Certification Schemes and the Impacts on Forests and Forestry

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Abstract

Certification schemes have emerged in recent years to become a significant and innovative venue for standard setting and governance in the environmental realm. This review examines these schemes in the forest sector where, arguably, their development is among the most advanced of the sustainability labeling initiatives. Beginning with the origins, history, and features of schemes, the review synthesizes and assesses what we know about the direct effects and broader consequences of forest certification. Bearing in mind underlying factors affecting producers' decisions to certify, direct effects are examined by describing the uptake of schemes, the improvements to management of audited forests, and the ameliorative potential of certification for landscape-level concerns such as deforestation and forest protection. In assessing broader consequences, we look beyond the instrument itself to detail positive and negative unintended consequences, spillover effects, and longer-term and slow-moving effects that flow from the emergence of the certification innovation.

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1. INTRODUCTION

In recent years, a new type of voluntary certification and labeling scheme has emerged and become a particularly vibrant source of standard setting and governance in the environmental realm. This type of certification is based on third-party auditing of compliance with performance-based sustainable resource management standards developed by nonstate actors, such as environmental nongovernmental organizations (NGOs), industry associations, and social groups. In this review, we look at certification schemes in the forestry sector, as initiatives in this sector, in our view, are among the most advanced cases of natural resources sustainability labeling. Within the forestry sector, we have seen the emergence of quite demanding schemes that have attracted voluntary participation from a number of forest owners and forest companies. The certification model that originated in the forestry sector has inspired similar initiatives in other sectors, including fisheries, sustainable tourism, palm oil production, soy production, and park management (1–3). Studying forest certification schemes can provide important lessons about the achievements and challenges of nonstate governance of natural resources.

This article seeks to review what we know about the effectiveness and broader consequences of forest certification. A narrow definition of effectiveness would judge forest certification as effective if it contributes directly to resolving the problem it was created to address. We can then conceive the effectiveness of forest certification as the degree to which this instrument modifies on-the-ground practices in ways that are likely to reverse or alleviate environmental deterioration and socioeconomic harm resulting from forestry (4). This conception of effectiveness is commonly used in evaluations of environmental regime effectiveness (5, 6).

A distinction should be made between the direct effects of the institution itself and broader consequences flowing from institutional-formation efforts. Although investigating the former is an appropriate strategy for evaluating the institution, the latter provides a basis for exploring the broader consequences of problem-solving efforts or processes (6). Certification schemes may, for instance, have consequences not intended or anticipated by those who developed these tools, such as favoring large-scale over small-scale operations, owing to the benefits of economies of scale, and favoring developed-country producers over developing-country producers, owing to varying capacities to implement certification requirements. We are interested in both the problem-solving effectiveness of forest certification and the broader environmental, economic, and social effects.

The remainder of this review proceeds as follows. First, we provide an overview of forest certification, seeking only to offer details pertinent to the review's main tasks. This includes itemizing the key common and unique features

Labeling: the practice of marking products or services with a distinctive label to show consumers that they conform to specific requirements

Certification: a procedure whereby an independent third party issues a written assurance that a product, process, or service meets specific requirements

of the various forest certification schemes. We also review work that compares certification standards, including research that goes beyond the oft cited distinction between performance and procedural approaches. The next section turns to the questions of effects. It begins with a common measure of direct effects: areas certified by schemes and country and the number of chain-of-custody certificates. From these basic descriptive statistics, the review highlights the patchwork nature of certification's adoption thus far. Considerable work has been done comparing and contrasting the implementation of certification in various countries. We glean critical observations from this work to paint an overall picture of what is known to underlie these patterns. Finally, in this section, we discuss the works that examine changes to the management of certified forests.

In the closing section, the review turns to the broader implications of certification. It suggests future directions for research that address both the direct and indirect impacts of certification and other similar initiatives. This includes in-depth work that examines the intersection of private and public solutions to ongoing environmental and social challenges in forestry and other areas.

2. THE FORMATION OF FOREST CERTIFICATION SCHEMES

As a baseline for assessing the effects of certification schemes, a brief discussion of their origins is required. The creation of private or nonstate forest certification schemes was, in large part, a result of increasing concern among environmental NGOs and other stakeholders over global forest degradation, following irresponsible industrial logging and the failure of governments to tackle the problem. The refusal of the International Tropical Timber Organization (ITTO) to support NGO proposals to develop a forest certification and labeling system for tropical timber from sustainably managed sources convinced the World Wide Fund for Nature (WWF) that such a system would have to be developed by private initiative (7, pp. 74–75; 8). This conviction gained strength as a result of the lack of success, during the preparatory process for the 1992 UN Conference on Environment and Development (UN CED), of the aspiration to negotiate a legally binding global forest agreement. Forest-rich developing countries argued that a forest convention would be a trade barrier to their timber and forest products, and the negotiations stalled (7). At the UN CED, developing and developed countries agreed instead on the Forest Principles, which are general guidelines for the management of forests relating to economic, environmental, and developmental concerns. Because it is a set of nonbinding principles that do not clarify how conservation and utlization of forests should be balanced, the agreement has been viewed as legally and politically weak. By circumventing international forest policy negotiations, the perception was that forest certification potentially offered an alternative, fast-track route to sustainable forest management around the world (9–11).

The intergovernmental processes of the late 1980s and through the 1990s therefore were important for certification in what they did and did not accomplish. The lack of binding global forest principles gave environmental NGOs reason to seek an alternative solution, whereas discussions about forest management criteria and indicators served as a point of departure for standards setting in the private sector. Although the lack of progress on a global forest convention could be interpreted to set a low bar counterfactual from which to assess certification schemes, it is critical to recognize that the processes are closely intertwined. Hence, the absence of one clearly affects the dynamics in the other.

2.1. The Formation of the Forest Stewardship Council

In 1993, the Forest Stewardship Council (FSC) was officially founded in Toronto, Canada, by the WWF and other environmental NGOs, timber traders, indigenous peoples' groups, forest worker organizations, and other

Chain-of-custody: the path a product takes from its point of production through to the end consumer

ITTO: International Tropical Timber Organization

Forest Stewardship Council (FSC): a nongovernmental organization that sets forest management standards and accredits certification bodies to conduct forest management and chain-of-custody audits

High Conservation Value Forests (HCVF): an FSC term to delineate forests with environmental and social values of significant importance

stakeholders to globally promote sustainable forest management. More precisely, the FSC was formed to "promote environmentally appropriate, socially beneficial, and economically viable management of the world's forests (12). "Environmentally appropriate" meant practices that ensured the maintenance of "the forest's biodiversity, productivity, and ecological processes." "Socially beneficial" meant that local people and society as a whole would commit to long-term management of forests, thus guaranteeing future forest benefits. "Economically viable" meant that profits would be generated without jeopardizing "the forest resource, the ecosystem, or affected communities (12)." Thus, although commentators have since attached different aims to the organization, including a complete or primary emphasis on tropical forest loss and degradation (13, 14) or indigenous and forest dwellers' rights, the FSC formally sought to promote improved management of all the world's forests (15). The ITTO was the birthplace for the idea, but boreal and temperate forests quickly became part of the problem definition.

The FSC was legally registered as a nonprofit organization in Oaxaca, Mexico. The members of the FSC make up a General Assembly, which serves as its highest decision-making body. At its founding meeting, participants accepted a bicameral structure comprising a social and environmental chamber, with 75% of the votes, and an economic chamber with representatives from forest companies, forest owners, and the retail sector, holding 25% of the votes (16, 17). Before the first General Assembly meeting in 1996, the bicameral structure had been changed to a tripartite structure including social, environmental, and economic chambers (12, 15). Each chamber now holds one-third of the votes and has voting parity between stakeholders from developing and developed countries. The chambers each elect three representatives for a three-year term to the board of directors, which is accountable to FSC members. This structure is designed to ensure that no specific interests can dominate rule making (10, 15). Because FSC was an effort to work outside intergovernmental forest politics, state agencies cannot hold membership, although they have served in various advisory roles during standards-setting processes at the national or subnational level (18), and as of 2002, government-owned and -controlled companies may apply for membership in the economic chamber (19).

The FSC developed a global standard for its definition of well-managed forests; the standard includes 10 principles and 56 criteria, which cover key issues including tenure and use rights and responsibilities; indigenous peoples' rights; community relations and workers' rights; use of forest products and services; maintaining biodiversity and high conservation value forests (HCVFs); forestry planning, monitoring, and assessment; and planning and management of plantations. These principles and criteria are tailored to meet conditions in different countries through a process in which ecological, economic, and social stakeholders collaborate on a level playing field. Nationally or locally developed standards are approved by the FSC board of directors if they conform to the scheme's global principles, criteria, and decision-making rules (20).

Using the FSC label requires chain-of-custody certification, which involves tracking the origin of forest products all through the supply chain and guaranteeing that products meet specific content requirements. Initially, only products with 100% FSC content had access to the label (15). The rules have since been revised, gradually reducing the percent thresholds, introducing new restrictions delineating acceptable non-FSC content (18, 21), and developing an FSC label for 100% postconsumer recycled paper (22).

Although the FSC develops rules and accreditation requirements, audits are done by independent certification bodies. The process typically includes a preliminary assessment; on-the-ground field inspection by a team including professional foresters, biologists, and other experts; consultation with local communities; preparation of a preliminary assessment report by the certifier and peer review of the report;

discussion with the applicant; a final certification determination and issuance of a certificate; and annual follow-up audits (19, p. 71). To discourage favoritism and ensure consistency, FSC reviews selected audits by certifiers and can suspend and revoke certification authority if serious breaches of standards are uncovered (19, p. 72). The FSC also requires certifiers to publicly disclose audit results via a public summary report. On passing this hurdle, the company receives a renewable five-year FSC certificate and may sell the wood as certified. If forest companies or forest owners fail to correct serious certification standard shortfalls, they risk losing their certification. Accreditation began in 1996 and was originally conducted by the FSC accreditation unit. Ten years later, in March 2006, the FSC formed Accreditation Services International as an independent business entity overseeing the accreditation process for the scheme.

2.2. The Emergence of Producer-Backed Schemes

From the beginning, FSC has been challenged by a number of producer-backed forest certification initiatives. Many forest producers have objected to the institutional setup and design of FSC, in particular (*a*) the key role of WWF and other NGOs in its creation and (*b*) the ability of environmental and social interests to outvote economic interests. Producers have also objected to the stringency and intrusiveness of the FSC's environmental and social standards (11, 17, 18) and have expressed the belief that those who must actually implement rules for sustainable forest management (i.e., companies and forest owners) ought to develop the rules (18, 23). On the basis of this assumption, several countries' national forestry interest groups or industry associations responded to the FSC by forming competitive schemes (10, 11, 17).

In North America, producer-backed schemes took form as early as 1993 (18, 24–26). In 1993 and 1994, the American Forest and Paper Association (AF&PA), a national industry association in the United States, created the Sustainable Forestry Initiative (SFI). The AF&PA designed and operated the SFI and tasked professional foresters and other experts with developing sustainable forest management principles and implementation guidelines. Initially an industry code of conduct with mandatory self-reporting for association members, the SFI added voluntary third-party verification in 1998 (18, 24). In Canada, the Canadian Pulp and Paper Association (CPPA), now the Forest Products Association of Canada, along with other industry associations approached the Canadian Standards Association (CSA) about developing a forest certification scheme. This initiative was announced during the FSC's founding meeting in Toronto, clearly indicating the competitive stances it intended to take (10). The CSA adopted the sustainable forest management requirements in 1996 as the national standard for forest certification; the first forest company was certified in 1999 (27). Forestry interest organizations and national forestry authorities in Europe, as well as in several developing countries, have also created certification schemes, beginning with Brazil and later in Indonesia, Malaysia, Finland, Chile, and Gabon, among others (10, 28–30).

In 1998 and 1999, European forest owners' associations joined together to create the Pan-European Forest Certification (PEFC) scheme to facilitate the mutual recognition of national schemes and to provide them a common ecolabel. The PEFC Council, composed of national governing bodies primarily representing forest owner associations and the broader forestry community, approves national schemes if they are developed in conformance with the criteria, indicators, and rules of the umbrella scheme. In 2003, PEFC restructured itself and went global, changing its official name to the Program for the Endorsement of Forest Certification schemes while retaining the PEFC acronym. PEFC has since endorsed the Brazilian and Chilean schemes, and the Malaysian scheme is a member but not yet endorsed. With this expanding international membership, the PEFC has firmly established itself as a global competitor to the FSC. The

Accreditation: an assessment process that determines an individual or organization is qualified to conduct audits against a scheme's certification standards

SFI: Sustainable Forestry Initiative

Program for the Endorsement of Forest Certification (PEFC): a nongovernmental organization, which endorses national certification schemes that comply with its rules and procedures

Indonesian scheme, Indonesian Ecolabelling Institute (LEI), represents an exception among government- and producer-backed schemes in that it has chosen not to affiliate itself with the PEFC, but rather to develop a memorandum of agreement with the FSC (30).

2.3. The Stringency of Certification Standards

In part because the competition between PEFC and FSC involves gaining acceptance from market players, in particular larger wood- and paper-product buyers, considerable effort has been directed to assessing the differences across the schemes. Numerous reports and matrices now exist that compare schemes over a range of criteria (e.g., 31–33). Overdevest (34), for example, provides an excellent review of how comparative reports in the United States were used to pressure the SFI to continually change, narrowing the gap between its approach and that of the FSC. And although the gap has narrowed (18), there remain differences between FSC- and PEFC-endorsed standards, as well as differences among standards within each of these global umbrella schemes.

McDermott et al. (35) have identified the issue of "prescriptiveness" as one key area of difference, an issue related to perceptions of trust, distrust, and power (36). Nonproducer interests tend to prefer more prescriptive standards and policies as a means to increase control over distrusted producers. Producer interests, in contrast, prefer the flexibility to dictate their own actions (37). Hence, although certification standards have become increasingly similar in the scope of issues addressed, detailed comparisons indicate that, in the United States and Canada at least, FSC standards are still more prescriptive than those endorsed by PEFC (38). Differences in prescriptiveness can also be found internally in the PEFC and FSC systems, and these also may bear sociopolitical explanation. A comparison of certification standards and government regulations in the United States and Canada found that differences among FSC regional standards mirrored differences in the relative prescriptiveness of underlying government regulations (35).

These sociopolitical dynamics, and the resulting variation in standards and procedures, is of importance to effectiveness in two, somewhat contradictory, ways. On the one hand, the more stringent the standards, presumably, the greater the behavioral change among certified producers. On the other hand, producer desire for control and flexibility may lead to faster uptake of less stringent systems (11, 39). The next section looks at the outcome thus far of competition on certification's on-the-ground uptake.

3. FOREST CERTIFICATION UPTAKE

This section turns to the question of effectiveness. It first describes worldwide participation in the FSC and PEFC schemes and then offers explanations for the patterns that emerge.

Understanding these patterns requires accounting for adoption decisions because, just as states make choices of whether to sign and ratify international agreements (40), forest owners and companies choose to participate in certification schemes. Accordingly, what are perceived as improvements resulting from a scheme may have occurred for independent reasons (41), or more broadly, it is possible that only those producers that face minor compliance costs will opt in, raising questions about the net effects of certification initiatives. To properly assess effectiveness, we need to account for this selection problem. This should help determine whether factors influencing adoption are systematically precluding certain forest operators from participating.

3.1. Patterns of Adoption

The most regularly used short-run proxy for forest certifications' impacts is the uptake of schemes by producers (4, 11, 18, 24, 28). This is for good reason; without producer participation, any influence on practices will be indirect at best; and without a critical mass of producers, a scheme is unlikely to change widespread

producer practices in ways that lead to improvements in the biophysical environment and socioeconomic outcomes.

Measured by area certified, in November 2007, PEFC- and FSC-certified lands totaled nearly 300 million hectares (ha), or approximately 7.6% of the world's forest cover, 5.2% and 2.4% of the world's forest cover for the respective schemes. For forests allocated for production, the proportion certified jumps to 23% (42–44). Disaggregating by country and program reveals important patterns (**Figures 1** and **2**). Canada alone accounts for 40% of the area certified with PEFC endorsement; European and Scandinavia countries account for another 28%. Brazil contributes less than 1% to the PEFC total, which represents approximately 0.2% of the country's total forest cover. Likewise, Chile has certified a little over 10% of its forested lands, adding only 1% to the PEFC total. Although there are other schemes seeking PEFC endorsement (e.g., India and Malaysia), by and large, the PEFC activity continues to center in Europe and North America. Market penetration is even more focused; of the 20,296 PEFC logo users in the fall of 2007, over 87% of them were based in Germany and France, respectively 38% and 49% (42). However, PEFC now has a Tokyo-based promotions office, indicating that the scheme may soon have a presence in the Chinese and Japanese markets (45).

For areas that are FSC certified, Canada again secures the top spot with over 21% of the total as of November 2007, or 20.2 million ha (**Figure 2**). The Russian Federation contributes 18% (i.e., 17.5 million ha), and Sweden and the United States contribute an additional 10% each. Together, these four countries account for nearly 62% of all FSC-certified lands. Yet, with the exception of Sweden, which has 40% of its forest area certified by FSC, these large producers have certified small portions of their total forested land base. In Canada, 6.5% of all forests have been FSC certified and in the Russian Federation, only 2%. By contrast, although minor contributors to the total area, several countries have certified a large portion of their forest holdings. Four countries—Ireland, Croatia, Poland, and Latvia—have over 50% of their forest area certified. Another 16 countries have more than 10% of their forests certified with the scheme, ranging from Lithuania with 49% to Guatemala with just about 13%.

By November 2007, the FSC had also issued 7219 chain-of-custody certificates in 84 countries. Most are located in Europe and North America: The United States has 1116 certificates (15%), and the United Kingdom, Germany, and Switzerland combined have another 1786 certificates (25%). Unlike PEFC, FSC recently added a sizable number of chain-of-custody certificates in Asia. Japan and China together contribute 916 (13%) (46). Many of the Chinese certificates are to service FSC demand in Europe and the United States (45) because Chinese forest product exports to these markets have exploded, growing by 1000% between 1997 and 2006 for the United States and by almost 800% over the same period for Europe (47).

In total, for 2006, industrial roundwood production from certified sources—both the FSC and PEFC—neared 370 million m^3 (23% of the world's annual production); this had risen to 385 million in 2007 (24% of annual production) (45). Yet, only a small fraction of this wood reaches market carrying a logo. The reported exception is the Dutch market, where both the FSC and the PEFC have 10% to 20% market shares for labeled products. The FSC is strongest in the timber market, whereas PEFC has seen successes in labeling pulp and paper products (45).

Accomplishing this level of uptake in under two decades reflects a wide and rapid acceptance of forest certification. Still, assessing what these levels of participation mean for effectiveness is difficult. For one, as noted above, the standards across schemes and even within schemes vary. Consequently, a hectare certified in one country may not have the same ameliorative effects as a hectare certified in another. Before turning to these issues, it is necessary to examine the mechanisms that underpin the patterns of adoption.

3.2. Explaining Patterns of Adoption

Extensive research examines reasons for differences in cross-firm and cross-country adoption. Initial studies at the firm level were typically case studies gleaning lessons learned by first movers (48) or surveys examining the knowledge of, experience with, and attitudes toward different certification options among landowners (49–51); forest products producers (52–55); buyers, such as architects, homebuilders, and retailers (56–58); and end consumers (59–65). More recent case studies take a firm strategy angle, assessing the options available to firms and determining what choosing to certify will mean for a given business (21, 66, 67). Complementary are comparative firm-level studies seeking to directly assess and trace the reasoning behind different certification choices (68). Additionally, research has examined the technical challenges posed by schemes to smaller community operations, how system changes may enhance uptake, and what benefits further uptake can generate for communities (69–71).

Other work investigates adoption from a commodity supply chain perspective (72), treating the sector as the unit of analysis and assessing how the structure of economic transactions affects participation in schemes. This work highlights horizontal modes of diffusion, whereby firms at the same level in a supply chain seek collective solutions to a common problem (e.g., an industry-wide bad reputation) (26), and vertical diffusion, whereby a large firm dictates the terms of buying and selling arrangements up and down the supply chain (24). Several works underscored how this can transmit new standards and practices through supply chains (26, 69, 73, 74), yet there is far from consensus on the progressive benefits of these mechanisms, especially with respect to global-equity and development-oriented objectives (30, 75). A similar but distinct set of works investigates the development of certification within single countries or among a comparative set of countries and examines country-specific influences of market and political factors (10, 18, 25, 28, 29, 76–78). Each strand of work contributes to our current understanding of the varying adoption choices made by firms in the six ways discussed below.

3.2.1. Character of the forest operation. The size and ownership of a forest operation influence adoption choices. This influence generally works through the operation's goals. Government-owned forests likely have a mandate to balance extractive objectives against social and environmental objectives in a way that a publicly traded forest company will not. Nonindustrial owners, in a number of cases, are also influenced by a desire to maintain their independence, objecting in principle to outsiders telling them how to act on their land. This reaction underlaid the creation of the PEFC and is one important reason why certain nonindustrial owners have supported producer-backed programs in the United States, Finland, Norway, Sweden, and the United Kingdom (18, 77, 79). An operation's size also affects its vulnerability to public scrutiny and pressure, with bigness correlating with vulnerability (18). Small operations, by contrast, face higher costs of compliance owing to the high fixed costs of preparing for, paying for, and responding to a certification audit (69, 80).

3.2.2. Market and product characteristics. Niche and higher-end products are more amenable to differentiation strategies. Espach (28) explains that native tropical woods exported from Brazil carrying an FSC logo typically received 20% to 50% premiums; commodity goods available from other sources, including fiber board and composite products, by contrast, continued to compete on price. Kollert & Lagan (81), in a study of Malaysian-certified operations, uncovered prices for FSC logs between 2% and 56% higher than comparable uncertified logs; higher quality timber, particularly for export, attained the largest price differentials. Hayward Lumber, a California-based company, reported in 2003 that in limited cases luxury home builders would pay premiums for FSC products; low-cost operators, in contrast, were not willing to pay premiums

(67). Certain products also lend themselves to empowering suppliers over buyers. For instance, Finnish forest owners, working in concert, could more easily dictate what happened with certification because of their importance as a supplier of certain fine paper grades (79).

3.2.3. Trade dependence. Although the results are mixed (55), most work indicates that sending exports to Europe or North America increases the probability that an operation will certify (82). An export orientation was critical to the early support British Columbia companies gave the FSC (18), and it has served to secure premiums for certain products in Brazil, where companies exporting to Europe felt FSC certification was becoming a criterion for market access (28), and in Bolivia, where FSC-certified exports received premiums 5% to 51% higher than equivalent uncertified products (83). An export orientation was also a motivation for Mexican cooperatives to FSC certify; they hoped certification would enable them to compete in international markets in a manner similar to what they saw occurring for Fair Trade coffee producers (84).

Overdevest & Rickenbach (85), however, document how United States–based FSC certificate holders had high expectations about market access and premiums but have not realized these expectations in practice. Previous research on the United States found small premiums, in the range of 3% to 5% (86, 87). Yet, with increased competition between the FSC and SFI, certification has become more a market access requirement rather than a tool for eliciting premiums, greater product sales, or customer loyalty (68). In the case of countries facing pressure from imports, adoption of FSC certification has also been observed (18), for instance in the United Kingdom and Germany.

3.2.4. Associational structures. Strong, well-organized producer associations have worked to impede the progress of FSC certification in certain countries (18). Essentially, it is easier for a unified industry to stave off pressure for FSC certification through tactics such as forming a competitor scheme. Differences between the United States and Canada underscore how associations matter. In the United States, the AF&PA worked successfully to generate a national collective response, whereas in Canada, the CPPA had to initially turn to CSA for assistance. This difference in strategy, partially determined by the different associational systems, dramatically altered the choice set between FSC and producer-backed schemes in the two countries. By contrast, there are other cases, for instance Sweden, where a move to support the FSC from a few critical companies within an association produced the opposite effect, i.e., broad support and participation in the FSC rather than the creation of a competitor scheme (18). Dependence on export markets helps explain why all the large Swedish forest companies eventually choose the FSC, demonstrating the intersecting effects of factors influencing certification choices (18, 77).

3.2.5. NGO pressure. Just as the FSC was largely the product of NGO efforts, the continued involvement of and pressure from these actors has been critical to adoption decisions. Even though the FSC arose partly to offer an alternative carrot to the boycott stick, this did not mean NGOs curtailed their direct efforts to change firm-level forestry practices once the FSC was established. The action of these groups has taken several forms. First, WWF coordinates groups of companies around the world that commit to seeking forest products coming from independently certified forests. The first of these groups formed in the United Kingdom in 1991 and created an immediate impression that market demand would exist for any producer willing to undergo FSC certification (18). Similar buyer groups, which became part of what is now known as the Global Forest and Trade Network (GFTN), were established in other countries in the following years (88, 89). Initially only on the demand side, the GFTN presently includes producers and buyers that operate in over 30 countries. Combined they control 27 million ha of forest of which 12 million are certified, trade forest products with

GFTN: Global Forest and Trade Network

a volume of nearly 200 million m^3 of roundwood equivalent per year, and have ~$45 billion in annual forest product sales (90).

Second, certain groups focus their efforts on convincing companies to certify. Companies may be targeted directly. They can receive pressure indirectly just through association with general controversy over forest practices. Or they can receive pressure from their buyers, who may themselves have been the target of activist pressures (68). Home Depot was the target of campaigning by the Rainforest Action Network, among others, for two years prior to its 1999 announcement committing the company to avoid certain controversial species and to have a preference for third-party-certified wood (18). ForestEthics has been another champion of market pressure. Recent targets included office supply retailers, such as Staples and Office Max and the catalog industry, in which Victoria's Secret received considerable attention (3). In general, the spread of forest certification schemes has been driven more by NGO targeting of supply chain companies and less by end-consumer demand for certified products (91, 92). Work on these dynamics also unpacks the critical role of U.S. philanthropic foundations both as sources of funds for the FSC but also as the critical backer and coordinator of NGO efforts pushing producers to certify (93).

For producers, FSC certification has been one strategic response to this pressure. Yet, as noted above, the pressure has also motivated companies to collectively respond with their own schemes. Thus, although NGO activities are viewed as assisting the FSC, pressure alone is not a sufficient condition for company participation (21, 68). Disaggregating the NGO community also exposes differences in approach and in ideas about the underlying problems requiring attention. This means producers may feel pressure to change several facets of their behavior, only part of which may be remedied by certifying with the FSC (e.g., protecting old-growth forests versus improving management of production forests). And although most environmental NGOs have welcomed FSC certification, some are critical and claim that the scheme will not have the promised effects. The Rainforest Foundation, a nonprofit dedicated to rainforest protection, penned a voluminous report alleging that FSC certification is hampered by inadequate audits and lack of effective control mechanisms (94). The FSC, with support from the WWF, responded by agreeing that there were areas for improvements but that many of the allegations were dated or inaccurate (11, p. 89). The Rainforest Foundation still does not recommend tropical timber approved by any certification scheme for fear that this simply "greenwashes" unsustainable forestry practices. Similar backlashes against the potential that certain operations would achieve FSC recognition—for instance J.D. Iriving in the Canadian Maritimes (95), Western Forest Products in British Columbia, Canada, and Mendocino Redwood in California (18)—were all important in elucidating how FSC was, at times, not enough to prevent further scrutiny and criticism from NGOs (21).

3.2.6. Special role of government. Governments are also central to the development of certification both on the supply and demand sides. Several governments have welcomed the FSC and other schemes by signaling that these are desirable and important private sector initiatives (18, 77, 96). The FSC has been supported by several developed countries that saw voluntary certification as a way to circumvent trade rules, which otherwise prevented them from imposing tropical timber import restrictions to control illegal and irresponsible logging. For instance, after Malaysia and Indonesia threatened to challenge the General Agreement of Tariffs and Trade (GATT) legality of Austrian rules restricting tropical timber imports, the Austrian government choose to give the FSC funds it had budgeted for its import restrictions (97). Government assistance agencies have also covered auditing costs for producers. Swiss and U.K. governments along with WWF Mexico, for instance, covered initial audit costs for several Mexican forest cooperatives; German and U.K. agencies for technical

cooperation and certain U.S. foundations continued to fund audits from 1995 to 2001 (84).

Many government lands have also been certified. Several American states have obtained FSC, SFI, or both certifications for state public lands; indeed, 65% of U.S. FSC-certified lands are classified as public. In the United Kingdom, the government's Forest Enterprise has FSC certified approximately 785,000 ha, nearly half of the U.K. total. As noted above, in recognition of governments' role as landowners, the FSC changed membership rules in 2002 to allow government-owned and -controlled companies to apply for membership in its economic chamber (19).

Governments have also been critical on the demand side. In the European Union, five countries have developed and implemented specific public procurement policies for the purchase of timber from legal and sustainable sources: the United Kingdom, Germany, France, the Netherlands, and Denmark. Japan also recently revised its government procurement policy for timber from legal and sustainable sources. These governments have identified certification by a credible scheme as a means to verify compliance with public procurement requirements for legal and sustainable timber (98). Public procurement policies not only facilitate market uptake, but they also help enhance the rule-making legitimacy of several forest certification schemes. By approving specific certification schemes, governments signal that those schemes are legitimate and credible governance systems on which private procurers and other buyers can also rely (23, 91).

Finally, governments set public forest policies and serve as alternative venues of policy deliberation to those available in certification schemes. Many studies highlight how forest owners and operators who face strict government regulations find it easier to certify because they already meet high standards (14, 69, 99). Thus compliance costs will be lower relative to competitors in areas with few regulations and even more so when regulations are not enforced. Certain early adopters reported making minimal changes to their operations in order to secure certification (21, 28). Still, high regulations alone are not reasons to certify; companies may opt not to certify, reasoning that meeting government regulations is sufficient for their operations (68). Also, because of how standards are localized, operations in very similar forest ecosystems may face quite different standards. FSC standards in the Canadian Maritimes took a more stringent approach to addressing biocide applications than did FSC standards in the U.S. Northeast. Thus, even if higher standards exist in the Maritimes (95, 100), the region's operators may still find certification challenging.

All of the above factors to some extent influence the adoption decisions of producers, but this is not an exhaustive list. Nevertheless, it underscores that participation decisions may be unrelated to the potential on-the-ground results of a certification assessment; indeed, they may be negatively correlated (high performers select in while low performers do not). Exceptions include when foundation or government financing serves to offset audit costs that could otherwise prevent producers from participating. Bearing this in mind, the next section reviews what we know about behavioral changes made by audited operations. Unfortunately, owing to the limits of existing research, the analysis focuses mainly on FSC certifications.

Corrective action requirement (CAR): identifies changes a producer must address before being certified (precondition) or quickly after being certified (condition)

3.3. The Effects of On-the-Ground Auditing

By and large, companies that certify have had to change aspects of their management. This conclusion is supported by numerous studies of corrective action requirements (CARs) issued by certifiers. However, the types of changes are not uniform. Early reviews of CARs found that most changes pertained to documentation and monitoring as opposed to on-the-ground practices (69, 101). For instance, Rametsteiner & Simula (13, p. 95) noted that improvements were mainly with "internal auditing and monitoring in forest organizations." Concerning on-the-ground impacts, they avoided premature conclusions, suggesting only that audits likely

made forest managers more sensitive to issues such as natural regeneration, thinning operations, reduced-impact harvesting, forest road construction, use of chemicals, and relations with society (13, p. 95). They also found high variability in the quality of auditing between different certification schemes and between different auditors under the same scheme. More recent studies in the United States (102) and Sweden (103) also found a predominance of "system elements" (102) as requirements specified by CARs. For the U.S. study, a sample of 80 SmartWood audits revealed that 94% required improved management plans, 79% required enhanced monitoring, 71% dealt with inventory issues, and 69% involved forest mapping activities (102). In terms of the issues addressed, both the Swedish and U.S. studies found significant attention to ecological issues. In Sweden, two-thirds of more than 400 CARs, issued from 1996 to 2001, addressed ecological issues, a quarter concerned social issues, and less than two percent addressed economic issues such as productivity and yield (103). The U.S. study also found that 79% of operations had to change practices around sensitive sites and HCVFs, and 63% needed to address threatened and endangered species, and woody debris, snags and legacy trees (102).

Similar analyses have been applied in several developing-country studies, with similar results. However, in Brazil (28), Bolivia (83), and Mexico (84), results indicate that audits also gave more regular attention to compliance with laws and regulations of workers' rights. Corroborating these case study findings, a stratified random sample of 129 SmartWood audits (stratified by regions: South America, Central America and Mexico, Asia, New Zealand and Australia, United States and Canada, and Europe) showed that operations in less-developed countries were statistically more likely to have conditions on communication and conflict resolution with stakeholders, neighbors, and communities; training; worker safety; nontimber forest products; and worker wages and living conditions than operations in developed countries (104, p. 22).

These findings indicate that practices are changing as a consequence of FSC audits. Nevertheless, it is possible that those involved are already the highest-performing operators (99). The data on adoption patterns show that certified lands are skewed in favor of temperate and boreal forest, indicating that forest certification has spread primarily among producers who face relatively low costs of participation. To conclude, we do see evidence that FSC certification has changed practices of participating producers, but patterns of adoption continue to raise questions about effectiveness.

Although certification did mainly intend to improve the management of audited operations, Gullison (99) suggests there is value in considering whether it has either alleviated pressure on high conservation-valued forests or reduced pressures for deforestation. Thinking about these ancillary effects helps determine what role certification plays in landscape concerns for forest conservation.

Gullison (99), in 2003, drew pessimistic conclusions about the benefits of certification as a tool for alleviating pressure to log HCVFs. Have things changed? Many more countries now have certified forests, including some in the tropics. Yet the selection problems identified above still apply, leading to the worrying possibility that those operations achieving certification are not the worst offenders. There are two considerations here. First, whether the operations certifying are required to improve their attention to HCVFs. And second, what the patchwork of adoption means for protection of HCVFs at the landscape level.

With the first point, the above-noted work on CARs shows that forest operations are required to address management of HCVFs. The study of SmartWood audits around the world revealed that 62% had such stipulations relevant to HCVFs, with the "identification, conservation and protection of these areas" as typical requirements (104). With the second issue, there is broad recognition that certification cannot be the tool for addressing protection at the landscape level. Rather, government-sanctioned protected areas, the curtailment of

illegal logging, and perhaps private conservation agreements need to be part of the solution (105, 106, p. 142–67). Moreover, there is a perceived trade-off between the conservation gains occurring on FSC-certified lands and the landscape-level patterns of protection. Without a commensurate reduction in demand for forest products, too much protection on an individually certified tract, which leads to reduced outputs, can mean higher pressure for extraction on noncertified lands. This logic has led to arguments that reduced standards for certified plantations may help conservation rather than hinder it (105). The broader point is, however, that an audit can uncover areas of improvement at the forest unit level, but landscape-level planning is necessary to address concerns such as the management of large predators requiring millions of hectares of contiguous habitat and the appropriate placement of productive plantation forests versus areas for ecological protection (107). This is underlined by challenges raised by wildlife biologists about certification schemes. They have noted the lack of attention to wildlife conservation (108, 109) and the serious challenges in developing useful criteria to guide managers in appropriately conserving these values (110). These issues of scale are a significant hurdle in using a certification tool to address environmental problems that are rarely contained within a single forest, again highlighting how the intersection of public and private initiatives is a critical area for future research.

In regard to reducing pressure for deforestation, researchers have also been skeptical about certification's potential impacts (83). Certification provides an inadequate counterbalance to larger economic incentives for land-use conversion. Indeed, Gullison (99, figure 4) plotted the proportion of a country's FSC-certified forest lands against per annum net change in forest cover and found that most FSC certifications up to 2002 had occurred in countries with no annual net forest losses. From this, he concluded that "forest certification is not a viable conservation strategy to counter deforestation." **Figure 3** updates this analysis on the basis of PEFC- and FSC-certified areas in November 2007 (42, 44) and with per annum forest change data for the period 2000 to 2005 (43). This figure reveals that the FSC has made notable inroads in countries where per annum losses of forests occurred in the 2000 to 2005 period. The scheme has now certified operations in 31 countries with annual net losses of forest cover. Bolivia has 3% of its forest lands certified and yet continues to lose forest cover each year; ~135,200 ha/year of forest were estimated to have been converted from primary forests to other land uses for the period 2000 to 2005 (43), with a total net loss of 270,000 ha/year. Guatemala had nearly 13% of its forest lands FSC certified while continuing to lose 1.3% of its forest area per annum, approximately 54,000 ha/year (43). By contrast, PEFC is in about the position the FSC was five years ago in terms of the relative area of developing-country certification. The scheme has certified virtually no lands in countries with annual losses of forest cover; only Brazil and Australia lost forests between 2000 and 2005 (–0.6%/year and –0.1%/year, respectively) while also having areas certified under PEFC-endorsed schemes.

Even still, it is hard to conclude anything from this; more research should explore the direct connections between certification and pressures for conversion. There is also the well-recognized fact that conversion is only one part of the problem and forest degradation is another (111). Net changes in forest cover obscure two important challenges. First, planting forests to replace harvested primary forests can be similar to replacing an apple with an orange; planted forests typically include only a subset of the species originally on a site (112). Second, net changes in closed forest cover measure whether or not a forested area is covered by forests (defined as 40% forest cover according to the UN Food and Agriculture Organization). Until the 40% threshold is surpassed, a forest will remain for definition purposes, a forest. To what extent it is in a degraded state is another matter.

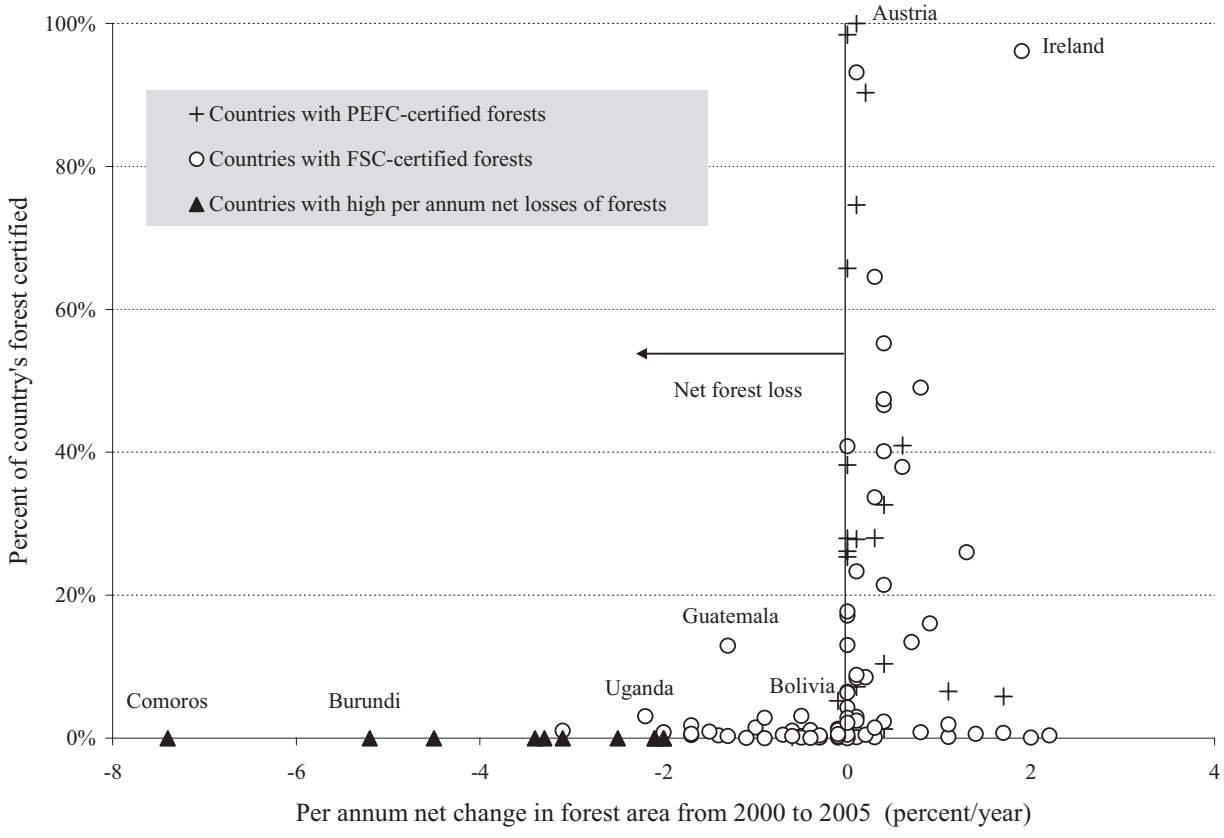

Figure 3

Areas FSC and PEFC certified as percentage of national forest cover versus per annum change in forest cover for 2000 to 2005. Sources: UN Food and Agriculture Organization (43), Program for the Endorsement of Forest Certification (42), and Forest Stewardship Council (44).

4. BROADER CONSEQUENCES OF FOREST CERTIFICATION

The emergence of forest certification schemes has not occurred in a vacuum. The FSC founders turned to the International Federation of Organic Agriculture Movements (IFOAM) and the International Union for Conservation of Nature and Natural Resources as organizational models for the FSC chamber system (10); schemes under the PEFC umbrella, by contrast, drew more extensively on government-sanctioned criteria and indicator processes (18, p. 13–15, 51, 106, p. 127). Such linkages, facilitated by network ties that are growing tighter (113), have been an important facet of the creation and strength of certification. In this section, we review the broader implications of certification, looking beyond the instrument itself.

4.1. Positive and Negative Unintended Effects

Probably the most significant unintended outcome of the creation of the FSC was how producers around the world responded by creating their own national certification schemes. Whether this is viewed positively or negatively depends in large measure on one's perspective of the alternative outcome. There are many groups that publicly criticize the producer-backed schemes, in a manner, as noted above, that Overdevest (34) argues is a strategy to leverage change instead of an

absolute belief that these schemes lack merit (see also Reference 18). In this view, the FSC had both the direct effect on the management of participating companies and an indirect effect on those participating in producer-backed schemes who were continually under pressure to raise their standards. Had the FSC not developed, the form certification schemes took could very well have been a voluntary version of the nonbinding forest principles negotiated at the UN CED in Rio. In November 1992, an ITTO-commissioned report written by the London Environmental Economics Center was released. It dealt with incentives for responsible tropical forest management, and instead of supporting a global initiative similar to the one conceived by FSC supporters, it advocated country-level labeling schemes (7, p. 72–75, 8, p. 171). Thus, without the FSC, it is unlikely producer-backed competitors would have widely emerged. Had schemes developed at all, they probably would have formed on a country-by-country basis. A question this raises is whether or not the selective adoption of certification, given the development of the FSC, surpasses this counterfactual country-level pattern of initiatives.

There are also negative sides to the competition. In particular, the resources expended to certify operations and to support the various schemes' managerial structures could have been used for other ends. Certain commentators question the return on these investments, suggesting that we should carefully examine whether money spent on certification could not achieve more extensive forest conservation through other means (99). Moreover, even though the FSC was established to encourage improved forest management in all the world's forests, the disproportionate certification of temperate and boreal forests was not necessarily intended or anticipated.

This has clear implications. Developing countries increasingly see labeling as a de facto barrier to trade and have been quick to voice their concerns in World Trade Organization (WTO) deliberations, particularly those by the Committee on Trade and Environment (114), and within other intergovernmental organizations such as the UN Conference on Trade and Development (115, 116). Certification and labeling schemes are essentially voluntary process and production methods schemes. WTO provisions directly related to labeling have been included in the agreements on Technical Barriers to Trade (TBT) and Sanitary and Phytosanitary Measures. Although the latter agreement primarily deals with food safety labeling, the TBT agreement potentially restricts the scope for natural resources sustainability labeling. Single-issue labeling, such as dolphin-safe tuna, has been brought before the WTO (GATT) (117–119), and although the dispute's panel report was never adopted, it did find that the U.S. voluntary dolphin-safe label was acceptable under GATT Article I:1 (41). Hence, in principle, the WTO accepts voluntary and nondiscriminatory labeling for environmental purposes. Still, the status of voluntary multiple-criteria forest labeling schemes has yet to be put to the test.

This highlights an underlying trade-environment tension within the certification arena. International standards are not neutral; they secure advantage for certain players and disadvantage for others. As a consequence, first movers who shape the rules can tailor the provisions to match their technical and operational requirements, leaving late movers with higher switching costs (120). According to Rotherham (121), this can seriously disadvantage small and medium enterprises in developing countries where low labor costs and low capital investments may serve as the basis of an operation's cost advantage in the market (see also Reference 115). Requirements for equipment upgrades and fees for technical advice, especially when both are not available on the domestic market, work to increase production costs. With certification schemes, standards are tailored to the specific national (or subnational) context. Nevertheless, the pattern of adoption detailed in the previous section highlights the continued challenges of including operations that face high technical and financial hurdles.

A clearer connection is made between the strategy of seeking mass-market uptake and the constraints facing smaller operations (75, 122). Big players need big volumes, which are harder for smaller operations to provide. The economies of scale in certification assessments have spurred continual efforts to form specialized programs to reduce these barriers to entry and to fit assessment procedures to the technical and informational capabilities of smaller operators (75, 80). In part, this was a reason why PEFC formed, and it remains a reason that the American Tree Farm System certifies small operations and that the SFI is directed to larger operations. Yet these initiatives have not assisted producers in developing countries.

Certification has also had interesting effects for public policies. Espach (28) documents how FSC certificate holders, in order to gain their certificate, had to comply with government laws that were largely unenforced. One company had to build a storage unit to hold chemical packaging materials because local waste disposal services and chemical companies were not providing legally required treatment facilities. Another company had to register on a legally mandated list that was not even in existence; the local authorities created it to allow the companies to meet their FSC obligations.

Finally, probably more apparent than in any other segment of the forest sector, there is the challenge of competition from substitutes. This issue is apparent in the U.S. Green Building Council's recent discussions about credits for certified forest products (123). The key issue involves how to compare the environmental impacts of certified wood from different schemes, uncertified wood, and rapidly renewable biobased products, such as bamboo. Although these discussions are ongoing, the underlying point is that greater scrutiny on forestry practices can have the unintended effect of making them appear environmentally unfriendly relative to other products just because these alternatives have not been publicly scrutinized.

4.2. Spillover Effects

When the FSC was established in the early 1990s, interest in labeling and certification was taking hold. There were numerous consumer awareness initiatives relevant to forestry and other sectors. This included the 1991 publication of the U.S. Council on Economic Priorities' first edition of *Shopping for a Better World*, a guide meant to empower consumers with information on the ethical dimensions of the products bought in their daily lives (124). Certification schemes were a tool deployed in a number of different settings at this time. Some had largely independent roots. Labor standards and forestry certification began as separate processes; those working on the respective schemes had little knowledge of what was happening in other sectors (97). Other certification initiatives were clear examples of copying: The Marine Stewardship Council (MSC) was a product of work by Unilever and the WWF, which sought to model a fisheries sustainability label after the FSC (125). WWF, the Rainforest Alliance, and others, such as auditors including Société Générale de Surveillance, known as SGS, have gone on to be critical players in carrying facets of the certification idea to many other sectors, such as parks management, sustainable tourism, the marine aquarium trade, palm oil production, and soy production (1). But in all cases, the background interest in consumer empowerment, or the individualization of environmental responsibility (126), and in voluntary approaches to environmental problems was a framing feature of the period.

The effects of certification have also worked to foster an entire subsector of activities that did not previously exist. Auditing, of course, is the most obvious. But more importantly, those groups, concerned about the patchwork of adoption both in terms of lands certified and shelf space for products, have been working in a number of capacities to help further the aims of forest certification. The SmartWood program, for example, was the first accredited certifier to work on Resource Manager and group certification models with the hope of reducing the cost

and technical barriers facing smaller operators. These approaches subsequently became official policies of the FSC in 1998 (127). More recently group chain-of-custody certification has been introduced, and in 2002, the FSC began its Small and Low Intensity Managed Forests program, with the hope of further reducing technical and cost barriers to the participation of this group (75). As well, the WWF's work on the GFTN is an example of work seeking to further the aims of certification. More peripheral but still significant are organizations such as the Tropical Forest Trust, set up in 1999 to help bring producers toward the ultimate goal of FSC certification (128).

In 1997, the World Bank and WWF announced an alliance, renewed in 2005, to promote forest certification and forest protection, particularly in developing countries. The Bank's commitment to certification demanded that it take a clear position on the standards that it would accept. These standards are set out in its operational policies on forests (129). Although the World Bank states that it does not favor any particular certification scheme, the requirements set out in its operational policies on forests are remarkably similar to the FSC principles and criteria (106). Officially, the operational policies on forests is an internal reference guide for World Bank managers, but the Bank can transmit its policy to countries to which it lends and, in so doing, promote the FSC (129).

4.3. Long-term and Slow-Moving Effects

The establishment of the PEFC was not only motivated by the need for a common and recognizable ecolabel for national certification schemes, but also by recognition of the benefits of harmonizing national schemes within a common framework. Harmonizing efforts are partly attempts to adapt schemes to the international trade regime and to reduce the likelihood of challenges that national schemes are incompatible with the TBT agreement. This may also help explain the key role the FSC played in creating the International Social and Environmental Accreditation and Labeling (ISEAL) alliance in 1999. The founders and members of the alliance are eight organizations: the FSC, MSC, Marine Aquarium Council, Rainforest Alliance, Social Accountability International, IFOAM, International Organic Accreditation Service, and Fairtrade Labelling Organizations International. The goals of the alliance are to promote the growth of the member organizations and to increase the compatibility between the members, something that could be seen as a harmonizing effort to enhance the international recognition of these schemes as facilitators and not barriers to trade (130).

ISEAL: International Social and Environmental Accreditation and Labeling

IAF: International Accreditation Forum

Efforts to gain international recognition for nonstate certification schemes have not been limited to creating umbrella organizations and formal alliances. Both the FSC, through the ISEAL alliance, and PEFC have approached the International Accreditation Forum (IAF) and applied for membership (106, p. 133). Established in 1986, IAF is a worldwide association of national accreditation bodies, which also has allowed associate membership to certain international certification and accreditation bodies.

Although IAF rejected FSC's application for recognition as part of the ISEAL alliance and turned down an application of ISEAL for associated status, it accepted PEFC as an associate member in March 2004. Part of the explanation for this outcome may be that both PEFC and IAF are dominated by business interests and that they therefore represent the same constituencies (106, p. 133), but it is probably equally important that PEFC has succeeded in its strategy of establishing itself as a mutual-recognition body aimed at harmonizing national standards and certification rules. Its transition from a European umbrella to a global mutual-recognition body was partly driven by the ambition to include developing countries in the scheme and to not violate WTO rules.

This is by no means a static process, however. Although these macroinstitutions may constrain certification programs in the short term, the causal arrows could flip in the longer

term. ISEAL's standard-setting practices refer to and build from the ISO/IEC Guide 59 "Code of Good practice for Standardization" and "WTO Technical Barriers to Trade (TBT) Agreement Annex 3 Code of Good Practice for the Preparation, Adoption and Application of Standards" (131), but now the ISEAL code itself is being referenced as a benchmark for good practice. Hence, ISEAL, over time, may develop greater influence over the directional change of macroinstitutional constraints.

5. CONCLUSIONS

The development of certification schemes in the forest sector is neither an isolated event nor an inconsequential process. The certification model now exists in numerous sectors, covering an ever-expanding suite of production processes. This review sought to glean lessons from the forest sector to elucidate the state of extant research while also contributing to growing understandings of this instrument's potential across sectors. We discussed features of forestry schemes and the main competitive split that pitted the FSC against schemes now typically housed under the PEFC umbrella. Although not exhaustive, these details served as a foundation from which to explore the direct effects and broader consequences flowing from the emergence of these schemes.

Within forestry, land areas certified and numbers of chain-of-custody certificates, crude measures of impacts as they are, illustrate the dramatic growth of forest certification in the past 15 years. Nevertheless, we noted and discussed why selection problems mean simple measures of uptake are inadequate for accurately assessing impacts. Although audited operations have been required to change practices to participate in schemes, patterns of adoption continue to raise questions about effectiveness. Similarly, we evaluated ancillary effects for landscape concerns about forest conservation and loss. Audited operations were shown to have been required to address the protection of HCVFs, yet extant research is skeptical that certification can play a significant role in reducing pressure for deforestation or assisting forest conservation goals at the landscape level. Given the data available, it is difficult to draw strong conclusions; future work should explore the direct connections between certification and pressures for conversion.

In considering broader consequences, we discussed how the competition between schemes has been viewed from the perspective of effectiveness. Though producer-backed schemes reduce possible participation in the FSC, upward pressure on these schemes has extended the influence of certification more broadly. Implications of certification for developing countries' market access were highlighted as an emerging issue of debate and concern. Much remains to be determined regarding the application of international trade law to multicriteria environmental and social labels. The emergence of certification schemes has been discussed in relation to its fit with existing structural constraints, such as those delineated by trade rules; however, causation might also be reversed, with certification schemes having power to change the course of macrostructural constraints. This remains an area of active engagement for schemes in the forest and other sectors, and careful attention to these developments will be critical for further research understandings.

Where does this leave us? This article, through summarizing existing work on effectiveness, identifies a number of areas for productive future research. With respect to on-the-ground impacts, a critical area of study is the linkage of certification to public and private efforts to reduce deforestation and pressure on HCVFs. Placing certification in the broadest context of indirect spillover and long-term effects, more research is needed on certification's intersection with governmental, intergovernmental, and civil society initiatives to address intersectoral issues related to land use and climate change. Such topics include avoided deforestation, biofuel production, green building, and other challenges related to the impact of production and consumption on the full global balance of natural resources.

SUMMARY POINTS

1. Certification schemes have emerged in recent years to become a significant and innovative venue for standard setting and governance in the environmental realm. Those in the forest sector are among the most advanced and thus are useful to explore.
2. An assessment of impacts needs to consider both the direct effects and broader consequences, including longer-term influences, to accurately determine what certification has accomplished.
3. Adoption decisions are fundamental to assessing effects. We need to know why producers certify before we can know to what extent certification is having independent and positive effects for behavioral change. Extant research shows that adoption choices are influenced by the character of the forest operation, market and product characteristics, trade dependence, associational structures in the forestry sector, NGO pressure, and government support.
4. Data on adoption patterns show that certified lands are skewed in favor of temperate and boreal forests, and this continues to raise questions about the effectiveness of forest certification.
5. Examinations of corrective action requirements (CARs) issued by certification bodies indicate that forestry practices are changing as a consequence of forest management auditing. This work also shows that forest operations are being required to address management of HCVFs, but research is skeptical of the potential of certification to reduce pressure for deforestation or to assist forest conservation goals at the landscape level.
6. In assessing broader consequences, studies need to look beyond the instrument itself to understand the positive and negative unintended consequences, spillover effects, and longer-term and slow-moving effects that flow from the emergence of the certification innovation.

FUTURE ISSUES

1. With respect to on-the-ground impacts, a critical area of study is the linkage of certification to public and private efforts to reduce deforestation and pressure on HCVFs.
2. More research is needed on the economic, political, and social factors that facilitate or hinder the spread of certification in forest-rich developing countries.
3. More research is needed on certification's intersection with governmental, intergovernmental, and civil society initiatives to address intersectoral issues related to land use and climate change. Such topics include avoided deforestation, biofuel production, green building, and other challenges related to the impact of production and consumption on the full global balance of natural resources.

DISCLOSURE STATEMENT

Auld is a member of the Forest Stewardship Council's environment chamber; McDermott is a member of the Forest Stewardship Council's social chamber.

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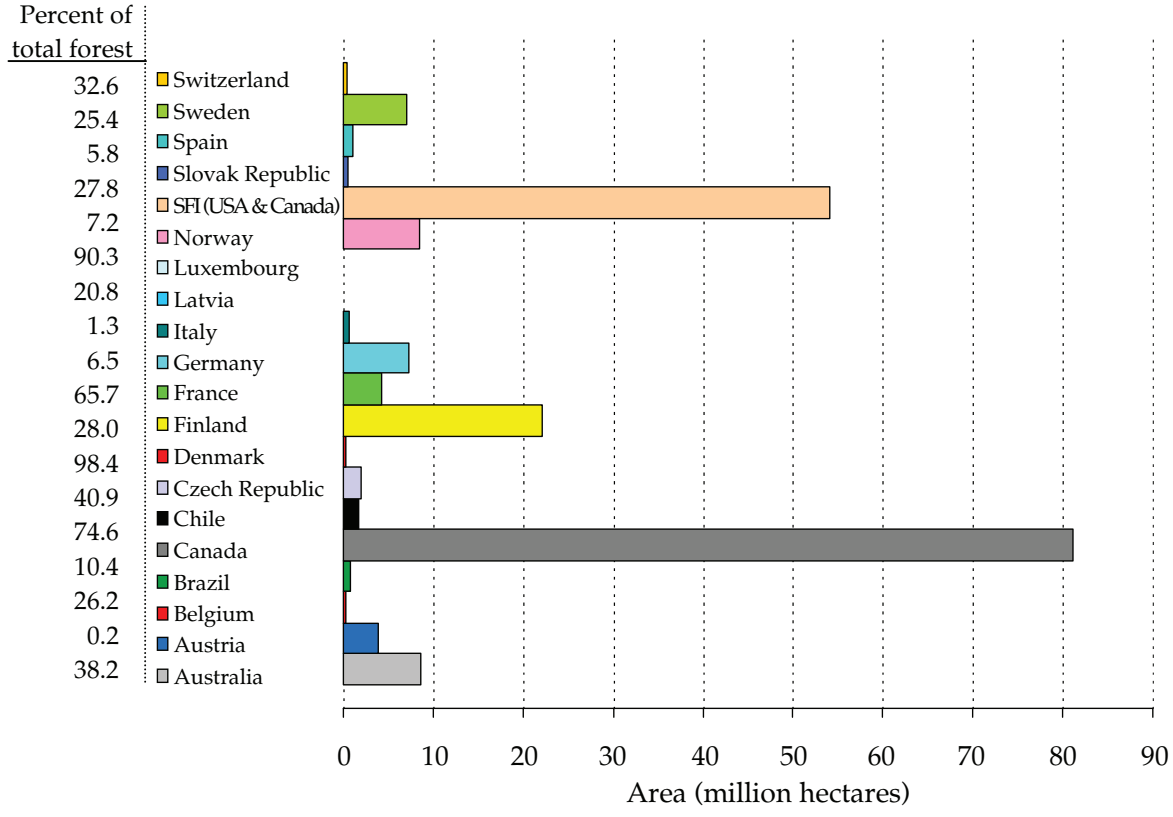

Figure 1

Program for the Endorsement of Forest Certification (PEFC)—certified areas by country and areas as a percentage of total national forest areas. From the PEFC (42) and the UN Food and Agriculture Organization (43). (The 7.2% in the first column is for U.S.-certified lands, i.e., 21,871,119 ha.)

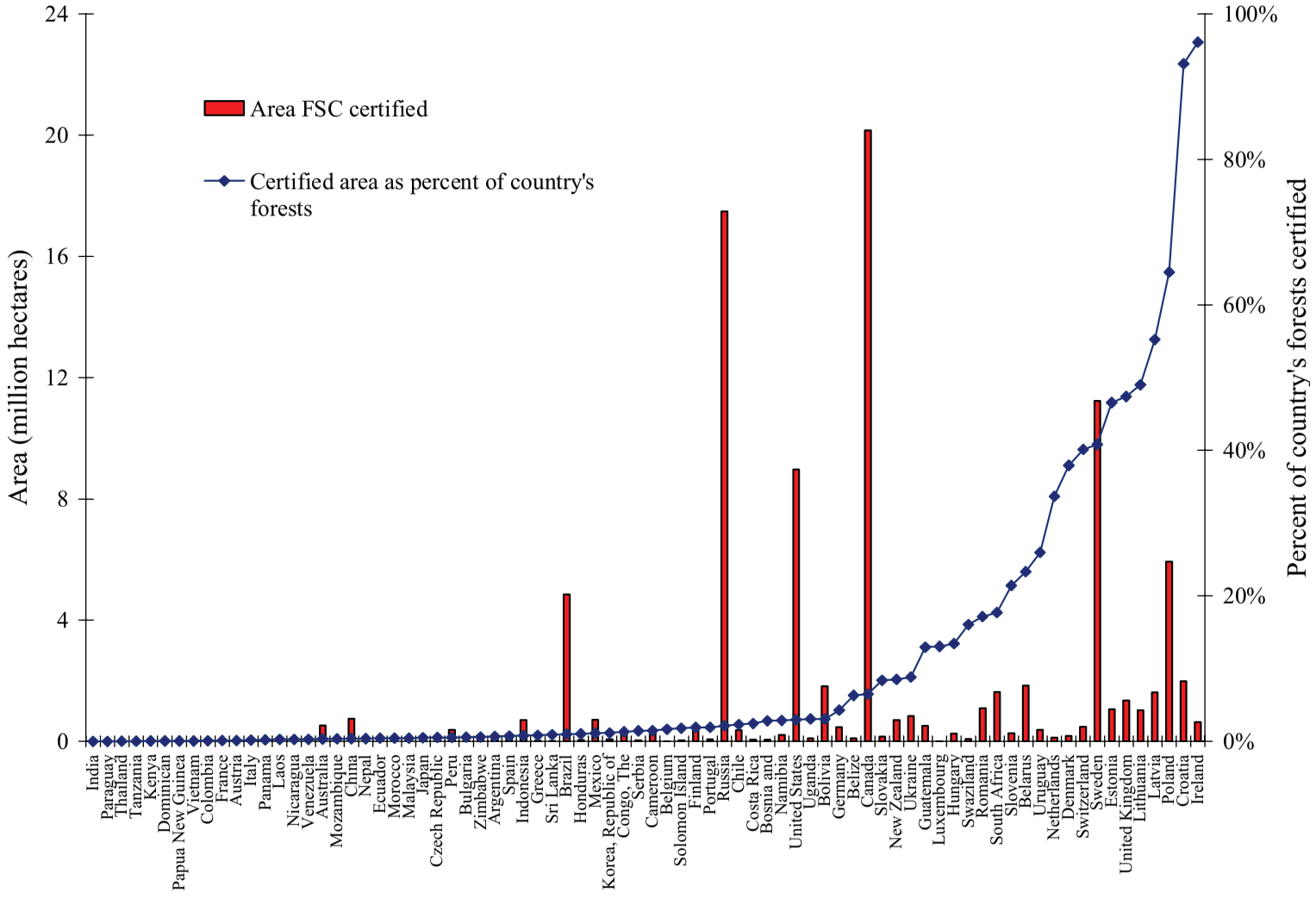

Figure 2

Forest Stewardship Council (FSC)—certified areas and as percentages of a country's total forest lands from the FSC (44) and the UN Food and Agriculture Organization (43).

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