



The impacts of forest certification for Chilean forestry businesses

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ABSTRACT

Forest certification, under both the Forest Stewardship Council (FSC) and the PEFC-endorsed Chilean CERTFOR schemes, has been widely adopted in both the native and plantation forestry sectors in Chile. This study of the impacts of forest certification on Chilean forestry businesses is based in-depth interviews with 72 actors representing a diversity of roles and perspectives in the Chilean forestry sector.

The impacts of certification have been greatest in the plantation forestry sector, and for larger businesses. These impacts include the cessation of deforestation for plantation establishment, rehabilitation of natural ecosystems, greater benefits to local communities, and the development of a positive dialogue between forestry businesses and their stakeholders. However, certification has not resolved some long-standing conflicts between forestry businesses and other actors, notably in relation to Indigenous peoples' land claims and workers' rights.

Both certification schemes in Chile have promoted legal compliance; FSC certification is encouraging improvements beyond legal compliance, and deepening the changes initiated by CERTFOR. The results illustrate how certification can contribute to effective hybrid governance regimes, but also of the limits of certification in addressing deeply-entrenched social conflicts. Nevertheless, the impacts of certification for Chilean forestry businesses and their stakeholders have largely been positive.

1. Introduction

The scale and adverse impacts of unsustainable forest management in the second half of the 20th Century prompted many governance responses at a range of scales, from international to local (Lister, 2011; McDermott et al., 2010; Humphreys, 2014). Since the mid-1980s, promoting sustainable forest management (SFM) has been a central concern of forest governance globally. SFM aims to enhance and balance the environmental, social and economic values of all types of forests (see definition in UN, 2007). However, the lack of progress in developing credible international intergovernmental arrangements to address deforestation and forest degradation (Humphreys, 2014), and the limited progress at national and subnational levels in many countries (e.g. McDermott et al., 2010), have catalyzed the emergence of forest certification, a form of “private” or “non-state”, “market-based” governance (Auld et al., 2008; Auld, 2014; Cashore et al., 2006).

Since forest certification was initiated by the Forest Stewardship Council (FSC) in 1995, certification has both diversified – as other actors initiated a number of competing forest certification schemes (Lister, 2011) – and expanded, to now encompass some 500 million ha of forests globally (FSC, 2017; PEFC, 2017), around a third of the

world's production forests (Auld, 2014). While natural tropical forests were the initial focus of forest certification, forests in all geographic regions, and both natural (syn. native) and plantation forests, are now the subject of certification (FSC 2016, Auld, 2014, Cubbage et al., 2010, Mikulková et al., 2015).

As the scale and significance of certification as a forest governance mechanism has increased, so too has interest in the impacts of certification (e.g. Gale, 2014; Lewis and Davis, 2015; Miteva et al., 2015; Poynton, 2015). However, as many of these authors note, our knowledge and understanding of forest certification impacts are limited, and the majority of studies to date have focused on the impact of certification in natural forest management. This study investigates the impacts of certification in both the native and plantation forestry sectors in Chile.

We first review what has been reported by other studies about the impacts of certification, and describe our research framework and methods. We then present our findings from applying this framework to the Chilean forestry sector, and discuss our results and their implications.

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2. Forest certification impacts

Studies of the impacts of forest certification have been conducted both at the operational level (e.g. Cabbage et al., 2010; Miteva et al., 2015) and on broader forest governance (e.g. Auld, 2014; Gale, 2014). At the operational (often Forest Management Unit – FMU) level, most studies have followed the characterisation of authors such as Cashore et al. (2006), and focused on economic, environmental and social dimensions of sustainability as the basis for analysis.

At the FMU level, there is considerable evidence that certification has often had positive environmental impacts, for example in terms of biodiversity conservation (Dias et al., 2013) and ecological values more generally through use of lower-impact harvesting methods (Lidestav and Lejon, 2011). Conversely, others criticize certification standards as inadequate to protect environmental values (Poynton, 2015), or as being relatively ineffective (Blackman et al., 2014). Others (e.g. Auld et al., 2008) have noted that the scope of certification is limited to certified forests, and so does not address the major environmental issue of deforestation.

There is no clear consensus about the social impacts of certification. In some cases certification has realized positive impacts for forestry workers and local communities. For example, Cashore et al. (2006) reported improvements in working conditions of forestry workers across regions and countries, and Dare and Schirmer (2011) and Tsanga et al. (2014) reported how certification had improved the relationship between firms and Indigenous communities in Australia and Cameroon, respectively. Conversely, McCarthy's (2012) review found that certification has not reduced conflicts between firms and Indigenous peoples, or that they had been only partially addressed (Teitelbaum and Wyatt, 2013). Others have found that certification addressed the power imbalance between firms and their stakeholders (Cashore et al., 2006), increased the participation of local communities, and fostered better dialogue between different actors in forest governance (Ulybina and Fennell, 2013). Other studies have identified structural limitations in how certification addresses community concerns (Boström, 2012), the poor quality of certification assessments (Malets, 2015), and concerns about inequitable outcomes amongst stakeholders (Pinto and McDermott, 2013, Moog et al., 2015).

Certification has influenced the economic performance of forestry businesses in various ways and to varying degrees. For instance, impacts such as improved access to environmentally sensitive markets, premium prices for certified timber, and increased costs of production have been reported in some cases (Lidestav and Lejon, 2011), but not in others (Toppinen et al., 2013). Certification does, however, appear to have led to greater transparency in the supply chain (Cashore et al., 2006). One of the most common concerns about the economic impact of certification remains its disproportionate cost to smaller-scale forest owners and businesses (Poynton, 2015).

Overall, Auld's (2014: 250) observation that “while certification programs have made laudable progress, they face an ongoing struggle to bring on board more participants and adapt to the ever-changing perceptions of environmental and social challenges” seems an appropriate synopsis of the operational impacts of forest certification.

Studies of certification more concerned with its impacts on forest governance have explored the dynamic between state and private governance mechanisms, and the role of certification as an example of a “new” form of environmental governance (sensu Tollefson et al., 2012). In this context, Burns et al. (2016) discuss the interplay between state and non-state actors in the adoption of certification in Argentina, in which the former played a decisive role, and argue that this is a more general phenomenon. Auld et al. (2008) note that there are both positive and unintended consequences of certification for forest governance, and a range of spillover and longer-term effects.

The results of this study both echo and inform many of these general conclusions drawn by previous work. They also complement those previously reported for Chile, notably by Cabbage et al. (2010),

Masiero et al. (2015) and Heilmayr and Lambin (2016). The contributions of this study are principally in its comprehensiveness – encompassing both natural and plantation forestry sectors, and large and small forestry businesses – and its use of a mixed methodology framework. The study took advantage of the unique trajectory of certification adoption in Chile, in which some businesses adopted different schemes sequentially; the framework provided a structure for the evaluation of certification impacts through comparison of businesses that were not certified and those that were certified under one or both certification schemes.

3. Research context, framework and methods

3.1. Research context

Few studies of certification impacts have been able to take a comprehensive approach, addressing each of environmental, social, and economic impacts; or employ a research design that allows investigation of the ways in which different types of forestry businesses in an otherwise similar operating environment have responded to competing certification schemes. The specific forms of forestry in Chile, and the particular history of forest certification there, suggest Chile as a case study from which to address these limitations.

Chile has a large area of temperate natural forests, some of which is managed for production; a well-developed export-oriented plantation forestry industry; significant environmental and social issues in the forestry sector; and a large area of both native and plantation forests certified under one or both of two schemes, the Forest Stewardship Council (FSC) and the Chilean Forest Certification Scheme (CERTFOR), a PEFC-endorsed scheme.

Hence, this research was able to investigate the impacts of certification in different forest types, i.e. natural and plantation forests; in different scales of operation, i.e. small to large; and in terms of other characteristics (e.g. geographic region, market orientation, business structure, and level of professionalization; as grouped in Table 3). It was also able to take advantage of the particular history of forest certification in Chile (Table 1), which is that most large plantation companies now hold dual certification, under the CERTFOR and FSC schemes, as a consequence of them first adopting the former, and then the latter, scheme. This pattern of adoption allows comparison of the impacts of the two schemes.

3.2. Research frameworks

The research draws firstly from the framework developed by Tikina and Innes (2008) for assessing the effectiveness of forest certification (Table 2). This framework identifies a number of criteria for effectiveness, viz. in terms of problem solving and goal attainment; and each of process, behavioral and constitutive effectiveness. We did not seek to use the framework to assess “effectiveness” in their terms, but rather to provide a structure (Table 2) for assessing certification impacts. In this study, we did not seek to investigate constitutive effectiveness directly.

3.3. Research design

The research design was informed by the counterfactual approach (Blackman and Naranjo, 2012), which seeks to avoid selection bias, i.e. the risk of overestimating the changes due to certification when selecting only the best performers. Although the study could not implement a counterfactual approach, the research design was based on investigation of a set of reasonably similar “matched groups” of certified and non-certified forestry businesses, and of FSC-certified and CERTFOR-certified businesses; a total of 19 businesses comprised the sample (Table 3). These groups were similar in terms of the common characteristics shown in Table 3, but differed in their adoption of certification. This design was complemented by use of a *before-after*

Table 1
Précis of the evolution of forest certification in Chile.

Time period	Event/activity	Outcomes	Consequences
1995–1999	First FSC approaches to the Chilean forest industry	Better understanding of SFM principles amongst different actors in forest governance	1. Forest certification awareness amongst some forest owners 2. Increasing domestic and international NGO concern about the future of Chilean temperate native forests
1999–2003	International NGO campaigns against the Chilean forest industry	Early adoption of FSC scheme by two plantation forestry businesses	1. The FSC faced strong opposition from the large-scale plantation forest industry 2. The large-scale plantation forest industry is pressured by the NGO Forest Ethics to adopt the FSC, otherwise their products would face boycotts
2002	Creation of CERTFOR	CERTFOR is created by the large-scale forest industry, supported by some Chilean state agencies	1. Most large-scale plantation forestry businesses adopt CERTFOR
2007–2009	Increasing international market pressure to adopt the FSC	1. FSC scheme introduced in some native forestry businesses 2. Adoption of the FSC by the large-scale forest industry	1. The area of certified native forests nevertheless remains small. 2. Participation of the large-scale plantation forest industry in the FSC governance perceived to cause power imbalance amongst the three FSC chambers

Source: authors' interviews and literature review.

Table 2
Conceptual framework and its application to this research.

Effectiveness framework (Tikina and Innes, 2008)		Sources of data/evidence
Dimensions	Description	
(1) Problem solving	Sustainability problems solved by certification	<ul style="list-style-type: none"> ● In-depth interviews ● Audit reports ● Document analysis ● Field-based evidence
(2) Goal attainment	Degree of compliance with certification goals (certification drivers)	<ul style="list-style-type: none"> ● In-depth interviews ● Audit reports
(3) Behavioral effectiveness	Change in companies' behavior due to certification	<ul style="list-style-type: none"> ● In-depth interviews ● Audit reports ● Field-based evidence
(4) Process effectiveness	Attitudes of key actors in forest governance towards particular certification schemes	<ul style="list-style-type: none"> ● In-depth interviews ● Document analysis
(5) Constitutive effectiveness	Attitudes of the public towards certification schemes	<ul style="list-style-type: none"> ● Public not surveyed in this study; some evidence from retailers and media sources

approach (Romero et al., 2013), which was relevant to investigating the impacts associated with businesses adopting certification and different certification schemes sequentially: thus, the nature of certification adoption in Chile (Table 1) allowed a comparison over time, from 2004 to 2014, as organizations moved from (a) certified to non-certified, and (b) CERTFOR to FSC-certified, status.

The geographic scope of the research was limited to six southern Chilean regions where forestry and forests are most significant, viz. El Maule, Biobío, La Araucanía, Los Ríos, Los Lagos and Magallanes regions. The 19 forestry businesses sampled (Table 3) comprised small, medium-sized and large organizations in both native and plantation forestry sectors. The plantation forestry businesses (PFBs) included in the sample represented about 80% of the FSC certified area (c. 2.3 million ha) and 90% of the CERTFOR certified area (c. 1.9 million ha) in Chile. Most PFBs had a mix of exotic tree plantations of *Eucalyptus* sp. and *Pinus radiata*. Native forestry businesses (NFBs), in contrast, had a more diverse mix of *Nothofagus* species (mostly in small and medium businesses) and lenga forests (*Nothofagus pumilio*) in larger firms.

3.4. Research methods

The research used qualitative methods to collect and analyze the data following Layder's (1998) adaptive approach. The first author

conducted in-depth interviews between March 2013 and March 2014 with 72 actors representing a diversity of roles in and perspectives on the forestry sector, using a semi-structured questionnaire and following an approved protocol.¹ The interviewees represented a diverse range of informants, including both industry representatives and their stakeholders (see Table 4). Interviews covered a comprehensive range of environmental, social, economic, and governance issues potentially impacted by certification.

These primary data were complemented by analysis of available FSC and CERTFOR audit reports for the certified businesses, with a focus (following Blackman et al., 2014 and Romero et al., 2013) on the Corrective Action Requests (CARs) issued by certification auditors after their initial assessments (see FSC, 2015; CertforChile, 2015); and of government documents, public statistics, reports, and media information, and triangulation across these sources, with informants, and with some field visits. Secondary sources from audit reports – mostly CARs – were collated for each of three time periods, reflecting the phases of certification adoption in Chile: 2004–2008 (after CERTFOR creation), 2009–2011 (after large PFBs adopted the FSC), and 2012–2014 (after maturation of both schemes). In each of these phases, CARs were grouped by environmental issues (themes including: biodiversity; conservation status of species and forests; forest management; riparian zones management; soils and water management), social issues (themes including: workers' safety, training and living conditions; and relationship with local communities) and economic/legal issues (themes including profitability; land tenure; and compliance with laws and regulations).

Interviews transcripts were coded by using the QSR NVIVO computer software, and resultant data analyzed employing thematic networks (Attride-Stirling, 2001) to identify the principal themes at different levels of abstraction, and using comparative methods (Hopkin, 2010) to investigate the reasons for differences between otherwise similar cases.

4. Results

4.1. Case study business characteristics

All large Chilean plantation forestry firms are certified. However, comparisons were possible only between dual-certified firms, both FSC and CERTFOR, and a CERTFOR-only certified firm. The *before-after* approach complemented those comparisons. In contrast, certified NFBs represented < 15% of the certified area of the country, with large firms having the largest native certified area. NFBs were certified under the

¹ Australian National University Human Ethics Protocol No 2012/250

Table 3
Matched-groups sampling design used in the study.

Business scale	Comparison		Common characteristics of 'matched groups'
	Number of organizations		
	Certified	Non-certified	
Large native forestry businesses	2 ^b	1	<i>Nothofagus pumilio</i> forests located in the far southern Magallanes region; between 10,000–50,000 ha; > 50 forestry workers; less sophisticated forestry machinery than plantation forestry; domestic and modest international market access; entire native sector 2017 annual sales c. US\$ 3,500,000
Small and medium-sized plantation forestry businesses	4 ^a	3	Eucalypt and pine species; ≤ 2000 ha of plantation forests located across El Maule, Biobío, La Araucanía and Los Ríos southern regions; agroforestry businesses were common; international and domestic market access; < 50 forestry workers; sophisticated forestry machinery and outsourcing of forest operations; annual sales < US\$ 4,000,000 each organization
Small and medium-sized native forestry businesses	1 ^b	4	Mix of <i>Nothofagus</i> species; < 10,000 ha of native forests located across La Araucanía, Los Ríos and Los Lagos southern regions (usually c. 100–200 ha); usually small owners who were also farmers; only domestic market access; usually < 10–15 forestry workers; entire native sector 2017 annual sales c. US\$ 3,500,000
Large plantation forestry businesses	3	1	Eucalypt and pine species; over 80,000 ha of forest estates located across El Maule, Biobío, La Araucanía and Los Ríos southern regions (usually between 500,000 to 1000,000 ha); international and domestic market access; sophisticated forestry machinery; typically complex multinational corporations with over 14,000 workers each; outsourcing of forest operations; annual sales > US\$ 4,000,000 per organization
		Number of organizations Double certification (FSC & CERTFOR)	CERTFOR certified

^a Only one organization had double certification.

^b FSC-certified only.

Table 4
Summary of interviewees by category.

Type of informant	Number of interviewees
PFBs: forest owners and industry officers	18
NFBs: forest owners and industry officers	10
Members of forestry associations	3
Forestry contractors	4
Forestry workers	2
Union representatives	4
Non-indigenous community members	2
Indigenous community members	4
NGO members	7
Forestry authorities	8
Labor authorities	2
Researchers and forest consultants	5
Executives of forestry standard associations	3

FSC scheme only.

The case study organizations comprised small, medium and large forestry businesses. They were grouped into different categories following the “FSC Guide for standard setting according to the scale, intensity and risk” (see Table 5); this classification was generally paralleled by their level of sophistication, viz. staff, financial and technical resources.

Table 5
Classification of forestry business scale.

Category	Forest management unit area (ha)
Small scale	≤ 1000 ha (plantation and non-plantation forests)
Medium scale	Between small and medium scale
Large scale	> 80,000 ha (plantations) > 300,000 ha (non-plantation forests)

Source: FSC Guide for standard setting according to the scale, intensity and risk (FSC-GUI-60-002 V1-0 ES).

4.2. The Chilean forest industry prior to certification

Assessing the effectiveness of certification also required an assessment of whether the sustainability changes were due to certification or other causes. Hence, knowing the conditions prior to certification provided the researchers with an overview of the most significant environmental, social and economic issues faced by the Chilean forest industry in the last four decades (Table 6).

The case studies showed two different types of forest industries. On the one hand, PFBs are economically successful and export-oriented enterprises, particularly large corporations. Notwithstanding the significant improvements in environmental and social issues associated with their operations since the late 1990s, most of the environmental and social impacts are associated with large-scale forestry operations.

Conversely, NFBs have only modest economic performance. However, they (those with formalized, legal operations) have a comparatively better environmental performance than plantations. Socially, they had modest working conditions, but did not face significant conflicts with their workers and local communities.

4.3. Impacts of certification

This concerned the impacts of certification on Chilean forestry businesses. Impacts were realized on both processes and outcomes, viz. according to Tikina and Innes' (2008) framework (Table 2), in terms of behavioral effectiveness and of problem solving and goal attainment dimensions, respectively.

4.4. Certification impacts on plantation forestry businesses

Overall, in operational terms, certification yielded the most significant impacts in PFBs, particularly in large corporations. Certification had a significant impact on the environmental performance of PFBs. Table 7 shows a summary of those impacts.

Table 6
The main sustainability issues of the Chilean forest industry.

Plantation forestry businesses	
Environmental issues	<ul style="list-style-type: none"> ● Conversion of native forests to plantations ● Impact of extensive clear-cuts ● Pollution by chemicals (e.g. by aerial spraying)
Social issues	<ul style="list-style-type: none"> ● Forestry workers: poor working conditions (contractor firms and small forestry firms) anti-union practices (large PFBs), work overload (large firms), poor workers' training (all firms) and occupational health and safety (OHS) performance (small-medium PFBs) ● Local communities: land tenure conflicts with Indigenous peoples and poor benefits for communities (large PFBs)
Economic issues	<ul style="list-style-type: none"> ● Large-scale industry is economically successful; however, it monopolizes the supply chain at the detriment of smaller firms
Native forestry businesses	
Environmental issues	<ul style="list-style-type: none"> ● Certain level of pollution caused by forestry (large forest operations) ● Illegal/unsustainable logging (small-medium NFBs)
Social issues	<ul style="list-style-type: none"> ● Modest working conditions, poor OHS performance (small-medium NFBs)
Economic issues	<ul style="list-style-type: none"> ● Supply chain problems, low timber quality and modest prices

Source: first author's interviews and literature review.

4.5. Impacts on environmental issues

Most certified companies undertook a number of systematic, substantive and procedural measures to make their forest operations more environmentally sustainable. This influenced their processes. For instance; companies set measures to protect and enhance some environmental values. Thus, most industry and stakeholders respondents agreed that such measures made companies more aware of the environmental impact of their operations (e.g. by setting an improved planning of forest operations to protect soils, watercourses and riparian buffer zones); and encouraged companies to undertake new measures, such as identification and protection of high conservation value forests (HCVFs) and high conservation value areas (HCVAs). Illustrating other measures, an industry forest officer described:

“Now, with the FSC we realize that although we were technically able to harvest that amount [of forest hectares], the people did not want us to harvest more than 100 hectares. Therefore, we harvested 100 hectares. That was the change”.

(Interview with PFB-MB-p01)

These procedural and substantive measures led to some positive environmental outcomes, mainly for large operations. As evident from the quote above, the foremost were the substantial reduction of clear-cuts and ecological restoration plans to mitigate the environmental damage caused by firms during the late 1990s.

All our case studies show that certified large PFBs adopted, comparatively, more extensive and procedural changes to address their environmental problems than their smaller counterparts. Notwithstanding these differences, certification was found to have significantly reduced the environmental degradation, which was caused by forestry in both types of operations. However, the two forestry standards performed differently: for the most part the FSC deepened and drove most of the important changes in the plantation forest industry, in circumstances in which the greatest gaps in sustainability issues had been exposed.

The FSC not only deepened and drove most of the changes (many already initiated by CERTFOR), but also initiated some new ones too (e.g. restoration of converted native forests and reduction of clear-cuts) which went beyond legal compliance. Generally, the FSC encouraged companies to seek alternative solutions to address environmental

Table 7
The main certification impacts on the environmental and social performance of plantation forestry businesses.

Impacts on processes	
Setting of procedural/substantive environmental measures, to:	Social measures, such as:
<ul style="list-style-type: none"> ● Improve the planning of forest operations to protect soils, watercourses and riparian buffer zones ● Reduce slash-and-burn practices ● Improve the building standard of forest roads ● Control chemical pollution ● Prevent exotic trees invasion on natural areas ● Identify HCVAs and HCVFs ● Monitor and mitigate environmental impacts ● Enhance biodiversity values and the conservation status of flora and fauna species ● Improve staff's environmental training and awareness 	<ul style="list-style-type: none"> ● Procedures to enforce social and OHS laws ● Hiring of specialized staff to address community concerns (large PFBs) ● Implementation of consultation procedures concerning forest operations, HCVFs and HCVAs ● Setting of alternative approaches to settle land tenure disputes with Indigenous communities (large PFBs)
Impacts on outcomes	
Main environmental outcomes:	Main social outcomes:
<ul style="list-style-type: none"> ● Reduction of clear-cuts (large PFBs); use of “checker boarding” clear-cuts in smaller firms ● Restoration of converted native forests (large PFBs) ● Collaborative relationship with NGOs in environmental matters (large PFBs) ● Major openness and transparency concerning companies' environmental issues ● Environmental awareness in forestry workers, contractors and executives 	<ul style="list-style-type: none"> ● Improvement of some working conditions and social benefits (work shifts and holidays) (large PFBs) ● Certification used as a negotiation tool by unionists (large PFBs) ● Tangible benefits for local communities: water-supply catchments, impact mitigation of forest operations, firewood donation, authorization to collect non-timber forest products (NTFPs), mutually beneficial agreements (e.g. cattle grazing inside forestlands), and jobs ● Reduction of conflicts with Indigenous communities (large PFBs) ● Collaborative relationship between firms and NGOs (large PFBs) ● Certification had no significant effect in other cases: modest working conditions in contractor firms, little progress in OHS performance (small-medium PFBs), persistence of anti-union practices land tenure conflicts with Indigenous communities

Source: first author's interviews and audit reports (CAR analysis).

Table 8

The main certification impacts on the environmental and social performance of native forestry businesses.

Impacts on processes	
Setting of procedural and substantive environmental measures, to: <ul style="list-style-type: none"> ● Improve road planning and reduce skid trails extension ● Document and systematize forestry practices ● Perform sustainable logging techniques ● Manage chemical products/toxic waste properly ● Protect biodiversity/control poaching ● Reduce the frequency of forest operations during wet seasons ● To protect watercourses and wetlands ● Identify/protect HCVAs and HCVPs 	Social measures, such as: <ul style="list-style-type: none"> ● Procedures to enforce social laws and improve OHS training ● Procedures and records to formalize the relationship with local ● Communities ● Implementation of consultation ● Procedures concerning HCVAs
Impacts on outcomes	
Main environmental outcomes: <ul style="list-style-type: none"> ● Environmental awareness in forestry workers, contractors and forest managers and owners 	Main social outcomes: <ul style="list-style-type: none"> ● Improvement of working conditions and social benefits (work shifts, wages and proper holidays) in some large firms ● Better job stability in some large firms ● Greater OHS awareness in forestry workers – but not necessarily better ● OHS performance (small firms) ● No change in the already collaborative relationship with local communities

Source: first author's interviews and audit reports (CAR analysis).

problems and; as many respondents both from the industry and NGOs noted, the FSC encouraged companies to take a more environmentally proactive role. For instance, some companies adopted stricter self-regulations to comply with the standard (e.g. prohibiting slash-and-burn practices and setting buffer zone widths based on scientific information).

4.6. Impacts on social issues

Socially, although certification did not solve all the problems with companies' stakeholders, in most cases certification was capable of improving the social performance of companies. Table 8 shows a summary of those changes.

Turning to workers' welfare, for the most part certification helped companies to ensure their compliance with OHS laws and working conditions. For example, one large firm provided additional social benefits (beyond legal compliance) such as better work shifts and holidays. However, certification did little to alleviate or diminish anti-union practices in most cases. As apparent from our interviews and audit reports, this was due to the relative immaturity of certification programs (particularly, the FSC, implemented in most cases only in the last six years). Yet, in the absence of certification, some working conditions would not have improved, as noted by this industry forest officer:

“...Today, forest camps have quite different conditions, like ‘mini’ hotels, satellite TV, obviously hot water, electricity and a phone signal (...) certification made us understand that all these things are interconnected: we want workers in better conditions and to get them in touch with their families, during the 10 days they are working [through a new shift system].”

(Interview with PFB-MB-q01).

Perhaps the most remarkable certification benefit was its contribution to improving the relationship between companies and stakeholders by implementing a number of procedural (e.g. consultation processes and social monitoring) and substantive measures (e.g. local labour hiring and control of logging trucks traffic) to mitigate the impact of their operations. As illustrated by this Indigenous representative:

“I've seen how some people from indigenous communities, despite the difficulties they have to get through [because of the impact of forest operations], appreciate the public consultation processes (...) I've never seen that before.”

(Interview with I-IX-02)

Although those changes mostly benefited Indigenous and non-Indigenous communities, firms and NGOs also benefited from a collaborative relationship in environmental and social matters. One industry forest officer, for example, commented how his company benefited their surrounding communities through rehabilitating and protecting water-supply catchments and this, in turn, benefited the company operations. However, in some areas of radicalized Indigenous conflicts, certification did little to solve long-standing land tenure conflicts, which prevented companies from performing their operations. Yet, overall, certification mostly had positive outcomes including tangible benefits to communities and increased community participation in forest management.

Again, the FSC deepened and drove most of the social changes initiated by certification. Therefore, both CERTFOR and the FSC initiated various important changes such as the improvement of working conditions and OHS issues, consultation processes with communities, mitigation measures for local communities and Indigenous peoples, and monitoring of social impacts. However, as many industry officers and their stakeholders admitted, the FSC deepened most of these changes, e.g. consultation processes with communities were not sufficiently deep, and social impacts were not thoroughly monitored, in CERTFOR-certified companies.

4.7. Impacts on economic issues

Economically, certification had two main impacts. The first impact, market access, was largely relational and conditional on the varying size of the company. As discussed previously, certification allowed all large companies to maintain their traditional access to environmentally sensitive overseas markets in the northern hemisphere. Conversely, small-medium PFBs gained access to markets that otherwise they would not be able to access without certification. In contrast, no Chilean company reported premium prices for selling certified timber (mainly pulpwood).

The second impact, increased costs due to certification, was particularly felt by large PFBs. Industry forest officers admitted that there were significant associated costs from modifying forest operations to meet the new certification requirements:

“...Today manual operations [using chainsaws operators and logging using oxen] are more expensive than mechanized ones: they are [US\$] 2 dollars more expensive per cubic metre. The 600 indigenous forestry workers we employ on manual operations are an extra cost of US\$ 5 million dollars a year”.

(Interview with PFB-MB-q01)

Such increased costs from modifying forest operations had to meet social (e.g. favouring manual operations and indigenous labour) and environmental certification requirements (e.g. rehabilitation of converted natural areas). In contrast, neither associated costs from modifying operations nor direct and indirect costs (from audit fees or audit costs) were reported by small-medium PFBs. But the circumstantial evidence suggests that small-medium PFBs businesses had avoided much of the direct and indirect certification costs by sharing them under the “group certification option” and by accessing certain governmental subsidies.

4.8. Certification impacts on native forestry businesses

The changes encouraged by certification (rather, the FSC) were generally less significant than in the case of PFBs. However, certification helped native forestry businesses to enforce their legal compliance.

4.9. Impacts on environmental issues

Overall, certification had a greater impact on the environmental issues of large forestry businesses than those of smaller firms. Large companies evidenced major changes in the protection of natural resources, the management of chemicals, their workers' environmental awareness and a better systematization of their operations.

The two certified large firms included in our sample made changes in forestry practices “with little effort” in the view of one government forest officer; which was consistent with some audit reports. Rather, large companies generally deepened or reinforced sustainable forestry guidelines as set in official forest management plans; making more substantial changes when setting measures to protect natural resources.

Likewise, the major contributions of the FSC in small-medium NFBs were in deepening their sustainable forestry practices and controlling pollution by properly managing chemicals and toxic waste. Therefore, certification also represented little change for small firms. As one forest manager illustrated:

“We met most of the stuff requested by the FSC, we did very little to certify our operations, excepting for more documentation.”

(Interview with B-XIV-01)

Most of the certification changes were limited to enforcing compliance with forestry and environmental laws (see Table 8). Only a few changes went beyond legal compliance, such as the identification of HCVAAs and HCVFs, some specific measures to protect biodiversity (e.g. prohibition of hunting and fishing) and to avoid pollution (e.g. procedures to manage chemicals and fuels).

Certification had the greatest impact on PFBs in large part because, compared with formalized NFBs, PFB operations had a much larger environmental impact, and so the gap between the former status quo and what needed to be done to achieve sustainability was therefore much greater.

4.10. Impacts on social issues

The major social contributions of certification in small and medium-sized NFBs were to improve their weaknesses in OHS related issues by setting procedural measures to address them. Some changes included the implementation of OHS procedures, hiring of a full time OHS expert (large firms), and OHS training provided to forestry workers. Yet the relative immaturity of certification programs may explain the poor OHS performance still found amongst small firms. In contrast, in large NFBs, such changes were deeper and more numerous, having more positive outcomes such as certification improving working conditions as well as OHS performance in certain firms. Table 8 shows a summary of those changes.

One forestry worker, from a large company, described the

contributions of certification to improve his company's OHS performance:

“It has changed [company's behaviour] because when someone needs to replace some Personal Protective Equipment (PPEs), it can be done straight away (...) If you spoil your PPEs you can replace them [without delay]. Now there is an OHS expert to do the training, and before certification, we never had that advice.”

(Interview with DW-XII-d01).

In relation to local communities, certification only formalized the already positive relationship between firms and their communities. Most, if not all, the organizations included in our sample had collaborative agreements with local communities to provide them firewood leftovers or local jobs as forest rangers and allow them to collect NTFPs.

4.11. Impacts on economic issues

In economic terms, certification did not provide their expected benefits in improved market access or premium prices. But it did impact differently depending on the business scale.

Certification did not make any difference to small-medium NFBs in relation to their economic performance: neither economic benefits (companies did not export despite their intentions of so doing in the future, envisaging potential revenues) nor handicaps (that is, major costs) were reported by certified firms. And again, the circumstantial evidence indicates that our sample of small organizations only adopted certification because a government agency subsidized their direct costs. Moreover, when checking the 2015 FSC website, one of those small-certified organizations had decided to not recertify their operations.

But, conversely, certification had a clear negative impact on the economic performance of large NFBs, as some companies reported significant associated costs from modifying their forest operations. As stated by one industry forest officer:

“It's [certification] been a greater cost because we have to leave productive forests without being harvested”

(Interview with NFB-XII-d01).

This was particularly detrimental during some wet season periods when the pressure to obtain economic returns left one company in relatively non-compliance with the FSC standard. However, another certified company sampled did not report increased associated costs, suggesting that certification may have a negative impact in companies' economic performance under certain conditions.

4.12. Impact on broader forest governance

Three major forms of impact on Chilean forest governance were evident from the results. Firstly, certification changed decision-making processes about forests, particularly for large PFBs. Although CERTFOR pioneered consultation processes with communities, the FSC certification deepened such processes and engaged communities and NGOs in developing shared sustainability goals. For example, large forestry businesses and Indigenous communities engaged in dialogue processes to define HCVFs and HCVAAs. As this NGO member observed:

“...To define the HCVFs and the HCVAAs, companies have had to identify their forests, cultural sites, and have a public consultation process including Indigenous communities”.

(Interview with N-RM-01)

Hence, certification altered the power balance between companies and their stakeholders, shifting from traditional “top-down” governance to more multicentric and “bottom-up” governance shared amongst diverse actors. Some of these are now embedded in a multistakeholder Chilean Forest Dialogue (Diálogo Nacional Forestal; see *Diálogo Forestal Chile*, 2017). At a local level, local communities and NGOs leveraged the planning of forest operations and of mitigation measures,

which had hitherto been led or undertaken only by companies, to advance their interests.

Secondly, certification has also influenced the role of the state in forest governance. Some government agencies intervened across the certification policy cycle by participating in the rule-making process of CERTFOR in the early 2000s. Other government agencies (notably the Forest Corporation, CONAF) encouraged the implementation of both forestry schemes by providing technical advice about certification and, more recently, CONAF promoted the FSC adoption by small forest owners by signing an agreement with FSC Chile. As one CONAF senior officer noted (interview with A-RM-01):

“We aspired to modify forestry legislation in such a way to tailor it to certification”.

State responses towards certification thus varied over time and between agencies, from simply observing and not obstructing its development to openly endorsing and promoting certification (interviews with A-IX-01, A-IX-02, A-X-01 and A-RM-01). These interactions between state agencies and certification in Chile are both similar to and different from those reported by Burns et al. (2016) for Argentina, as we discuss in the next section.

Thirdly, as noted in the previous sections, certification encouraged both legal compliance and improvements beyond compliance. For example, analysis of 2012–2014 audit reports led certification bodies to require native forestry businesses to address weaknesses in the compliance of their OHS program with OHS regulations, such as those for training and monitoring. In other cases, certification led large PFBs to go beyond legal compliance, such as in reducing the size of clear-cuts and improving consultation procedures with communities. These outcomes are consistent with those expected of ‘smart regulation’ (Gunningham, 2009; Gunningham and Sinclair, 2017).

Together, these outcomes demonstrate certification impacts in terms of the process effectiveness dimension of Tikina and Innes’ (2008) framework (Table 2).

5. Discussion

Our study offers new insights on the achievements and limitations of certification in emerging economies such as Chile. In general, our results are consistent with those of other studies (e.g. Reyes and Nelson, 2014; Andersson et al., 2016) on sustainability issues for Chile’s forest industry: in the plantation forestry sector, we find an economically successful export-oriented plantation forestry industry, but which is facing significant threats to its environmental and social sustainability. In contrast, as reported by Reyes and Nelson (2014), formal (syn. legal) natural forest businesses generated fewer environmental and social impacts than the plantation industry, but they have struggled instead with poor economic returns, modest working conditions and low timber yields due to extensive degradation by unsustainable logging in past decades. Our research does not account for the environmental and social impacts of informal native forest operations, of which very little is yet known.

Overall, our findings indicate that certification had a much greater impact on performance of large plantation forestry businesses, which have a much larger operational footprint than small-medium plantation forestry businesses and the native forest industry. This is important for two reasons. First, although certification may have a selection bias towards large firms (the best performers; see Cashore and Auld, 2012), in the Chilean context, where plantation forestlands are highly concentrated in only a few firms, large firms reaped most of the benefits of certification. This might be a consequence of poorly enforced forestry regulations (as observed by many interviewees) and the extensive area of these forest estates. Second, it is likely that much of the future potential impact of certification may lie in the more numerous small and/or informal forest operations (the worst performers), which may have a greater impact on a per hectare basis – particularly in environmental

terms – albeit over a smaller area. Further research on small-scale forestry in both sectors is needed to understand the potential of certification to address these impacts.

Many of the positive environmental and social changes encouraged by certification – particularly the FSC – went beyond legal compliance in matters where Chilean legislation is not prescriptive (e.g. reduction of clear-cuts areas, ecosystem rehabilitation, and reduction of conflicts with communities), in order to achieve social license to operate. This provides a forest sector example of the aspirations for ‘smart regulation’ (Gunningham and Sinclair, 2017). Our research did not explore the equity dimensions of certification (e.g. Pinto and McDermott, 2013); this is a topic warranting further research.

The Chilean cases showed that some elements of the success of certification are founded on pre-existing regulatory requirements (e.g. buffer zone widths and ecosystem protection), which certification “enforces” through its own mechanisms. This result illustrates the complementary role of certification in a context in which state regulation was ineffective in enforcing environmental requirements, and provides a positive example of the situation that Gale and Haward (2011) describe as “hybrid governance”, in which states, markets and civil society share forest governance. In these terms, the Chilean case contrasts with Malets’ (2015) findings for Russia where FSC certification was in contradiction with state regulations, limiting the effectiveness of certification.

Economically, there were increased costs associated with certification. However, the access gained or sustained by plantation forestry businesses to international markets seemed to counteract any increase in their costs. Conversely, some large native forestry businesses did not benefit from better market access. Given the uncertain economic benefits, it is unlikely that firms that are not currently certified will seek certification for economic reasons.

Our results both support the general conclusions that Burns et al. (2016: 27) drew for “decisive and active role” of state agencies in the adoption of forest certification in Argentina, and illustrate the nuances of how this role may play out. In both countries, state agencies played a key facilitating role in the development of certification – in the Argentinian case, in association with FSC (Burns et al., 2016), and in the Chilean case in association with the FSC-competitor CERTFOR. Whereas in Argentina the coalition of support – including that of state agencies – for FSC ebbed away over time, in favor of the PEFC-endorsed CERFOAR (Burns et al., 2016), the reverse occurred in Chile, even for small-scale forest owners, whose participation in FSC certification has been facilitated by the state agency CONAF, in parallel with continuing state support for the PEFC-endorsed CERTFOR scheme. Together, the results from these neighboring countries demonstrate both the significance of the role of the state in the private governance initiatives, and its context specificity.

6. Conclusions

This research shows that Chilean forestry businesses were motivated to adopt certification for similar reasons to businesses elsewhere; and that certification is making a substantial difference to plantation and native forestry businesses in Chile, particularly for large plantation forestry businesses. In terms of impacts, certification proved a relatively effective governance mechanism (sensu Tikina and Innes, 2008) to address unsustainable forest management compared with Chile’s traditional forest governance, for a number of reasons. It ameliorated deforestation and reduced many social conflicts (problem solving); it granted a social license to operate and ensured market access in many cases (goal attainment); most companies adopted and deepened sustainable forestry practices (behavioral effectiveness); plantation forestry businesses largely adopted FSC and CERTFOR certification (process effectiveness); and local communities’ awareness of certification allowed them to leverage forestry firms’ decision-making processes (constitutive effectiveness).

This non-state governance approach in the Chilean context has both supplemented and supplanted the role of the state in each of the plantation and natural forestry sectors; this is due to the more effective enforcement mechanism and the higher prescriptiveness of some certification requirements, particularly for plantation forestry businesses. At the same time, as elsewhere, the state has played a key role in facilitating the development and adoption of certification, Government agencies should therefore continue to foster certification to help forestry businesses meet their own sustainability goals; however this poses a challenge given the (a) domestic orientation of most native forestry businesses (due to low timber yields); (b) lack of appropriate green procurement policies for certified timber; (c) high certification costs, particularly for small, informal and unsustainable forest operations to which certification may yield the greatest change; and (d) the existence of power asymmetries in the timber supply chain between large and small-medium plantation forestry businesses.

To fully achieve its potential in realizing sustainability goals, certification also needs sound public policies to provide a minimum legal framework (see Gale and Haward, 2011) that sets clear rules, particularly to address social conflicts (e.g. land tenure policies with Indigenous communities), otherwise its effectiveness will be undermined over time – particularly the credibility of the FSC system, which has generated the highest expectations. In particular, the research identified a number of cases where certification alone has not been sufficient to settle land tenure disputes, due to the absence of public policies to integrate diverse interests, and set clear parameters for land ownership, in long-term planning of the landscape in contested territories. In the Chilean context, much has been and can still be done without the state, by the joint effort of forestry companies and their stakeholders to address these disputes. For example, the maturation of the Chilean National Forest Dialogue (see *Diálogo Forestal Chile*, 2017) initiative might offer a promising alternative to address land tenure conflicts compared with many failed state attempts.

Finally, there are some areas in which these results suggest the need for future studies. As is common globally, the role of certification in addressing the sustainability issues of small scale-forestry in Chile requires further investigation. A related issue is that a proportion of small-scale natural forest operations are informal, and thus currently not subject to regulation or certification. Further research is necessary to characterize the extent and impact of these operations, and how they might best be improved. Field studies on the environmental quality of newly rehabilitated areas are necessary to determine whether the assumed environmental benefits of certification have been realized. Last, the persistence of high-intensity conflicts between large companies and some Indigenous communities highlights the importance of understanding the impact of social processes and programs encouraged by certification.

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