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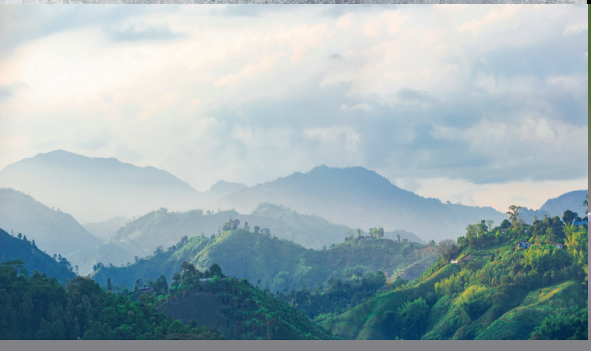

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Chapter 12

Forest certification – an answer to the challenge of sustainable forest management?

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1 Introduction

Forest certification was developed because of a growing global concern for issues related to the sustainable management of forest resources and deforestation. It can be seen as a form of governance without government, a way to regulate global markets in the absence of a single authoritative body. Today it is one of the most common tools for sustainable forest management and is essential for considering the multiple values of forests (Malek & Abdul Rahim, 2022). Starting as a global environmental concern, forest certification has developed to become an organisational governance tool to differentiate. It is based on the assumption that consumers are willing to pay a premium price for certified products (products with an eco-label) much the same way as for food products.

Standards for forest certification include three main types of standards that cover different parts of the value system: forest management certification (FM), chain of custody certification (CoC), and trademark licenses. This chapter focuses on forest management certification because it serves as a condition for other value system certifications.

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As with most standards (Brunsson & Jacobsson, 2000), forest management certification is voluntary. It is a market-driven tool that considers environmental, social and economic dimensions of value creation, and as such, it has effectively raised awareness of sustainable forest management (Rametsteiner & Simula, 2003). It enables responsible forest owners to consider the nature of corporate social responsibility (CSR) in their resource management choices (Uggla, 2017). Sustainable forest management is described as a practice to ensure that forests are able to provide current and future generations with forest goods and services (FAO, 2023). However, many forest stakeholders view the definition of sustainability and sustainable forest management as too broad and prefer the term responsible forest management (FSC, 2023). In this context, the main forest stakeholders refer to actors in the forest sector such as different types of forest owners, entrepreneurs that provide services, forest owner organisations processing industries and customers (industrial and end consumers), as well as environmental organisations, local and indigenous communities, forest workers, and outdoors and tourism organisations (Baumgartner, 2019).

Forest certification as a concept and forest certification programmes have, over the years, been criticised for both how the system is built around continuous improvement and specific issues regarding credibility (Röstlund, 2022). The biggest challenge for forest certification schemes has been attaining legitimacy. It refers to establishing in practice, how forest certification influences sustainability concerning, in particular, environmental, social, and financial dimensions of value production. Despite developed systems for value-based indicators for each of these dimensions, measurements in practice prove to be challenging.

In Sweden and other countries, many small private forest owners combine their forest ownership with agricultural land and the associated practices. This group of forest owners is often described as a traditional type of forest owners, that value their autonomy, with larger holdings and dependency on forestry income. Therefore, motivating small private forest owners to adopt forest certification requires awareness of what certification implies for them.

This chapter focuses on two well-established (Malek & Abdul Rahim, 2022) forest certification schemes, the Forest Stewardship Council (FSC) and the Programme for the Endorsement of Forest Certification (PEFC). A short presentation of each of these systems is provided, followed by a case study and a synthesis of the context of the forestry certification.

2 How forest certification works and different forest standards

Forest certification can be described as a social contract established by a range of forest stakeholders (Lehtonen *et al.*, 2021). It aims to deliver sustainable

(or responsible) forest management by validating, through third-party audits, that the forest management in place fulfils standard requirements, in a production process that may take between 50 and 100 years. The forest certification systems involve several complex governance processes, including setting standards, auditing, certification and accrediting.

Governance of forest certification schemes occurs on a global, national and sometimes regional level. Internationally governance is carried out through a board, nomination committee and general assembly for international members. Many forest certification schemes are member organisations where members are part of the governance system and can influence objectives, strategies and motion proposals at the general assembly (Meidinger *et al.*, 2003). The international governance level can also create the framework for national standards, for example, in the case of FSC's criteria and indicators.

The *standard-setting process* is mainly carried out nationally and aims to define specific requirements for sustainable forest management. The standard-setting process for forest certification is often described as a negotiation process between members. Members can be part of different working groups for specific standard requirements, where the members negotiate standard rules, requirements and policies applied to national or regional forest conditions. Proposed standards are also open for more comprehensive consultations, during which stakeholders can comment on the standard draft. The standard-setting process can be more or less complicated depending on the number and heterogeneity of members and stakeholders participating (Tröster & Hiete, 2018).

The *certification implementation process* consists of sub-processes such as certification implementation, auditing, labelling and administration (Meidinger *et al.*, 2003). The forest owner that wants to become certified often starts with choosing and contacting an accredited certification body for approval for certification and audits. Certification bodies are accredited by an accreditation body appointed by the certification scheme. It is also not uncommon for actors desiring certification to use the service of a certification consultant to assist in modifying resource governance and account for the forestry management. The implementation process of forest certification described by Higman *et al.* (2005) often starts with a pre-assessment before closing out gaps and stakeholder consultation. When these tasks are completed, the main assessment can take place. During the main assessment, documentation is examined, and field visits and interviews with employees and stakeholders are conducted. Certified forest owners must pass the main assessment and annual audits by the independent (often third-party) certification body. Non-compliance is listed as either a minor or major corrective action request (CAR). Minor CARs arise as a result of the forest owner demonstrating only partial compliance or a failure that can be

considered as minor and not systemic. Major CARs arise during an audit as a result of the identification of complete non-compliance and systemic failures to meet criteria with an element(s) of the standards. Major CARs hinder the implementation of forest certification and need to be closed out before proceeding with the certification process. After a successful main assessment, independent specialists often peer-review the certification report based on their regional and forest ecosystem expertise. If no new issues are raised, the final certification decision can be made by a panel appointed by the certification body. Routine annual audits occur to assess continuous compliance by following up and closing any outstanding CARs or stakeholder complaints, visiting new sites and ensuring that any changes to the standard that have been made are addressed by the forest owner and any non-compliance that could result is categorised as minor or major CARs, with the resultant corrective action being required.

The products from certified forests can then be assured and labelled through Chain of Custody, CoC and trademark standards for eco-labelling, ensuring the certified products' traceability and credibility. Actors not required to be certified often at the end of the value chain can apply for a trademark license to use the eco-label in marketing certified products. The next section provides a closer analysis of each of the certification schemes, FSC and PEFC.

2.1 Forest Stewardship Council and Programme for Endorsement of Forest Certification

FSC is an international membership organisation founded in 1993 in Toronto by representatives from various forest industry and environmental organisations, aiming for globally responsible forest management (Overdevest, 2009). FSC responsible forestry is based on economic, social, and environmental value dimensions. This is reflected in the organisation of FSC. It is founded on three-member chambers: the social, the economic and the environmental chamber. Each chamber has equal decision-making rights, as decisions are primarily made based on consensus between the chambers. The system also considers that each chamber consists of actors from the global economic north respectively south to avoid unjustness due to resource allocation. Members negotiate the standard for forest certification through participation in different working groups and committees. Agreed-upon national standards then need to be approved by FSC International. FSC can be considered the most studied scheme in forest certification research (Wolff & Schweinle, 2022). FSC relies on Assurance Services International (ASI) as accreditors for certification bodies.

The FSC standard-setting process for forest management standards is based on ten principles and criteria that function as a framework for national standards (FSC, 2023) (see Table 1).

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Table 1 Overview of principles for Forest Steward Certification and Programme for Endorsement of Forest Certification

FSC certification	PEFC certification
Compliance with laws	Legal framework
Workers right and employment conditions	Workers' rights, local employment
Indigenous peoples' rights	Indigenous peoples' rights
Community relations	
Benefits from the forest	Ecosystem services
Environmental values and impacts	
Management and planning	
Monitoring and assessment	
High conservation values	Biodiversity
Implementation of management activities	
	Natural alternatives

The Pan European Forest Certification Council (PEFC) was founded in 1999 as an alternative certification scheme for European smallholders or here referred to as small private forest owners. PEFCs member system is based on chambers for forest management, forest industry and forest stakeholders. PEFC later came to approve national forest certification standards globally and, therefore, in 2004, changed its full name to Programme for the Endorsement of Forest Certification. PEFC has often referred to the slogan 'act locally, think globally' and functions as an umbrella organisation that endorses national and regional forest certification standards (PEFC, 2023). Sustainable Forestry Initiative (SFI) and Malaysian Timber Certification Council (MTCC) are members today, and their standards are endorsed by PEFC (Gutierrez Garzon *et al.*, 2020). PEFC national requirements for sustainable forest management are guided by a common framework (PEFC, 2023). PEFC uses national accreditation bodies that are members of the International Accreditation Forum (IAF). A PEFC Sustainable Forest Management certification encompasses the following aspects of forestry management (Forest Eco Certification, 2023) (see Table 1).

These principles are part of the PEFC Sustainability Benchmark, further developed with over 300 criteria that serve as a basis for national certification systems assessed in a PEFC endorsement audit.

3 Delivering environmental, social and financial value

Forest certification is an independent assessment process of the environmental and social impact of forestry (Gullison, 2003). The idea of forest certifications as a market-driven tool is based on their capacity to effectively deliver value for different stakeholders. Numerous stakeholders' needs are negotiated

in a certification scheme. Forest certification should, for example, reduce deforestation and improve the lives of local communities and the conditions for forest workers while also increasing the financial viability for forest owners. Ensuring the forest certification sustainability impact is essential for the credibility of the certification system. Research on forest certification is often done to evaluate issues related to the impact of certification (Malek & Abdul Rahim, 2022). Several studies have aimed to assess the outcomes of forest management certification and how well it delivers on environmental, social, financial and policy aspects. However, studying and assessing the impact of forest certification can often be a complex and costly process (Romero *et al.*, 2017). The level of impact of forest certification also depends on governance and policy on a national and regional level and not only the applied certification system. Governmental support for forest certification is essential for a well-functioning system (Niedziałkowski & Shkaruba, 2018). The three dimensions of sustainable value related to forest certification are now considered more in detail.

3.1 Environmental impact

The history of forest certification emphasises the conflict between environmental and financial values in forests. Therefore, the ability of forest certification to provide documented environmental benefits in terms of reduced deforestation and biodiversity conservation as well as informing environmental legislation and models of forest ownership is an essential topic for research (Table 2).

Table 2 points to several positive environmental effects from forest certifications. However, environmental aspects and the associated value have also been found to be an understudied area (Wolff & Schweinle, 2022). Forest certification has been found to support several positive environmental outcomes regarding biodiversity at comparable levels as forests with a minimum of activities (Campos-Cerqueira *et al.*, 2019; Polisar *et al.*, 2017). Forest certification tends to benefit the environment (reduce deforestation rate), but more studies are needed to understand the impact evaluation (Burivalova *et al.*, 2017). Other studies support the notion of an inconclusive impact from forest certification's with regard to deforestation (Rana & Sills, 2018; Romero & Putz, 2018).

Villalobos *et al.* (2018) and Johansson and Lidestav (2011) question the environmental benefits of forest certification provided by small private forest owners. Although, this is done without considering that certification also affects the whole forest industry and impacts uncertified forests (Lehtonen *et al.*, 2021). However, the certification system based on price premiums might attract already active forest owners. Market tools that promote premiums depending on the forest products sold are related to challenges in the level of extraction in certified areas. For example, certification in intact forest landscapes could

Table 2 Research pointing to environmental impacts of forestry certification, presented in alphabetical order

Environmental factor	Reported impact in certified forests	Author, year
Biodiversity conservation	Higher biodiversity. Forest certification can provide protection for threatened species. Set-asides in forest certification can have positive impact on biodiversity but need to be complemented with other policy tools.	Campos-Cerqueira *et al.*, 2019; Polisar *et al.*, 2017; Alveira *et al.*, 2023; Elbakidze *et al.*, 2011
Deforestation	Reduced rate of de-forestation. Geographic location had greater impact on hindering de-forestation in tropical forests than certification. First certification reduced de-forestation. Later forest certification was found to increase de-forestation. Certified plantation had a higher degree of native forest cover regeneration. The practice of clear-cuts undermines ecological effectiveness of forest certification in boreal forests.	Burivalova *et al.*, 2017; Panlasigui *et al.*, 2018; Rana & Sills, 2018; da Silva *et al.*, 2019; Blümröder *et al.*, 2020
Environmental consideration among small private forest owners	Minor positive impact. However, differences between active and non-active forest ownership. Forest certification did not have any positive environmental impact.	Johansson & Lidestav, 2011; Villalobos *et al.*, 2018
Environmental legislation	Certification schemes may influence the development of and enforcement of legislation.	Haywood & Henriot, 2019; Sundstrom & Henry, 2017

lead to that other areas close to certified forest land that are uncertified being logged more intensively (Kleinschroth *et al.*, 2019). Other studies also question the environmental benefits of forest certification altogether and propose changes in forest operations practices such as clear-cuts (Blumröder *et al.*, 2020). Forest standards contribute to reducing deforestation, as a complement to national legislation (Haywood & Henriot, 2019). The practice of certification can impact state forestry policy (Sundstrom & Henry, 2017). Non-conformities are most frequently found, by certification bodies during audits concerning the environmental impact of FSC (Trishkin *et al.*, 2019) and tend to increase in frequency with the size of forest management units (Dagnaisser *et al.*, 2022). However, this also relates to the country's economic development, as

non-conformities were found to be more likely in countries with less developed forestry practices (Halalisan *et al.*, 2016).

3.2 Financial and socioeconomic impact

Financial and socioeconomic impacts from forest certification are often reduced to monetary dimensions, in terms of benefits or costs. Critical aspects in these assessments relate to which system boundaries, stakeholders and time dimensions are considered. Research findings may appear contradictory partly because different system boundaries, stakeholder focus and time perspectives have been selected (Table 3).

Table 3 illustrates a number of financial factors that are influenced by forestry certification. Assuming a consumer's willingness to pay a price premium and market access were the main driver for certification (Perera *et al.*, 2022). Certification can enable price margins and negatively affect quantitative margins, essential aspects of a country's export growth (Zhang *et al.*, 2022). Forest certification can increase sales prices of hardwood in auctions but is often related to the increased cost of certification (Deniz, 2023). However, premiums are often limited and might only occur on higher-quality logs (Durusoy & Özdemir, 2021). Furthermore, certification cost is one of the most significant barriers to becoming certified (Sugiura & Oki, 2018).

Managers of certified forests perceive improved forest management and changes in stakeholder communication due to certification (Halalisan *et al.*, 2018). Certified forest owners recognise that certification contributes to demonstrating environmental consideration and improving public relations (Paluš *et al.*, 2018). However, certification standards often include restrictions on the use of chemicals, which can lead to lower forest productivity and yield (Mendell *et al.*, 2015). A critical motive for companies to adopt forest certification has been as a signal to the market and end-consumers that they are responsible actors (Galati *et al.*, 2017). Forest certification is an essential communication tool for sustainable forest management utilised by forest actors (Lombardo *et al.*, 2021). A forest certification may provide market opportunities and an improved corporate image which may lead to positive competitiveness and improved stakeholder relations (Perera *et al.*, 2022; So & Lafortezza, 2022). Also, the future of digitalisation tools and remote sensing in forest certification offers lowered costs, and higher transparency (Lopatin *et al.*, 2016) associated with higher credibility.

The cost of certification is one of the biggest barriers to becoming certified and having a small forest ownership (Sugiura & Oki, 2018). Therefore, it is also important that global standards are adapted to local contexts (Lemes *et al.*, 2017). Forest certification is found to impact increased stakeholder

Table 3 Research pointing to financial and socioeconomic impacts of forestry certification

Financial or socioeconomic factor	Reported impact in certified forests	Author, year
Consumer behaviour	Environmental attitudes play an important role in willingness to pay for certified products.	Panico *et al.*, 2022
Contextual interpretations	Global standards need to be adapted to local conditions.	Lemes *et al.,* 2017
Costs	Cost and sales price increase with forest certification.	Deniz, 2023
Legitimacy and image	Digital tools, remote sensing – offers transparency. The main reason to adopt forest certification is as signalling mechanism. Grounds to communicate.	Lopatin *et al.*, 2016; Galati *et al.*, 2017; Lombardo *et al.*, 2021
Management skills	Managers grounds for communication is enhanced.	Halalisan *et al.*, 2018; Paluš *et al.*, 2018
Market access	Forest certification aids in accessing new markets, keep market share, and sell products in existing markets.	Perera *et al.*, 2022
Price premium	Limited price premiums for forest certification. Cost of certification must be balanced with a price premium.	Durusoy & Özdemir, 2021; Sugiura & Oki, 2018
Profit	Influence price margins and imports. Companies that perform well financially have predisposition for forest certification.	Zhang *et al.*, 2022; Zubizarreta *et al.*, 2023
Smallholders	Subsidies for forest certification are important for small private forest owners adopting certification. Long-term forest certification can lead to economic resilience. Administration can hinder smallholders from selling certified wood as labelled.	Wibowo *et al.*, 2018; Ehrenberg-Azcárate & Peña-Claros, 2020; Hermudananto & Supriatno, 2020
Stakeholder engagement	Increased stakeholder participation	Lescuyer *et al.*, 2021
Trade	Forest certification has become a trade barrier for developing countries trading with developed countries.	Chen *et al.*, 2020
Yield and productivity	Restricted use of chemicals may lower productivity.	Lemes *et al.*, 2021; Mendell *et al.*, 2015

participation. However, this does not affect national governance or levels of corruption or increased transparency (Lescuyer *et al.*, 2021).

3.3 Social impact

Forestry is, for the most part, carried out in rural areas. The rural localisation influences social aspects, such as the need for transport, limitations in labour recruitment, a potential for labour abuses, and a need for stakeholders to keep a very long financial time perspective. Social, generational perspectives on forestry also mean locking up much financial capital for a long time (50–100+ years) between harvests means that the social impacts are key and intimately connected to the financial aspects of forestry certification.

As in most CSR research fields, the social dimension is less researched. Key findings are synthesised in Table 4.

Forest certification has positively influenced workers' rights, health and safety, and forest companies' relations to the community (Pezdevšek Malovrh *et al.*, 2019). Although living and working conditions improved for forest

Table 4 Research pointing to the social impacts of forestry certification

Social factor	Reported impact in certified forests	Author, year
Democracy	Transparency promotes democratic traditions, fair distribution and gender equality. A challenge to include social sustainability in forest certification systems.	Loveridge *et al.*, 2021; Boström, M, 2011
Free, Prior and Informed Consent (FPIC)	Risk of transferring responsibility and duties to actors with fewer resources. Possibility to achieve mutual understanding and mitigate conflicts. Social norms and stakeholders affect the implementation and effectiveness of certification tools.	Dobrynin *et al.*, 2020; Tysiachniouk *et al.*, 2021
Human rights	Positive effects in areas of workers' rights, health and safety, living conditions and community relations.	Cerutti *et al.*, 2017; Pezdevšek Malovrh *et al.*, 2019
Indigenous communities	Forest certification can involve indigenous communities and strengthen their rights. Forest certification as a learning tool for forest companies to consider indigenous communities. Forest certification activities can impact indigenous communities negatively.	Tikina *et al.*, 2010; Teitelbaum & Wyatt, 2013; Doremus, 2019
Local community development	Forest certification tends to favour larger actors. Benefits local communities but cannot resolve deeply rooted social conflicts.	McDermott *et al.*, 2015; Tricallotis *et al.*, 2018

workers, forest certification also meant considering a forest management plan that sets the rules for how the certified forest area can be utilised, thereby limiting local access to forest resources and customary rights (Cerutti *et al.*, 2017).

Forest certification and associated principles of democracy and transparency promote democratic decision-making, fair distribution and gender equality (Loveridge *et al.*, 2021). Although, this requirement comes with an increased administrative burden for community forests and smallholders. Therefore, it is necessary to support capacity building among local communities to ensure these principles are met. Forest certification activities have also created disadvantages for local and indigenous communities as they tend to favour larger actors with the infrastructure and economic ability to engage with certification (Doremus, 2019; McDermott *et al.*, 2015). Forest certification systems could greatly benefit from focusing on social sustainability that enables inclusion and acceptance among social stakeholders (Boström, 2011; Tikina *et al.*, 2010).

Forest certification programmes have adopted tools for comprehensively including and considering indigenous communities. This is accomplished through a consultation and participation process called Free, Prior, and Informed Consent (FPIC). However, these are often complex issues to resolve where forest companies need to develop capacities (Teitelbaum & Wyatt, 2013). FPIC can be considered as a tool for mutual consent that mitigates potential conflicts. There is also the risk of transferring responsibility from state governance to private actors and narrowing the scope of included stakeholders (Dobrynin *et al.*, 2020; Tysiachniouk *et al.*, 2021). The next case study explores some of these themes described in the previous sections.

4 Case study: small private forest owners' motives for forest certification

The perceived and proven impact of forest certification affects the adoption of forest certification, which is especially true for small private forest owners. A study of a diverse group of private forest owners points to the forest certification process as being complex. As suggested by Weiss *et al.* (2019), their motives for making a forest certification decision depends on their specific objectives, attitudes and behaviour. A qualitative approach was conducted to understand further small private forest owners' motives and objectives for adopting forest certification in Sweden (Thorning & Mark-Herbert, 2022). Their lived experience of forest certification (n = 14) was explored through interviews with forest owners. Through a process called laddering, important forest certification attributes that give rise to perceived benefits and disadvantages that, in turn, trigger emotions and are essential for understanding the motives, objectives

and values behind the reason for adopting forest certification were developed. The results showed a range of experiences and motives for forest certification. These groups were mainly women and men, and owners with forestry as their primary occupation compared to those with another main income.

For both men and women, forest certification was important for the credibility and legitimacy of the forest industry and, for some, showing solidarity with their forest owner association. Women's important forest certification attributes were set-asides, rules and regulations, eco-labelling and price premiums. For women, price premiums were both a financial benefit and an acknowledgement of doing the right thing. Forest certification was also seen as an instrument for fulfilling environmental objectives. Social and environmental considerations through forest certification are essential aspects for female forest owners and provide a sense of pride and being a knowledgeable and accomplished forest owner. This was also a result of understanding the forest certification standard that most female forest owners stated that they had no problems complying with.

Attributes for men were the same as for women, with the addition of a certified forest management plan that functioned as an important forest management tool resulting in feeling pride in being a good forest owner and forest steward. For male forest owners, set-asides not only resulted in environmental and social considerations (as for women) but also increased costs. The male interviewees differed in their opinion of forest certification as being either easy to follow the rules or difficult to follow. The group of men who found it difficult also questioned forest certification's environmental impact.

Small private forest owners with forestry as a primary occupation frequently combined this with agricultural practices. These forest owners then often chose to apply for certification for forest management and agricultural practices, resulting in high costs. For these forest owners, attributes such as set-asides, standard rules and regulations, labelling and price premiums were important attributes. For them, price premiums needed to result in financial benefits, which could make up for increased costs and loss in timber production that occurred through set-asides. Complying with forest certification was also considered as a decrease in autonomy. Environmental considerations in forest certification fulfilled environmental interests and objectives, resulting in credibility and legitimacy. Forest certification also included having a long-term perspective on forestry which was connected to taking pride in forest ownership and having it as a lifestyle. Forest certification could also strengthen the feeling of being knowledgeable and accomplished forest owners through gaining forestry and certification knowledge.

Increased forestry and certification knowledge and the feeling of being an accomplished forest owner were even more important for forest owners with a main income other than forestry. This group shared the same view on important

attributes as those with forestry as the main occupation but also included the benefit of a forest management plan that could fulfil environmental interests and objectives. The objective of environmental consideration was also achieved by environmental considerations through set-asides and having a long-term perspective. Set-asides also resulted in social and environmental considerations as well as increased costs. However, the group of forest owners with other main income than forestry perceived no problems with certification compliance, which allowed them to take pride in their forest ownership.

5 Forest certification for small private forest owners

Forest certification began as a market-driven policy instrument developed under pressure by NGOs and companies that invited stakeholders to the standard-setting process. Early on, small private forest owners (often referred to as smallholders in forest certification) considered forest certification a threat to autonomy and forest income, costly and with uncertain benefits (Bensel, 2001; Lindström *et al.*, 1999; Rickenbach, 2002). Problems that arise for smallholders often relate to understanding and complying with requirements and the cost of certification. When PEFC was founded, it was seen as an alternative to forest certification offered to small private forest owners. FSC later developed a standard for small- or low-intensity managed forests (SLIMF) to cater to the needs of smallholders in the certification process and auditing and lessen the cost for certification. Here forest management can be classified as small, if 100 hectares or less, but can also be considered for management sizes up to 1000 hectares under certain conditions. Low-intensity forest management is considered when harvesting is less than 20% of the mean annual increment and the annual harvest is less than 5000 cubic metres. The forest can also be eligible for SLIMF if it is managed for non-timber forest products, not including plantations.

Arguments for offering forest certification are that small private forest owners contribute to the UN Sustainable Development Goals and that this is not solely a responsibility of the state or companies (Danley, 2018). However, forest certification rates among small private forest owners or smallholders are at a different rate than among forest companies. First, to increase in uptake of certification when the forest owners' associations started to offer certification, including a price premium, to its members (Johansson & Lidestav, 2011). Then a need for financial incentives or cost compensation was suggested to encourage small private forest owners to consider conservation or more sustainable forest practices (Kilgore *et al.*, 2008; Langpap, 2006). An ongoing policy and media debate encourages small private forest owners to consider environmental objectives (Lindahl *et al.*, 2017). Forest conservation is also expected to increase among small private forest owners (Karppinen *et al.*,

2019). Therefore these forest owners are now experiencing increased pressure from society to consider sustainable development (Cashore *et al.*, 2007).

The financial benefits of forest certification are often highlighted and described as price premiums and market access. Johansson and Lidestav (2011) noted that certified forest owners are more likely to increase forest management activities. They proposed that certified forest owners are generally more active or become more active when forest management plans following certification are in place. A forest management plan refers to a detailed plan for each local forest area that gives information about how it will be managed over the next ten or more years. A green forest management plan includes forest certification.

Administrative burden acted as a barrier for smallholders to sell certified wood as labelled, and often it was sold into uncertified markets (Hermudananto & Supriatno, 2020). Challenges in certification for small private forest owners can be addressed through group certification managed by forest owners' associations, forest companies or certification organisations. Enrolment by association is encouraged by offers of green forest management plans that include forest certification. For small private forest owners who are not members of an association, the route to becoming certified either includes a self-initiative or a process as suggested by timber-procuring companies. The motives for becoming certified vary from one forest owner to another. Forest owners' background, values and own forest management experience serve as background to understand differences in motives. Therefore, the intermediary organisation facilitating and administrating group certificates are essential in lowering the barrier threshold to certification and creating value for participating forest owners (Boakye-Danquah & Reed, 2019).

Small private forest owners are transforming from a relatively homogenous group (males living close to their forestland) to a more heterogeneous group as they are increasingly urban, a growing proportion of female owners and less financially dependent on their forest land (Follo *et al.*, 2016; Keskitalo, 2017). Socio-demographic characteristics, such as gender and residency of the forest owner include categories, e.g. female and urban forest owners as a new type of forest owner. Previous studies show that female and non-resident forest owners have other objectives than solely timber production and are inclined to assess forest values linked to environmental and social aspects higher than the traditional forest owner (Berlin *et al.*, 2006; Umaerus *et al.*, 2019). The socioeconomic shift also means forest owners are increasingly highly educated and less financially dependent on their forestland (Karppinen *et al.*, 2019). The ongoing change in ownership structure and demographics indicates new types of forest owners with goals other than primarily financial, which in turn influences forest management and policy and sustainability goals (Weiss *et al.*, 2019). These changes in forest owner types are predicted to create challenges

for the forest industry and policy-makers due to their expected non-traditional forest views and objectives (Follo *et al.*, 2016). These forest owners require the forest industry to develop new types of service and view value creation from multiple uses of forests (Kurttila *et al.*, 2019). Sustainable development in the form of forest certification can be viewed as a source of value creation and a possibility to innovate and develop services specific to forest owners (Toppinen *et al.*, 2019).

6 Conclusion and future trends

A transition to sustainable forest management is guided by standards such as FSC and PEFC. Critical perspectives would argue that landowners pay for the enforcement of rules, in this case, compliance with these standards. In contrast, positive perspectives point to the opportunities to differentiate forest management approaches, signaling responsible management for which they can receive a price premium for products or services, and a feeling of 'doing the right thing'.

Forestry certification differs from certification of agricultural production in that the production process has long-time dimensions, between 50 and 100 years in Scandinavia (and shorter production spans in a warmer climate where the production cycle is shorter). It means that a decision made by one generation of forest owners will influence the management of the forest resource for the next generation as well as the current generation.

A similar logic can be applied to understand the landowner's motives for certification. Forestry owners are a diverse group. Their lands may differ in size and location and thereby be more or less suitable for certification, but what is more, the importance of the income from forest management varies. For a small private forest owner who makes a prime living from the forest, the financial aspects (added value from certification and the use of an eco-label) might be crucial to attaining a price that supports a livelihood. On the other hand, a forest owner that is not dependent on the income from forest management may have another job on the side, which explains other expectations from a forest certification, and other needs to contract management support. As the profile of forest owners gradually changes over time, from a male-dominated domain, where a forest owner lives close to the forest property and manages his or her own forest, a transition is taking place where a larger proportion of forest owners are women and/or living in urban areas.

From a market development perspective, industrial market incentives are crucial. A solution to management challenges for small forest owners is seen in the option of group certification, to relieve the administrative burdens. Service and value co-creation are becoming essential to the timber procuring process to attract and build relationships with new types of forest

owners (Andersson & Keskitalo, 2019). Nevertheless, path dependence in the forest industry is often a barrier to developing new value creation and service offerings. Their primary focus on keeping their market position hinders more minor actors from entering the market (Mattila *et al.*, 2013).

Future development of certification schemes is influenced by societal development, in particular, awareness of sustainability aspects of forest management. The continued development of carbon markets is of particular interest as part of eco-system services provided in forest contexts. From a consumer perspective, it may continue to fill an essential educational role for fibre-based products. Compared to food products, where eco-labels are part of everyday consumption decisions for consumers, the eco-labels for fast-moving consumer fibre goods (hygiene products, packaging, paper in books etc.) are not given the same attention.

Forestry management and standards appear on the sustainability agenda as a concern for resource management focusing on biodiversity, carbon sequestration, ecosystem services, social services and cultural heritages. Just like FSC and PEFC, future standards need to engage a wide set of stakeholders in the dialogue of managing resources to avoid conflicts (Dare *et al.*, 2011). The democratic traditions of forest certification may serve as well-grounded principles for managing forestry resources for sustainable development.

7 Where to look for further information

- Cashore, B., Auld, G. and Newsom, D. (2004). *Governing through markets: Forest certification and the emergence of non-state authority*. Yale University Press. doi:10.12987/9780300133110
- Forest Stewardship Council (FSC): https://fsc.org/en.
- Nussbaum, R. and Simula, M. (2005). *The forest certification handbook*. 2nd edition. London. Earthscan.
- Malek, E. J. and Abdul Rahim, A. R. (2022). A thematic review of forest certification publications from 2017 to 2021: analysis of pattern and trends for future studies. *Trees, Forests and People, 10*. doi:10.1016/j.tfp.2022.100331
- Program for Endorsement of Forest Certification (PEFC): https://pefc.org.

Journals

- *Forest Policy and Economics: https://www.sciencedirect.com/journal/forest-policy-and-economics*.
- *Forests: https://www.mdpi.com/journal/forests*.

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8 References

Alveira, M., de Bustos, S. and Tálamo, A. (2023). Certified forest management and conservation of medium and large-sized mammals: biodiversity, trampling, browsing and seed removal in the Argentine Austral Yungas. *Forest Ecology and Management, 533*. doi:10.1016/j.foreco.2023.120860

Andersson, E. and Keskitalo, E. C. H. (2019). Service logics and strategies of Swedish forestry in the structural shifts of forest ownership challenging the old and shaping the new. *Scandinavian Journal of Forest Research, 34*, 508–520. doi:10.1080/02827581.2019.1604990

Baumgartner, R. J. (2019). Sustainable development goals and the forest sector—a complex relationship. *Forests, 10*(2). doi:10.3390/f10020152

Bensel, T. (2001). Promoting certified sustainable forestry on private woodlots in Northwestern Pennsylvania: challenges and opportunities. *Local Environment, 6*(3), 257–278. doi:10.1080/13549830120073266

Berlin, C., Lidestav, G. and Holm, S. (2006). Value placed on forest property benefits by Swedish NIPF owners: difference between members in forest owners associations and non-members. *Small-scale Forest Economics, Management and Policy, 5*, 83–96.

Blumröder, J. S., Hoffmann, M. T., Ilina, O., Winter, S., Hobson, P. R. and Ibisch, P. L. (2020). Clearcuts and related secondary dieback undermine the ecological effectiveness of FSC certification in a boreal forest. *Ecological Processes, 9*(1). doi:10.1186/s13717-020-0214-4

Boakye-Danquah, J. and Reed, M. G. (2019). The participation of non-industrial private forest owners in forest certification programs: the role and effectiveness of intermediary organisations. *Forest Policy and Economics, 100*, 154–163. doi:10.1016/j.forpol.2018.12.006

Boström, M. (2011). The problematic social dimension of sustainable development: the case of the Forest Stewardship Council. *International Journal of Sustainable Development & World Ecology, 19*(1), 3–15. doi:10.1080/13504509.2011.582891

Brunsson, N. and Jacobsson, B. (2000). *A world of standards* (N. Brunsson & B. Jacobsson, Eds.). Oxford: Oxford University Press.

Burivalova, Z., Hua, F., Koh, L. P., Garcia, C. and Putz, F. (2017). A critical comparison of conventional, certified, and community management of tropical forests for timber in terms of environmental, economic, and social variables. *Conservation Letters, 10*(1), 4–14. doi:10.1111/conl.12244

Campos-Cerqueira, M., Mena, J. L., Tejeda-Gómez, V., Aguilar-Amuchastegui, N., Gutierrez, N., Aide, T. M., Pettorelli, N. and Lecours, V. (2019). How does FSC forest certification affect the acoustically active fauna in Madre de Dios, Peru? *Remote Sensing in Ecology and Conservation, 6*(3), 274–285. doi:10.1002/rse2.120

Cashore, B., Egan, E., Auld, G. and Newsom, D. (2007). Revising theories of nonstate market-driven (NSMD) governance: lessons from the Finnish forest certification experience. *Global Environmental Politics, 7*, 1–44. doi:10.1162/glep.2007.7.1.1

Cerutti, P., Lescuyer, G., Tacconi, L., Eba'a Atyi, R., Essiane, E., Nasi, R., Tabi Eckebil, P. P. and Tsanga, R. (2017). Social impacts of the Forest Stewardship Council certifi- cation in the Congo basin. *International Forestry Review 19*, 50–63.

Chen, J., Wang, L., Li, L., Magalhães, J., Song, W., Lu, W., Xiong, L., Chang, W.-Y. and Sun, Y. (2020). Effect of forest certification on international trade in forest products. *Forests, 11*(12). doi:10.3390/f11121270

da Silva, R. F. B., Batistella, M., Palmieri, R., Dou, Y. and Millington, J. D. A. (2019). Eco-certification protocols as mechanisms to foster sustainable environmental practices in telecoupled systems. *Forest Policy and Economics, 105*, 52–63. doi:10.1016/j.forpol.2019.05.016

Dagnaisser, L. S., Chaves Cardoso, J., Ribeiro, L. O. M. M., Monte, M. A., Silva, E. V. and Basso, V. M. (2022). Forest stewardship council certification of forest plantation management in the Southern Cone of America. *Small-scale Forestry, 21*(4), 601–619. doi:10.1007/s11842-022-09515-x

Danley, B. (2018). Skepticism of state action in forest certification and voluntary set-asides: a Swedish example with two environmental offsetting options [Article]. *Scandinavian Journal of Forest Research, 33*(7), 695–707. doi:10.1080/02827581.2018.1479442

Dare, M., Schirmer, J. and Vanclay, F. (2011). Does forest certification enhance community engagement in Australian plantation management? [Article]. *Forest Policy and Economics, 13*(5), 328–337. doi:10.1016/j.forpol.2011.03.011

Deniz, T. (2023). The effect of forest certification on log sale prices: a case study in Northwestern Turkey. *Forests, 14*(3). doi:10.3390/f14030596

Dobrynin, D., Smirennikova, E. and Mustalahti, I. (2020). Non-state forest governance and 'responsibilization': the prospects for FPIC under FSC certification in Northwest Russia. *Forest Policy and Economics, 115*. doi:10.1016/j.forpol.2020.102142

Doremus, J. (2019). Unintended impacts from forest certification: evidence from indigenous Aka households in Congo. *Ecological Economics, 166*. doi:10.1016/j.ecolecon.2019.106378

Durusoy, İ. and Özdemir, O. (2021). Price premiums for certified roundwood: evidence from auction sales in Turkey. *Journal of Forest Research, 26*(6), 395–399. doi:10.1080/13416979.2021.1940664

Ehrenberg-Azcárate, F. and Peña-Claros, M. (2020). Twenty years of forest management certification in the tropics: major trends through time and among continents. *Forest Policy and Economics, 111*. doi:10.1016/j.forpol.2019.102050

Elbakidze, M., Angelstam, P., Andersson, K., Nordberg, M. and Pautov, Y. (2011). How does forest certification contribute to boreal biodiversity conservation? Standards and outcomes in Sweden and NW Russia. *Forest Ecology and Management, 262*(11), 1983–1995. doi:10.1016/j.foreco.2011.08.040

FAO. (2023). *Sustainable forest management*. Retrieved from https://www.fao.org/sustainable-forests-management/en/

Follo, G., Lidestav, G., Ludvig, A., Vilkriste, L., Hujala, T., Karppinen, H., Didolot, H. and Mizaraite, D. (2016). Gender in European forest ownership and management: reflections on women as "new forest owners". *Scandinavian Journal of Forest Research, 32*(2), 174–184. doi:10.1080/02827581.2016.1195866

Forest Eco Certification. (2023). *Forest Eco certification*. Retrieved from https://forestecocertification.com/pefc-requirements-and-criteria/

FSC. (2023). *The 10 FSC principles*. Retrieved from https://fsc.org/en/fsc-standards

Galati, A., Gianguzzi, G., Tinervia, S., Crescimanno, M. and La Mela Veca, D. S. (2017). Motivations, adoption and impact of voluntary environmental certification in the Italian Forest based industry: the case of the FSC standard. *Forest Policy and Economics, 83*, 169–176. doi:10.1016/j.forpol.2017.08.002

Gullison, R. E. (2003). Does forest certification conserve biodiversity? *Oryx, 37*(2), 153–165. doi:10.1017/s0030605303000346

Gutierrez Garzon, A. R., Bettinger, P., Siry, J., Abrams, J., Cieszewski, C., Boston, K., Mei, B., Zengin, H. and Yeşil, A. (2020). A comparative analysis of five forest certification programs. *Forests, 11*(8). doi:10.3390/f11080863

Halalisan, A., Abrudan, I. and Popa, B. (2018). Forest management certification in Romania: motivations and perceptions. *Forests, 9*(7). doi:10.3390/f9070425

Halalisan, A., Ioras, F., Korjus, H., Avdibegovic, M., Maric, B., Pezdvesek Malovrh, S. and Abrudan, I. V. (2016). An analysis of forest management non-conformities to FSC standards in different European countries. *Notulae Botanicae Horti Agrobotanici Cluj-Napoca, 44*(2), 634–639. doi:10.15835/nbha44210263

Haywood, C. and Henriot, C. (2019). Protecting forests from conversion: the essential role of supply-side national laws. *Frontiers in Forests and Global Change, 2*. doi:10.3389/ffgc.2019.00035

Hermudananto, H. and Supriatno, N. (2020). Evaluation of timber harvesting planning in Indonesian certified small and low-intensity managed forests. *Journal of Tropical Forest Science, 32*(3), 283–288. doi:10.26525/jtfs32.3.283

Higman, S., Mayers, J., Bass, S., Judd, N. and Nussbaum, R. (2005). *The sustainable forestry handbook* (2nd ed.). London: Eartschan.

Johansson, J. and Lidestav, G. (2011). Can voluntary standards regulate forestry?–Assessing the environmental impacts of forest certification in Sweden. *Forest Policy and Economics, 13*, 191–198. doi:10.1016/j.forpol.2010.11.004

Karppinen, H., Ní Dhubháin, Á. and Butler, B. J. (2019). Family forest owners' changing values and other service-demand drivers. In *Services in family forestry* (pp. 83–102). doi:10.1007/978-3-030-28999-7_5

Keskitalo, E. C. H. (2017). *Globalisation and change in forest ownership and forest use: natural resource management in transition*. London: Palgrave Macmillan.

Kilgore, A., M, Snyder, S., Taff, S. and Schertz, J. (2008). Family forest stewardship: do owners need a financial incentive? *Journal of Forestry, 106*, 357–362.

Kleinschroth, F., Rayden, T. and Ghazoul, J. (2019). The dilemma of maintaining intact forest through certification. *Frontiers in Forests and Global Change, 2*. doi:10.3389/ffgc.2019.00072

Kurttila, M., Butler, B. J., Hujala, T., Miina, J., Vanhanen, H. and Vacik, H. (2019). The diversifying use of family forests–opportunities for new services. In T. Hujala, A. Toppinen and B. J. Butler (Eds.), *Services in family forestry* (pp. 67–81). Berlin: Springer.

Langpap, C. (2006). Conservation of endangered species: can incentives work for private landowners? *Ecological Economics, 57*(4), 558–572. doi:10.1016/j.ecolecon.2005.05.007

Lehtonen, E., Gustafsson, L., Lohmus, A. and von Stedingk, H. (2021). What does FSC forest certification contribute to biodiversity conservation in relation to national legislation? *Journal of Environmental Management, 299*, 113606. doi:10.1016/j.jenvman.2021.113606

Lemes, G., P., Zanuncio, J. C., Jacovine, L. A. G., Wilcken, C. F. and Lawson, S. A. (2021). Forest stewardship council and responsible wood certification in the integrated pest management in Australian forest plantations. *Forest Policy and Economics, 131*. doi:10.1016/j.forpol.2021.102541

Lemes, G., P., Zanuncio, J., C., Serrao, J., E. and Lawson, S., A. (2017). Forest Stewardship Council (FSC) pesticide policy and integrated pest management in certified tropical plantations. *Environmental Science and Pollution Research International, 24*(2), 1283–1295. doi:10.1007/s11356-016-7729-3

Lescuyer, G., Tsanga, R., Nziengui, S., Forni, E. and Romero, C. (2021). Influence of FSC certification on the governance of the logging sector in the Congo basin. *Natural Resources Forum, 45*(3), 289–304. doi:10.1111/1477-8947.12231

Lindahl, K. B., Sténs, A., Sandström, C., Johansson, J., Lidskog, R., Ranius, T. and Roberge, J.-M. (2017). The Swedish forestry model: more of everything? *Forest Policy and Economics, 77*, 44–55. doi:10.1016/j.forpol.2015.10.012

Lindström, T., Hansen, E. and Juslin, H. (1999). Forest certification: the view from Europes NIPFs. *Journal of Forestry, 97*(3), 25–30.

Lombardo, E., Crescimanno, M., Vrontis, D. and Galati, A. (2021). Driving forces affecting the adoption of certifications in the forest-based industry: a systematic literature review. *Jōurnal of Global Business Advancement, 14*, 453–476.

Lopatin, E., Trishkin, M. and Gavrilova, O. (2016). Assessment of compliance with PEFC forest certification indicators with remote sensing. *Forests, 7*(12). doi:10.3390/f7040085

Loveridge, R., Sallu, S. M., Pfeifer, M., Oldekop, J. A., Mgaya, M., da Silva, D. A., Latham, J., Platts, P. J. and Marshall, A. R. (2021). Certified community forests positively impact human wellbeing and conservation effectiveness and improve the performance of nearby national protected areas. *Conservation Letters, 14*(6). doi:10.1111/conl.12831

Malek, E. J. and Abdul Rahim, A. R. (2022). A thematic review of forest certification publications from 2017 to 2021: analysis of pattern and trends for future studies. *Trees, Forests and People, 10*. doi:10.1016/j.tfp.2022.100331

Mattila, O., Toppinen, A., Tervo, M. and Berghäll, S. (2013). Non-industrial private forestry service markets in a flux: results from a qualitative analysis on Finland. *Small-Scale Forestry 12*, 559–578. doi:10.1007/s11842-012-9231-1

McDermott, C. L., Irland, L. C. and Pacheco, P. (2015). Forest certification and legality initiatives in the Brazilian Amazon: lessons for effective and equitable forest governance. *Forest Policy and Economics, 50*, 134–142. doi:10.1016/j.forpol.2014.05.011

Meidinger, E., Elliott, C. and Oesten, G. (2003). The fundamentals of forest certification. In E. Meidinger, C. Elliott, & G. Oesten (Eds.), *Social and political dimensions of forest certification 3*. Forstbuch Verlag. Retrieved from https://open.fsc.org/handle/resource/996

Mendell, B. C., Lang, A. H., Caldwell, W. and Garrett, D. L. (2015). Chemical use and forest certification: productivity and economic implications. *Journal of Forestry, 113*(4), 367–371. doi:10.5849/jof.14-121

Niedziałkowski, K. and Shkaruba, A. (2018). Governance and legitimacy of the forest stewardship council certification in the national contexts – a comparative study of Belarus and Poland. *Forest Policy and Economics, 97*, 180–188. doi:10.1016/j.forpol.2018.10.005

Overdevest, C. (2009). Comparing forest certification schemes: the case of ratcheting standards in the forest sector. *Socio-Economic Review, 8*(1), 47–76. doi:10.1093/ser/mwp028

Paluš, H., Parobek, J., Šulek, R., Lichý, J. and Šálka, J. (2018). Understanding sustainable forest management certification in Slovakia: forest owners' perception of expectations, benefits and problems. *Sustainability (Switzerland), 10*(7). doi:10.3390/su10072470

Panico, T., Caracciolo, F. and Furno, M. (2022). Analysing the consumer purchasing behaviour for certified wood products in Italy. *Forest Policy and Economics, 136*. doi:10.1016/j.forpol.2021.102670

Panlasigui, S., Rico-Straffon, J., Pfaff, A., Swenson, J. and Loucks, C. (2018). Impacts of certification, uncertified concessions, and protected areas on forest loss in Cameroon, 2000 to 2013. *Biological Conservation, 227*, 160–166. doi:10.1016/j.biocon.2018.09.013

PEFC. (2023). *What is sustainable forest management?* Retrieved from https://pefc.org/what-we-do/our-approach/what-is-sustainable-forest-management

Perera, P., Rupasinghe, R. L., Weerasekera, D., Vlosky, R. and Bandara, R. (2022). Revisiting forest certification in Sri Lanka: the forest management and export wood-based manufacturing sector perspectives. *Forests, 13*(2). doi:10.3390/f13020179

Pezdevšek Malovrh, Š., Bećirović, D., Marić, B., Nedeljković, J., Posavec, S., Petrović, N. and Avdibegović, M. (2019). Contribution of forest stewardship council certification to sustainable forest management of state forests in selected Southeast European Countries. *Forests, 10*(8). doi:10.3390/f10080648

Polisar, J., de Thoisy, B., Rumiz, D. I., Santos, F. D., McNab, R. B., Garcia-Anleu, R., Ponce-Santizo, G., Arispe, R. and Venegas, C. (2017). Using certified timber extraction to benefit jaguar and ecosystem conservation. *Ambio, 46*(5), 588–603. doi:10.1007/s13280-016-0853-y

Rametsteiner, E. and Simula, M. (2003). Forest certification–an instrument to promote sustainable forest management? *Journal of Environmental Management, 67*(1), 87–98. doi:10.1016/s0301-4797(02)00191-3

Rana, P. and Sills, E. (2018). Does certification change the trajectory of tree cover in working forests in the tropics? An application of the synthetic control method of impact evaluation. *Forests, 9*(3). doi:10.3390/f9030098

Rickenbach, G. M. (2002). Forest certification of small ownership: some practical challenges. *Journal of Forestry, 100*(6), 43–47.

Romero, C. and Putz, F. (2018). Theory-of-change development for the evaluation of forest stewardship council certification of sustained timber yields from natural forests in Indonesia. *Forests, 9*(9). doi:10.3390/f9090547

Romero, C., Sills, E., Guariguata, M., Cerutti, P., Lescuyer, G. and Putz, F. (2017). Evaluation of the impacts of Forest Stewardship Council (FSC) certification of natural forest management in the tropics: a rigorous approach to assessment of a complex conservation intervention. *International Forestry Review, 19*, 36–49.

Röstlund, L. (2022). Frihet under ansvar. Om certifieringar som lovar hållbarhet *Skogslandet*. Stockholm: Bokförlaget Forum.

So, H. W. and Lafortezza, R. (2022). Reviewing the impacts of eco-labelling of forest products on different dimensions of sustainability in Europe. *Forest Policy and Economics, 145*. doi:10.1016/j.forpol.2022.102851

Sugiura, K. and Oki, Y. (2018). Reasons for choosing Forest Stewardship Council (FSC) and Sustainable Green Ecosystem Council (SGEC) schemes and the effects of certification acquisition by forestry enterprises in Japan. *Forests, 9*(4). doi:10.3390/f9040173

Sundstrom, L. and Henry, L. (2017). Private forest governance, public policy impacts: the forest stewardship council in Russia and Brazil. *Forests, 8*(11). doi:10.3390/f8110445

Teitelbaum, S. and Wyatt, S. (2013). Is forest certification delivering on First Nation issues? The effectiveness of the FSC standard in advancing First Nations' rights in the boreal forests of Ontario and Quebec, Canada. *Forest Policy and Economics, 27*, 23–33. doi:10.1016/j.forpol.2012.09.014

Thorning, A. and Mark-Herbert, C. (2022). Motives for sustainability certification—private certified forest owners' perspectives. *Forests, 13*. doi:10.3390/f13050790

Tikina, A., Innes, J. L., Trosper, L., R. and Larson, C., B. (2010). Aboriginal peoples and forest certification: a review of the canadian situation. *Ecology and Society, 15*, 33.

Toppinen, A., Mikkilä, M., Tuppura, A. and de Vries, G. (2019). Sustainability as a driver in forestry-related services Hujala, T., Toppinen, A. & Butler., B. J. (Eds.), *Services in family forestry* (pp. 289–306). Cham, Switzerland, Springer.

Tricallotis, M., Gunningham, N. and Kanowski, P. (2018). The impacts of forest certification for Chilean forestry businesses. *Forest Policy and Economics, 92*, 82–91. doi:10.1016/j.forpol.2018.03.007

Trishkin, M., Karjalainen, T. and Kangas, J. (2019). An analysis of the non-conformities of certified companies operating in Northwestern Russia. *Forests, 10*(12). doi:10.3390/f10121061

Tröster, R. and Hiete, M. (2018). Success of voluntary sustainability certification schemes – a comprehensive review. *Journal of Cleaner Production, 196*, 1034–1043. doi:10.1016/j.jclepro.2018.05.240

Tysiachniouk, M. S., McDermott, C. L., Kulyasova, A. A., Teitelbaum, S. and Elbakidze, M. (2021). The politics of scale in global governance: do more stringent international forest certification standards protect local rights in Russia? *Forest Policy and Economics, 125*. doi:10.1016/j.forpol.2021.102407

Uggla, Y. (2017). Negotiating responsible forestry: forest owners' understanding of responsibility for multiple forest values. *Environmental Sociology*. doi:10.1080/23251042.2017.1414659

Umaerus, P., Högvall Nordin, M. and Lidestav, G. (2019). Do female forest owners think and act "greener"? *Forest Policy and Economics, 99*, 52–58. doi:10.1016/j.forpol.2017.12.001

Villalobos, L., Coria, J. and Nordén, A. (2018). Has forest certification reduced forest degradation in Sweden? *Land Economics, 94*, 220–238.

Weiss, G., Lawrence, A., Hujala, T., Lidestav, G., Nichiforel, L., Nybakk, E., Quiroga, S., Sarvašová, Z., Suarez, C. and Živojinović, I. (2019). Forest ownership changes in Europe: state of knowledge and conceptual foundations. *Forest Policy and Economics, 99*, 9–20. doi:10.1016/j.forpol.2018.03.003

Wibowo, A., Pratiwi, S. and Giessen, L. (2018). Comparing management schemes for forest certification and timber-legality verification: complementary or competitive in Indonesia? *Journal of Sustainable Forestry, 38*(1), 68–84. doi:10.1080/10549811.2018.1498359

Wolff, S. and Schweinle, J. (2022). Effectiveness and economic viability of forest certification: a systematic review. *Forests, 13*(5). doi:10.3390/f13050798

Zhang, J., Zhao, Z., Zhao, W., Tao, C. and Cheng, B. (2022). The impact of forest certification on the ternary margins of China's forest product export. *Forests, 13*(8). doi:10.3390/f13081313

Zubizarreta, M., Arana-Landín, G., Wolff, S. and Egiluz, Z. (2023). Assessing the economic impacts of forest certification in Spain: a longitudinal study. *Ecological Economics, 204*. doi:10.1016/j.ecolecon.2022.107630

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