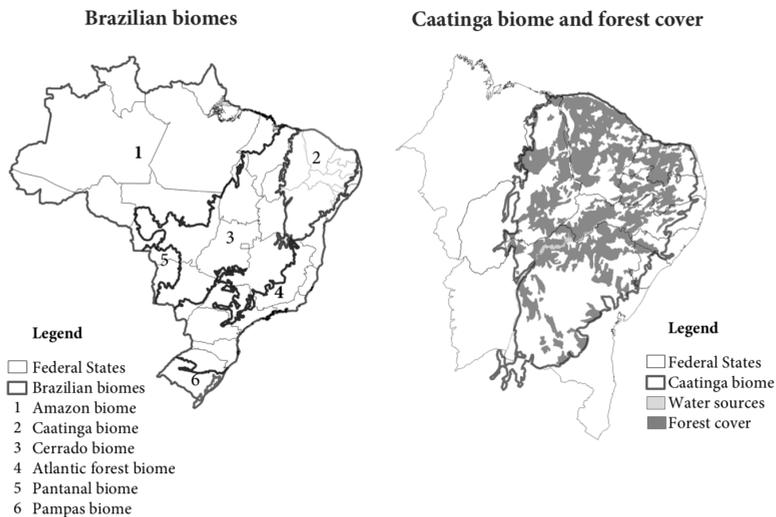
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<sup>1</sup> A biome is “a geographical area defined mostly by the climate conditions but also by the vegetation, soil and altitude” (IBGE 2017a). For the purpose of this paper, the division of the Brazilian territory in biomes is also linked to a division based on similarities of policies, governance, cultural identity and social contexts (Aguilar et al. 2016).

supply (firewood and charcoal). Forest resources provide 30% of the energy supply in the region (Pareyn 2010b). Implementation of SFM in Caatinga started in the 1980s as a way to combine the use of forest biomass as a source of renewable energy with forest conservation. SFM is considered to have the potential to decrease biodiversity loss, desertification vulnerability, and poverty (Gariglio and Barcellos 2010; Gariglio et al. 2010). However, a research gap exists with regard to the understanding of how SFM implemented in Caatinga is shaped by social-ecological factors.

Caatinga is an indigenous word from the ‘Tupi’ language (kaa’tinga - ‘kaa’: vegetation, plants + ‘tinga’: white, clear), meaning ‘white forest’ (Houaiss et al. 2001). The biome is located in northeastern Brazil and covers 84 million hectares spread over 9 federal states (see Figure 6). It is the third most populated biome with 12,9% of Brazilian inhabitants (IBGE 2010), and presents the highest poverty index amongst the biomes: of the 200 poorest Brazilian municipalities, 153 are found in Caatinga (UNDP 2013). Located in a semi-arid area, Caatinga is exposed to long dry seasons. The dry season that started in 2011 continues till today – even though there was a rainy season in 2017 – and has been reported as the most intense of the last 30 years (WMO 2014).

Figure 6. Brazilian biomes and forest cover in Caatinga biome



Elaborated by the author cf. (Brasil 2004; IBGE 2017b).

Brazilian forest governance has historically focused on the Amazon biome, which embraces the largest tropical rain forest in the world, and on the Atlantic Forest biome, the most deforested amongst the Brazilian biomes (Duarte-Almada et al. 2013). Recently, federal government's strategies, especially those dealing with deforestation threats, also started to focus on the Cerrado biome (Savannah), where deforestation rates have been increasing in the last five years due to land use change as part of agribusiness expansion in the region (Trancoso et al. 2015). Caatinga and its tropical dry forests receive little attention in terms of domestic actions targeted at conservation or sustainable use of natural resources (Blackie et al. 2014; Faggin and Behagel 2017), even while it is home to the poorest and the third largest population of the country (IBGE 2017a) and has the second larger forest cover in relation to the total area of the biome, coming just after the Amazon (SFB 2018).

Considering the above, this article investigates how implementation of SFM in Caatinga contends with multiple issues. First, it explores how technical aspects of SFM are translated to the natural tropical dry forest ecosystem of Caatinga. Arguably, this involves both technical expertise and the adaptation of legal frameworks to be suited to this context (Arts et al. 2016). Second, the article addresses questions over governance, such as which actors are involved, and how SFM implementation strategies seek to introduce and/or change already existent institutions (Clever 2002). Finally, the article addresses how SFM in Caatinga might be shaped by socially embedded values and beliefs that are particular to this social-ecological system (McGinnis and Ostrom 2014; Ostrom 2009). We thus hypothesize that the social-ecological interactions particular to Caatinga will shape translations of SFM. In the following, we first present our analytical framework based on the Social-Ecological System model (Hinkel et al. 2014; McGinnis and Ostrom 2014; Ostrom 2009), and the Critical Institutionalism approach (Clever 2002; Clever and De Koning 2015; Hall et al. 2014). After that, we discuss our methodology and present our results. We conclude the article by discussing how social-ecological interactions shape translations of SFM in Caatinga and how these translations affect the uptake of SFM on the ground.

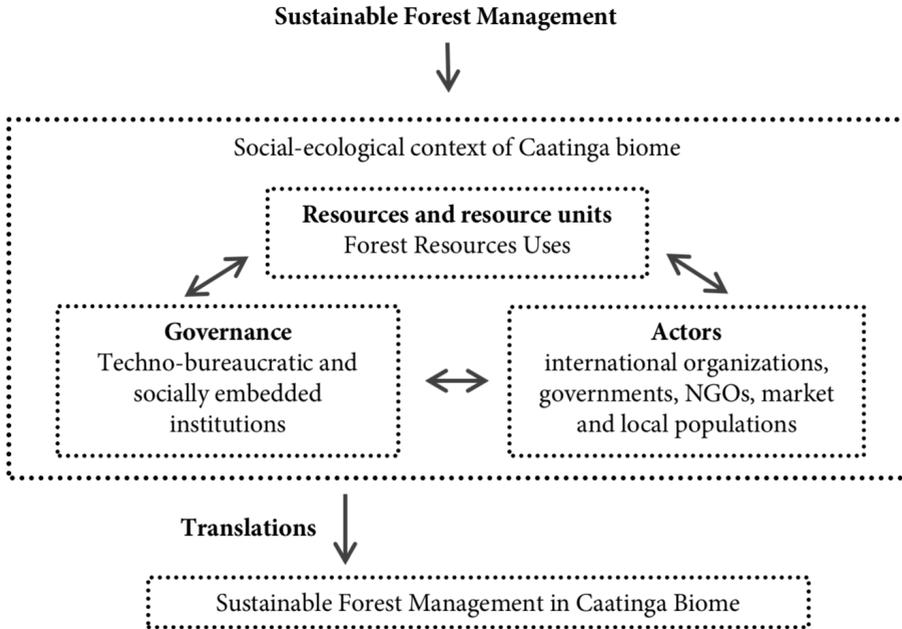
## 4.2. ANALYTICAL FRAMEWORK: SOCIAL-ECOLOGICAL SYSTEMS AND CRITICAL INSTITUTIONALISM

To understand how social-ecological interactions within a biome affect and shape translations of SFM in a specific context, we integrate ideas from literature on Social-Ecological Systems (SES) (Folke 2006; Ostrom 2009) and Critical Institutionalism (CI) (Cleaver 2002; Cleaver and De Koning 2015) into our own analytical framework (see Figure 7). In particular, we use the SES model to discuss how interactions between actors, institutions, and resource uses shape SFM within a specific social-ecological context (McGinnis and Ostrom 2014; Ostrom 2009). Accordingly, we understand the emergence of technical approaches, rules, and cultural values and beliefs on SFM to result from social-ecological interactions within a specific context or region (Berkes and Folke 1994).

The SES model presents a complex system of interactions across resources, resource units, actors, and governance sub-systems within specific social-ecological contexts (McGinnis and Ostrom 2014; Ostrom 2009). When applying the SES model to a specific case, each of these sub-systems comprises a set of variables that depend on “the particular question under study, the type of SES, and the special and temporal scales of analysis” (Ostrom 2009, p.420). We adapt the SES model to our case and argue that institutions (rules, norms, and values) are shaped by a given social-ecological context (Schlüter et al. 2014). To identify variables for the study of translations of SFM in Caatinga in recent years, we consider a *translation* to be a process through which rules, norms, and cultural values linked to SFM are shaped by interactions amongst actors, governance, and resources use.

The general understanding on which the SES model is based holds that interactions amongst resource and governance systems entail institutions that steer actors’ behaviour as they participate in the management of natural resources (Hinkel et al. 2014; McGinnis and Ostrom 2014; Ostrom 2009). For our analysis, we specify two groups of institutions that we adopt from CI: techno-bureaucratic and socially embedded institutions. Techno-bureaucratic institutions comprise formal rules and norms, such as regulations and technical approaches linked to SFM. Formal rules can be seen as deliberate interventions to change or strengthen a specific actors’ behaviour and can be applied across different contexts. Although norms are not always formalised in rules, they are nonetheless specific enough

Figure 7. Translations of SFM in a social-ecological system framework



Elaborated by the authors cf. (McGinnis and Ostrom 2014; Ostrom 2009).

to be recognised as standards or codes of conduct by which to act and behave (Scott 2008). Socially embedded institutions are related to cultural values and beliefs guiding actors' behaviour. This type of institutions differs from techno-bureaucratic institutions in that it is generally much stronger anchored in a society or community in a historical, cultural, and political sense. As it is socially embedded, this type of institutions is more diffuse in its articulation and less likely to travel across different contexts (Peters 2014).

Critical Institutionalism (CI) answers questions about how institutions are translated from one context to another. According to CI, processes of “reusing, reworking, and refashioning” of already existent socially embedded institutions happen when they interact with new techno-bureaucratic institutions that arrive ‘from outside’ (Clever and De Koning 2015). CI argues that if institutions

from different origins and scales interact, then new local arrangements will be produced, thus leading to governance outcomes that in many cases are unintended and/or unexpected (Cleaver 2000; Cleaver and De Koning 2015). According to CI, such processes of institutional change involve *bricolage*, a process by which people (un)consciously draw upon existing socially embedded institutions to shape new arrangements and outcomes in order to cope with change (Cleaver 2002; Cleaver and De Koning 2015). For the purpose of this paper, we speak of ‘translation’ instead of ‘bricolage’. The latter is particularly tailored to address individual actors’ behaviour in a new institutional setting, whereas ‘translation’, we believe, better expresses the change of institutions and outcomes from a collective action perspective. That is to say that we consider institutional actors such as governments as well as local communities to play a key role in shaping institutions, and hence as the relevant actors in the process of institutional change.

For our analysis, we are interested in how SFM – introduced in the social-ecological context of Caatinga – is translated and shaped by: (1) the nature and availability of biome-specific forest resources; (2) their use and management by regional and local actors; and (3) their governance through techno-bureaucratic and socially embedded institutions (see Figure 7). In particular, our analytical framework brings out how actors, resource use, and governance influence each other to shape SFM on the ground. As such, we hypothesise that the uptake of SFM as a practice on the ground – and therefore SFM implementation in general – is strongly related to the extent to which these categories do or do not interact.

### **4.3. MATERIAL AND METHODS: ANALYSING TRANSLATIONS OF SFM IN THE SOCIAL-ECOLOGICAL CONTEXT OF CAATINGA**

We analyse SFM implementation in Caatinga for two main reasons. First, in a country such as Brazil with at least four different tropical forest biomes (Amazon, Atlantic Forest, Cerrado, and Caatinga), SFM strategies need to engage in dialogue with the social-ecological specificities of these different territories for

them to be successful. Caatinga is the least researched forest biomes of the four (Blackie et al. 2014). Second, the biomes of Brazil do not only refer to geographical territories that share biophysical similarities but also correspond to territories with shared social, economic, political and cultural contexts (Aguiar et al. 2016), thus representing social-ecological systems.

We apply a simplified SES model to Caatinga as a composition of three sub-systems: (1) *Resources and Resource Units* – including the uses of forest resources and the ecosystem services provided by these uses; (2) *Governance* – including techno-bureaucratic and socially embedded institutions; and (3) *Actors* – including international organizations, federal and state governments, non-governmental organizations, market actors, and local populations. We understand these actors to both shape institutions and forest use on the one hand and to be shaped by institutions and forest use on the other hand. As these sub-systems continuously interact, we present our results below by discussing both resource use and governance in relation to the actors that use and implement them.

Our analysis is based on data obtained from 24 semi-structured interviews with representatives of the Brazilian government in federal (central) and state (regional) levels; non-governmental organizations; universities; private companies; international organizations; and experts (see Table 7). The selection of key-actors to be interviewed was based, first, on the previous working experience of the first author at the Brazilian Forest Service supporting governmental strategies of SFM implementation in Caatinga. Second, we adopted the ‘snowballing’ qualitative method, where interviewees were asked to indicate other potential interviewees (Ritchie 2013). The interviews had an average duration of 50 minutes and followed a semi-structured script to explore the interviewees’ opinion on experiences and ideas linked to SFM implementation in Caatinga. We also collected data from around 30 additional documents, comprising of governmental documents, policy reports, and an event called the ‘First Symposium of the Caatinga biome’, organised by the Brazilian Agricultural Research Corporation (*Embrapa*), in Petrolina, Pernambuco. Qualitative coding of the interviews was based on an inductive approach to qualitative data analysis (Howard-Payne 2016), which means that the first round of analysis generated empirical codes that in the second and further rounds of analysis were organised in various blocks corresponding to analytical frames distilled from literature. As qualitative coding was iterative, it also contributed to the design of the analytical framework.

Table 7. List and profile of interviewee

<b>Brazilian Federal government (13)</b>	
Interviews 1 and 2	Brazilian Forest Service (Ministry of the Environment)
Interview 3	National Fund for Forest Development (Ministry of the Environment)
Interview 4	National Fund for Climate Change (Ministry of the Environment)
Interview 5	Department of Sustainable Rural Development (Ministry of the Environment)
Interview 6	Department to Combat Desertification (Ministry of the Environment)
Interview 7	Caatinga Nucleus (Ministry of the Environment)
Interviews 8, 9 and 10	Northeastern Regional Office of the Brazilian Forest Service (Ministry of the Environment)
Interview 11	Office of the Ministry of Agrarian Development in Pernambuco state
Interview 12	'Dom Helder Câmara' Project (Ministry of Agrarian Development)
Interview 13	National Institute for the Semi-arid (Ministry of Science, Technology, and Innovation)
<b>States' government (2)</b>	
Interview 14	Environment Agency of Paraíba (Sudema)
Interview 15	Environment Agency of Pernambuco (CPRH)
<b>Non-governmental Organizations (3)</b>	
Interview 16 and 17	Northeastern Plants Association (APNE)
Interview 18	Center for Sustainable Industrial Production (CEPIS)
<b>Universities (2)</b>	
Interview 19	Federal Rural University of Pernambuco (UFRPE)
Interview 20	Federal University of Campina Grande (UFCG)
<b>Private Company (1)</b>	
Interview 21	Northeastern Reforestation (Nordeste Reflore)
<b>International Organization (1)</b>	
Interviews 22a and 22b	Inter-American Institute for Agriculture (IICA)
<b>Experts (2)</b>	
Interview 23	Representative of the Climate Observatory (Observatório do Clima)
Interview 24	Former director of sustainability of the Brazilian office of the United Nations Development Programme (UNDP)
<b>'First Symposium of the Caatinga biome' (5)</b>	
Interview 25a	Food and Agricultural Organization of the United Nations (FAO)
Interview 25b	Department to Combat Desertification (Ministry of the Environment)
Interview 25c	Federal University of Campina Grande (UFCG)
Interview 25d	Federal University of Ceará (UFC)
Interview 25e	Northeastern Plants Association (APNE)
<b>Total: 24 interviews + 5 presentations at a Symposium</b>	

*Elaborated by the authors.*

## 4.4. RESULTS

### 4.4.1. Forest resources uses in Caatinga

In Caatinga, pressures on forest cover and uses of forest resources include: use as a natural pasture for animals (cattle and goats); use as a source of biomass for energy supply (firewood and charcoal); use as a source of non-wood forest products (NWFPs) (such as fruits, fibres and oils); and use linked to local knowledge and practices. In the following, we discuss each of these forest resources uses.

Long-term land use change from forest to agriculture is not present in Caatinga on a large scale, due to its extreme climate conditions and lack of water resources (Interviewee-11[NG]). Instead, cattle and goat rearing happens mainly through the occupation of natural forest cover areas that are used as natural pasture. In other words, cattle and goat rearing is a simple matter of inserting animals in the natural environment (Interviewee-12[GOV] ; Interviewee-13[UNI]). The use of land under forest cover as a natural pasture for cattle and goats is a central livelihood strategy of local populations, especially to face periods of drought. At the same time, this strategy is closely linked to forest degradation.

For local populations, it is interesting to maintain the natural forest cover even if it is over-exploited and degraded by animals over-pasturing (Interviewee-12[GOV], p.4).

When we talk about forest resources in Caatinga we are talking about a huge livestock-grazing system, with animals that roam freely in these forest areas (Interviewee-13[UNI], p.2).

Another important use of forest resources in Caatinga is as a source of biomass for energy supply. The use of biomass from forests happens through using firewood in the household (cooking), and through producing firewood and charcoal used by local and regional business (bakeries and barbecue restaurants), and industries (brick, roof tile, and plaster) (Pareyn 2010b). The domestic use of firewood is hardly quantifiable because local people collect the wood that is already on the ground as part of their daily practice (Interviewee-14[GOV]). However, pressure on forest resources from the energy supply of business and industries

is a historical presence in Caatinga that continues today; indeed, the largest area of deforestation in the biome is located exactly around the area where most of the plaster industries are concentrated, in the Araripe region, state of Pernambuco (Interviewee-1[GOV] ; Interviewee-11[NG]). The plaster industry in the Araripe region produces around 95% of national demand for plaster and has a huge impact on the Caatinga biome (Interviewee-2[GOV]).

In addition to firewood from natural forests, industries and business also get their energy supply by using biomass from exotic tree species, such as *Algaroba*, and pruning of *Cajun-nuts* trees. The management of both species is allowed by environmental agencies in Caatinga (Interviewee-15[GOV]). The proportion of biomass for energy supply of industries and business in Caatinga is as follows: around 20% comes from SFM schemes in natural forest cover areas, around 30% comes from management of *Algaroba* and from pruning of *Cajun-nuts* trees, and around 50% comes from non-authorized (illegal) forest management sources. The latter type of use is considered to be the leading cause of deforestation of natural forests in Caatinga (Interviewee-1[GOV]).

Even if there is a huge offer of these alternatives sources, more *Algaroba* than pruning from *Cajun-nuts* trees, still almost half of the firewood consumed comes from the natural forest cover. This is a reason why it is important to control the use of this resource (Interviewee-12[GOV], p.5).

The use of forest resources in Caatinga is also linked to NWFPs. Most of these products, such as fibres, oils, and fruits, are intended for the direct consumption of local populations and are not under any formal regulation of use and management (Interviewee-4[GOV]). Commercialization of NWFPs in Caatinga happens mainly on a local scale (Interviewee-11[NG]). Most of the NWFPs are seasonal and strongly dependent on the intensity and duration of the dry seasons. Accordingly, most local people prefer to invest in other livelihood strategies, such as cattle and goats, and in the production of firewood and charcoal – whether that is sourced through SFM or illegal forest management – as biomass for energy supply has a permanent demand.

Although NWFPs in Caatinga have the potential to generate income for local people, their related value chains are more complex and more difficult to be maintained in a social and economic vulnerable situation. The value chain for firewood and charcoal, for instance, is permanent, even though not completely legal (Interviewee-9[GOV], pp.6-7).

An additional important forest use is linked to its function as an indicator of environmental conditions. This forest use is embedded in local practices and can be understood as part of a system of local knowledge on environmental performance, for instance to deal with dry seasons or to identify the quality of soils (Interviewee-16[GOV]).

The *Juazeiro* tree, which during rainy seasons loses leaves, and during dry seasons is the only green tree in Caatinga, gives an indication of climate conditions. The *Jurema* tree is also an indicator of desertification or poor soils conditions, as it is the first species to grow in very poor soils. The *Pereiro* tree can be an example of how to deal with poor soil conditions. Fertile soil accumulates around its base giving it the necessary nutrition for growth. Accordingly, the *Pereiro* tree is known as the 'professor of restoration' (Interviewee-16[GOV], p.7).

The various uses of forest resources in Caatinga as part of the livelihoods of local populations are relevant when considering how they face socio-economic vulnerability. Especially during long dry seasons, forest resources become key to sustaining livelihoods (Interviewee-12[GOV]). On the one hand, forest resource uses are integrated in local livelihoods such as a natural pasture for cattle and goats, and as a source of biomass to rapidly generate income in emergency situations. On the other hand, some livelihood strategies, notably those related to commercial firewood, may cause degradation of forest resources in the biome. Promoting SFM is therefore considered an important strategy to contribute to the biome conservation (Interviewee-17[NG]). Moreover, conservation strategies in Caatinga may also need to consider the uses of forests resources by local populations, as they may contribute to promoting integrated sustainable practices (Interviewee-11[NG]).

In truth, local people already use and manage forest resources through local knowledge practices. Organizing an activity that is already part of their production system might be a key element in promoting sustainability (Interviewee-17[NG], p.1).

#### *4.4.2. Techno-bureaucratic institutions linked to SFM in Caatinga*

Below, we discuss two types of techno-bureaucratic institutions found for SFM in Caatinga. First, we analyse the technical approach of SFM that has been developed in order to provide technical guidance on how to implement SFM in Caatinga. Second, we analyse formal rules and governmental support on SFM

implementation in Caatinga. In Caatinga, the technical approach of SFM is mainly focused on the production of firewood and charcoal. Most of the formal rules and governmental support on SFM implementation are equally related to firewood and charcoal. As a result, techno-bureaucratic institutions do not integrate other important uses of forest resources, for example as a source of NWFPs or as a natural pasture for animal rearing.

#### *4.4.2.1 Technical approach of SFM in Caatinga*

Discussions on SFM in Caatinga are reported to have started in the end of the 1980s through a project funded by FAO and implemented by the Brazilian federal government (Interviewee-12[GOV]). This initiative provided the first experiments on the ground aiming to assess the ecological dimensions of SFM, even if it was focused on the production of forest biomass for energy supply alone (Interviewee-16[GOV]).

The FAO project in Caatinga produced a lot of data related to forest management focused on producing biomass for energy supply: from forest regeneration to studying the calorific power of the different wood species (Interviewee-10[IO], p.13).

One of the results of the FAO's project showed that regional consumption of forest biomass for energy supply is between 30 and 60 million stère meters per year. Supplying this annual energy demand through a non-sustainable use of forest resources could result in the loss of all forest cover in Caatinga within 40 years. So, early discussions focused on the viability of forest plantations to answer the demand for biomass for energy supply. However, experiments clarified that the introduction of exotic species for biomass production would not give positive results mainly due to the extreme weather conditions of the biome (Interviewee-12[GOV]). Changing their focus to reforestation with native species, FAO's project researchers concluded that while working with natural forests to produce biomass, there was no need of reforestation due to the high resilience capacity of the native tree species. As a result, research started to explore techniques that could allow natural restoration of the managed forests (Interviewee-12[GOV]).

By the end of the 1990s, new research initiatives started through governmental projects in partnership with the United Nations Development

Program (UNDP) and the Global Environment Facility (GEF) (Pareyn 2010b). Results of this second wave of projects, also focusing on biomass for energy supply, established technical guidelines for SFM in Caatinga, such as standardizing the best practice of clear-cutting while respecting a non-use cycle of a minimum of 15 years between exploitations in the same area (Gariglio et al. 2010). Norms linked to SFM, such as the definition of techniques of clear-cutting, closely resembled the practices of local populations when managing natural forest resources in Caatinga (Interviewee-12[GOV]). However, the non-use cycle between clear-cutting is almost unfeasible as it is a common practice to use these areas as a natural pasture for cattle and goats rearing (Interviewee-1[GOV] ; Interviewee-10[IO]).

Even though most of the research on SFM in Caatinga is clearly focused on biomass for energy supply, it more recently also produced the insight that SFM must include ‘multiple uses’ of forest resources. Some researchers now recognise that the management of NWFPs and using forest cover as natural pasture are important elements of the livelihoods of local populations and cannot be put aside when talking about the management of natural forest cover in Caatinga.

There are places where managing natural pastures for animals is more important and can bring better results in terms of conservation; there are other places where bee and honey production can have a more positive impact, and so on. We need a more integrated approach in using forest resources in Caatinga and leave aside the strategy that is focused only on firewood and charcoal (Interviewee-9[GOV], p.6).

The federal government has also supported a research initiative aiming to define best practices of managing specific trees as a potential source of NWFPs (20 tree species were elected from a list of 67 species). This initiative resulted in ‘working books’ published by the federal government that indicate sustainable practices for managing forest focusing on NWFPs, such as the definition of an ideal quantity and ideal intervals for its exploitation, sustainable extraction practices of products, and information on natural regeneration (Interviewee-11[NG]). Research that focuses on the use of forests resources as natural pasture is being developed since the 1990s, and is closely related to agroecology strategies (de Araújo Filho 2013). Even so, these initiatives are still barely integrated into the SFM technical approach and governmental strategies to support SFM in Caatinga.

#### 4.4.2.2. Formal rules, regulations, and governmental support to implement SFM in Caatinga

Legal use of forests in Brazil requires compliance with both Federal law and State regulations. The use of forest resources is, first of all, subject to the main federal legislation in force: the Forest Code (*Lei n.12.651 25/05/2012*) (Brasil 2012a). This code prescribes, amongst others, the mandatory maintenance or implementation of conservation areas in a rural property: (a) the Permanent Conservation Area (APP – *Área de Preservação Permanente*) mainly aiming to protect water and soil; and (b) the Legal Reserves (RL – *Reserva Legal*), aiming to maintain forest ecosystem services locally (Brasil 2012a). Besides federal legislation, the use of forest resources is, secondly, also subject to States' regulations. All forest uses need to be authorised by a State Environmental Agency, which regulates and controls any activity that might harm the environment (*Resolução CONAMA n.237 19/12/1997*) (Brasil 1997b).

When forests are used according to SFM principles, this means that a SFM plan needs to be authorised by a State Environmental Agency. The implementation of SFM in Caatinga is mainly guided by a federal government's regulation (*Instrução Normativa IBAMA n.1 25/06/09*) (Brasil 2009a), which describes technical parameters and bureaucratic steps for licensing and monitoring a SFM plan. With this normative document, the federal government regulates the production of firewood and charcoal through SFM plans. The use of forest resources embedded in the livelihoods of local populations is generally not (clearly) regulated by the States' Environmental Agencies (Interviewee-4[GOV]), and thus neither clearly considered illegal nor legal by authorities even when it involves sustainable practices.

The bureaucratic steps to get an environmental license for a SFM plan involves an analysis of technical documents, monitoring, and control by the state's environmental agencies. In addition to the environmental license, an authorization of exploitation is needed for each yearly cycle of clear-cutting (*AUTEX – Autorização de Exploração*), which involves again another yearly round of analysis on technical documents, monitoring, and control by the environmental agencies.

Every year you have to request exploitation license with the environmental agency, and most of the times due to a very slow bureaucracy process in these agencies, it is possible to obtain this annual license only after the time that

the cutting was planned, and this is a year of lost work. Only those who have savings can deal with this bureaucratic instability (Interviewee-18[GOV], p.4).

One of the central challenges in turning the licensing of a SFM plan more efficient is the lack of technical staff in the state's environmental agencies, both in terms of the number of people and their technical capacity. This lack of bureaucratic capacity has two main consequences: (1) the discontinuity of the activity on the ground; and (2) a lack of offer of biomass from SFM plans for energy supply. At the same time, the demand for biomass for energy supply by industries (plaster, roof tiles, and bricks) and business (bakeries and barbecue restaurants) is continuous and covered mostly by illegal forest management.

If there is no firewood from SFM plans in the market the industries are not going to stop their activities, they then buy firewood from illegally managed forests and those who manage forest illegally take a huge advantage in filling this supply gap (Interviewee-19[NG], p.2).

Considering that surveillance to prevent illegal forest management is sporadic when compared to the control of a licensed SFM plan, forest users having a SFM plan are, in practice, under a higher level of control (Interviewee-1[GOV]). A community that is waiting for analysis, monitoring, or control as part of the licensing of a SFM plan competes with illegal practices that are not under the same level of control creating an "inverse effect": is not the better choice to be legal in a market that is mainly illegal (Interviewee-15[GOV]). The "inverse effect" also happens on the consumer's side. Once the industries and business are regulated to be a consumer of firewood from SFM plans, for instance, they are also subject to a higher level of control by environmental agencies when compared to the sporadic controls on consumers of illegal firewood and charcoal (Interviewee-12[GOV]). These non-regulated consumers are also supported by the fact that the alternative sources of biomass, such as *Algaroba* and *Cajun-nuts* do not need a SFM plan to be managed and consumed. A consumer that use firewood from illegal forest management, for instance, will always have an amount of these alternative sources in their back yard to show in case of an unexpected control (Interviewee-12[GOV]).

To buy firewood from a SFM plan the industry needs to be completely regulated and answer to all the environmental and commercial rules, and this is also a challenge because most of the industries are still operating informally. We work

with 24 ceramic industries and only 7 are able to buy firewood from SFM plans (Interviewee-19[NG], pp.6-7).

A lack of funding through credit programs is another issue for SFM implementation as it threatens its economic viability. There is a lack of credit programs to finance planning and licensing; most available credit programs only support the activity when a community or landowner already has an environmental license approved (Interviewee-9[GOV] ; Interviewee-18[GOV] ; Interviewee-20[PV]). In the scenario where local communities are economically and socially vulnerable, landowners that have better financial conditions have also better conditions to deal with all the challenges of implementing a SFM plan. Accordingly, there are different conditions amongst social groups to deal with challenges in implementing a SFM plan. For certain communities, these challenges imply a lack of income from firewood and thus contribute to their economic and social vulnerability (Interviewee-17[NG]).

Recently, the federal government's initiatives to support SFM in Caatinga started to focus on increasing income generation in areas where the most vulnerable communities live: rural settlements (Interviewee-15[GOV] ; Interviewee-17[NG]). Although they mainly focus on the production of firewood and charcoal, federal government's initiatives for SFM implementation in rural settlements in Caatinga increased significantly during the last five years. The Department to Combat Desertification and Droughts Effects of the Ministry of Environment was the governmental actor that mainly articulated these initiatives (Interviewee-21[GOV]). However, after the impeachment of president Dilma Rousseff, this department was extinguished in 2016. As a result, the political articulation and integration of federal government's initiatives around sustainable use of natural resources in Caatinga has again weakened significantly today.

Even though federal government actions to support SFM in Caatinga increased in the last years, an integrated strategy such as a National Program for Caatinga is still lacking, which could bring to these actions a more integrated approach. Resources have been increasing, but without a formal structure to guide their application the effort can be lost (Interviewee-9[GOV], p.5).

#### *4.4.3. Socially embedded institutions linked to SFM in Caatinga*

In rural areas in Caatinga, livelihoods of local populations are mainly based on small-scale agriculture, cattle and goat rearing, and on the use of forest

resources for direct consumption and trading in local and regional markets. The cultural and social values of these different activities vary according to their timing, efficiency in income generation, and value-chain stability. Agriculture, cattle, and goat rearing have high levels of social legitimacy for local populations and are strongly linked to local cultural values.

Agriculture and livestock are activities that are more ‘traditional’ even if local farmers know that they probably will face some kind of loss in agriculture or need to spend more money to feed animals during the dry seasons. Having animals and huge areas of agriculture are practices that are, socially, more valorised (Interviewee-17[NG], p.9).

Social legitimization of forest-related activities in Caatinga is lower than agricultural activities, which relates also to the under-valorisation of forest products. Forest resources are part of the livelihoods of local populations, but often yield low-value products that are culturally linked to poverty and social vulnerability. Having an agriculture area, some cows, and goats, symbolizes a much more social and financial success. Even if agriculture and cattle are culturally more related to progress and development, in practice, SFM focused on firewood and charcoal can potentially bring an effective financial success (Interviewee-7[NG]).

The rural settlement Baixa Grande [in Ceará state] has 8 thousand hectares covered by arboreal Caatinga, of which 2 thousand are under a SFM plan, playing a central role in their income generation. However, they still have the desire to implement agriculture and cattle in the other 6 thousand hectares, even though SFM could bring much more income and would be better for nature conservation (Interviewee-1[GOV], p.16).

The social legitimization of specific forest uses also depends on their ability to help local populations face social, environmental, and economic hardships. In social and economic extreme conditions, for instance, selling illegally harvested firewood and charcoal in local and regional markets is an opportunity to generate income rapidly, even with the risk that comes with illegal management. Cultural values linked to managing forest resources illegally also influence SFM negatively. Especially in the case of Caatinga, the visual image resulting from a SFM plan is very similar to the one resulted from illegal deforestation, because SFM in Caatinga includes a clear-cutting technique. Forest areas after a clear-cutting, a truck of firewood, or ovens used to produce charcoal are easier related

to simple deforestation, which is illegal, than to SFM, which is legal.

There is a common sense about SFM practices that compares it to illegal forest cuttings and does not notice any difference in the landscape. In Caatinga, for instance, SFM can mean a clear cutting and this does not mean that is not sustainable (Interviewee-10[IO], p.4).

When one sees the area after a clear cutting, even as part of a SFM plan, the visual impact is negative, and consequently, there is a tendency to negatively evaluate SFM (Interviewee-11[NG], p.2).

Recent federal government initiatives to promote SFM in rural settlements (see section 4.3.2) have faced challenges linked to the fact that this technical approach of SFM is not integrated with other forest uses or production systems and, therefore, the livelihoods of local populations. The federal government's strategy of SFM implementation does not link to social movements, nor is it well connected to other federal or state's governmental initiatives. In the social-ecological context of the long and intense dry seasons of Caatinga, rural development strategies are in place to strengthen the coexistence of livelihoods of local populations with semi-arid conditions (Interviewee-1[GOV]). Improving the integration of production systems with environmental conditions is central to these initiatives, especially in extreme weather conditions.

Only by integrating and supporting different activities does it become possible to adapt the livelihoods of local populations [to weather conditions] and, at the same time, to contribute to decreasing their social and economic vulnerability when facing extreme weather conditions (Interviewee-22[IO], p.7).

Actions to promote integrated production systems with the aim to strengthen the coexistence of livelihoods of local populations with semi-arid conditions did not internalize SFM. The reason for this was mainly a difference in the origin of both initiatives. On the one hand, strategies aiming to strengthen the coexistence of livelihoods of local populations with semi-arid conditions were initiated by social movements and NGOs (Interviewee-16[GOV]), and only later became part of federal government's initiatives. On the other hand, initiatives to support SFM, financed by international organisations, mainly focused on solving deforestation caused by the use of forest biomass for energy supply. Given the different origins and aims of these initiatives, SFM has only lately been considered

as part of a strategy to strengthening livelihoods of local populations (Interviewee-12[GOV]). This lack of a historical link to a social demand hinders the effective integration of SFM in other social initiatives in Caatinga on a larger scale as well.

While a broad integration of SFM in production systems is missing, some small changes in institutions have recently nonetheless become visible, as federal and state's government initiatives linked to rural development strategies have started to insert the forest component in their rural assistance programs.

In Rio Grande do Norte state, for the first time, the federal government's program for technical assistance in rural communities will include one forest engineer in the team. This is a sign that forest uses started to be thought off as a production activity (Interviewee-12[GOV], p.8).

A final aspect of how cultural values are linked to forest use is reflected in the way in which environmental agencies deal with the licensing of different activities. The license to suppress (or clear-cut) a forest to implement agriculture is much easier obtained than the license for a SFM plan (Interviewee-14[GOV]). In practice, getting the license for SFM plans is much slower and full of technical and bureaucratic resistances compared to the license to implement agriculture on a previously forested land. There is a perception that SFM is an activity that is not part of the 'normality' of managing forest resources, which is more often linked to conservation strategies than other forest uses (Interviewee-12[GOV]). At the same time, it is considered normal to give an environmental license for forest suppression to implement a pasture or agriculture.

Getting the authorization for a SFM plan involves a feeling, especially inside the environmental agencies, that the person is planning to do something that seems to be completely wrong because it involves native forest (Interviewee-12[GOV], pp.9-10).

## 4.5. DISCUSSION

Table 8 summarizes the results and schematically visualises how SFM is translated in Caatinga. What follows is a discussion of how the interactions amongst *forest resource uses, actors, and techno-bureaucratic and socially embedded institutions* shape translations of SFM in a specific social-ecological context.

Table 8. Translations of SFM in Caatinga

Translations of SFM in Caatinga						
Governance		Main uses of forest resources				Main actors translating SFM
		Source of biomass for energy supply	Natural pasture	Non-Wood Forest Products	Local knowledge	
Techno-bureaucratic institutions	Technical approach	XX	-	X	-	International organizations, government and market
	Rules and regulations	XX	-	-	-	Government and market
Socially embedded institutions	Cultural values and beliefs	X	XX	X	X	Non-governmental organizations and local population

'XX' = present or mostly present, 'X' = present in some cases, '-' = absent or mostly absent.

Elaborated by the author.

Techno-bureaucratic and socially embedded institutions are both crucial for sustainable natural resource management, as they are shaped by and guide interactions between different actors and forest resources uses in a specific social-ecological context (Clever 2002). According to Cleaver, techno-bureaucratic institutions are not necessarily “inclusive, fair and emancipatory”, while socially embedded institutions “may reproduce social divisions or gloss over inequality” (Clever 2002, p.28). SFM in Caatinga has currently taken shape as a techno-bureaucratic approach that indeed faces a lack of inclusiveness, as it largely excludes socially embedded practices and their related values and beliefs. While the

general idea of SFM conceptually embraces local communities' needs and interests in forests, its actual techno-bureaucratic implementation in Caatinga has implied their exclusion, thus leading to a low legitimization of SFM by local populations. Translations of SFM in Caatinga are particularly focused on production of forest biomass, while excluding other uses of forest resources, such as those linked to livelihood of local populations (livestock, NWFPs, and local knowledge). This exclusive focus of SFM on production of forest biomass in Caatinga also confirms an observed tendency of SFM approaches to focus on the provision of one specific ecosystem service alone, and thus hardly achieving the ideal balance between trade-offs and environmental, economic, and social goals (Nasi and Frost 2009; Quine et al. 2013).

A dominance of techno-bureaucratic translations of SFM in Caatinga was expected on the basis of how institutional interventions in resources policy commonly take place (Cleaver and De Koning 2015). At the same time, we also expected these translations to be shaped by social-ecological context and the interests of a specific group of actors. We found that social power relations amongst international organisations, governments, and market actors directly influenced the design of research, policies and implementation strategies linked to SFM (Giessen et al. 2009; Krott et al. 2014). The promotion of SFM strategies by the Brazilian federal government in Caatinga first aimed to maintain the provision of forest biomass for energy supply of industries and business, and at the same time sought to decrease deforestation linked to this use of forest resources in the biome. Only as an additional aim does government consider the potential of SFM to decrease desertification vulnerability, to conserve biodiversity, and to reduce poverty, and these aims are not translated in to formal or technical norms. Support of international organizations appears to fit this configuration of interests and social demands: SFM was introduced by actors such as FAO, UNDP, and others as a strategy to strengthen the use of renewable energy while only addressing broader issues such as deforestation, biodiversity conservation, climate change mitigation, desertification, and poverty as an added benefit (Giessen 2013; Humphreys 2009).

Although the use of forest resources as a source of biomass for energy supply is relevant to local populations, we found that SFM initiatives in Caatinga still do not align with many other socially embedded forest uses: forests are also crucial for livestock and as a source of NWFPs, forest uses that are neither recognised by

authorities nor considered legal or legitimate by them. Moreover, local practices of forest resources use (firewood and charcoal) to generate income in emergency situations are hardly integrated by the SFM techno-bureaucratic approach either, as it takes long periods of time to be licensed by environmental agencies through a SFM plan. We find that SFM in Caatinga would be much more socially legitimised if it were better integrated with existing strategies and initiatives to strengthen the coexistence of local population with semi-arid conditions. These strategies, mostly lead by non-governmental organizations and social movements, are built on the integration of local practices with social and environmental conditions, and are part of a broader strategy of sustainable development for the region (Crispim et al. 2016; de Oliveira Marinho and de Oliveira 2016).

The potential contribution of SFM in Caatinga to a broad set of sustainability objectives – i.e. decreasing vulnerabilities to climate change, desertification, biodiversity loss, and poverty (Gariglio et al. 2010; Riegelhaupt et al. 2010) – thus, appears to remain unrealised. Indeed, we found that translations of SFM in Caatinga have not achieved a balance amongst these goals, and also do not contribute significantly to decreasing illegal forest use. This makes the crucial question to ask whether SFM implementation strategies that are currently being developed indeed have the potential to balance trade-offs between different uses of forest resources and their linked ecosystem services within the specific social-ecological context of Caatinga.

## **4.6. CONCLUSIONS**

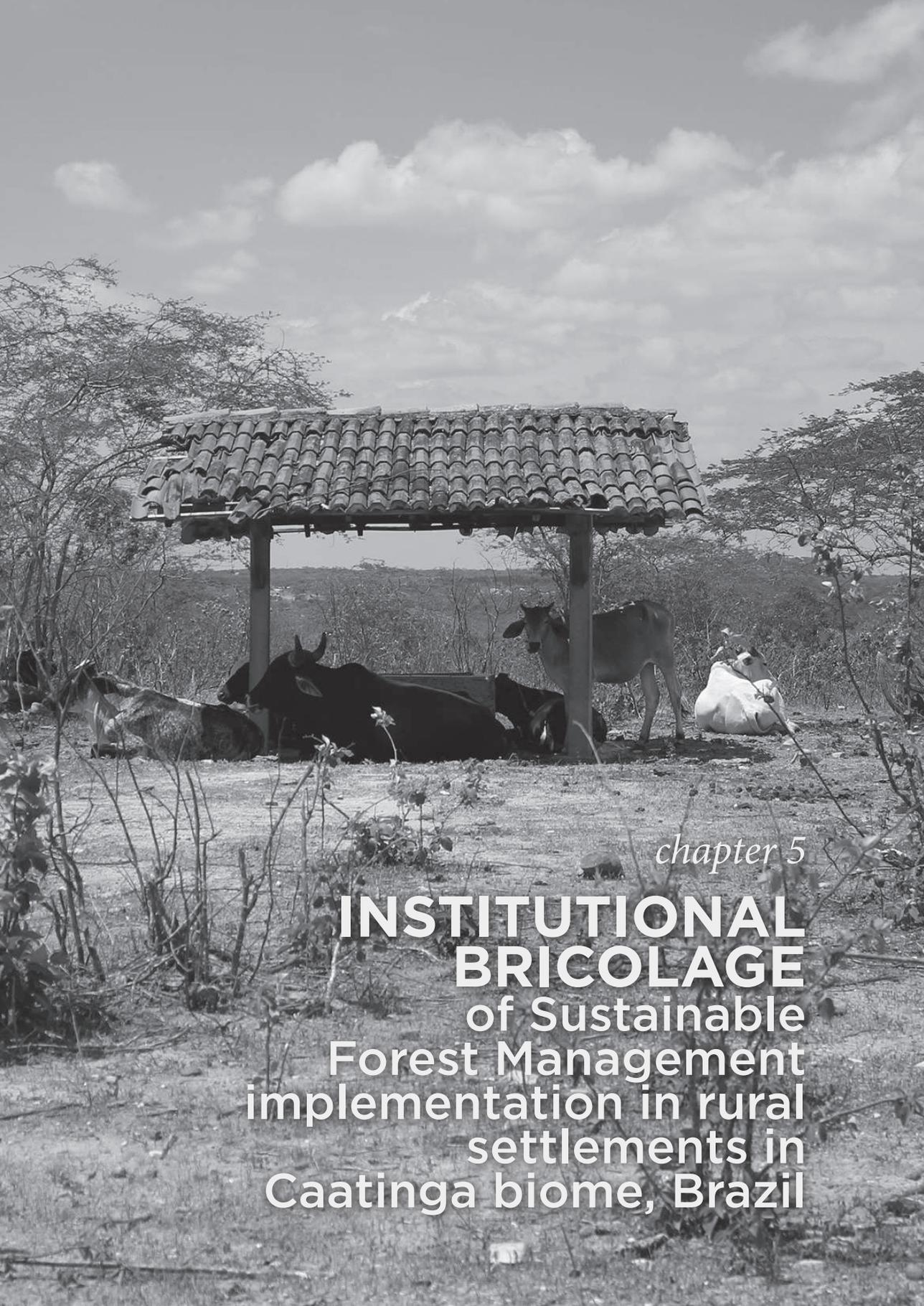
Our findings lead us to conclude, first of all, that social-ecological interactions matter for SFM strategies. Strategies for use and conservation of forest resources and ecosystem services, while balancing economic, social and environmental goals, are highly dependent on which social-ecological interactions are considered (Berkes and Folke 2000; McGinnis and Ostrom 2014; Ostrom 2009). In particular, the interaction of natural resource use, actors, and institutions strongly influences how strategies of sustainable management of natural resources take shape within a social-ecological system (Cleaver 2000; Hall et al. 2014). In our case, SFM initiatives were shaped by the social power of different groups of

actors involved, regional institutions, as well as the types of forest use in Caatinga. Therefore, understanding interactions between institutions (rules of the game), actors (players), and forest use helped to explain past choices for SFM strategies in Caatinga and may allow for adaptation of those strategies in the future.

Second, we conclude that the consideration of social-ecological interactions in SFM strategies may either support or undermine the very ideas and ambitions that SFM is based upon (Berkes and Folke 2000; Cleaver 2002; Ostrom 2009). New institutions, such as those linked to strategies for SFM implementation, interact with pre-existing institutions in a specific social-ecological context. In this interaction, new institutions might reproduce already existent social arrangements, for instance, when regional industry contributes more to setting forest use priorities than local and vulnerable populations are able to. Thus, SFM may reproduce social inequalities as the techno-bureaucratic institutions that are introduced are translated to local social-ecological systems.

Finally, we want to highlight that translations of institutions within a specific social-ecological context often lead to unexpected outcomes. Institutional translations may turn institutions weakened instead of strengthened, or may yield other outcomes than originally intended (Cleaver 2002; Cleaver and De Koning 2015). In SFM initiatives in Caatinga, the dominant techno-bureaucratic approach appears to struggle to find a broad foothold in regional forest management strategies. In the cases where it does connect to more socially embedded institutions and forest uses, it almost exclusively caters to a small, powerful set of actors and forest uses, while more socially embedded strategies are not explored. Consequently, SFM initiatives in Caatinga currently do not achieve their potential of a balance amongst social, economic and environmental goals.

To more fully explore the potential of SFM in Caatinga, we suggest a broader exploration of forest uses, stronger engagement with and inclusion of local communities and NGOs, and a more balanced consideration of forest ecosystems services by governments and international organisations. This will not only do more justice to the tenets of SFM as they are articulated in the global domain (Faggin and Behagel 2017), but will also result in a broader uptake of SFM as a strategy to manage one of the last tropical dry forest biomes in the world. We moreover expect such a broad exploration to yield SFM institutions that both strengthen the conservation of natural forest cover and improve local livelihoods.



*chapter 5*

**INSTITUTIONAL  
BRICOLAGE**  
of Sustainable  
Forest Management  
implementation in rural  
settlements in  
Caatinga biome, Brazil

## Abstract

Sustainable Forest Management (SFM) implementation strategies articulate different aims, goals, and interests across different scales of governance and social-ecological contexts. When SFM is implemented in common pool or public forests, governmental initiatives play a central role in defining formal institutions that will interact with the local social-ecological context. At the same time, local actors' practices of governing common pools forests are also a key factor in SFM implementation. This article uses a critical institutionalism lens to analyse how interactions between a new set of formal institutions with pre-existing local institutions result in (un)expected governance outcomes when implementing SFM on the ground. Using the Caatinga biome in northeastern Brazil as a case study, it shows how local actors (*bricoleurs*) perform institutional bricolage processes by rejecting, adapting, or integrating institutions linked to SFM implementation strategies to their social-ecological contexts. The article is based on a qualitative data analysis from twenty interviews with local and governmental actors, and nine site visits to rural settlements and industries. It concludes that formal SFM institutions in Caatinga do not dialogue with all the different roles that forests resources have in the livelihood of local actors, but rather have a dominant focus on the production of forest biomass for energy supply. Moreover, we found that the success of SFM implementation is highly dependent on the interactions amongst local actors within the social-ecological context. Accordingly, positive results are only achieved when these interactions help to face implementation challenges, specifically those linked to bureaucracy and to technical capacity.

**Key-words:** Caatinga, critical institutionalism; institutional bricolage; Sustainable Forest Management.

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## **5.1. INTRODUCTION: INSTITUTIONAL BRICOLAGE AND SFM IN CAATINGA**

Sustainable Forest Management (SFM) is currently part of different environmental debates on global, domestic, and local scales (IUFRO 2009; Locatelli et al. 2010; Wagner et al. 2014). Global debates influence domestic policies linked to SFM via international markets and institutions (rules, norms, and cultural beliefs), and via direct access to policy-makers (Bernstein and Cashore 2012). Within a domestic context, however, institutions are strongly shaped by how forest resources are used and governed by different groups of local actors (Hinkel et al. 2014; McGinnis and Ostrom 2014; Ostrom 2009). Thus, the international concept of SFM is strongly shaped by regional and local contexts.

In many places where SFM is implemented, forests represent a common pool resource that is considered public property. Therefore, state actors are considered to be key to the sustainable management of forests. While state policies and institutions have often been part of the loss and deterioration of common pool resources, the right type of policies and institutions, according to many scholars in common pool resource management (e.g. Ostrom 1992; Richards 1997), can also prevent forest degradation and loss. Local communities are increasingly recognised as a key factor to the success of SFM or similar forest management schemes that seek to attain both social and ecological objectives, including Community Forest Management and Participatory Forest Management, amongst others (Arts and de Koning 2017; Persha et al. 2011).

The role of local communities in forest management, including SFM, continues to be underestimated in policy implementation in many regions (Agrawal 2007). Social networks and learning processes are important for integrating conservation of forests with local livelihoods (Arts and de Koning 2017), but are often not integrated in policy programmes. Scholars also increasingly emphasise the need to consider ecological context as interlinked with social networks when assessing the effectiveness of common pool resource institutions, defining it as a social-ecological context (McGinnis and Ostrom 2014). Specifically, SFM programmes should more explicitly address multiple forms of local resource use, governance, and traditions, rather than only trying to implement globally agreed upon principles of SFM (Rametsteiner 2009).

Many scholars point out that sustainable forest outcomes strongly depend on the extent to which formal organisations and local community networks interact (Agrawal et al. 2013). More practically, the question is how external interventions by states or other (transnational) actors, such as the Food and Agriculture Organisation of the United Nations (FAO) and the Global Environmental Facility (GEF), connect to local livelihoods and their social-ecological contexts (Cleaver 2012). For example, Barnes et al. (2017) found the success of interventions in community forestry in a region of India to be related to how well these interventions connected to the livelihood portfolio of communities. These portfolios also represent specific forms of resource use that are related to the specific socio-ecological contexts the communities are part of. In another example, Le Tourneau and Beaufort (2017) found that for common pool resource management in the Amazon, the support of local social networks, such as the Chico Mendes movement, was crucial to maintain community management after external interventions end.

In the Caatinga biome of Brazil, academic research on SFM has been carried out since the 1990s, yet a majority of it has a technical focus on forest resources as biomass for energy supply (Riegelhaupt et al. 2010). Some more recent studies do focus on other forest issues, including Non-Wood Forest Products (NWFPs) (Pareyn 2010b) and forest as a natural pasture for animal rearing (Bakke et al. 2010; de Araújo Filho 2013), but such studies are rare. Moreover, a social science perspective on SFM implementation and common pool resource use is mostly lacking for Caatinga. So, little is known about how local communities are included in SFM implementation and how their various forest uses are considered in government strategies related to issues such as biodiversity conservation, climate change mitigation and adaptation, desertification vulnerability, and poverty.

This article focuses on how formal and state institutions linked to SFM implementation strategies in the Caatinga biome of Brazil interact with a pre-existing set of local institutions (Cleaver 2012; Cleaver and De Koning 2015) within a specific social-ecological context; and to what extent these interactions shape forest governance outcomes and forest practices on the ground. In particular, we highlight how such 'bricolage processes' take place in the interactions between multiple actors who represent different types of resource use and the resource system itself (Ostrom 2009). Below, we discuss our analytical framework and

methods, after which we discuss how the themes of legality, social organisation, and technical capacity are focal points of bricolage processes in the implementation of SFM in Caatinga. We conclude by emphasising the importance of considering local networks that include, but also extend beyond, local communities and a broad range of forest uses when introducing SFM institutions.

## **5.2. ANALYTICAL FRAMEWORK: INSTITUTIONAL BRICOLAGE SHAPING SFM ON THE GROUND**

Institutions are understood as a set of formal or informal rules, norms, and cultural beliefs that guide actors' choices and shape actors' behaviour (Arts and Buizer 2009; Scott 2010). While a key characteristic of institutions is that they are generally stable over time, they are equally subject to a constant process of change across different scales of governance and space (Clever 2012). Critical Institutionalism (Clever 2012; Hall et al. 2014) holds that newly introduced, bureaucratic institutions interact with socially embedded institutions on a local scale to produce both expected and unexpected outcomes in a governance context (De Koning 2014). This occurs in processes of institutional bricolage, when actors (*bricoleurs*) reject, adapt, or integrate newly introduced institutions to a set of institutions already present in their own social-ecological contexts (Clever and De Koning 2015).

When we translate the concept of institutional bricolage to SFM implementation, we can first identify newly introduced techno-bureaucratic institutions that consist of a 'package' of rules, norms and ideas about SFM (Behagel et al. 2017). Second, this 'institutional package' interacts with a pre-existing set of socially embedded institutions as local actors adapt, reject, or integrate this package in their local practice. The social-ecological context in which forest resource uses and governance are embedded is key to this process. By analysing the social-ecological context where SFM is implemented, one can identify different groups

of local actors, the socially embedded institutions (i.e. local rules, and routines), established forest uses and governance, and ecological context (Ostrom 2009).

When institutions linked to SFM implementation do not connect to practices of local actors, including the social, economic, and environmental values that forest resources have for their livelihood, literature suggest a high probability that intended goals and aims will fail (McGinnis and Ostrom 2014). Moreover, certain interactions between a new set of institutions with socially embedded institutions may reinforce patterns of exclusion and vulnerabilities of local populations (Cleaver and De Koning 2015). Accordingly, the interaction between newly introduced SFM institutions and previously existing institutions entail processes of institutional bricolage that have an important impact on sustainability objectives in general and on the (dis-)empowerment of local communities in particular (Arts and de Koning 2017; Cleaver 2012).

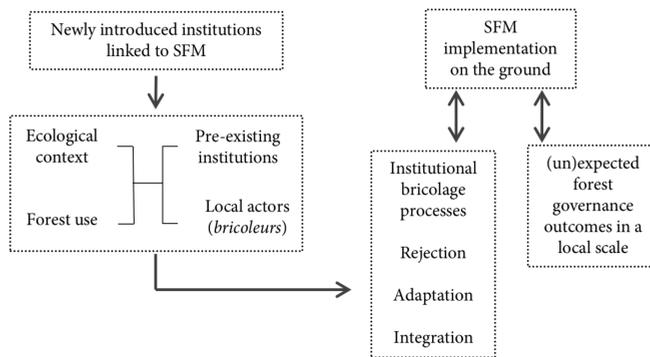
In the context of institutional bricolage linked to SFM implementation on the ground, we base our analysis on three different bricolage processes of articulation, alteration, and aggregation (De Koning and Cleaver 2012). Newly introduced institutions (i.e. SFM implementation strategies) are shaped or rejected through institutional bricolage processes by the different groups of actors on a local scale of governance. The first bricolage process of articulation is when there is local resistance to adopting a newly introduced set of institutions (De Koning and Benneker 2013). A rejection process then happens when local actors reject a new set of institutions, in our case those linked to SFM implementation strategies, as they instead affirm their pre-existing practices, cultural values, and beliefs associated with their social-ecological context.

The second institutional bricolage process is ‘alteration’ (De Koning and Benneker 2013) or adaptation, when a newly introduced institution is reshaped to answer local actors’ needs or interests. This adaptation process entails the interaction between newly introduced and pre-existing institutions where some parts (but not all) of the new ‘package’ of institutions are combined with pre-existing institutions. Various groups of local actors may conduct such institutional adaptation processes differently depending on their economic, political, and social power, as well as their position in the social-ecological context.

The third institutional bricolage process is ‘aggregation’ (De Koning

and Benneker 2013) or integration, when newly introduced institutions positively interact with a pre-existent set of socially embedded institutions. This integration process is likely to occur when the introduction of a new set of institutions, such as those linked to SFM implementation, can be made to produce co-benefits between the aim of the introduced institutions and the pre-existing social-ecological context of local actors. It is usually accompanied by dialogue and trust building between multiple actors within and outside communities. Figure 8 summarises the analytical framework.

**Figure 8.** Analytical framework: institutional bricolage of SFM implementation in a specific social-ecological context



*Elaborated by the authors.*

### 5.3. MATERIAL AND METHODS: ANALYSING SFM IMPLEMENTATION IN RURAL SETTLEMENTS IN CAATINGA

Located in the semi-arid region of northeastern Brazil, Caatinga spans a total area of 85 million hectares of which 53% is covered by native forests (IBAMA 2011; SFB 2013) and is considered the most biodiverse tropical dry forest in the world (Moura 2010). Caatinga also encompasses the poorest region of the country (UNDP 2013) where 12,9% of the Brazilian inhabitants lives (IBGE 2010). Forest and

land degradation in Caatinga, together with climate change effects – shorter rainy and longer dry seasons – make this region the most vulnerable to desertification processes in the national territory (Gutiérrez et al. 2014; Santos et al. 2014).

Forest resources in Caatinga are central to the livelihoods of local populations and are also an important source of biomass for energy supply of industries, businesses, and households (Beuchle et al. 2015; Riegelhaupt and Pareyn 2010). Research focused on sustainable techniques for using native forest biomass for energy supply, developed since the 1990s (Riegelhaupt et al. 2010), has helped to define technical parameters for SFM in Caatinga. These technical parameters inspired formal regulations for the use of native forest resources focusing on wood products, such as firewood and charcoal as a source of forest biomass for regional and local energy supply.

### *5.3.1. The SFM ‘package’ in Caatinga*

The Federal Regulation number 01 from 25th June 2009 (Brasil 2009a) defines the technical and legal proceedings for the development, presentation, and implementation of a SFM plan for Caatinga. SFM of native forests in Caatinga is based on clear-cutting techniques: yearly one parcel of the total area of the SFM plan is harvested for timber; this same parcel will be harvested again only after the time needed for natural forest restoration, which is determined as a minimum of 15 years for Caatinga (Brasil 2009a). The use of the managed area for other purposes, such as natural pasture for animal rearing or to collect NWFPs, is not clearly regulated, although there is an understanding that the area needs to be protected to allow forest restoration between the clear-cuttings of the management cycle.

The SFM plan, which includes an inventory of the forest resources of the area and specifies the volume of forest products (wood) under management (stère/hectare/year), needs to be approved by the state environmental agency. This agency also issues the ‘Annual License for Exploitation’ or AUTEX. The federal structure of Brazil means that state’s environmental agencies articulate their own regulations on SFM based on and being equally or more restrictive than federal regulations (Brasil 2009a). To trade forest products from a SFM plan, a license from the consumer’s side is required in addition to the ‘Document of Forest Product’s Origin’ (DOF) from the producer, issued by the Federal environmental agency (IBAMA). The license to consume products from a SFM plan is only awarded if the consumer, a ceramic or

plaster industry for instance, adheres to a series of other formal regulations, linked to labour, commercial, industrial, and environmental laws (Brasil 2014b).

### *5.3.2. Governmental support for SFM implementation in rural settlements in Caatinga*

To support the implementation of SFM in rural settlements in Caatinga, the federal government contracts specialised organisations through public tenders for the provision of technical assistance services. These public tenders are mostly financed by the National Fund for Forestry Development (FNDF) and the Social-environmental Fund of the Federal Bank (FSACEF). They have a duration of two to three years, which most of the time only covers the elaboration and approval of the SFM plan and, in some cases, also covers the process for getting the AUTEX, the effective management of forest resources, and the trading of forest products.

Since 2010, federal government increased support for SFM implementation in rural settlements in Caatinga focused on the production of wood products such as firewood, charcoal, and wood stakes. When implemented in a rural settlement and on public lands, a SFM plan also needs to be authorised by the federal government agrarian agencies and by all the families settled in the area, even by those that are not involved in the implementation of the SFM plan (Brasil 2010a).

### *5.3.3. Case selection, data collection, and data analysis*

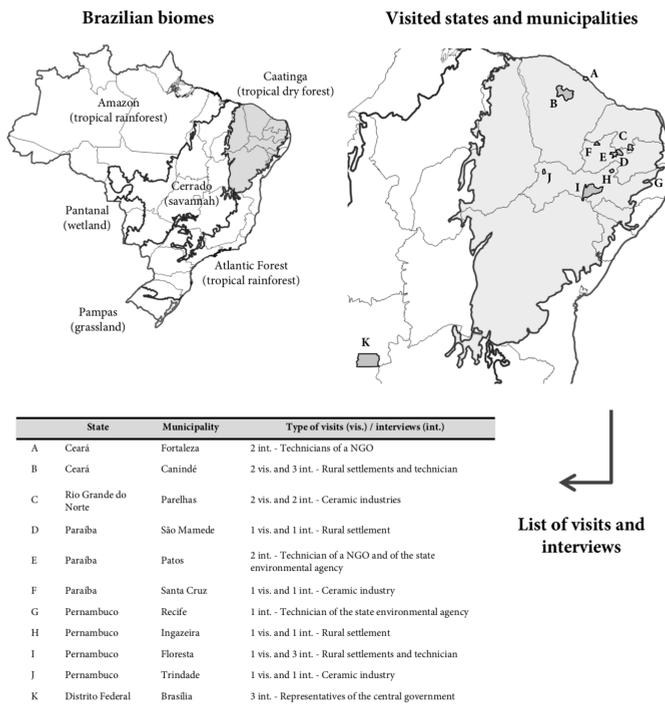
We focus our analysis on the local scale of governance of SFM implementation in rural settlements in Caatinga, where four main groups of actors interact: (a) local communities living in rural settlements; (b) technicians from specialised organisations that have federal tenders to provide technical assistance services; (c) local and regional industries and businesses: the main consumers of forest biomass for energy supply; and (d) governmental actors, including state environmental agencies that approve SFM plans and issue the AUTEX and IBAMA that controls the trading of forest products from SFM plans.

Our case study is based on qualitative data collected through nine local visits and twenty semi-structured interviews with individual actors, including: communities of rural settlements (producers), technicians (implementation agents), industries (consumers), environmental agencies (regulators), and central government

(supporters). The locations we visited and the actors we interviewed were chosen to strongly represent the different contexts of Caatinga, as illustrated in Figure 9. In addition, we analysed literature, laws, regulations, official documents, and reports linked to SFM implementation in Caatinga.

The twenty interviews were coded following an inductive approach, where bottom-up coding of the data is alternated with coding via the theoretical and analytical framework, using the three processes of institutional bricolage as sensitizing concepts (Howard-Payne 2016). The results of the analysis are organised by three themes that we identified in the data to be focal points for bricolage processes: legal and sustainable use, community social organisation, and technical assistance.

Figure 9. A Brazilian biomes, Caatinga biome, and list of visits/interviews\*



(\* names of industries, rural settlements, organisations, and interviewees were preserved / Elaborated by the author.

## 5.4. RESULTS: INSTITUTIONAL BRICOLAGE OF SFM IMPLEMENTATION IN RURAL SETTLEMENTS IN CAATINGA

### *5.4.1. Legal and sustainable use and trading of native forest resources through the implementation of a SFM plan*

#### *5.4.1.1. SFM implementation and illegal use of native forest biomass for energy supply*

The use of native forest resources for energy supply (firewood and charcoal) from illegal sources is a common practice of sellers and buyers of forest products in Caatinga. Considering the social vulnerability of local populations, selling small quantities of firewood is sometimes the only way for members of local communities to generate income in emergency situations (Riegelhaupt and Pareyn 2010). At the same time, industries and local businesses that are operating illegally due to other irregularities also continue to use forest resources from illegal sources. In this case, local populations (producers), industries, and businesses (consumers), together maintain practices of illegal and unsustainable use of native forest resources, thus ‘rejecting’ institutions regarding the implementation of SFM plans and the consumption of its products.

There are situations in which a local family arrives here offering a small quantity of firewood to buy some food for their family; even if I have legal firewood to use, I buy the illegal wood mainly to help them (Interviewee-24[IND], p.8).

Over time, the IBAMA has increased controls and monitoring of the use of native forest as a source of biomass for energy supply in Caatinga, and industries now need to rethink their energy supply system (Interviewee-33[IND]). The increased risk of receiving fines for transporting and using illegal forest biomass put the industries in a dilemma: how to continue the use of native forests as a source of biomass for energy supply through a legal way? The use of forest biomass from SFM plans properly fits this new reality, as it is a good strategy to avoid fines. So, industries and business (consumers) adapted the use of products from SFM plans to their need to avoid fines.

We decided to start getting firewood from legal sources after receiving a fine from the federal environmental agency for using firewood without the Document of Forest Product’s Origin (DOF) (Interviewee-24[IND], p.2).

We decided to buy firewood from a SFM plan to turn our activity legal and to avoid the risk of receiving fines (Interviewee-27[IND], p.1).

There are also other strategies than using firewood from SFM plans to avoid illegality: the use of forest biomass from exotic species such as Algaroba, pruning of Cajun Nuts, Mango, and urban trees; and in some cases, Eucalyptus from forest plantations. Some industries even deny the use of forest biomass from SFM plans to avoid their link to the use of native forests resources altogether; others do not stock illegal firewood from native forest to avoid fines and only maintain stocks of legal and exotic firewood or other sources of biomass.

Since 2007 we do not use firewood from native forests and we do not want to work with this kind of firewood anymore. We prefer to focus on other sources of biomass, such as pruning of Cajun nuts and urban trees (Interviewee-26[IND], p.2).

We do not stock firewood here, only if it has the Document of Forest Product's Origin (DOF) proving that it is from a SFM plan. If the firewood we buy is illegal, without documents, we use it the same day (Interviewee-24[IND], p.8).

In both cases above, industries and companies perform a rejection process regarding the use of forest biomass from SFM plans, and instead, build on other formal and informal institutions.

*5.4.1.2. Barriers for SFM implementation: lack of integration with other productive activities, bureaucracy for licensing, and difficulties for trading forest products*

It is clear that strategies to maintain the illegal market of products from native forests do not contribute to SFM implementation. However, there are also other factors that contribute to bricolage processes of 'rejection' by local actors. First, there is the lack of integration of SFM, mainly focused on the production of firewood and charcoal, with other activities that are part of the livelihood of local populations, such as animal rearing and the extraction of NWFPs. Second, to get a SFM plan approved and the AUTEX, local populations need to face bureaucratic processes that require much time and resources. Finally, to consume products from a SFM plan, the buyer also needs to adhere to industry, labour, commercial, and environmental regulations.

For local populations, forest cover has a central use as a natural pasture for cattle and goat rearing, and the implementation of a SFM plan focused on producing firewood or charcoal still lacks integration of this use of native forest resources. In a SFM plan focused on firewood or charcoal production, pasture is a sub-product, and when regeneration is going well, you might insert some animals to access the pasture that is under the trees (Interviewee-35[TEC]). However, formal regulations and norms for integrating other uses of forest resources into a SFM plan are unclear or absent (Interviewee-28[TEC]). So, local populations adapt to SFM by integrating the use of forest cover as a natural pasture in a SFM plan, even if this use is not clearly regulated.

We do not allow goats to enter in the area when it was just cut, but cattle there is no problem because they do not eat all the vegetation, it depends on when you allow them to enter in the area (Interviewee-32[LC], p.3).

Due to the bureaucratic process of getting an environmental license, local populations often do not see the implementation of a SFM plan as a feasible activity to be integrated into their production systems. Getting an environmental license for implementing a SFM plan and trading forest products legally depends on the capacity and time to deal with bureaucratic norms and regulations, which does not align with the practice of using firewood as a way to generate income rapidly.

We feel lost with all this bureaucracy needed to implement a SFM plan (Interviewee-30[LC], p.1).

The time spent on waiting to get an environmental license is too long when we are talking about local communities with an emergency need of income generation. Local people do not understand the reasons for all these documents asked by the environmental agencies to obtain a license to do something that they already do (Interviewee-23[TEC], pp.3-4).

Trading forest products legally also depends on the legality of the consumer. Consumers are allowed to buy firewood or charcoal from a SFM plan only if they follow industry, labour, commercial, and environmental regulations (Interviewee-24[IND]). As most of the ceramic industries and local businesses, such as bakeries and restaurants, operate illegally it is very difficult to find a legal buyer within a reasonable distance of a SFM plan. In such cases, the rejection is indirectly performed by industries and businesses (consumers) that are legally not able to buy

forest biomass from a SFM plan, thus forcing local population (producers) to also reject the implementation of a SFM plan due to the lack of a legal market.

#### *5.4.1.3. Positive results of SFM implementation in rural settlements*

Despite all the difficulties linked to the slow and bureaucratic process of obtaining an environmental license for a SFM plan, the lack of trading opportunities, and access to a legal market, SFM implementation has also achieved positive results when implemented in rural settlements in Caatinga. The first positive result is linked to local populations' perception of environmental benefits when adopting technical parameters of a SFM plan to manage forest resources, especially because they stop following the slash-and-burn system. In this case, local populations (producers) are able to integrate SFM practices in their own practices producing co-benefits for their environment.

When you compare the area where we managed forests according to the technique of a SFM plan with areas where we used to set fire, the differences are amazing. The sprouting of the vegetation in managed areas make you understand why it is not good to set fire (Interviewee-29[LC], p.6).

When you do not set a fire in the area you can notice a faster and better regeneration, and the vegetation grows better also because if you insert some animals they are not going to damage the soil as they would do in areas where you set fire (Interviewee-32[LC], p.4).

The second positive result is linked to the fact that not having an environmental license for a SFM plan does not mean that forest resources are being managed in an unsustainable way. There are cases where a local population adopted technical parameters of SFM while continuing to manage forest resources without having the environmental license. In this case, even though the use of forest resources was not turned into a legal activity, local communities (producers) integrate SFM with the pre-existing practice of using forest resources as a source of income generation.

While a community was waiting for the authorisation to manage forest resources in their SFM plan, a local ceramic industry offered to buy all their firewood. They decided to accept the risk of selling it without the environmental license, but followed all the technical parameters for managing the forest resource that they already knew from the previous years (Interviewee-23[TEC], p.3).

Local populations link a third important benefit of SFM to the use of forest resources as part of a saving system in emergency situations: they cite income generation as its most positive result (Interviewee-23[TEC]).

If you plant some corn, for instance, on January you are going to make money from it only on September or October, and between planting and selling, you are going to spend a lot of time working to maintain the plantation. With the charcoal, we have a lot of work as well, but every week you can make money from it; with agriculture is not like this (Interviewee-30[LC], p.2).

We do other things here such as goat rearing and some agriculture, but the money that is guaranteed is the one from the SFM plan (Interviewee-31[LC], p.7).

SFM fits community needs when it is part of a saving system. When they get the AUTEX, communities usually do not manage all the forest resource of that parcel of the SFM plan at once; they spread the management of small quantities along the time of the license, making it a steady source of income. This strategy is an example of a bricolage adaptation process, when local populations adapt SFM according to their needs and as part of a saving system for emergency needs and situations.

The SFM plan is like saving, the wood is there. If you need some money you can go there and cut firewood from the area that has the license in that year, and sometimes in the dry seasons, this money also serves to feed animals (Interviewee-31[LC], p.7).

#### *5.4.2. SFM implementation and social organisation of local population in rural settlements in Caatinga*

SFM implementation in rural settlements in Caatinga is strongly linked to the social organisation of local communities. We found major differences in the way in which local communities distribute the areas of the SFM plan, share benefits from a SFM plan, and organise the workforce for its implementation. In rural settlements they spread the areas that are part of a SFM plan in two different ways: they are either equally spread in the individual areas of the families that are involved with the SFM plan, or they are implemented in a collective area where productive activities need to be approved by – and benefit – all families. When forest cover is spread over different

patches, spreading the area of a SFM plan into individual parcels might solve two problems at once, the division of the workforce and the division of the profit from the SFM plan (Interviewee-25[LC]).

When the SFM plan is spread over individual parcels, its implementation is 'integrated' with local communities' custom to divide the work and the benefits from it. When SFM plans are implemented in a collective area, usually the case when a continuous forest cover is present, they have to face the problem of how to equally benefit all the families that are part of the rural settlement. One of the solutions is dividing the profit differently amongst people that directly work on the SFM plan and people that, despite not working on the SFM plan, have authorised the use of a collective area for its implementation. In this case, local communities 'adapt' the implementation of a SFM plan through pre-existing practices of sharing benefits differently amongst different degrees of participation, while also maintaining the collective benefit of the activity.

The rural settlement has 23 families and only 10 are involved with the SFM plan. The counterpart for who is not involved is that we transfer 10% of the profit of the SFM plan directly to the common association (Interviewee-29[LC], p.2).

I am not part of the SFM plan, however, a percentage of their profits go to our association. This income is good because I do not have to use my money to pay the fees and other things that the association needs to pay (Interviewee-37[LC], p.7).

A collective activity also brings problems linked to the division of the workforce while managing the parcels of SFM plans: should all the people that are involved work together and at the same time? How to solve the differences in work rhythm and individual productivity? One of the solutions is to divide the collective areas into individual parcels and distribute them amongst people that are directly involved in the SFM plan. In this case, local communities 'integrate' the implementation of a SFM plan with the strategy of dividing the work force while implementing a collective activity.

In the beginning, we started cutting as a collective work but did not work well because inside the group there is always someone not working as the others, and when the time arrives to share the profit they want to receive the same amount. We decided to divide the area and then each one could work in their own rhythm (Interviewee-31[LC], pp.1-2).

After being challenged by both problems, division of the managed area and of the workforce needed for implementing a SFM plan, one of the rural settlements found an alternative solution: they pay a third party for managing forest resources that are part of the SFM plan. In other words, they authorise the implementation of SFM in their common area but a third party provides the labour, and these are often the same people that buy the firewood. In this case, local communities 'adapt' their social organisation concerning a SFM plan by contracting a third party for labour, sharing the benefits from the SFM plan equally amongst all the settled families.

We started cutting the firewood ourselves, but then it was confusing, people were cutting more than others. We decided to sell to someone that could come here, cut, load the truck and pay us a fixed price (Interviewee-32[LC], p.3).

Another important issue involving the social organisation of local communities is linked to their ability to develop a trading plan for products from a SFM plan, and consequently, access to the market. Besides elaborating the SFM plan, getting the environmental license and managing forest resources, implementing SFM also involves decisions on what should be the trading strategy and how to access the market.

Most of the local farmers are not integrated into the market; they do not have trading experience. They could add more value to their products selling charcoal directly to restaurants, for instance (Interviewee-34[TEC], p.5).

A central figure is present in all the visited rural settlements with experiences on SFM implementation: a jobber. The jobber makes the connection between those who have a legal forest biomass to sell and those who are legally able to buy it. The uncertainty about the time spent to get an environmental license does not allow producers to make deals directly with consumers because the former might not be able to guarantee a constant offer of firewood for the market. In this situation, the jobber is the only one capable of organising the offer and the demand amongst different producers and buyers. Thus, local communities 'adapt' SFM by using a common practice to face the instability of its implementation: the presence of a jobber connecting producers and consumers.

We have difficulty to sell a constant quantity to the industry; we cannot guarantee that we are going to have the exact quantity that they need every day. Consequently, we sell our firewood to a jobber that sells it to a ceramic

industry. We do not have a contract with the ceramic industry, it is the jobber that has it (Interviewee-31[LC], pp.5-6).

### *5.4.3. The provision of technical assistance services for SFM implementation in rural settlements in Caatinga*

In Caatinga, governmental support for SFM implementation through public tenders is not integrated in other rural assistance programmes and, thus, is not continuous over time. On the one hand, the strategy of contracting specialised services through public tenders guarantees technical assistance for SFM implementation in rural settlements. On the other hand, the discontinuation of technical assistance services that are not part of a long-term governmental programme of rural technical assistance makes it difficult to guarantee the continuous implementation of a SFM plan, and thus its credibility for local communities.

When they arrived with this thing of a SFM plan we thought that it would not work for us; we did not believe in this possibility. And then after a while, they came again making some studies and suddenly disappeared. They took one year to come back, and at this point, we did not believe in it anymore (Interviewee-30[LC], p.1).

In some cases, industries directly support implementation of SFM plans in areas of private owners by paying technical assistance services, while the owner of the area agrees on selling the firewood exclusively to this industry (Interviewee-24[IND]). As part of this arrangement, the same specialised technicians that are part of government initiatives are paid by industries to offer their services for SFM implementation in privately owned areas (Interviewee-23[TEC]). In this case, industries and businesses (consumers), through an arrangement with technicians (implementers), 'adapt' the implementation of SFM in the absence of effective governmental support.

The private hiring of technicians to draft SFM plans contributes to a continuous production of firewood through sustainable practices, guaranteeing the offer of forest biomass for industry and business energy supply. However, this kind of agreement between industries, technicians, and private owners does not contribute to income generation for vulnerable local populations, such as those living in rural settlements. In this case, social exclusion of vulnerable populations from forest

benefits is strengthened through bricolage processes. Moreover, the arrangement between industries, private owners, and technicians is also exposed to difficulties linked to the slow processes for getting an environmental license and depends on a relation with a private owner that is not always easy to maintain.

The ideal would be to put together four or five ceramic industries to support one big SFM plan, but this depends on the owners of the areas where we could implement a SFM plan (Interviewee-27[IND], p.3).

Here in the region, there is no private property with a dimension that could fit a SFM plan, so you need to put together four or five properties to establish a SFM plan. It is very hard, first, to convince different owners, and then, to maintain the agreement for the implementation of such a SFM plan (Interviewee-24[IND], p.4).

In the case of rural settlements, due to the slow bureaucratic process of approving a SFM plan and getting the AUTEX, in most of the cases, technical assistance provided by governmental initiatives finishes before it is possible to harvest the first parcel of a SFM plan. In this case, local communities use two different strategies. The first one is making an agreement directly with the buyer and including in the selling price the needed technical assistance for obtaining the approval of a SFM plan and the AUTEX.

We implemented seven SFM plans in rural settlements and only two of them worked out because the families decided to pay for technical assistance together with the buyer, which included it in the final price. The other five plans did not work out after the project of technical assistance finished (Interviewee-28[TEC], p.3).

When the project that helped us to start the SFM plan is finished we are planning to continue; we are talking with other rural settlements to organise that the buyer pays the technicians that need to sign and send the documents to the environmental agency, and the association pays only the fees of the licensing process (Interviewee-29[LC], p.2).

A second alternative that local communities have to deal with the discontinuation of technical assistance services is to make an agreement directly with the technicians. Local communities that have some resources pay specialised organisations for the provision of technical assistance services when their contracts with the government are finished.

We are finishing a contract of technical assistance now in a group of rural settlements, but I am already talking with them to continue offering my services and they will pay me through their association. I can ask a much lower price because it is less work than when we work through a programme or a project, we are already used to the SFM plan, the area, and the people (Interviewee-28[TEC], p.7).

In both cases, local communities 'adapt' the implementation of SFM to the discontinuation or the lack of technical assistance provided by governmental initiatives, obtaining it directly from the buyer of the forest products of the SFM plan, or from specialised organisations that were part of governmental initiatives. In some cases, these specialised organisations and their technicians also play the role of jobber, intermediating between local communities, environmental agencies, and buyers and, in doing so, having financial benefits. In this sense, a SFM plan, even if implemented in a rural settlement and consequently benefiting local communities, is part of a business plan, and once the organisation does not see it as an opportunity to generate income, they can suddenly abandon it.

The person who was giving us technical assistance as part of these governmental programme funded a small company that now offers the service of doing everything, from the SFM plan to the process of getting the environmental license, organising the management, and selling it (Interviewee-25[LC], p.3).

The company that was elaborating the SFM plan for us, managing its parcels, and selling its products, does not see it as an opportunity anymore because in the last time they earned less money than they were expecting (Interviewee-25[LC], p.3).

In one of the cases, a specialised organisation elaborated a project funded by the central government that was specifically focused on training local communities for simple technical tasks. The training was focused on measuring the parcel and making all the technical calculations required for obtaining the AUTEX. The organisation that carried out this project was previously involved in other governmental initiatives to support SFM implementation in rural settlements. This organisation concluded that training local populations for the basic technical work would increase the possibility of continuing the implementation of the SFM

after federal assistance ends. This is an example where technicians (implementers) tried to ‘integrate’ the implementation of SFM in local practice by training local communities on technical tasks that are needed for requesting the AUTEX.

I was part of a course where they taught us how to use the GPS and how to measure the area each year, and then I can make all the measurements that need to be done here in the area (Interviewee-31[LC], pp.2-3).

Even if the local community has some technical capacity to deal with bureaucratic processes, an engineer is still needed to sign and submit documents, and to monitor the bureaucratic processes, thus making the connection between the local community and the environmental agency. To cover the inability of local communities to deal with bureaucratic processes, one local community has an informal agreement with a non-governmental organisation that previously gave them the technical assistance as part of a governmental initiative. In this informal agreement, the local community sends all the measurements made in the field to the technicians, who then elaborate the reports and sign the technical documents to be sent to the environmental agency.

As he [community member] is able to make all the measurements of the area and to collect all the data needed to request the annual license [AUTEX], they send us the data and we can elaborate the report and submit it in the environmental agency, it is a collaboration (Interviewee-36[TEC], p.12).

The organisation made an agreement with us that they are going to support how they can, and if needed they will make this bridge between us and the environmental agency; we also do not have to pay an engineer to sign the papers, and they already know the area and how the things work here (Interviewee-31[LC], p.13).

In this case, local communities and technicians made an informal agreement to ‘adapt’ the implementation of a SFM plan to the lack of capacity and resources of local communities to deal with bureaucratic processes.

## **5.5. DISCUSSION: INSTITUTIONAL BRICOLAGE PROCESSES, SOCIAL-ECOLOGICAL CONTEXT AND LOCAL PARTICIPATION SHAPING SFM IMPLEMENTATION ON THE GROUND**

### *5.5.1. Bricolage processes and interactions between formal and informal institutions*

Our results confirm that outcomes from local SFM implementation are mainly shaped by institutional bricolage processes of rejection, adaptation, and integration performed by local actors (Cleaver and De Koning 2015). In Caatinga, bricolage processes of rejection are mainly linked to the maintenance of local practices linked to the illegal use and trade of native forest resources. Difficulties in following regulations either for implementing SFM or for buying firewood and charcoal from SFM plans, together with the fact that selling firewood illegally is sometimes the only way for local communities to generate income rapidly, strengthens the illegal market of firewood from native forests in Caatinga.

In Caatinga, multiple adaptation bricolage processes occur linked to the maintenance of local practices while implementing SFM, such as using managed areas as natural pasture for animal rearing, which is not clearly regulated by SFM formal institutions. An institutional adaptation process also occurs when local communities contract a third party (often a jobber) to do all the work linked to the SFM plan and to the trading of forest products, through an informal leasehold mechanism. Less sustainable forms (or more exclusionary) of adaptation processes happen when SFM implementation is decided on by industry and technical consultancy firms that mostly follow market rationales and fail to take local livelihoods into account.

Finally, results show that a more sustainable outcome of SFM implementation happens in general when local actors integrate not only the technical, but also the social and environmental elements of SFM (Behagel et al. 2017). In particular, this means that various actors work together towards a commonly shared objective. In Caatinga, such institutional integration was seen to happen when consumers (industries) and technicians (implementers) work together with local communities (producers) to cover the lack of a continuous technical support from government, or to address the bureaucratic processes of requesting the AUTEX for a SFM plan.

### *5.5.2. SFM implementation in different social-ecological context*

Social-ecological context was seen to shape local SFM implementation by influencing bricolage processes (Hinkel et al. 2014; McGinnis and Ostrom 2014; Ostrom 2009). In Caatinga, SFM implementation strategies are mainly focused on the use of native forest resources as a source of biomass for energy supply to local industries and businesses. The lack of consideration of other economic roles that native forest resources have in the livelihoods of local actors – in the case of Caatinga, as a natural pasture or as a source of NWFP for local communities – can be directly linked to both bricolage processes of rejection and adaptation, as described above. Accordingly, SFM institutions do not reach their full potential in Caatinga because they do not take the full range of forest uses into account.

In addition to a narrow view on resource use, the SFM package introduced in Caatinga broadly fails to include important governance aspects of the social-ecological context. In particular, SFM implementation strategy in Caatinga does not focus on three important types of socially embedded institutions: the illegal market of native forest products; the social organisation of local communities; and the lack of integration of SFM in other governmental rural technical assistance programs. The lack of consideration of the specificities of resource use and governance within the social-ecological context of Caatinga implies that SFM implementation strategies will unlikely achieve environmental, social, and economic goals simultaneously as the tendency by local actors to reject SFM institutions is increased.

### *5.5.3. Local participation to strengthen SFM implementation strategies*

Local communities are increasingly being considered a key-factor to the success of strategies that aim for more sustainable management of forests (Arts and de Koning 2017; Persha et al. 2011). Our results show that local actors indeed play a key role in managing forest commons. They do so, first, by legitimizing institutions in their daily practices, and second, by adapting institutions according to their social values and beliefs (Agrawal 2007; Cleaver 2012). Our results particularly highlight the importance of local social arrangements amongst various groups of local actors (De Koning and Benneker 2013). Increasing levels of acceptance of newly introduced institutions in bricolage processes were generally seen to follow from increased interactions between a variety of local actors, including technicians, jobbers, industries, communities, and so on.

In Caatinga, the lack of participation of local communities in the development of the original SFM package is reflected in its many bureaucratic hurdles and a dominant focus on biomass for energy supply. On a broader scale, strategies aiming for the sustainable use of environmental resources still lack an integration of local norms and cultural values, which would be achieved through a better consideration of interactions amongst different groups of local actors (Merrey and Cook 2012). In the case of Caatinga, this lack arises from the fact that SFM implementation strategies are based on the interests and ideas of only two groups of actors: federal government and international organisations that seek to decrease deforestation and forest degradation, and local industries and businesses that need to guarantee their source of biomass for energy supply.

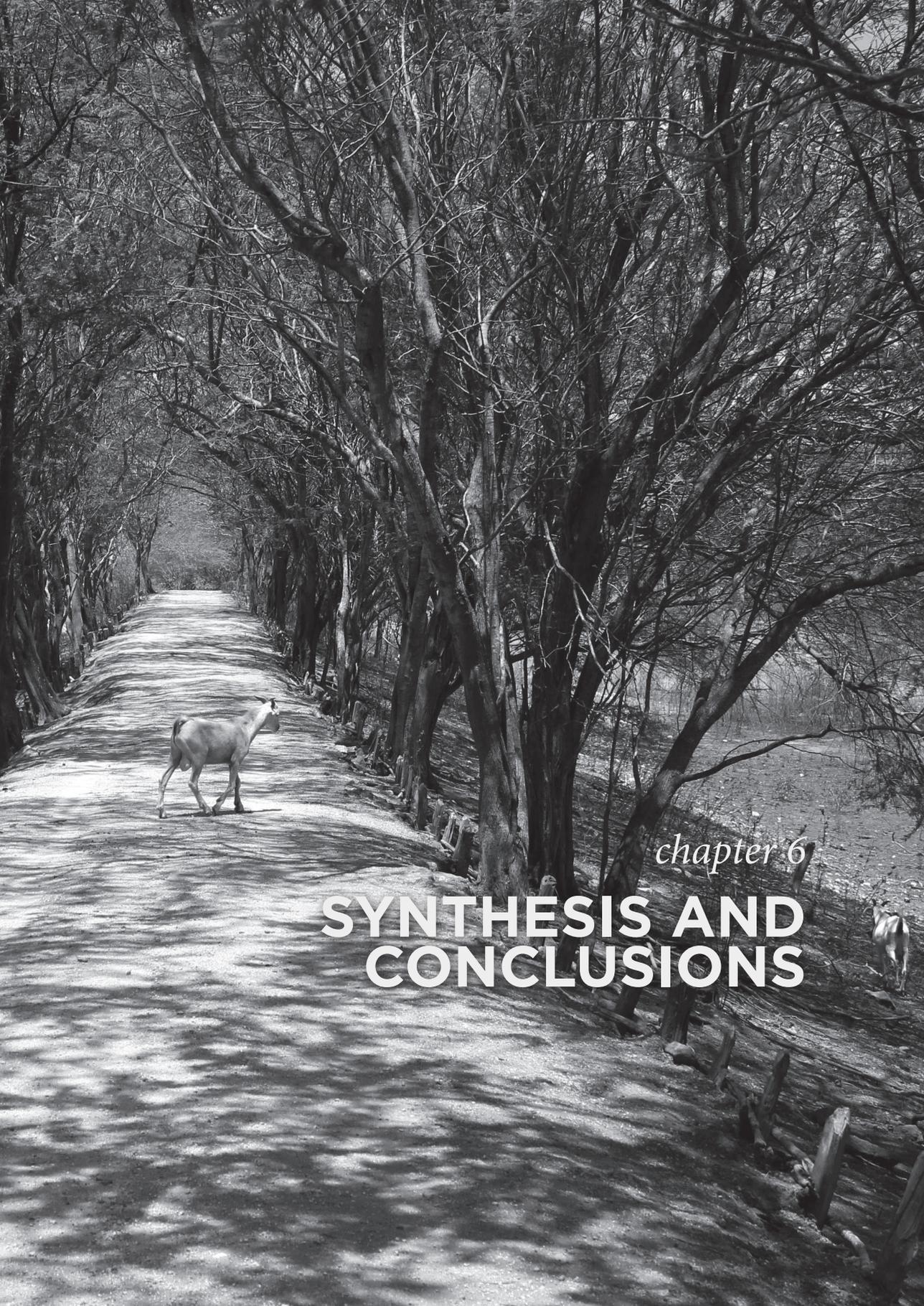
## 5.6. CONCLUSION

First, we conclude that formal institutions linked to SFM implementation strategies fail to convincingly connect to the different roles that native forest resources have in a specific social-ecological context. In the case of Caatinga, a Brazilian government research initiative successfully addressed one of the main causes of deforestation in the biome – the use of native forest resources as a source of biomass for energy supply – through developing technical parameters of SFM for this purpose. The focus of SFM implementation strategies on the production of forest biomass in Caatinga is at the same time a clear example of how the use of native forest resources directly linked to forest loss is targeted over other uses of native forest resources that are linked to livelihoods of local populations, overshadowing their role in and potential for being key actors in the sustainable use of forest resources (Agrawal 2007). This lack of consideration of other roles that native forest resources have in the livelihoods of local populations – in the case of Caatinga as a natural pasture or as a source of NWFP – shows how the specificities of the social-ecological context in the design of SFM implementation strategies are often left outside consideration (Hinkel et al. 2014; Ostrom 2009). In turn, this can lead to exclusion of vulnerable populations and general implementation failure.

Our second conclusion is that the success of sustainably managing forest resources that are under a common pool of local communities is closely dependent

on the way in which their social-ecological context is considered (McGinnis and Ostrom 2014; Monroy-Sais et al. 2016), which also depends on the participation of a broad range of local actors in the design and formulation of SFM implementation strategies (Agrawal et al. 2013; Barnes et al. 2017; Le Tourneau and Beaufort 2017). Moreover, success of participation also depends on the social organisation of local actors amongst themselves, i.e. the arrangements between different groups of local actors aiming to improve the social network linked to forest resources uses (Arts and de Koning 2017).

Finally, we understand that institutional bricolage processes are performed not only by local communities, but also by other groups of local actors linked to markets and services accessed by these communities. Bricolage processes linked to SFM implementation in Caatinga biome are articulated by different groups of actors performing locally, such as local communities (producers), industries (consumers) and technicians (providers of technical services). We therefore recommend that policy-makers place more effort on keeping formal institutions flexible enough to consider the social-ecological context in which SFM is implemented. This means placing focus not only on the different uses of native forests that are part of local livelihoods and local markets, but also to consider the importance of a diverse group of local actors for successful SFM implementation, including technicians, jobbers, consumers, restaurants, and industries, in addition to the central role that local communities should play.



*chapter 6*

# SYNTHESIS AND CONCLUSIONS

## 6.1. INTRODUCTION: GLOBAL-LOCAL NEXUS OF SFM

This thesis set out to contribute to a better understanding of the global-local nexus of SFM in multi-level forest governance. To do so, it has investigated how SFM institutions are translated across different levels of governance. While these SFM institutions ‘travel’ across different levels of governance, they are translated by various actors according to the economic, social, and environmental values that are given to forests in different social-ecological contexts (Angelstam et al. 2004; Hickey 2008; Ostrom 2009). When SFM is implemented on the ground, these institutions are also translated by local actors through their practices, and thus results in (un) expected environmental, social, and economic outcomes (De Koning 2014). As such, this thesis defined SFM institutional translations as processes through which rules, norms, and beliefs are shaped across different levels of governance, including changes that happen during the travel from one context to another.

The travelling process of SFM institutions can be investigated in various ways and through different perspectives. These perspectives can adopt a bottom-up or top-down approach; focus either on vertical and horizontal interactions between ideas, actors, and institutions; or may simply start from the global concept of SFM and then consider all the institutions that are relevant in other levels of governance up until its implementation on the ground. In this thesis, the choice was to begin the analysis by adopting a top-down perspective and following vertical, institutional interactions to investigate how global forest governance affects SFM institutional translations on a domestic forest governance level, with Brazil being chosen as a case study. While taking this perspective as a starting point for the structuring of the full thesis, horizontal interactions of ideas, actors, and institutions, and bottom-up initiatives that shape SFM institutions were also explicitly considered in each step of the analysis.

In the first step of the analysis, results have shown that translations of SFM institutions (rules, norms, and beliefs) are influenced by a complex set of horizontal interactions on a domestic policy level. These horizontal interactions were studied as integral parts of the more vertical ‘pathways of influence’ that seek to explain how SFM is translated from a global to a domestic level (Bernstein and Cashore 2012). The second step of the thesis consisted of an analysis on how SFM institutions

are translated in a specific sub-national context, the Caatinga biome. In this second step, the thesis reports how interactions amongst resources, actors, and governance systems specific to the Caatinga biome shape SFM institutional translations. In other words, this analysis was aimed at investigating how SFM institutions are translated within a specific social-ecological context. The final step of analysis in this thesis discusses how different groups of local actors translate SFM institutions through their practices, producing certain social, economic, and environmental outcomes on the ground. In this analysis, the agency of local actors was a key factor to understand how institutions change through processes of being rejected, adapted, or integrated into local practices (Clever 2012).

This chapter is organised as follows. First, all three research sub-questions that were articulated in chapter 1 are answered, after which the main question is answered. Through answering the research questions, this section presents both the thesis' main findings and contributes to the academic debate on SFM within the global-local nexus. The section that follows presents a reflection on the thesis' theoretical framework, including the concept of multi-level governance and institutional translation, and discusses considerations for future research. Subsequently, a reflection on the methodological approach explores the choice for a nested case study, along with my personal role as a researcher with background as a practitioner. Finally, the section presents a number of policy recommendations that follow from the thesis' findings and conclusions.

## **6.2. ANSWERING THE RESEARCH QUESTIONS**

*6.2.1. Research question 1 - How is sustainable forest management translated from global forest governance to the Brazilian national level of forest governance?*

The findings of this thesis confirm that international rules, norms, discourses, markets, and direct access to policy-making processes are valuable pathways for the analysis of influences, be it positive or negative, of global forest

governance on domestic policies (Bernstein and Cashore 2012). Moreover, the analysis of how SFM institutions are translated from the global to the Brazilian context produced new insights on how these pathways gain and lose force in the influencing of national governance and policy frameworks (Faggin and Behagel 2017). This thesis thus shows that the domestic context, and pre-existing policy frameworks, discourse coalitions, and different social-ecological contexts within the national territory are important factors that co-shape pathways of influence (Adger et al. 2005). In the particular case of analysing how SFM institutions are translated from the global to the Brazilian forest governance context, the three main conclusions of chapter 2 and 3 of this thesis are considered below.

First, as the multi-level governance literature shows (e.g. Mwangi and Wardell 2012; Stephenson 2013), forest-related international agreements (i.e. UNFCCC, CBD, and UNCCD) have a direct influence on how SFM institutions are translated into Brazilian national policies that are linked to these agreements. However, such national policies are already anchored in an pre-existing and complex domestic governance context (Singer 2008). Therefore, the pre-existing domestic forest governance context was found to strongly shape the translations of SFM institutions within the national territory. This finding confirms that vertical interactions - from international to national level - are also shaped by horizontal dynamics within a domestic context (Mwangi and Wardell 2012; Stephenson 2013). Furthermore, these horizontal dynamics represent interactions amongst competing discourses, specific policies, and actors and their interests that set the scene for other international influences to occur (Behagel and Arts 2014; Burns and Giessen 2016).

Second, despite that forest-related markets increasingly connect global concerns to local practices (i.e. via forest certification schemes and timber trade agreements) (Arts 2014), this thesis found that a more relevant form of influence on SFM institutional translations within the Brazilian policy framework comes from non-forest related markets. The reformulation of the Brazilian Forest Code, a law that regulates the use, management, and conservation of forest resources in private properties, is a good example of how the agribusiness sector has influenced forest governance in Brazil in a markedly higher degree than other sectors (Santos-Filho et al. 2015; Soares-Filho et al. 2014). This thesis thus illustrates how the outcomes from a dispute between agribusiness and nature conservation strongly shape SFM institutional translations in the Brazilian Forest Code. Moreover, agricultural

activities still bring a rapid and more substantial economic return when compared to sustainable forest uses (Ferretti-Gallon and Busch 2014), especially in countries where agricultural commodities are the main source of income. This confirms that national discourses and policy frameworks on agriculture, while not directly linked to forest issues, are key to understanding how SFM institutions are translated within a domestic context (Soares-Filho et al. 2014).

Third, the findings of this thesis confirm that direct access of international organisations to domestic policy-making processes is a very important pathway to understand how international influences reach a domestic context (Bernstein and Cashore 2012). In addition, the thesis finds that the influence of any of the four pathways is strongly shaped by the different social-ecological contexts within the Brazilian national territory, thus resulting in different SFM institutions translations in these contexts. One of the main horizontal influences that shape SFM institutional translations is found in the different values that are given to forest resources, which vary according to social, ecological, and economic contexts (Eikermann 2015; Giessen 2013; Haberl et al. 2013). Accordingly, in areas where forest conservation is both nationally and internationally prioritised, as seen in the case of the Atlantic rainforest, the tendency is to see a more direct influence from the international 'rules' and 'discourse' pathways on SFM institutional translations. In contrast, in social-ecological settings where international and national forest conservation discourses compete with economic and agricultural interests and demands, the 'direct access' pathway is more prevalent. In the Brazilian Amazon, for instance, internationally funded programmes follow the 'direct access' pathway to support sustainable use, including SFM initiatives, and forest conservation. (e.g. 'Pilot Program for Tropical Forest Protection in Brazil' - Portuguese acronym PPG7, and 'Amazon Fund'). The Cerrado biome has been receiving support from international organisations since the 1990s, with a focus mainly on the sustainable production of NWFPS by local communities (e.g. PPP-Ecos/GEF). Furthermore, Caatinga biome receives attention from international actors, such as FAO and GEF/UNDP, which supported the Brazilian government in developing research on technical parameters for SFM focused on the production of biomass for energy supply (FAO 2010). Indeed, the different values of forest resources within the various social, economic, and environmental contexts – for instance preferences for forest conservation, management, or restoration – are central to the understanding of SFM institutional translations across different levels of governance.

*6.2.2. Research question 2 - How is sustainable forest management translated within the social-ecological context of Caatinga biome, in Brazil?*

As a second dimension of SFM institutional translations, this thesis highlights the relevance of human-environmental interactions in shaping SFM institutions. To do so, the thesis used the Social-Ecological System (SES) analysis framework (McGinnis and Ostrom 2014; Ostrom 2009), which includes an analysis on how interactions amongst resources, actors, and governance sub-systems shape institutions (rules, norms, and beliefs) in a specific context.

The first conclusion that is derived from the analyses of SFM translations in the SES of Caatinga states the relevance of the ecological aspects of forest resources, which is still underestimated in social science research (e.g. Potapov et al. 2017). In Caatinga biome, the native forest species are resilient to extreme climate conditions, such as long dry periods, and exhibit a high capacity of regeneration (da Silva et al. 2018; Vieira and Scariot 2006). These particular ecological characteristics offer the possibility to using clear-cutting techniques for shorter management cycles of 15 years as part of SFM, which is not possible in other ecological systems, such as the Amazonian rainforests. In the Amazon, SFM is more focused on a selective management of trees and species to allow the natural restoration of forest resources that considers, for instance, a cycle of 30 years between the management cycles within the same forest area. Consequently, what is ecologically sustainable in one context may not be in another, and these differences shape how SFM institutions are - or should be - differently translated in the various biomes (Quine et al. 2013).

A second conclusion regarding the analysis of specificities of a SES states that the relevance given to a certain type of forest resource use in SFM depends on how well different groups of local actors are considered (Folke et al. 2005). In the case of Caatinga, the use of forest resources as a source of biomass for energy supply is central to SFM (Faggin et al. 2017). This focus specifically responds to a strong market factor, namely the demand of regional industry and business to be able to continue using natural forest biomass as their main source of energy supply. Even though the focus of SFM on firewood and charcoal do offer local communities the opportunity for income generation, when it is strictly focused on a market demand, it also reproduces a social dynamic of exclusion of vulnerable populations (Clever 2002). In this case, the local communities' knowledge and specific needs are not considered by SFM institutions, thus undermining the expected outcome of SFM of

balancing the social, economic, and environmental aspects of using forest resources (Berkes and Folke 2000). Therefore, to achieve more positive results, SFM institutions in Caatinga need to much better reflect the multiple uses of forest resources by local populations (e.g. de Araújo Filho 2013; Maia et al. 2017; Ticktin 2015), which have not yet been integrated into SFM regulations.

Finally, the exploration of socially embedded and techno-bureaucratic institutions within the SES of Caatinga offered a more precise understanding of how these institutional connections to the SES (or lack thereof) shape SFM implementation outcomes on the ground. Techno-bureaucratic institutions, which include rules, norms, and technical parameters on SFM, form a ‘package’ of formal institutions that guide actor’s behaviour within a certain governance context (Scott 2008). Socially embedded institutions, in contrast, are norms and beliefs linked to cultural values and local practices in a specific setting (Clever and De Koning 2015). In the case of Caatinga, techno-bureaucratic SFM institutions neglect the other uses of forest resources that are linked to local practices. This lack of consideration of local practices undermines the socially embedded institutions and consequently negatively affects the success of SFM implementation by local communities.

### *6.2.3. Research question 3 - How do local actors translate sustainable forest management into their social practices?*

As a third dimension of SFM institutional translations, this thesis analyses how different groups of actors perform bricolage processes through their local practices to adapt to SFM implementation. Literature on community-based forest management highlights that newly introduced rules, norms, and beliefs are always interacting with locally embedded practices (Arts and de Koning 2017; De Koning 2014). Such interactions occur when local actors use agency to re-use, rework, and recombine external and embedded institutions (Behagel et al. 2017; Cleaver 2012). In other words, local actors reject, adapt, or integrate new institutions into a set of pre-existing institutions through their social practices (Cleaver 2012; Cleaver and De Koning 2015). When situated in the global-local nexus, bricolage processes may be considered as the final stage of the process where SFM institutions are translated from global to national and sub-national levels, and to practices on the ground.

The first conclusion that follows from the analysis of local institutional bricolage processes confirms a lack of connection between the newly introduced SFM institutions and socially embedded ones. Indeed, many of the different groups of local actors reject the techno-bureaucratic SFM 'package' in Caatinga through an institutional bricolage process of 'articulation' (De Koning 2014). This rejection is linked to the lack of consideration of forest resource uses other than the production of forest biomass in this package. Another important reason for this rejection is that formal SFM institutions do not consider the difficulties that industries, business, and local communities have to access bureaucracies and technical services to implement SFM. The thesis also finds that, in the case of Caatinga, SFM implementation that is focused on the production of forest biomass results in mental images that are associated with illegal practices, such as clear-cutting areas and trucks full of firewood and charcoal. These similarities between the images of legal and illegal activities also contribute to the rejection of SFM by local communities, which tend to prefer activities that are easily linked to a legal practice, such as agriculture or cattle and goat rearing, despite the possibility of these practices being more harmful to environmental resources.

The second conclusion finds that local groups of actors differ on how they adapt techno-bureaucratic institutions to socially embedded institutions through local practices (De Koning 2014). This thesis identifies that different groups of actors – namely business and industries (consumers), providers of technical assistance services (technicians), and local communities (producers) – have different capacities and abilities for adapting newly introduced institutions through the institutional bricolage process of 'alteration'. In other words, local actors draw on their own local practices to exercise agency and create new forms of forest governance (Behagel et al. 2017). In the case of Caatinga, consumers have more capacity to adapt SFM techno-bureaucratic institutions to their needs as they have better access to bureaucracy and technical assistance services. Technicians are able to offer their services for the implementation of SFM to local communities via governmental tenders, or to private landowners in order to adapt to techno-bureaucratic institutions. Local communities rely on arrangements with consumers and technicians to be able to adapt to techno-bureaucratic institutions, as they have low levels of access to the bureaucracy requested by SFM regulations. Institutional bricolage processes of 'alteration' (adaptation) thus show how the role and potential of local communities in being key-actors in the

sustainable use of forest resources is diminished, as their low capacity for adapting to SFM techno-bureaucratic institutions by themselves reinforces pre-existing social exclusion processes.

Third, positive examples that were found with regard to how local actors integrate newly introduced institutions to pre-existing socially embedded ones brought new insights regarding the role of cooperation between groups of local actors. The focus on actors from local communities often tends to neglect the crucial role that other groups of local actors play in forest governance. This thesis' findings thus show that local communities do not perform institutional bricolage processes in isolation from other groups of actors. This became particularly clear in the analysis of the 'aggregation' bricolage processes. The capacity of local communities to integrate techno-bureaucratic institutions into their socially embedded institutions through local practices is highly dependent on their cooperation with other groups of actors, such as technicians and consumers. Only if the cooperation amongst these different groups of actors is considered, it is possible to understand how local communities are indeed able to integrate SFM techno-bureaucratic institutions through their practices. As such, this finding is of high importance because it highlights that an analysis on how SFM is implemented on the ground needs to broaden its focus from only local communities to also include different actors that perform locally, such as technicians, jobbers, business, and industries.

#### *6.2.4. Main question - How is sustainable forest management translated within the global-local nexus of forest governance?*

Within a global-local nexus, both vertical and horizontal interactions amongst actors are relevant for the analysis of institutional translations. These include vertical interactions that directly influence translations of SFM formal institutions, such as rules and norms that 'travel' from the global to national, sub-national, and local levels. In contrast, horizontal interactions are what shape SFM institutional translations on each level of governance more broadly: strengthening or weakening specific influences, highlighting one forest use over another, or connecting to certain local practices while not to others.

Although the global-local nexus perspective is usually seen as an opportunity for the consideration of the needs of local communities within forest

governance strategies (Asiyanbi 2015), this could not be confirmed in the case of Caatinga. First, the findings of this thesis show that connection of forest resource uses to international, national, sub-national, and local markets has a direct influence on which actors are involved in SFM institutional translations. In the Brazilian domestic context, this thesis identified at least three different groups of actors that had direct influence on SFM institutional translations studied, included: agribusiness in Amazon and Cerrado biomes, conservationists in Atlantic Forest biome, and local industries and business in Caatinga biome. In Caatinga, forest resources uses are not directly linked to international markets. However, they are directly linked to national as well as sub-national and local markets. This is as forest biomass is the main source of energy supply of plaster and ceramic industries in the region, with plaster being produced for the entire national market of Brazil, and ceramic being produced for regional and local markets. Other uses of forest resources by local communities have very little room in SFM institutional translations in Caatinga, thus reflecting a lack of consideration of their needs. The result is that local communities receive a 'package' of sustainable practices that primarily answer the needs of other actors, and thus face challenges to adapt SFM implementation to their own needs.

Second, despite the fact that SFM institutions in Caatinga are mainly focused on one dominant use of forest resources, its technical parameters are close to the pre-existing practices of local communities and do not request extra technical capacity. Instead, the bureaucratisation of pre-existing local practices while implementing SFM is the major challenge for communities. The non-regulated use of forest resources by local communities, or those that do not have an environmental license, are not necessarily unsustainable. This means that although local communities have difficulties in accessing the bureaucracy and obtaining an environmental license for the use of forest resources, they have historically been managing it in a mostly sustainable way. As local communities depend on forest resources for their livelihood, their traditional knowledge is often embedded in strategies that do consider sustainability as one of the core values (Folke et al. 2005). The findings of this thesis thus confirm those broader findings in the literature, noting that local communities are able to create local institutions that lead to a more sustainable use of forest resources (Agrawal 2012, 2014; Ostrom 1990).

Third, in the case of Caatinga, the difficulties in accessing bureaucracy and the absence of a continuous stream of support from governmental initiatives

for SFM implementation has thus created the need for local actors to coordinate strategies amongst themselves to face the challenges of SFM implementation. It is interesting to note that local communities that have positive experiences while implementing SFM through support from governmental initiatives tend to build arrangements with other groups of local actors, such as technicians, jobbers, and consumers, to guarantee the continuation of the implementation of their already approved SFM plan. In this context, technicians, mostly from regional NGOs, have an important role in intermediating the relationships of local communities with other groups of actors and bureaucracy (Barnes and van Laerhoven 2015).

Finally, the findings of this thesis show that the analysis of environmental resources management by local communities should be expanded by consideration networks amongst local actors more explicitly. The adaptation and integration of newly introduced institutions to pre-existing, socially embedded ones have more chance of producing the expected forest governance outcomes when involving different groups of actors. This finding emphasises that local governance systems need to be better considered in the design of SFM implementation strategies. Therefore, to achieve the desired outcomes, forest governance should emphasise how local practices are shaped in social learning processes (Muro and Jeffrey 2008). More generally, a global-local nexus analysis of environmental governance needs to consider that global influences will always need to interact with a pre-existing network of actors and governance systems before being able to realise desired local impacts and changes.

### **6.3. REFLECTIONS ON THE RESEARCH APPROACH**

The theoretical approaches that were adopted for each step of this thesis' analysis ('pathways of influence', SES, and Institutional Bricolage) gave important guidance to each block of analysis. Similarly, their relevance was also clearly visible in other levels of governance: the thesis shows that all three of the approaches can contribute to the analysis of institutional translations in all levels of governance. The pathways of influence can also be used to analyse how domestic governance

influences sub-national levels of forest governance, and practices on the ground, for instance through a discourse of SFM. The SES analysis framework can be expanded to analyse how international influences impact upon domestic levels of governance, as countries have preferred forest uses and harbour specific biomes. And institutional bricolage may also be helpful in understanding how international arenas influence domestic and subnational levels, as forest governance actors on those levels actively adapt it to their needs. Thus, while for the aforementioned case study these were appropriate frameworks for the intended analysis, the thesis also invited more critical reflections on how to study the global-local nexus of forest governance through an institutionalism lens.

First, research on the global-local nexus should consider that global ‘pathways of influence’ (international rules, norms, discourses, markets, and direct access to policy-making processes) (Bernstein and Cashore 2012) not only influence domestic policy frameworks, but also regional and local ones. In addition, these pathways of influence are also relevant in the analyses of how other levels of governance interact with and influence each other. A suggestion for further research would be to expand the analysis of global governance ‘pathways of influence’ beyond the domestic level, considering that these pathways also influence other levels of governance, such as sub-national and local ones.

Second, the application of the SES approach (McGinnis and Ostrom 2014; Ostrom 2009) to SFM institutional translations leads me to conclude that SESs appear to be ‘scale-free’. This means that there is no pre-determined scale to define a social-ecological system; it could be any scale from a local to the global one (Wyborn and Bixler 2013; Young 1994). To complicate this point further, interactions amongst actors, resources use, and governance sub-systems are not necessarily happening locally or where the resources are located. These interactions may happen on different levels involving actors and governance sub-systems on a continuous scale, from broad to specific contexts (Adger et al. 2005). Further research on environmental governance should therefore primarily consider how the interactions amongst actors, resources use, and governance sub-systems are of relevance in the shaping of forest governance and associated outcomes across levels. This would require an investigation of how institutions are shaped and guide actors’ behaviour in any level of governance. Therefore, a suggestion for further research is to expand the notion of SES beyond an analysis of a local level of governance – as is most often still the case – and to apply it more directly to the analysis of multi-level environmental governance.

Finally, institutional bricolage processes that occur when a newly introduced set of institutions interact with a pre-existing one (Clever 2012; Clever and De Koning 2015) do not happen exclusively at a local level of governance, nor do these only involve local actors. Institutional bricolage processes may also occur when international institutions interact with national ones, and when domestic institutions interact with sub-national and local ones. In addition, institutional bricolage processes are performed not only by local communities, but also by different groups of actors who are active on both international and domestic levels. Accordingly, institutional bricolage processes do not only happen at a local level of governance but also in other levels of governance. A suggestion for further research is thus to focus on how actors who operate across multiple levels of governance (e.g. national industries, federal agencies, FAO, environmental NGOs, etc.) perform bricolage processes while translating institutions to fit with their own ideas, needs, and interests.

## **6.4. REFLECTIONS ON THE METHODS**

As aforementioned, this thesis based its analysis on a nested case study (Thomas 2011). This choice brought some positive and some negative aspects to the analysis. The positive aspect was that in the analysis of SFM institutional translations across different levels of governance, the nested case study helped to organise the steps of analysis: first from global to domestic, then from domestic to sub-national, and finally from sub-national to local levels of governance. However, in organising the analysis in these three steps, other interesting interactions across different levels of governance (for example from the local to the national level) were kept out of the analysis framework. While these other interactions were not explicitly part of the research framework, the bottom-up coding of the qualitative data that was carried out helped to include them in both the results and discussions of each step of the thesis analysis. Specifically, the coding of the qualitative data in multiple rounds gave the possibility to identify interactions that were not necessarily linked to one particular step of the analysis but embedded in the nested case study in its entirety.

Another significant reflection on the methodological approach is on the benefits and challenges that my own background as a ‘practitioner’ and my

previous professional experience brought to the research. From the beginning, it was clear that a central challenge would be to look through the academic lens at a subject in which I have had practical experience on, as a professional in the forest policy sector in Brazil for approximately ten years, including three years specifically focused on SFM implementation in Caatinga biome. As such, it was not always easy to take some distance from the object so close to my profession and to avoid confusing analytical stands with normative viewpoints. At the same time, this previous experience greatly assisted me in the development of the empirical part of the research. The network and previous contacts related to the object of study helped, for instance, in planning and structuring data collection. Moreover, it afforded me a more nuanced and accurate interpretation of the empirical data of the research. The experience of being a scholar with a practitioner background also gifted me with a better understanding of the central issues that should be addressed to improve connections between academia and practice. On the one hand, it became clear that there is a growing body of research that increasingly contributes to policy-making and implementation processes, allowing a better understanding of the challenges faced on the ground by looking at it from a new perspective. On the other hand, it became clear that academic reflections could be greatly enriched by considering the practical experiences and challenges that policy-making and implementation face on the ground. In summary, I believe that the circulation of people with different backgrounds in both academia and policy practice may bring positive results to both researchers and practitioners, and ultimately to practice itself.

## 6.5. POLICY RECOMMENDATIONS

The choice to study SFM institutional translations in the Caatinga biome context was made for three key reasons. First, Caatinga is still not part of the agribusiness expansion frontier, unlike the Amazon and Cerrado biomes (Beuchle et al. 2015; Morton et al. 2006). At the same time, this is the region where a majority of the poorest population of Brazil lives (IBGE 2010; UNDP 2013). Second, the local population in Caatinga biome bases its livelihood primarily on natural resources use (Gariglio et al. 2010) and the ecological resilient characteristics of Caatinga vegetation (da Silva et al. 2018) have resulted in a comparatively high level of natural forest cover of 54% (MapBiomas 2018). Forest resources in Caatinga are central to building social and economic resilience for the local population while including other rural development strategies for the improvement of the coexistence between local livelihoods and the semi-arid conditions of the biome (Diniz and de Lima 2017; Gariglio and Barcellos 2010). Finally, Caatinga biome encompasses one of the most biodiverse tropical dry forests in the world (da Silva et al. 2018) and one of the most vulnerable regions to the desertification processes in South America (UNCCD 2017).

A first policy recommendation is to address the lack of technical capacity that is one of the main challenges of SFM implementation in Caatinga. There is a lack of governmental staff in the states' environmental agencies to deal with the demand for analysing SFM plans and monitoring its implementation, both of which are operations that are part of the environmental licensing processes. This lack of technicians in the states' environmental agencies is changing with the increase of integration of SFM in technical education systems. However, it is still far away from the ideal of responding skilfully to the demands of SFM plans analysis, approvals, and monitoring. This lack of human capacity is also reflected in the lack of these professionals in public programmes for rural technical assistance. The governmental initiatives that support SFM implementation in rural settlements in Caatinga try to cover this lack, but the technical services provided by public tenders are not permanent and often only cover the elaboration of a SFM plan. As such, a policy recommendation linked to technical assistance services is to integrate forestry as one of the activities covered by the public rural technical assistance programmes that already exist.

Second, the bureaucratic process for getting an environmental license, according to the formal regulations for SFM implementation in Caatinga, is complex and delayed by both the lack of technicians in environmental agencies and by the lack of provisions of technical services to local communities. Furthermore, local communities in Caatinga often find themselves in socially and economically vulnerable situations, thus increasing the complications when dealing with the risks and timings of this bureaucratic process. A policy recommendation is to make formal regulations more flexible and be able to adapt to the realities of local communities. One very concrete possibility is thus to skip the need to request for a license for managing the parcels of a SFM plan on an annual basis, once it is approved. Rather, licences could be renewed every three years. To compensate, the period between the approval of the SFM plan and the first three years of the parcels' management could be covered by a more efficient monitoring system managed by the technicians of the states' environmental licensing agency.

Third, governmental research initiatives were of key relevance for the establishment of formal regulations for SFM that focuses on firewood and charcoal production in Caatinga. Despite the fact that this research did not actively involve the needs and knowledge of local communities, it still resulted in technical parameters for SFM that are very close to the local practices of managing forest resources for firewood and charcoal production. A policy recommendation for further research on SFM strategies in Caatinga is on the one hand to study how to enhance and improve the management of natural pastures and the production of NWFPs, and on the other hand, to also find ways to better involve the local communities in policy making, along with seriously addressing their local knowledge and practices (see also Díaz et al. 2015). This would enrich SFM implementation strategies, including the integration of community-relevant uses of forest resources.

Fourth, there is a lack of integration of SFM strategies into other important development strategies in Caatinga biome, such as agro-ecology and initiatives that focus on sustainable rural development. A policy recommendation is to build a rural development programme able to integrate SFM in other initiatives and make it part of a broader strategy for rural development in Caatinga. Only when integrated with other regional development strategies will SFM be likely to become a broadly adopted strategy for the improvement of the livelihoods of the local population.

Finally, a relevant policy recommendation for Brazilian forest governance in general is to build more flexible regulations and policies that allow the sustainable use of forest resources in a broader range of nature conservation areas. This includes respecting the different social-ecological settings of the Brazilian biomes and considering the ecological and the social similarities and differences between these biomes. Such changes would likely increase the social and economic values of standing forests, would contribute to forest conservation, and would increase income generation for local populations, thus contributing to poverty reduction and social resilience. Finally, making Brazilian forest governance – and forest governance on levels between the global and the local more broadly – more sensitive to sustainable use will further assist in enhancing the ‘guardian’ role of local communities in the conservation of forest resources. ■

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- Interviewee-2[GOV]. Director of the Brazilian National Fund for Climate Change / Brazilian Ministry of the Environment (MMA). Transcription from the original language: Portuguese. Brasília, DF, Brasil. April 11th, 2016
- Interviewee-3[IO]. Programme Officer / Brazilian Office of the Food and Agriculture Organisation of the United Nations (FAO). Transcription from the original language: Portuguese. Brasília, DF, Brasil. April 08th, 2016
- Interviewee-4[GOV]. Representative of the Division of Rural Sustainable Development and Use of Natural Resources / Brazilian Ministry of the Environment (MMA). Transcription from the original language: Portuguese. Brasília, DF, Brasil. April 06th, 2016
- Interviewee-5[NG]. Representative of the non-governmental organisation '*Instituto Socioambiental (ISA)*'. Transcription from the original language: Portuguese. Brasília, DF, Brasil. April 06th, 2016
- Interviewee-6[NG]. Representative of the non-governmental organisation '*Instituto Socioambiental (ISA)*'. Transcription from the original language: Portuguese. [Available online]: <https://www.youtube.com/watch?v=bhUnUjfrUYk>. Brasília, DF, Brasil. May 25th, 2016
- Interviewee-7[NG]. Representative of the non-governmental organisation '*Observatório do Clima*' (Climate Observatory) and former director of the Brazilian Forest Service / Brazilian Ministry of the Environment (MMA). Transcription from the original language: Portuguese. São Paulo, SP, Brasil. April 25th, 2016
- Interviewee-8[NG]. Director of the non-governmental organisation '*Instituto População, Sociedade e Natureza (ISPIN)*' (Population, Society and Nature Institute). Transcription from the original language: Portuguese. Brasília, DF, Brasil. April 11th, 2016
- Interviewee-9[GOV]. Director of the Caatinga Nucleus / Division of Biodiversity and Forests / Brazilian Ministry of the Environment (MMA). Transcription from the original language: Portuguese. Brasília, DF, Brasil. April 15th, 2016
- Interviewee-10[IO]. Former director of sustainability / Brazilian Office of the United Nations Development Programme (UNDP). Transcription from the original language: Portuguese. Brasília, DF, Brasil. April 15th, 2016

- Interviewee-11[NG]. Representative of the non-governmental organisation '*Associação Plantas do Nordeste (APNE)*' (Northeastern Plants Association). Transcription from the original language: Portuguese. Petrolina, PE, Brasil. June 08th, 2016
- Interviewee-12[GOV]. Director of the Northeastern Office / Brazilian Forest Service / Brazilian Ministry of the Environment (SFB / MMA). Transcription from the original language: Portuguese. Natal, RN, Brasil. May 25th, 2016
- Interviewee-13[UNI]. Professor of Forest Management at '*Universidade Federal Rural de Pernambuco (UFRPE)*' (Federal Rural University of Pernambuco). Transcription from the original language: Portuguese. Recife, PE, Brasil. May 18th, 2016
- Interviewee-14[GOV]. Representative of the '*Superintendência de Desenvolvimento e Meio Ambiente do Estado da Paraíba (SUDEMA)*' (Environmental Agency of Paraíba State). Transcription from the original language: Portuguese. Patos, PB, Brasil. June 02nd, 2016
- Interviewee-15[GOV]. Technician of the Northeastern office / Brazilian Forest Service / Brazilian Ministry of the Environment (MMA). Transcription from the original language: Portuguese. Natal, RN, Brasil. May 25th, 2016
- Interviewee-16[GOV]. Representative of the National Institute for the Semi-arid (INSA) / Brazilian Ministry of Science, Technology and Innovation (MCTI). Transcription from the original language: Portuguese. Campina Grande, PB, Brasil. May 30th, 2016.
- Interviewee-17[NG]. Director of the non-governmental organisation '*Associação Plantas do Nordeste (APNE)*' (Northeastern Plants Association). Transcription from the original language: Portuguese. Recife, PE, Brasil. May 17th, 2016
- Interviewee-18[GOV]. Representative of the National Fund for Forest Development (FNDF) / Brazilian Forest Service (SFB) / Brazilian Ministry of the Environment (MMA). Transcription from the original language: Portuguese. Brasília, DF, Brasil. April 13th, 2016
- Interviewee-19[NG]. Representatives of the non-governmental organisation '*Centro para a Produção Industrial Sustentável (CEPIR)*' (Center of Sustainable Industrial Production). Transcription from the original language: Portuguese. Campina Grande, PB, Brasil. May 31st, 2016
- Interviewee-20[PV]. Representative of the company '*Nordeste Reflore*' (Northeastern Reforestation). Transcription from the original language: Portuguese. Patos, PB, Brasil. June 03rd, 2016
- Interviewee-21[GOV]. Representative of the Community-based Forest Management Division / Brazilian Forest Service (SFB) / Brazilian Ministry of the Environment (MMA). Transcription from the original language: Portuguese. Brasília, DF, Brasil. April 12th, 2016
- Interviewee-22[IO]. Representatives of the Brazilian office of the Inter-American Institute for Cooperation in Agriculture (IICA). Transcription from the original language: Portuguese. Brasília, DF, Brasil. April 14th, 2016
- Interviewee-23[TEC]. Technician of a non-governmental organisation. Transcription from the original language: Portuguese. Patos, PB, Brasil. April 04th, 2017
- Interviewee-24[IND]. Owner of a ceramic industry. Transcription from the original language: Portuguese. Santa Cruz, PB, Brasil. April 05th, 2017
- Interviewee-25[LC]. Community member of a rural settlement. Transcription from the original language: Portuguese. São Mamede, PB, Brasil. April 05th, 2017
- Interviewee-26[IND]. Owner of a ceramic industry. Transcription from the original language: Portuguese. Parelhas, RN, Brasil. April 06th, 2017

- Interviewee-27[IND]. Owner of a ceramic industry. Transcription from the original language: Portuguese. Parelhas, RN, Brasil. April 06th, 2017
- Interviewee-28[TEC]. Technician of a non-governmental organisation. Transcription from the original language: Portuguese. Fortaleza, CE, Brasil.
- Interviewee-29[LC]. Community member of a rural settlement. Transcription from the original language: Portuguese. Canindé, CE, Brasil. April 11th, 2017
- Interviewee-30[LC]. Community member of a rural settlement. Transcription from the original language: Portuguese. Canindé, CE, Brasil. April 11th, 2017
- Interviewee-31[LC]. Community member of a rural settlement. Transcription from the original language: Portuguese. Floresta, PE, Brasil. April 17th, 2017
- Interviewee-32[LC]. Community member of a rural settlement. Transcription from the original language: Portuguese. Ingazeira, PE, Brasil. April 18th, 2017
- Interviewee-33[IND]. Owner of a plaster industry. Transcription from the original language: Portuguese. Trindade, PE, Brasil. April 19th, 2017
- Interviewee-34[TEC]. Technician of a non-governmental organisation. Transcription from the original language: Portuguese. Fortaleza, CE, Brasil. April 10th, 2017
- Interviewee-35[TEC]. Field technician of a non-governmental organisation. Transcription from the original language: Portuguese. Canindé, CE, Brasil. April 11th, 2017
- Interviewee-36[TEC]. Field technician of a non-governmental organisation. Transcription from the original language: Portuguese. Floresta, CE, Brasil. April 17th, 2017
- Interviewee-37[LC]. Community member of a rural settlement. Transcription from the original language: Portuguese. Floresta, PE, Brasil. April 17th, 2017

# APPENDICES

## *Appendix 1*

List of questions for the semi-structured interviews

### **A. Interviewees of the international/national level of governance**

#### *Relations amongst different levels of governance*

1. In which levels of environmental/forest governance does your organisation work?
2. How is the work of your organisation related to international forest-related agreements? (What about the non-legally binding instruments such as UNFF?)
3. What is the role of your organisation in international meetings?
4. How is the work of your organisation related to Brazilian forest related policies?
5. What do you think about the interactions amongst international and national levels of forest related governance?

#### *Sustainable Forest Management translations and implementation*

6. How does your organisation define Sustainable Forest Management (SFM)? By whom or what this SFM definition is mainly inspired?
7. In your opinion what is the main focus/goal/objective of this SFM definition?
8. How do you see the implementation of this SFM definition?

#### *Sustainable Forest Management in a Brazilian scale*

9. In the Brazilian context can you identify SFM initiatives/practices? Where are these SFM initiatives/practices happening? Who is involved in these SFM practices?
10. How do you see the specificities of community-based SFM initiatives?

#### *Sustainable Forest Management in Caatinga biome*

11. Considering your experience, what aspects of SFM would you highlight for the Caatinga biome context?
12. Do you suggest or know another organisation or expert that could also contribute for this research?

### **B. Interviewees of the sub-national level of governance**

#### *Relations amongst different levels of governance*

1. In which levels of environmental/forest governance does your organisation work?
2. How is the work of your organisation related to international, national and states forest-related policies and agreements?
3. What is the role of your organisation in national and regional meetings?
4. What do you think about the interactions amongst international, national and regional levels of forest-related governance?

*Sustainable Forest Management translations and implementation in Caatinga biome*

5. How does your organisation define Sustainable Forest Management (SFM)? By whom or what this SFM definition is mainly inspired?
6. In your opinion what is the main focus/goal/objective of this SFM definition?
7. How do you see the implementation of this SFM definition in Caatinga biome?
8. In the Caatinga context can you identify SFM initiatives/practices? Where are these SFM initiatives/practices happening? Who is involved in these SFM practices?
9. How do you see the specificities of community-based SFM initiatives?
10. Do you suggest or know another organisation or expert that could also contribute for this research?

**C. Interviewees of the local level of governance**

*Relations amongst different levels of governance*

1. What is the role of your organisation in a local scale or in your community?
2. How is the work of your organisation related to international, national and states forest-related policies and agreements?

*Sustainable Forest Management translations and implementation*

3. How does your organisation / you define Sustainable Forest Management (SFM)? By whom or what this SFM understating / definition is mainly inspired?
4. In your opinion what is the main focus/goal/objective of SFM?
5. How do you see the implementation of SFM?
6. How do you see the specificities of community-based SFM initiatives / practices?
7. To what extent do you observe differences in how you manage forests today compared to the period before the SFM initiative started?

*Local institutions bricolage*

8. How do you started to be involved with SFM initiatives / projects?
9. What is the SFM initiative/project that you are involved about?
10. What are the organisations involved in SFM initiatives / projects?
11. Which organisations / groups remained the same, changed, strengthened or weakened after the SFM initiatives / projects started?
12. In your opinion what should be improved in SFM initiatives / projects?

*Sustainable Forest Management in Caatinga biome*

13. In the Caatinga context can you identify other SFM initiatives / practices? Where are these SFM initiatives/practices happening? Who is involved in these SFM practices?
14. Do you suggest or know another organisation or community that could also contribute for this research?

## Appendix 2

Table 9. Detailed description of interviewees and visits in the international, national, regional and local levels

Interviews at the International and National levels		
Type	City	Description and position
International (4)	Brasília/DF	FAO Brazil - Food and Agriculture Organisation of the United Nations / Brazilian Office: Program Official and technical coordination of GEF projects in Brazil
		UNDP Brazil - United Nations Development Program / Brazilian Office / Agency of GEF projects in Brazil: Coordinator of the Sustainable Development Area
		IICA Brazil - Inter-American Institute for Cooperation in Agriculture: Department of Natural Resources, Environmental Management and Climate Change adaptation
		IICA Brazil: Supervisor of the Project "Support of Actions for the Implementation of the National Program to Combat Desertification and Drought Mitigation (PAN Brasil)"
Civil Society (5)	Brasília/DF	ISA - Socio-environmental Institute: Public Policy and Law Advisor
		ISPN - Institute for People, Society and Nature: Coordinator of the Small Grants Program of GEF (PPP-ECOS)
	Rio de Janeiro/RJ	Adapta Sertão: Director of the Institute Adapta Sertão
		FunBio - Brazilian Fund for Biodiversity / Operation Agency of GEF projects and of the Tropical Forest Conservation Act in Brazil: Director of Projects
	São Paulo/SP	OBC - Climate Observatory: board of the OBC and former director of the Brazilian Forest Service
Federal Government (10)	Brasília/DF	IN CRA / MDA - National Institute for Colonization and Agrarian Reform / Ministry for the Agrarian Development – Director of the Department for the Environment
		Bolsa Verde / SDRE / MMA - Division for Rural Sustainable Development and Nature Resources Uses / Brazilian Ministry of the Environment – Coordinator of the National Program for Payment for Environmental Services (Bolsa Verde)
		GEFLOC / SFB / MMA - Division for Community-based Forest Management / Brazilian Forest Service / Ministry for the Environment – Coordinator of the National Program for Community-based Forest Management
		FNDF / SFB / MMA - National Fund for Forest Development / Brazilian Forest Service / Ministry for the Environment – Director of the National Fund for Forestry Development
		SFB / MMA - Division of Forest inclusion / Brazilian Forest Service / Ministry for the Environment – Director of Forest inclusion
		SFB / MMA - Brazilian Forest Service / Ministry for the Environment – Former director of the Brazilian Forest Service
		NC / DCBIO / SBF / MMA - Caatinga Nucleus / Division of Biodiversity and Forests / Brazilian Ministry for the Environment – Coordinator of the "Caatinga GEF Project"
		DCD / SEDR/ MMA - Division of Rural Sustainable Development and Nature Resources Uses / Brazilian Ministry of Environment – Director of the Department to Combat Desertification
		FunClimq / SMC / MMA - Division of Climate Change and Environmental Quality / Brazilian Ministry of the Environment – Coordinator of the National Fund for Climate Change
		STF - Superior Court of Brazil – Public hearing for judgment of unconstitutionality of some articles of the Brazilian Forest Code

Continue...

Interviews at the Sub-national level		
Type	City	Description / Position
Federal Government (6)	Natal/RN	SFB / MMA - Brazilian Forest Service / Ministry for the Environment: Director of the Decentralised Office of the Brazilian Forest Service
		SFB / MMA - Brazilian Forest Service / Ministry for the Environment: Technician of the Decentralised Office of the Brazilian Forest Service
		SFB / MMA - Brazilian Forest Service / Ministry for the Environment: Technician of the Decentralised Office of the Brazilian Forest Service
	Recife/PE	MDA - Delegacy of the Ministry of Agrarian Development in Pernambuco State: Delegate of the MDA in Pernambuco State
		PDHC / MDA - Project "Dom Helder Camara" / Ministry for the Agrarian Development
Campina Grande/ PB	INSA / MCTI - National Institute for the Semi-arid region / Ministry of Science and Technology: Researcher in the area of Desertification and Nature Resources Uses	
State Government (2)	Patos/PB	SUDEMA - Environmental State Superintendence of Paraíba / Regional Office - Technician Environmental License for Sustainable Forest Management Plans
	Recife/PE	CPRH - Environment State Agency of Pernambuco: Director of Forest Resources and Biodiversity
University (2)	Patos/PB	UFPG - Federal University of Campina Grande / Campus Patos: Professor of Forest Management
	Recife/PE	UFRPE - Federal Rural University of Pernambuco: Professor of Forest Management
Civil Society (4)	Patos/PB	NE-REFLORE - Northeast Reforestation: Director and technician responsible for the implementation of projects to support Sustainable Forest Management
	Campina Grande/ PB	PQTecPB / CEPIS - Technologic Park of Paraíba State / Centre for Sustainable Industrial Production: Director of the PQTecPB / CEPIS
	Recife/PE	APNE - Association for Plants of the Northeast region: technician that works in projects to support Sustainable Forest Management in Caatinga
	Petrolina/ PE	APNE - Association for Plants of the Northeast region: Director
Interviews at the Local level		
Type	City	Description / Position
Ceramic / Plaster industries (4)	Santa Cruz/PB	Cerâmica Pereira: Manager (owner)
	Parelhas/ RN	Cerâmica Tavares: Manager (owner)
		Cerâmica Boa Vista: Manager (owner)
Trindade/ PE	Calcinadora Grupo Gesso Bonito: Manager (owner)	
Rural Settlements (5)	São Mamede/ PB	PA Cágados: Communitarian
	Canindé/ CE	PA Frazão: Communitarian
		PA Frios: Communitarian
	Floresta/PE	PA Pipoca: Group of communitarians
Ingazeira/ PE	PA Sítio do Meio: Group of communitarians	
Technicians (3)	Patos/PB	SOS Sertão: Director responsible for SFM implementation projects in rural settlements
	Recife/PE	APNE - Association for Plants of the Northeast region: Technician responsible for SFM implementation projects in rural settlements
	Fortaleza/ CE	Fadurpe - Foundation 'Apolônio Salles' for Education Development: Technician responsible for SFM implementation projects in rural settlements
<b>Total (45)</b>		

## SUMMARY

Forest issues have been a concern for multiple environmental governance arenas. Forests are directly linked to climate change issues, as deforestation and land degradation represent the second major cause for greenhouse gases emission, after the burning of fossil fuels. Forests are also of key relevance to biodiversity conservation, as forests are some of the most biodiverse earth ecosystems. Furthermore, deforestation and land degradation are closely linked to an increase in desertification and are one of the underlying causes for the increase of people's vulnerability in semiarid regions. Finally, forest resources are the basis for the livelihoods of many local populations, especially those living in tropical regions. Accordingly, forest degradation can be directly related to poverty and to social, ecological, and economic vulnerabilities of local populations. For these reasons, forest issues have become an increasingly significant part of a complex set of international, domestic, and local governance debates.

Sustainable Forest Management (SFM) is a central concept in international debates on forest governance. SFM is a strategy to use forest resources in a way that maintains forest-related ecosystem goods and services for current use and for future generations, thus supporting forest conservation through the principle of sustainable use. However, how the concept of SFM 'travels' from these international debates and governance arenas to its implementation on the ground involves various institutional translations that result in different outcomes per locality. This thesis focuses on investigating how SFM institutions – rules, norms, and beliefs – are translated from their conceptualisation in international policy arenas, to domestic and sub-national policy and governance frameworks, and further down to their implementation in a specific locality. For the purpose of this thesis, SFM institutional translations are defined as processes through which SFM institutions are reshaped by actors across different levels of governance and social-ecological settings until their implementation on the ground. The analysis of SFM institutional translations is used to explore the global-local nexus of SFM, including both vertical interactions across administrative levels and horizontal interactions amongst actors, discourses, policy frameworks, social-ecological systems, and governance practices.

To explore the global-local nexus of SFM, the research is based on a qualitative approach, including a nested case study that is based on interviews with 45 key-actors, 9 site visits, and an extensive desk review of relevant documents. The nested case study for analysing SFM institutional translations includes Brazil and Caatinga, one of the six Brazilian biomes. Brazil is ranked second in terms of total forest cover in the world, and ranked first in tropical forest cover. However, amongst the various types of tropical forests, most researches thus far have focused on rainforests, such as the Amazon. Caatinga biome, as a dry forest, is often not the focus of research and policy efforts when discussing strategies to combat deforestation in

Brazil, even though it represents one of the most biodiverse tropical dry forests in the world, and is home to the poorest population in Brazil. Caatinga is also a region with the highest vulnerability to desertification in the country, and this is a potential problem as the livelihoods of the local population is mainly based on the use of forest resources, including energy supply, natural pastures for animal rearing, and sources of Non-Wood Forest Products (NWFPs).

The thesis investigates how multiple actors from governmental and non-governmental organisations, including civil society and private industry and businesses, translate SFM institutions across different levels of governance, and explores how these translations occur specifically in Caatinga biome. The main objective of this thesis is therefore to explore how SFM is translated within the global-local nexus of forest governance. The thesis answers three sub-questions:

(a) How is sustainable forest management translated from global forest governance to the Brazilian national level of forest governance?

(b) How is sustainable forest management translated within the social-ecological setting of the Caatinga biome in Brazil?

(c) How do local actors translate sustainable forest management into their social practices?

In chapter 2, the thesis first describes the background of the analysis, specifically comparing institutional arrangements of SFM in the international arena and in the Brazilian forest governance context, focusing on Caatinga biome. The chapter concludes that the most of convergence between the international and Brazilian level can be found in legally binding policy instruments, specifically with regard to the international 'Rio' conventions (UNFCCC, CBD, and UNCCD). While the complexity of global forest governance is also found in the policy context of Caatinga, those complexities differ in quality. For Caatinga, the specificities of the social-ecological context comprise the main contribution to complexity, whereas on the global level this complexity is more directly related to different relations between countries and a plurality of policy instruments. The comparison between SFM institutional arrangements on the global and Brazilian levels indicates that the understanding of how SFM institutions are adapted, changed, and integrated by actors across such levels of governance is a first step to take in order to explore the global-local nexus of SFM.

In chapter 3, the thesis investigates how SFM institutions are translated from the international level to the domestic level of governance in Brazil. The analysis specifically focuses on how international rules and norms, discourses, markets, and direct access to policy-making influence SFM institutional translations within the Brazilian domestic context. This chapter also demonstrates that national policies that are directly linked to the international conventions, of which Brazil is signatory, bring the most evident influences of international arenas on SFM translations at a domestic level. The chapter illustrates how international discourses interact with pre-existing

domestic ones, resulting in a less direct influence of these international arenas on the country's national policy frameworks through discourse. The chapter concludes that the international influence on SFM institutional translations is different for each of the social-ecological settings of the Brazilian biomes. Thus, domestic policy frameworks and the specificities of different social-ecological settings strongly shape how international influences affect SFM institutional translations in Brazil.

Chapter 4 focuses on the analysis of SFM institutional translations in the specific context of Caatinga biome in Brazil. The analysis explores how interactions amongst actors, resources use, and governance sub-systems shape SFM institutional translations in this biome. The chapter elucidates that SFM techno-bureaucratic institutions in Caatinga are mainly focused on a technical approach to forest management and thus prioritise the production of firewood and charcoal. As a result, these SFM institutions fail to address the needs and interests of local communities who are dependent on forest resources for their livelihoods. This is explained by the fact that socially embedded institutions have less influence on SFM institutional translations in Caatinga than the formal-bureaucratic ones. Consequently, local forest use and management practices are not an integral part of SFM strategies in the biome, thus negatively affecting the uptake of SFM by local communities.

Chapter 5 explores how local actors reject, adapt, and integrate the SFM institutional 'package' through institutional bricolage processes. First, the chapter illustrates how the rejection of SFM institutions by local actors is due to the lack of consideration of local needs, particularly those of local communities, and of the difficulties shared by more actors in accessing bureaucracy and technical services required by SFM regulations. Second, the chapter shows that on the one hand institutional bricolage processes that happen at the local scale of governance may reinforce dynamics that strengthens the exclusion of socially vulnerable groups. On the other hand, the analysis shows that SFM may also be successfully implemented when performed by arrangements that include multiple groups of local actors. The chapter concludes with the finding that local SFM institutional translations do not only involve local communities but also different groups of actors that are part of local governance systems, such as technicians, consumers, and jobbers.

The overall findings of this thesis demonstrate that horizontal interactions in the global-local nexus, in addition to vertical dynamics across administrative levels, are highly relevant for understanding how SFM institutions are translated in the Brazilian forest governance context. For example, the agribusiness sector has historically had a much higher influence on SFM translations than actor coalitions who support forest conservation and sustainable use. Moreover, in a country such as Brazil, which is home to multiple biomes, the different values that are given to forest resources in various regions are key factors that shape SFM institutional translations. Therefore, studying the interactions amongst actors, resources use, and governance systems within these different social-ecological settings is essential to understanding how SFM institutions are translated differently

across the country. The thesis also demonstrates that SFM institutional translations are strongly linked to the consideration (or lack thereof) of the needs and interests of multiple actors within specific governance settings. Finally, the findings of this thesis demonstrate that different groups of local actors, isolated or together, reject, adapt, and/or integrate SFM institutions through their local practices in order to cope with SFM implementation challenges. As such, the global-local nexus of SFM embodies a complex set of vertical and horizontal interactions amongst actors, forest resources, and governance systems. Within that complexity, greater sensitivity to sustainable use on multiple levels of governance – not just the global or the local - will be needed to enhance the ‘guardian’ role of local communities in the conservation of forest resources.

## SUMÁRIO

As questões florestais fazem parte de diversos debates sobre governança ambiental. Os recursos florestais estão diretamente ligados às mudanças climáticas, já que o desmatamento e a degradação ambiental representam, juntos, a segunda maior causa de emissão de gases de efeito estufa após a queima de combustíveis fósseis. As florestas também são fundamentais para a conservação da biodiversidade, sendo um dos ecossistemas terrestres que apresenta o maior índice biodiversidade. Além disso, o desmatamento e a degradação ambiental estão diretamente ligados ao aumento da desertificação e são uma das causas centrais no aumento da vulnerabilidade das populações locais em regiões semiáridas. Finalmente, os recursos florestais são a base para a subsistência de populações e comunidades locais, especialmente aquelas que vivem em regiões tropicais do planeta. Conseqüentemente, a degradação florestal está diretamente relacionada ao aumento da pobreza e das vulnerabilidades sociais, ecológicas e econômicas das populações locais. Por estas razões, as questões florestais tornaram-se cada vez mais relevantes em um conjunto complexo de debates sobre governança ambiental nos âmbitos internacional, nacional e local.

O Manejo Florestal Sustentável (MFS) é um dos conceitos centrais nos debates internacionais sobre governança florestal. O MFS é uma estratégia que visa o uso dos recursos florestais de forma a manter os bens e serviços ecossistêmicos relacionados à floresta para uso atual e para as gerações futuras, apoiando assim a conservação da floresta através do princípio do uso sustentável. No entanto, a “viagem” que o conceito de MFS realiza desde debates e arenas de governança internacionais até a sua implementação local envolve várias traduções institucionais que resultam em diferentes resultados locais. Esta tese investiga como as instituições relacionadas ao MFS - regras, normas e crenças - são traduzidas a partir das políticas internacionais, para políticas e estruturas de governança nacionais e subnacionais, até a sua implementação em uma localidade específica. Para isso, a presente tese define traduções institucionais do MFS como processos através dos quais as instituições são reformuladas por atores em diferentes níveis de governança e configurações sócio-ecológicas até sua implementação local. A análise das traduções institucionais é usada para explorar a relação global-local do MFS, incluindo interações verticais entre diferentes níveis de governança e interações horizontais entre atores, discursos, políticas, sistemas sócio-ecológicos e práticas.

Para explorar a relação global-local do MFS, a pesquisa é baseada em uma abordagem qualitativa, incluindo um estudo de caso composto por diferentes níveis de análise relacionados entre si e baseado em entrevistas com 45 atores-chave, 9 visitas ao local e uma extensa revisão documental de documentos relevantes. O estudo de caso composto por diferentes níveis de análise das traduções institucionais relacionadas ao MFS inclui o Brasil e o bioma Caatinga, um dos seis biomas brasileiros. O Brasil ocupa o segundo lugar em termos de cobertura florestal total no

mundo, sendo o país com a maior cobertura de florestas tropicais. No entanto, entre os vários tipos de florestas tropicais, a maioria das pesquisas até agora se concentrou nas florestas tropicais úmidas, como a Amazônia. O bioma Caatinga, uma floresta tropical seca, geralmente não é foco de pesquisas e políticas que discutem estratégias para combater o desmatamento no Brasil, embora represente uma das florestas tropicais secas com maior índice de biodiversidade do mundo, aonde vivem a maior parte da população mais pobre do país. A Caatinga está localizada na região mais vulnerável à desertificação no país, um problema de potencial impacto pois os meios de subsistência da população local são baseados principalmente no uso de recursos naturais, incluindo lenha e carvão para geração de energia, pastagens naturais para criação de animais e produtos florestais não madeireiros (PFNMs).

A presente tese investiga como múltiplos atores de organizações governamentais e não-governamentais, incluindo a sociedade civil, a indústria e empresas privadas, traduzem instituições relacionadas ao MFS em diferentes níveis de governança, e explora como essas traduções ocorrem especificamente no bioma Caatinga. O principal objetivo desta tese é, portanto, explorar como o MFS é traduzido dentro do contexto global-local da governança florestal. Para isso, a tese é estruturada nas respostas de três sub-questões:

(a) Como o Manejo Florestal Sustentável é traduzido da governança florestal global para o nível brasileiro de governança florestal?

(b) Como o Manejo Florestal Sustentável é traduzido no cenário sócio-ecológico do bioma Caatinga no Brasil?

(c) Como os atores locais do bioma Caatinga traduzem o Manejo Florestal Sustentável em suas práticas sociais?

No capítulo 2 a tese descreve primeiramente os antecedentes da análise, comparando especificamente os arranjos institucionais do MFS na arena internacional e no contexto da governança florestal brasileira, com foco no bioma Caatinga. O capítulo conclui que a maior parte da convergência entre os níveis internacional e brasileiro pode ser encontrada em instrumentos de política juridicamente vinculativos, especificamente no que diz respeito às convenções internacionais resultantes da Conferência das Nações Unidas para o Meio Ambiente e Desenvolvimento realizada no Rio de Janeiro em 1992 (UNFCCC, CBD e UNCCD). Embora a complexidade da governança florestal global também seja encontrada no contexto político da Caatinga, essas complexidades diferem em sua origem e qualidade. Na Caatinga, as especificidades do contexto sócio-ecológico compõem a principal contribuição para tal complexidade, enquanto no nível global essa complexidade está mais diretamente relacionada às diferentes relações entre países e à pluralidade de instrumentos políticos. A comparação entre os arranjos institucionais do MFS nos níveis global e brasileiro indica que a compreensão de como as instituições são adaptadas, modificadas e integradas pelos atores em tais níveis de governança é um primeiro passo a ser dado para explorar o contexto global-local do MFS.

No capítulo 3, a tese investiga como as instituições relacionadas ao MFS são traduzidas do nível internacional para o nível doméstico de governança no Brasil. A análise se concentra especificamente em como regras e normas internacionais, discursos, mercados e acesso direto à formulação de políticas públicas influenciam as traduções institucionais do MFS dentro do contexto doméstico brasileiro. Este capítulo também demonstra que as políticas públicas nacionais que estão diretamente ligadas às convenções internacionais das quais o Brasil é signatário, trazem as influências mais evidentes das arenas internacionais nas traduções do MFS na esfera doméstica. O capítulo ilustra como os discursos internacionais interagem com os interesses domésticos preexistentes, resultando em uma influência menos direta dessas arenas internacionais nos marcos políticos nacionais do país. O capítulo conclui que a influência internacional nas traduções institucionais relacionadas ao MFS é diferente para cada um dos cenários sócio-ecológicos dos biomas brasileiros. Assim, as estruturas de políticas públicas domésticas e as especificidades de diferentes configurações sócio-ecológicas moldam de maneira evidente a maneira em que as influências internacionais afetam as traduções institucionais do MFS no Brasil.

O Capítulo 4 analisa as traduções institucionais do MFS no contexto específico do bioma Caatinga, no Brasil. A análise explora como as interações entre os atores, os recursos utilizados e os subsistemas de governança moldam as traduções institucionais relacionadas ao MFS nesse bioma. O capítulo elucida que as instituições técnico-burocráticas do MFS na Caatinga são focadas principalmente em uma abordagem técnica para o manejo florestal que prioriza a produção de lenha e carvão vegetal. Como resultado, essas instituições relacionadas ao MFS não conseguem atender outras necessidades e interesses das comunidades locais que dependem dos recursos florestais para sua subsistência. Isso é explicado pelo fato de que as instituições socialmente incorporadas têm menos influência nas traduções institucionais do MFS na Caatinga quando comparadas com a influência das instituições formais-burocráticas. Consequentemente, as práticas locais de uso e manejo florestal não são parte integrante das estratégias do MFS no bioma, afetando negativamente a aceitação do MFS pelas comunidades locais.

O Capítulo 5 explora como os atores locais rejeitam, adaptam e integram o “pacote” institucional relacionado ao MFS através de processos institucionais de bricolagem. Primeiro, o capítulo ilustra como a rejeição por atores locais das instituições ligadas ao MFS se deve à falta de consideração das necessidades, particularmente das comunidades locais, e das dificuldades compartilhadas por mais atores no acesso à burocracia e serviços técnicos exigidos pelos regulamentos do MFS. Em segundo lugar, o capítulo mostra que, por um lado, os processos de bricolagem institucional que acontecem na escala local da governança podem reforçar a dinâmica que fortalece a exclusão de grupos socialmente vulneráveis. Por outro lado, a análise mostra que o MFS também pode ser implementado com sucesso quando por meio de arranjos que incluem múltiplos grupos de atores locais. O capítulo conclui com a constatação de que as traduções institucionais no nível local de governança não

envolvem apenas comunidades locais, mas também diferentes grupos de atores que fazem parte deste contexto, como técnicos, consumidores e atravessadores.

Os resultados gerais desta tese demonstram que além da dinâmica vertical entre os níveis político-administrativos, as interações horizontais no contexto global-local são altamente relevantes para a compreensão de como as instituições relacionadas ao MFS são traduzidas no contexto da governança florestal brasileira. Por exemplo, o setor do agronegócio tem uma influência histórica muito maior do que as coalizões de atores que apoiam a conservação florestal e o uso sustentável das florestas em traduções institucionais ligadas ao MFS no nível doméstico de governança. Além disso, em um país como o Brasil, que abriga múltiplos biomas, os diferentes valores que são dados aos recursos florestais em várias regiões são fatores-chave que moldam as traduções institucionais ligadas ao MFS. Portanto, estudar as interações entre os atores, o uso de recursos e os sistemas de governança dentro desses diferentes contextos sócio-ecológicos é essencial para entender como as instituições ligadas ao MFS são traduzidas de maneira diferente no território nacional. A tese também demonstra que as traduções de instituições ligadas ao MFS são relacionadas à consideração (ou falta de) das necessidades e interesses de múltiplos atores dentro de contextos de governança específicos. Finalmente, os resultados desta tese demonstram que diferentes grupos de atores locais, isolados ou em conjunto, rejeitam, adaptam e/ou integram as instituições ligadas ao MFS através de suas práticas locais a fim de lidar com os desafios de implementação do MFS. Portanto, o contexto global-local do MFS incorpora um conjunto complexo de interações verticais e horizontais entre os atores, os recursos florestais e os sistemas de governança. Dentro dessa complexidade, uma maior sensibilidade ao uso sustentável em múltiplos níveis de governança - não apenas o global ou o local - é necessária para melhorar o papel de “guardião” das comunidades locais na conservação dos recursos florestais.

## ABOUT THE AUTHOR

Joana Faggin was born in São Paulo (Brazil) on 25th April 1979. She obtained her bachelor in Agriculture Engineering and a Science degree in Agriculture in 2003 at the University of São Paulo. After that, she started her professional career through projects from NGOs supporting rural development of local communities in rural settlements in Paraná. She then moved to the governmental initiative to implement the National Agrarian Reform Plan, working in the Ministry for Agrarian Development and focusing on social-ecological technical services in rural settlements in the state of São Paulo. These professional experiences led her to pursue a Master degree on Sustainable Development and Public Policies, which she obtained in 2009 at the Centre for Sustainable Development of the University of Brasília. Her Master thesis focused on participatory processes in the implementation of environmental rural settlements in the state of São Paulo. After that, she moved to Belém in the Pará state and started to work as a coordinator of participatory methodologies in a NGO that focuses on supporting local communities in Amazon, including indigenous populations and quilombolas, communities originated by groups of slaves and linked to the African-Brazilian identity. Also in Amazon, she carried out a consultancy for the participatory planning of action inside the project “Sustainable Development of BR 163”, a partnership between the United Nations Food and Agriculture Organisation and the Brazilian Ministry of the Environment. She then moved to Brasília and started to work in the Brazilian Forest Service supporting the Federal Program of Community-based Forest Management and initiatives for the provision of public technical assistance for forest management in natural reserves and rural settlements in the national territory. At this time, she started to be interested in the particular social-ecological context of Caatinga biome, in the semiarid region of northeastern Brazil. This last professional experience resulted in the intention to develop a PhD research focused on the global-local nexus of Sustainable Forest Management investigating how its conceptualization travels from the international to the Brazilian level of governance until its implementation on the ground. After the PhD she plans to continue her professional path by focusing on initiatives that support forest and environmental management and conservation by local communities.



# Joana Mattei Faggin



Wageningen School  
of Social Sciences

## Wageningen School of Social Sciences (WASS) Completed Training and Supervision Plan

Name of the learning activity	Department/Institute	Year	ECTS*
<b>A) Project related competences</b>			
Practices, power, and knowledge in participatory forest management	Forest and Nature Conservation Forest Group – FNP/WUR and Getúlio Vargas Foundation – FGV (Brazil), Rio de Janeiro, Brazil	2012	3.0
Managing Sustainable Forest Landscape	VIKKI Tropical Resource Institute, Helsinki University, Finland	2015	6.0
Socio-environmental changes in Latin America: power, participation, and governance	Centre for Latin American Research and Documentation (CEDLA), Amsterdam, The Netherlands	2015	6.0
Foundation of Public Governance by Prof. Guy Peters, Pittsburgh University	Public Administration and Policy Group (PAP), WUR	2016	0.5
Writing Workshop	Wageningen Centre of Sustainability Governance (WCSG, WUR)	2017	0.5
Writing Workshop	WCSG/WUR and Human Geography Group (GEO), WUR	2018	1.0
<b>B) General research related competences</b>			
Global certifying partnerships and development: A discussion about ways of knowing	International Centre for Integrated Assessment and Sustainable Development (ICIS), Maastricht University	2014	1.0
Participatory Knowledge Development	ICIS, Maastricht University	2014	1.0
Humans, Animals and Nature: A Sustainable Relationship?	ICIS, Maastricht University	2015	1.0
Introduction course	WASS	2016	1.0
<i>'Translations of Sustainable Forest Management in Caatinga biome, Brazil: An institutional analysis across different scales of governance'</i>	FLARE Annual Meeting (Forests & Livelihoods: Assessment, Research, and Engagement), Edinburgh, Scotland	2016	1.0
<i>'Translations of Sustainable Forest Management in Caatinga biome, Brazil: an institutional analysis'</i>	WASS PhD Day – WASS/WUR	2017	1.0
<i>'Sustainable Forest Management translations in a global-local nexus: an institutional analysis in Caatinga biome, Brazil'</i>	IUFRO 125 <sup>th</sup> Anniversary Congress (International Union of Forest Research Organisations), Freiburg, Germany	2017	1.0
<i>'Institutional bricolage of SFM implemented in rural settlements in Caatinga biome, Brazil'</i>	Second International Forest Policy Meeting, Wageningen, The Netherlands	2018	1.0
<b>C) Career related competences/personal development</b>			
Self-management for PhDs	Maastricht University	2014	1.0
Time management for PhDs	Maastricht University	2015	0.5
Presentation skills for PhDs	Maastricht University	2015	0.5
The essentials of Scientific Writing and Presentation	Wageningen Graduate Schools (WGS)	2016	1.2
Scientific Writing	WGS	2016	1.8
Qualitative Data Analysis	WASS	2017	2.5
<b>Total</b>			<b>32.5</b>

\*One credit according to ECTS is on average equivalent to 28 hours of study load

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**COVER DESIGN AND LAYOUT**

Dora Faggin

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**PHOTOS**

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