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REVISIONES

"Old" and "new" forest governance for sustainable forest management: an updated review

"Vieja" y "nueva" gobernanza forestal para el manejo forestal sustentable: una revisión actualizada

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ABSTRACT

Sustainable forest management (SFM) is a construct that entails the use of forest resources by multiple actors in a way that avoids their degradation and depletion. Achieving SFM has been a central concern for most countries in order to address deforestation and unsustainable forestry practices. The aim of this review was to analyse traditional or "old" as well as "new" forest governance approaches that have been employed by state regulators and private actors, in terms of their main characteristics and implications for SFM. Classical forest governance, in which state actors predominate, and their most relevant policy instruments such as command-and-control and economic approaches, have not been sufficient to achieve SFM goals due to their lack of credible enforcement mechanisms. Therefore, new types of forest governance, many grouped under corporate social responsibility (CSR) and industry self-regulation (ISR) concepts, arose to address these limitations. Most of them are characterised by the predominance of non-state actors in their rule-setting and enforcement. On the other hand, community-based forest management (CBFM) has also grown in popularity in the last few decades as a policy option in the new forest governance model. However, the effectiveness of a particular policy instrument in addressing sustainability issues has depended on the specific context in which a particular policy instrument is developed. Overall, new forest governance policy instruments have not replaced traditional policy instruments. Rather, they have complemented them, particularly through their enforcement mechanisms, in their efforts to achieve collective sustainability goals for the benefit of the entire society.

Keywords: sustainable forest management, forest governance, corporate social responsibility, industry self-regulation, global governance.

RESUMEN

El manejo forestal sustentable (MFS) es un constructo que involucra el uso de recursos forestales por múltiples actores, evitando su degradación y agotamiento. Por tanto, alcanzar un MFS es una preocupación central en la mayoría de los países que abordan los impactos de la deforestación y prácticas forestales deficientes. El propósito de esta revisión es analizar tanto los "viejos" como la "nuevos" enfoques en gobernanza forestal empleados por estados y actores privados, considerando sus principales características e implicancias para el MFS. La gobernanza forestal clásica se caracteriza por el predominio de actores estatales: sus instrumentos de política más relevantes incluyen mecanismos de comando y control e instrumentos económicos, que han sido insuficientes – al carecer de mecanismos creíbles de cumplimiento legal – de alcanzar las metas de MFS. Consecuentemente, nuevas formas de gobernanza forestal, varias agrupadas bajo los conceptos de responsabilidad social corporativa (RSC) y auto-regulación industrial (ARI) surgieron para abordar estas limitaciones; predominando actores no-estatales en el establecimiento de sus reglas y cumplimiento. Por otra parte, el manejo forestal comunitario (MFC) se popularizó también en las últimas décadas como otra opción de política de esta nueva gobernanza. Sin embargo, la efectividad de un instrumento de política particular en abordar problemas de sustentabilidad va a depender del contexto específico en que se desenvuelva. Generalmente, los instrumentos de política de la nueva gobernanza forestal no reemplazan aquella clásica; más bien la complementan – especialmente mediante mecanismos de cumplimiento – en sus esfuerzos por alcanzar metas colectivas de sustentabilidad en beneficio de la sociedad.

Palabras clave: manejo forestal sustentable, gobernanza forestal, responsabilidad social corporativa, auto-regulación industrial, gobernanza global.

INTRODUCTION

Forest governance uses a mixture of different types of policy instruments to address the negative effects of deforestation and unsustainable forest management. In the context of this review, the term "governance" encompasses the attempts of states or other actors to steer communities, countries, or groups of countries towards collective goals (Bell and Hindmoor 2009). The term "forest governance" is thus defined as the way in which state and non-state actors negotiate, make, and enforce binding decisions about the management, use and conservation of forest resources at multiple scales (FAO 2021). "Appropriate" or "good" forest governance (*sensu* Kichor and Rosenbaum 2012) is of fundamental importance to avoid forest degradation and deforestation that have been demonstrated to cause significant environmental, social, and economic impacts. To illustrate this point, a useful definition is provided: "Key features of good forest governance include adherence to the rule of law, transparency and low levels of corruption, stakeholder inputs in decision making, accountability of all officials, low regulatory burden, and political stability" (Kichor and Rosenbaum 2012).

Some well-known negative environmental impacts of forest degradation and deforestation include torrential rainfalls, soil erosion, damaged landscapes, and emission of greenhouse gases (Khalid *et al.* 2019). Furthermore, unsustainable forest management practices such as the removal of harvest residues, the conversion of primary forests to plantation forests, and site preparation can reduce soil organic carbon stocks significantly (Mayer *et al.* 2020). Along with nutrient and carbon stock losses from soil disturbances, deforestation and unsustainable forest management can cause habitat fragmentation and biodiversity loss (Khalid *et al.* 2019).

Deforestation can also socially and economically impact communities that depend on forests for their livelihoods. For instance, Darmawan *et al.* (2016) show a positive correlation between the degradation of natural forests and emigration of rural populations due to unemployment and rural poverty. Moreover, as Tacconi (2007) describes, illegal logging is usually associated with corruption of institutions, funding of local conflicts, increased poverty, and tax losses for national states. Lastly, deforestation has also been correlated with negative effects on human health (*e.g.* malaria outbreaks caused by deforestation in the Amazon basin), exacerbating poor hygienic conditions and poverty in rural populations (Darmawan *et al.* 2016).

Although the rate of net forest loss, primarily caused by agricultural expansion, decreased by c. 40 % during the 2010-2020 period, the world is still behind schedule for the United Nations Strategic Plan for Forests to increase global forest area by c. 3 % before 2030 (FAO 2020). In this context, sustainable forest management (SFM) is a multidimensional, multipurpose, multifunctional, and dynamic concept that can be defined as the sustainable use and conservation of forests to suit a wide range of values and interests through human interventions (FAO 2021). Thus, achieving SFM as a collective goal entails the use of different policy instruments in forest governance to address the undesirable effects of forest degradation, deforestation, and unsustainable forest management practices.

Achieving SFM often requires a combination of different policy instruments in forest governance. Most of them are characterised by the predominance of the state as a central actor to exert its power on other actors in pursuit of a SFM goal for the benefit of the entire society. These policy instruments are known as "state-centric" or "traditional" approaches. They also could be considered "old" forest governance in terms of what Auld *et al.* (2008) described, as they have existed for a long time. In contrast, there are also "new" practices by which forest governance is exerted through a myriad of non-state actors, including multi-centric and private forms of governance.

The aim of this review is to analyse both "traditional" and "new" forest governance, in terms of their main characteristics and implications for global SFM, including advantages and weaknesses. In order to provide an updated review of some of the main forest policies to achieve SFM, this work draws on the general framework for environmental governance provided by Gunningham *et al.* (1998) and the specific typology for forest governance developed by Kanowski (2010), classifying it as regulatory, voluntary, economic and community-based. It also draws on the Auld *et al.* (2008) framework, which is particularly focused on "new forest governance". This mixed framework is presented in table 1 and is largely influenced by the political dimension of different forest governance arrangements, *i.e.* the extent by which the state leverages specific policy instruments.

The taxonomic categories shown in table 1 are focused on, but are not limited to, domestic policy arrangements and instruments to achieve effective SFM at a national-state level. This review does not attempt to provide a taxonomy focused on international forest governance and policy arrangements promoted by state and non-state global actors.

This review article is structured as follows. It begins by presenting traditional "state-centric" or classical regulatory approaches that have considered the "nation-state" (also known as "Westphalian authority" in which three distinctive characteristic elements are present: territory, people and government; see Sørensen 1999) as the best source of governance or authority to achieve collective goals, and which have relied upon traditional and hierarchical regulatory instruments to deliver on SFM goals. Second, it examines state economic instruments but instead rely upon more flexible approaches. Third, this review examines concepts of CSR and self-regulation to analyse the myriad of self-regulatory, voluntary, and community-based instruments which are grouped under "new forest governance". Finally, this framework contrasts traditional

Table 1. Taxonomy categories of the most relevant forest governance forms.

Categorías taxonómicas de las formas de gobernanza forestal más relevantes.

	Traditional governance	New forest governance
Influence of the state	Maximum Predominance of state actors	Minimum Predominance of non-state actors
Specific policy instruments	Classical regulatory instruments *Command and control approaches* *Economic instruments:* Property rights Market creation Fiscal instruments and charge systems Financial instruments Performance bonds	Private governance instruments *Self-regulation instruments:* Environmental management systems Codes of conduct Non-state market driven systems *Voluntary instruments:* Information-based approaches Public-private partnerships *Community-based:* Community-based forest management

Source: modified from Gunningham *et al.* (1998), Auld *et al.* (2008), and Kanowski's (2010) frameworks.

state-centric regulation with various new forms of multicentric and private modes of governance, as will be explored in the conclusions.

TRADITIONAL FOREST GOVERNANCE

State-centric regulation is characterised by an overarching dominance of the state, which establishes controls underpinned by sanctions, and exercises the power to solve conflicts, distribute resources and coordinate activities and groups through democratic consent (Auld *et al.* 2008, Bell and Hindmoor 2009). For Bell and Hindmoor (2009), in hierarchical or state-centric approaches the states impose rules regulating behaviour of different actors to achieve collective goals for the benefit of the entire society. Hence, the state exerts its central and sovereign authority (*i.e.* its authority over a territory and a society) to regulate the behaviour of other actors. Traditionally, state-centric regulation relies heavily on "command-and-control" approaches (Bell and Hindmoor 2009). More recently, "economic instruments" have also played an important role.

CLASSICAL REGULATORY INSTRUMENTS: COMMAND AND CONTROL APPROACHES

Command-and-control regulation is perhaps the most obvious traditional policy approach used by nation-states to deal with many environmental and sustainability issues. On the one hand, these approaches have certain strengths: properly administered they have a high likelihood of achieving a policy goal in a consistent and predictable manner (Gunningham *et al.* 1998). Adequately enforced, command and control regulations can generate high rates of compliance with laws and regulations in the forest industry (*e.g.* McDermott *et al.* 2010). This is particularly the case with large companies because they are highly visible, well-resourced, accessible and under permanent social scrutiny (Gunningham *et al.* 1998). Command-and-control approaches play a fundamental role in shaping central forest policy issues and are essential to set minimum compliance standards for forest operations (Kanowski 2010), which provide relative certainty.

Common examples of command-and-control approaches in forestry include mandated best management practices (BMPs), logging restrictions, replanting limited to determined tree species, annual allowable cuts, predefined felling cycles, and diameter limits for harvesting (see *e.g.* McDermott *et al.* 2010, Labelle and Lemmer 2019).

On the other hand, command-and-control regulations have several limitations. First, they may not be able to keep up with technological changes and thereby they may become obsolete. For example, forestry standards are updated to address increasingly mechanised forest operations worldwide (Labelle and Lemmer 2019). Command-and-control regulations have been also seen as inflexible, blunt, costly (Carrigan and Coglianese 2011) and unable to encourage forest companies to go beyond legal compliance (McDermott *et al.* 2010). However, recent evidence has concluded that whilst detrimental in the short-term, stricter regulations may encourage some companies to innovate and thus gain a competitive edge in the long-term (Tang *et al.* 2020).

Second, command and control approaches are rarely capable of addressing global and complex environmental problems such as deforestation on their own (Ruggie 2014). Third, regulatory agencies usually have limited resources to enforce compliance with existing regulations, and therefore fail to pose a credible deterrent particularly

to small and medium-sized enterprises which are not subject to public pressure, unreceptive to environmental issues and unlikely to be inspected (Gunningham *et al.* 1998). By the same token, illegal forest operations have flourished in poorly regulated remote areas (Tacconi 2007).

Fourth, command and control regulations can be very sensitive to political manipulation from existing industrial associations and act as entry barriers to new forestry business actors, although this unwarranted pressure can be also exerted by politicians and civil society groups (Carrigan and Coglianese 2011).

CLASSICAL REGULATORY INSTRUMENTS: ECONOMIC INSTRUMENTS

The significant limitations of traditional command-and-control regulations led states to consider employment of incentive-based instruments to modify forest companies' behaviour, making them less environmentally destructive at a reasonable cost (Perman *et al.* 2011). These instruments, embedded in the free-market environmentalism (FME) concept, reflect the standpoints of many renowned classical liberal scholars, including Ronald Coase, Murray Rothbard, and Milton Friedman as some of the most relevant (Wirtz 2017). Economic instruments encompass a myriad of different policy options, the most relevant of which are summarised below.

Property rights. These approaches raise the idea that environmental degradation is caused by badly defined property rights, and this can be remediated by distributing these rights amongst different economic actors. The net outcome would be that natural resources are better preserved and sustainably managed when owners or users interested in avoiding their depletion by exclude other participants (Perman *et al.* 2011, Tietenberg and Lewis 2015). In short, private actors "internalise their externalities" (*i.e.* they bear the environmental and social costs caused by their forestry operations), (see *e.g.* Tietenberg and Lewis 2015) and their benefits include lower administrative costs, minimal price distortion and adaptation to changing circumstances. The obvious conclusion for SFM suggests that logging companies would have better environmental performance if they were granted with long-term concession rights, encouraging them to invest in SFM practices to maintain their resources (*e.g.* see the Sweden case, Sténs and Mårald 2020). Overall, secure and stable land tenure rights have been associated with productivity gains and higher income. As an illustration, property rights over forest resources are more likely to lead to positive welfare effects, including poverty alleviation (Miller *et al.* 2021).

Effective forest property rights would need to be well-defined in the long term, but in practice, they have evolved continuously worldwide in response to political, economic, and social forces (Sténs and Mårald 2020). Second, excessive and uneven allocation of forest property rights can lead to serious conflicts due to externalities (Cubbage *et al.* 2007). All things considered, Tietenberg and Lewis (2015) suggest three conditions for property rights to be effective: *exclusivity* (only the owner uses the resource, excluding others), *transferability* (transferable property rights from one owner to another by voluntary exchanges), and *enforceability* (security of property rights from involuntary seizure or encroachment by others).

Market creation. Market-based instruments (MBI) assume that increases in the use of a resource will be offset by equivalent reductions elsewhere, setting a maximum allowance for the use of a resource (*e.g.* logging concessions) through initial allocation of permits or credits that can be exchanged among private actors (Perman *et al.* 2011). MBI have long been recognized as policy instruments capable of reaching environmental targets at a lower cost than employing traditional approaches, allowing firms great flexibility to mould their own responses to reduce environmental degradation (Tietenberg and Lewis 2015).

As an illustration, the use of tradable development rights can be used to engage private individuals or corporations in the preservation of habitats, valuable forests, and biodiversity (Cubbage *et al.* 2007). But, although a standardised world market to trade ecosystem services is still lacking (Tietenberg and Lewis 2015), some experiences with payment for ecosystem services (PES) provided by forests have shown mixed outcomes (Salzman *et al.* 2018). Annual transactions from over 550 active PES programmes, operating at local, regional, and national levels, have been estimated at US $36-42 billion (Salzman *et al.* 2018), which is still much lower than the value of traditional forest products.

In general, PES schemes involve both public and private payment schemes aimed to compensate the opportunity costs being lost by the traditional utilisation of forest resources (Obeng *et al.* 2018). But whilst forest and land-use carbon PES have grown substantially in the last decade, they are prone to free-rider problems, particularly with public payment schemes (Obeng *et al.* 2018, Salzman *et al.* 2018).

Likewise, the Reduced Emissions through Avoided Deforestation and Forest Degradation (REDD+) is considered to be one of the most relevant MBI under which developing countries receive compensation payments from developed countries for avoiding deforestation and maintaining their carbon stocks. The vast majority of REDD+ projects have been funded by international initiatives and multilateral donors, including the World Bank, the UN REDD and the Norwegian government, totalling more than 500 projects worldwide valued in US $8 billion up to 2020 in REDD Readiness funds (Salzman *et al.* 2018).

The main limitations of MBI are due to perceived uncertainty about their expected benefits, particularly for some REDD+ projects in which local communities claim a lack of materialisation and funding (see *e.g.* Scheba and

Rakotonarivo 2016). Second, if not adequately defined, MBI metrics (*i.e.* how the specific ecosystem services are valued, measured, and exchanged) can be troublesome and discourage potential buyers (Salzman *et al.* 2018). Third, the political, social, economic, and institutional settings of many countries can play a crucial role in causing MBI initiatives to fail, or to exacerbate land tenure conflicts amongst local communities when competing for external funding (Scheba and Rakotonarivo 2016).

Fiscal instruments and charge systems. Similar to MBI and property right approaches, these instruments are based on a "the polluter pays" principle. Two prominent instruments are recognised here: environmental taxes and financial subsidies. The main difference is that taxes involve transfers of income from regulatees towards regulators, whereas subsidies involve net transfers of income in the opposite direction (Perman *et al.* 2011).

Environmental taxes are rather used as tax discounts to encourage SFM in forest owners; they have high administrative costs and enforcement challenges in remote areas, though these can be overcome by using technology (World Bank 2021). As an illustration of their economic valuation, tax incentives for promoting ecosystem services in the US have been valued at US $1.61 billion, involving c. 85 million hectares owned by 413,000 participants across 58 states (see *e.g.* World Bank 2021).

Forest subsides have been used extensively both in developed and developing countries. For example, the Forest Land Enhancement Program (FLEP) in the US has been supporting small and community forest landowners with financial assistance for growing trees in a sustainable fashion (Jacobson *et al.* 2009). More commonly, these instruments have been used to subsidise expansion of plantation forests, improving forestry companies' technical efficiency (*e.g.* see some case-study countries in McDermott *et al.* 2010, as well as in World Bank 2021). Both direct and indirect government subsidies can encourage forestry companies to expand the scale of their carbon sink forests (*i.e.* forests sequestering and storing atmospheric carbon dioxide) having a positive effect on climate change alleviation strategies.

In contrast, fiscal instruments and charge systems have often been criticised as increasing timber production but rarely achieving SFM goals. Mayer *et al.* 2020, for example, have claimed that conversion of primary natural forests to plantation forests, as encouraged by forest subsidies, has decreased biodiversity and carbon stocks as mentioned in the introduction of this review.

Financial instruments. Financial instruments involve different financial alternatives that often rely on extrabudgetary incentives to protect the environment, such as foreign aid, external borrowing, and soft loans. In forest governance, conservation trust funds (CTFs) have been used to conserve biodiversity and achieve certain environmental goals by using international financial assistance to create and operate protected areas, national environmental strategies, and other long-term environmental projects (Spergel and Wells 2009). Compared with other policy options, the use of financial instruments to address SFM issues is more limited.

Performance Bonds. Performance bonds follow the "polluter pays" and the "precautionary principle" as they require firms to post a bond *ex ante*, forfeiting all or part of the bond, depending on their environmental performance. Forestry bonds are an "insurance" against noncompliance and, if designed properly, allow innovation and better management strategies to reduce firms' burden of complying with environmental regulations. Usually, these bonds are related to SFM projects (Tolliver *et al.* 2019).

In addition, due to the Sustainable Development Goals (SDG) established by the United Nations (UN) 2030 Agenda, the market of "green bonds" is expected to rise, including forest-related projects for ecosystem maintenance and resource management (Tolliver *et al.* 2019). Rather, performance bonds can be effective instruments to encourage reduced impact logging (RIL) standards and fire prevention strategies.

NEW FORMS OF FOREST GOVERNANCE

The limitations of traditional state-centric approaches led to the search for alternative forms of forest governance beyond the hierarchical influence of states. These new forms of forest governance are embedded in the regulatory discourses of "new governance", "global governance" and "industry self-regulation". New governance focuses on more flexible and voluntary regulatory strategies than classical regulatory approaches and allows private actors to influence rule setting and enforcement (Carrigan and Coglianese 2011).

According to Parker (2008), new governance approaches exhibit three distinctive characteristics: they are non-exclusive (because new governance allows the multi-party collaboration of both states and non-state actors), non-hierarchical and multi-centric (the authority rule making and enforcement can be exerted by multiple parties) and post-territorial (spatial boundaries of governance often transcend conventional political-territorial boundaries of nation-states, extending environmental cooperation worldwide). Global governance shares the same features of the new governance model but highlights the role of non-state actors in tackling global environmental problems, often without the influence of national governments, and is characterised by fragmentation (Ruggie 2014).

Industry self-regulation (ISR) involves private actors (the industry) controlling their own environmental behaviour through the setting and enforcement of their own rules. In other words, ISR allows industry-level organizations to set their own rules and standards, encouraging the

adoption of these rules by the industry members to control their own conduct. It does not imply deregulation or no regulation at all, but the reallocation of regulatory responsibilities to the industry itself (see *e.g.* Gunningham 2009, Gunningham *et al.* 1998). Overall, this occurs when there is little governmental intervention in firms' behaviour.

Theoretically, ISR has great benefits over centralised government approaches. In principle, ISR allows corporations to tailor their own responses, internalising their responsibilities by relying on peer pressure rather than on legal coercion, which could arguably have the effect of raising the industry's standards to a higher level (Gunningham *et al.* 1998). Additionally, self-regulation posits a less costly alternative to conventional regulation for governments (Gunningham 2009, Tietenberg and Lewis 2015).

Many of the ISR initiatives are grouped under the concept of corporate social responsibility (CSR). CSR is an umbrella concept in which different forms of self-regulatory approaches are grouped. Generally, CSR involves the actions of firms to use their resources in a way that benefits the entire society, encouraging the participation of its members independently of the firm's direct gains.

CSR would benefit companies because when satisfying their stakeholders' demands, at the end of the day such costs are internalised by the stakeholders, as they would be willing to pay more for the firm's product, easing the regulatory burden and reducing social pressure (Henderson and Malani 2008). The concept of "social license to operate" (SLO) is thus central to explain why firms, especially larger ones, decide to go beyond legal compliance. Corporations today are well aware that the key for their long-term survival is to obtain a SLO, therefore local communities and NGOs have emerged as important governance actors in many industrial sectors over the last decades. Indeed, in the forest sector NGOs have often targeted large corporations, including timber producers and retailers, as a useful political strategy to pursue their aims.

Overall, CSR forces companies to be more proactive towards the environmental and social demands of different actors because the costs of not doing so may result in increased regulations, reputational damage, and unaffordable economic costs (Gunningham 2009). Following the model from Auld *et al*. (2008), the most relevant new governance initiatives are summarised as follows.

Information-based approaches. These voluntary approaches are characterised by the disclosure of information regarding a firm's sustainability practices. The most widely known example is the Global Reporting Initiative (GRI) which has expanded worldwide both in developed and developing countries. GRI approaches are especially suited for large forestry corporations whose operations are often located in remote geographical areas in which the relationship with local communities has a greater impact on firm's behaviour than legal requirements, as they need to obtain SLO (Boiral and Heras-Saizarbitoria 2017).

GRI guidelines are comprehensive as they cover many aspects of sustainability, including environmental, social, and economic indicators, increasing corporate transparency and therefore corporate reputation and image (Lähtinen *et al.* 2016). Although the focus of GRI approaches has historically been on large companies, it has shifted towards associations of small forest landowners (*e.g.* the Finland case - Lähtinen *et al.* 2016).

However, information-based approaches have shown inconsistency and lack of comparability amongst companies as the most important shortcomings of different GRI approaches. Indeed, as some studies in China have shown (Lu *et al.* 2017), inconsistency in the disclosure of information and the lack of standardisation of sustainability indicators amongst forestry firms have persisted.

Public-private partnerships. Public-private partnerships (PPPs) are voluntary agreements negotiated by governmental and non-governmental actors such as NGOs and private corporations to achieve sustainability objectives, usually in the form of a proportion of protected areas (Widman 2016).

Most PPPs are focused on conservation of forestlands to protect biodiversity across public and private lands. The Swedish government's "Komet programme", for example, renewed partnerships with forest landowners to encourage forest conservation efforts through Nature Conservation Agreements (NCAs) set during the mid-1990s (Widman 2016). In some developing countries, such as Kenya, Uganda and Tanzania, PPPs have been developed to attract forest investments without necessarily setting SFM goals (Cheboiwo *et al.* 2018).

To thrive, PPPs need well designed bottom-up (*i.e.* non-hierarchical) and decentralised strategies, which even some developed countries lack, to integrate diverse stakeholders (*e.g.* forestry authorities along with landowners and NGOs) in the decision-making process to meet forest conservation goals (Widman 2016, Auld *et al.* 2008). Moreover, the institutional settings of PPPs and the ability to develop sustainable relationships between authorities and forest owners may influence their willingness to participate in such agreements (see *e.g.* Widman 2016), all of which have seen an increasing role of private actors in forest governance.

Environmental management systems. Environmental management systems (EMSs) are formally documented systems in which integrated procedures and processes form the basis for the training of personnel, and for monitoring, summarising, continuous improvement, and reporting of firms' environmental performance information to stakeholders. Notably, the focus of an EMS is procedural or "process-based", rather than prescriptive or "performance-based". Therefore, the enhancement of a firm's environmental performance through an EMS can be attained through improvement of several processes rather than complying with detailed prescriptive requirements.

Although they are not forestry standards *per se*, EMSs such as the International Organization for Standardisation (ISO) 14.001 and the European Union's Eco-Management and Audit Scheme (EMAS) are voluntary guidelines widely used by the forestry industry and across many stages of the forest supply chain (Auld *et al.* 2008). The ISO 14.001 standard is usually used as the basis in which more sophisticated forest certification systems can be later implemented, as it provides a basic formalised and documented structure.

Like most other policy tools, EMSs have shown mixed success. On the one hand, while the ISO 14.001 standard can help enforce state environmental regulations (Demirel *et al.* 2018), this standard has ranked lower in terms of environmental benefits, as compared to other specific and performance-based forestry standards (viz. non-state market driven mechanisms, as will be shown in the following sections). Moreover, early adopters of EMS would be more technologically complex firms (*e.g.* Auld *et al.* 2008), making it difficult to assert whether the improvements in environmental performance are due to EMSs or other policy instruments.

Codes of conduct. Codes of conduct imply a set of requirements grouped into different guidelines for behaviour of multinational corporations (MNCs), addressing a variety of issues and being more flexible and cost effective than traditional state regulations. While most codes of conduct have been applied in areas other than forestry, when applied for SFM they have been chiefly promoted by state or transnational actors (*e.g.* Council of Europe's Code of Conduct on Planted Forests and Invasive Alien Trees – Brundu and Richardson 2016)

Non-state market driven mechanisms. Under the concept of non-state market driven mechanisms (NSMDs) are grouped two predominant forestry certification schemes: the Forest Stewardship Council (FSC) and the Programme for the Endorsement of Forest Certification (PEFC), in which many national schemes are included. NSMDs share several common characteristics, viz. predominance of non-state actors in their governance, legitimization of their governance through markets (*i.e.* empowered customers can exert their veto), stricter rules (performance-based forestry standards), institutionalised governance through open and transparent processes, and independent third-party verification (Auld *et al.* 2008).

Forest certification outcomes have been largely positive in terms of encouraging SFM by introducing changes in management practices and thus improving environmental and social performance as well as having a positive influence on companies' behaviour (*e.g.* Savilaakso *et al.* 2017). NSMDs can also supplement ineffective state forest policies and influence all the stages of the policy process (Savilaakso *et al.* 2017).

Economically, forest certification has proven effective in increasing the value of the firm, irrespective of its size, through providing a competitive edge on forest exports by offering eco-certified timber products. Indeed, SLO and market access have been argued to be common drivers of certification adoption by forestry companies. Certification is also usually perceived by firm managers as a tool to improve companies' reputation, as shown in growing empirical evidence (Paluš *et al.* 2021). Overall, all forest certification schemes positively impact forestry firms' sustainability performance. Some studies suggest (see, *e.g.* Gutierrez Garzon *et al.* 2020 and Judge-Lord *et al.* 2020) that the activist-backed FSC scheme would be more prescriptive than its competitor industry-backed schemes, most of them grouped under the umbrella PEFC. This had been even raised by other authors (see, *e.g.* McDermott *et al.* 2010). However, the level of prescriptiveness (*i.e.* the stringency of the social and environmental standards of a particular certification scheme) have increased over time, both in activist-backed and industry-backed certification schemes (Judge-Lord *et al.* 2020).

COMMUNITY-BASED FOREST MANAGEMENT

From a political standpoint, community-based forest management (CBFM) can be considered the opposite of economic instruments. CBFM is a relatively new approach, and it involves local people in the management of their own forestry resources, where the effectiveness of encouraging SFM and improving local livelihoods become central concerns. CBFM has been an increasingly influential approach to SFM in the last two decades, though there are mixed results in terms of its effectiveness. While in half of the literature the ecological and social impact of CBFM approaches has been shown to be positive, in many other cases they have had little impact, often due to their institutional settings (Arts and Koning 2017). In addition, as Arts and Koning (2017) pointed out, CBFM can be largely influenced by the power relations among interested parties, although sustainable CBFM would also depend on the existence of a certain level of conflicts. It is also noteworthy that unlike many ISR initiatives, CBFM approaches are not enforced by third-party verification.

CONCLUDING REMARKS

Overall, traditional forms of forest governance, particularly classical regulatory approaches, have not been sufficient to address the environmental and social issues caused by forest operations worldwide. Command-and-control approaches, for example, have often lacked credible enforcement mechanisms that force forestry businesses to comply with state laws and regulations. Therefore, states have designed and implemented a myriad of innovative approaches in forest governance, many of which are grouped under the category of economic instruments. They show many advantages over classical regulatory instruments. First, rather than imposing inflexible rules,

they leave regulatees to make their own rational choices by providing them with certain rights to achieve a socially acceptable level of environmental degradation. Second, economic instruments can "decompress" the financial and administrative burden of regulatory agencies because they delegate part of their accountability to the regulatee. Third, most of the options for economic instruments lead individuals and enterprises to internalise their externalities. Thus, private actors need to prevent any environmental damage before it occurs as economic instruments would theoretically encourage them to undertake preventive measures to protect the environment.

However, the practical application of economic instruments has produced modest outcomes in some cases. For instance, property rights cannot guarantee the efficient allocation of public goods, and others such as MBI and forest subsidies have often been blamed for not properly providing equitable access to resources and benefits from forests. However, it is also noteworthy that ideological reasons have been behind the increasing opposition towards PES and other MBI, because as some critics may argue, market valuation can be counterproductive in the long-term as it could encourage a utilitarian view of environmental protection.

Notwithstanding the limitations of traditional forest governance, accelerating technological change and hyper-connectivity may play a major role in a world post C19 pandemic, leading to a "renaissance" of both classical and economic instruments. For instance, the use of low-cost satellite monitoring combined with 5G technologies would allow regulators to improve their enforcement mechanisms by detecting unsustainable forestry practices and other environmental breaches in a timely manner.

In this context, new forms of forest governance arose to address many of the limitations of traditional governance. It is thus remarkable that many forestry businesses, particularly larger corporations, have adopted corporate reporting, EMSs, forest partnerships and industry codes of conduct. The SLO have played an essential role in the survival of large and small corporations, and would explain why some of them have chosen to regulate themselves and why many corporations have adopted complex self-regulatory initiatives to exceed environmental regulations. Again, these new governance initiatives have not been sufficient either for large corporations or for small and medium-sized forestry businesses to address their sustainability issues. The implementation of corporate reporting and EMSs in large forest corporations, for example, have not been necessarily associated with better environmental performance, leading to wide criticism. Therefore, NSMD mechanisms arose as a response to address the significant limitations of traditional and self-regulation approaches that forest certification schemes seem to overcome, including greater openness, transparency, stakeholders' participation, legitimisation by actors other than firms, and stricter rules.

CBFM approaches have enjoyed high popularity in the last two decades as they have allowed local communities to manage their own forestry resources. However, their practical application seems to be limited by their institutional settings and, arguably, the collectivist management of forest property.

All things considered, are new forest governance instruments more (or less) capable of achieving SFM goals than traditional forest governance instruments? The answer may well depend on the specific context in which a particular policy instrument is applied. For example, in developing countries with weak regulatory frameworks, classical command-and-control approaches are essential to set minimum forestry standards and, consequently, to lay the foundations of forest policies. As countries and their institutions develop, economic instruments become progressively more relevant, particularly those instruments that need clear and stable regulatory frameworks, *e.g.* MBI and property rights. Notably, the rise of ISR approaches brings up the concept of hybrid regulatory arrangements in which state regulations and some ISR instruments interact with each other and shape one another (see *e.g.* Savilaakso *et al.* 2017). Put differently, rather than adding new requirements some ISR approaches enforce existing state regulations, helping to achieve collective environmental policy goals, *e.g.* EMSs and NSMDs.

Overall, rather than replacing "old" forest governance, "new" forest governance has arisen to help the entire society in their pursuit of SFM collective goals. However, while some new policy instruments face many challenges in terms of improving their consistency and institutionalisation, others have emerged as increasingly legitimate instruments to help regulators achieve their sustainability goals. Therefore, more research will be needed to study their effectiveness and how the rise of new technologies will influence the future of forest policy.

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