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Effectiveness and synergies of policy instruments for land use governance in tropical regions

Eric Lambin et al (2nd revision submitted to GEC)

Abstract

Traditionally, land use is regulated through command-and-control interventions such as land use zoning and protected areas. More recently, coalitions of public and private actors have designed market-based and demand-driven policy instruments to influence land use – e.g., eco-certification, geographical indications, commodity roundtables and moratoriums, and payments for environmental services. These alternative mechanisms fall along a continuum of state involvement and interact with traditional public forms of land use regulation, leading to “hybrid” interventions. This article assesses the effectiveness of the main instruments used to promote sustainable land use, and explores interactions among them. Overall, there is a lack of rigorous studies of the effectiveness of new instruments, but available evidence suggests some positive direct and indirect benefits. Private regulatory systems with minimal state involvement have benefits as one component of policy mixes with a complement of baseline public law. We propose a typology to describe potential interactions between instruments that regulate land use. It combines different types interactions between instruments - complementary, substitution, and undermining effects – with the different stages of the regulatory process - agenda setting, implementation, and monitoring and enforcement. We give examples of governments endorsing certifications or using certification to support their own policies; governments creating enabling conditions for hybrid instruments to develop, and be more widely adopted; and private instruments reinforcing public regulations or substituting for missing or weak governance. In some cases, governments, NGOs and corporations compete and may hinder each other’s actions. With favourable institutional and governance contexts, well-designed hybrid public-private instruments can be effective. More systematic evaluation should support improving the effectiveness of instruments, including optimizing their interaction with traditional public land-use policy instruments to achieve incremental benefits as well as longer-term transformative outcomes in land-use protection.

Keywords: Land use zoning, certification, commodity roundtable, geographical indication, payment for environmental services, deforestation

1. Introduction

Enhancing food and fiber production to satisfy the growing global demand, while at the same time preserving the integrity of natural ecosystems and their capacity to deliver key services, requires the widespread adoption of more sustainable land use practices. A large and growing fraction of the conversion of natural ecosystems today is associated with commodities produced for global markets, with expanding demand and high income elasticities (e.g., soybean, palm oil, coffee, beef) (Lambin and Meyfroidt, 2011). Land use decisions related to these commodities are increasingly driven by factors in distant markets. The final consumers of these commodities, the corporations involved in their trade, transformation and retailing, and civil society show a growing concern for sustainability. Involvement of private actors led to the emergence of various initiatives aimed at influencing land use including eco-certification, geographical indications, multi-stakeholder supply chain initiatives, and payments for environmental services. These interventions fall along a continuum of state involvement and interact with traditional public forms of land use regulation such as land use zoning and protected areas. The dynamics and outcomes of interactions between regulatory mechanisms along the public-private continuum are not well understood.

This article reviews the current evidence base on the effectiveness of the main interventions to promote sustainable land use, and explores interactions among them. The objective is to better understand which combinations of actions by citizens, consumers, NGOs, corporations, and governments are best able to promote sustainable land use. Effectiveness is defined in terms of the ability to generate on-the-ground impact, be it directly, if the instrument contributes to resolving the specific problem it was created to address, or indirectly, if one includes non-targeted favourable changes. We focus, in particular, on the preservation of terrestrial ecosystems and improvements in ecosystem service provision vis-à-vis an established baseline. Evaluation of policy instruments generally rests on effectiveness, efficiency (cost-effectiveness), and equity (including legitimacy) (Russell and Powell, 1996; Jack et al., 2008). We focus here on effectiveness, mostly in developing economies where most conversion of natural ecosystems currently takes place, and where governance regimes may exhibit weaknesses. We first synthesize empirical evidence on the land use impact of single instruments. We then explore the main interactions between these new interventions and traditional regulatory policies.

Traditionally, public sector approaches to land use governance have predominantly relied on command-and-control instruments. These include legal regulations at national or regional scales on land and forest resource use (e.g., logging and deforestation bans, concessions, and management standards), land zoning, and declaration of protected areas at local scales (e.g., national parks, indigenous lands, sustainable use areas). To facilitate the implementation of these

regulations, governments often resort to enabling measures, such as land reform and decentralization as well as broader economic measures (e.g., trade restrictions, taxes, and subsidies) (Börner and Vosti, 2013). Public command-and-control instruments, while essential for protecting commercial and non-commercial land use values, face limitations. First, they involve uncompensated opportunity costs for landholders, which may be politically unsustainable for governments. Secondly, many governments lack the will or capacity to implement and enforce such regulations, because of limited executive power or ill-defined land and resource rights. Thirdly, with international trade and the growing market concentration of transnational corporations, the relative power of governments to manage resource production decisions, compared to private actors, decreases. And finally, command-and-control instruments, while producing local benefits, can have unintended spill-over effects in jurisdictions outside the regulator's accountability.

Recognizing these limitations, private actors, such as national and international non-government organizations (NGOs) and private companies, are increasingly engaging in land use governance either independently or in the form of mixed public-private (or hybrid) initiatives (Lemos and Agrawal, 2006; Dauvergne and Lister, 2013). Demand-led policy instruments, which try to influence the behaviour of actors by providing economic incentives, have emerged. In the private realm, these instruments function primarily through price signals sent to producers by consumers or retailers of a product or service through complex global supply chains. From the public sector, instruments generate incentives to modify private actors' behaviour – e.g., certification or payments for environmental services schemes. Although private actors do not have authority to enforce regulations through legal mechanisms, they are exerting coercive influence through other means. Large consumer awareness campaigns have enabled international environmental NGOs to exert considerable pressure on manufacturers and retailers who concentrate power along their value chains (Conroy, 2007). Some international retailers have engaged in imposing minimum sustainability standards on producers in response to moratoria (market exclusion mechanism) or commodity roundtables (partnered governance along supply chains) (Agrawal et al., 2011).

As developing countries increase their efforts to enhance compliance with existing regulations, the interactions between various mechanisms to steer land use become more salient. For example, in the context of REDD+ (a planned international mechanism to reduce emissions from deforestation, degradation, and enhance forest carbon stocks), NGOs are supporting Brazil's government-led environmental land registers (CAR) as a basis for effective land-cover change monitoring and law enforcement (Duchelle et al., 2013). In Indonesia, the government's moratorium on new forest concessions creates opportunities for private actors to gain credits

from carbon markets (Murdiyarso et al., 2011). Private regulatory mechanisms, such as third-party certification, have been developed independently of state delegation and require new forms of policy coordination (Cashore et al., 2004). The articulation between public and private governance, including governmental, intergovernmental, private sector, and civil society initiatives, is an emerging area of policy research (Auld et al., 2008; Lister, 2011; Gulbrandsen, 2013). Voluntary instruments may often not suffice to achieve ultimate policy goals and a better understanding of how multiple interventions along the public-private continuum can interact effectively is needed. The “new governance” literature calls for combined soft and hard law approaches as well as multi-actor engagement that involves industry and NGOs in the policy process (Gunningham and Young, 1997; Eliadis et al., 2005).

Despite the interest in multi-partner governance, the policy literature remains largely focused on the political authority of governments. Governments have historically provided or delegated to industry to self-regulate the coordination of these “hybrid” or “multi-partner” environmental governance arrangements (Lemos and Agrawal, 2006). Such coordination comes with a high cost and institutional complexity that can lead to suboptimal outcomes. Few studies have systematically collected evidence on overall land use impacts associated with private or demand-led instruments regulating land use. There is even less empirical evidence on how various interventions work together in different implementation mixes. However, polycentric governance systems, where ecosystems are co-managed from multiple independent yet coordinated centres of authority (Ostrom, 2010), are common in practice.

2. Effectiveness of individual policy instruments

Overall, the evidence for effectiveness of demand-led and private land use governance is thin (Miteva et al., 2012); results are mixed; and environmental impacts are much less discussed than social ones, partially because evaluating land use impacts requires more sophisticated spatial evaluation techniques. The causal link between initial triggers and outcomes is difficult to prove given multiple confounding factors. Most evaluations of the effectiveness of a land use policy rely on reduced-form empirical estimates. These evaluate whether and where policy instruments spur or maintain sustainable land use practices, but do not address the question of why and how the intervention worked (Miteva et al., 2012). Ideally, evaluation methods should address outcomes and processes stemming from implementation: uncovering underlying partial causes and mechanisms is as important as detecting aggregated impacts (White, 2009). Thus, one should combine reduced-form quantitative studies, which are robust, comparable, and allow meta-analyses, with process-based, qualitative understanding of causal pathways and indirect effects. To establish causal links between adoption of a production standard and its

environmental and social impacts, one needs to analyze how end markets transfer the economic incentive (price premium or social/environmental norms) to producers along the value chain; link standards to best management practices (BMPs); and link BMPs to environmental and socioeconomic outcomes. Selection biases are often unavoidable in the implementation of policy instruments, in particular the voluntary ones—i.e., participants to a program often have pre-existing characteristics that are associated with better performance, independent of the program. Below, we summarize the recent literature on the effectiveness of the main instruments aimed at promoting sustainable land use.

2.1. Command-and-control land use policies

Land use zoning results from a spatial planning process that divides a territory into zones with different rules and regulations for land use, management practices, and land cover change. In principle, planning involves a “systematic assessment of land and water potential, alternatives for land-use and economic and social conditions in order to select and adapt the best land-use options” (FAO 1993), including spatial targeting of areas with particularly high value or low tradeoffs (Margules and Pressey, 2000). As such, land-use zoning supports the implementation of land use policies, such as the definition of protected areas or the limitation of land uses. Land use zoning plans can cover entire national or sub-national administrative units. In reality, land zoning for a specific purpose often occurs in an *ad hoc* manner, covering only specific high-priority areas. Land use plans may be indicative or prescriptive. Indicative plans are used to select land uses on particular sites – e.g., to site new roads, mining operations, logging concessions, and protected areas. Prescriptive plans outline what land uses are allowed or disallowed on a larger landscape and are often used to address environmental externalities (Chomitz, 2007).

Land zoning may or may not entail a change in land tenure or in the legal status of land. In the tropics, official land use zoning, sometimes dating back to colonial times, often co-exists and conflicts with informal, customary land tenure systems (Fox et al., 2009; Lestrelin et al., 2012). Starting in the 1980s, decentralization processes in many parts of the developing world attempted to align formal and informal zoning and tenure systems (Larson et al., 2007).

A “zone” typically features specific social and environmental conditions. For example, protected areas tend to display a “high and far” bias – i.e., remote, mountainous areas (Joppa and Pfaff, 2009) - while logging concessions are generally established where timber resources are abundant. Land use zones can be defined based on the use (conservation, extraction) or the users (ancestral lands, community forests, concessions). A great variety of land use regimes exist in the tropics. In the Congo Basin, logging concessions, mining permits, agricultural plantations, and protected areas are the principal legally sanctioned land use zones (Nasi et al., 2012). An

increasing number of countries designate “forestry lands” (in Southeast Asia) or permanent forest estates (in the Congo Basin) - i.e., lands to maintain the forest cover with the intention of preserving forest resources, including biodiversity, timber, soil, and water, but often allowing specific land use activities. In Asia and some Latin American countries, community forests also represent a significant category, while indigenous reserves are mostly specific to Latin America (Nelson and Chomitz, 2011). Often, governments designate sustainable use areas (e.g., extractive reserves), which grant conditional local use rights on state lands. A large gap between *de jure* and *de facto* land use may exist, as in Indonesia or India where designated “forestland” areas have persisted with no tree cover for decades.

Land use zoning has traditionally been enforced through command-and-control policy instruments such as penal sanctions and administrative cross-conditional measures where demonstrating compliance is necessary to access resources. Implementation strategies may include social programs to compensate exclusion from protected areas or to encourage investments into non-agricultural income activities, such as eco-tourism (Wunder, 2000). Frequent among these are the integrated conservation and development projects (ICDPs) that combine rural development with biodiversity conservation goals. NGOs are often playing a key role in designing and implementing ICDPs, in partnership with government agencies.

Land use zoning was an important component of recent transitions from deforestation to net reforestation in China, India, Vietnam, and Bhutan (Meyfroidt and Lambin, 2011). Meta-analyses and global studies indicate that, on average, protected areas have significant effects in reducing deforestation and forest fires (Joppa and Pfaff, 2010; Nelson and Chomitz, 2011). Local spillovers or leakage are rarely measured, but often small (Soares-Filho et al., 2010; Miteva et al., 2012). Protected areas may squeeze out multifunctional land uses, unless they are explicitly included in land use zoning (Dewi et al., 2013). Few studies have quantified the marginal effects of improved management and enforcement on deforestation (Gaveau et al., 2009; Nolte and Agrawal, 2013). Effectiveness of protected areas, which is well supported by evidence, depends on context and location (Ferraro et al., 2011; Sims, 2010).

Protected areas allowing for various uses by local people can also contribute to conservation. They have been promoted by NGOs and co-managed by communities. Evidence on relative effectiveness of multiple uses *versus* strictly protected areas is mixed, as strict protection may be concentrated in less-threatened areas (Ferraro et al., 2013; Pfaff et al., 2013). In Latin America and Asia, fire incidence was lower in indigenous areas and multiple-use protected areas, when using matched comparisons to forest not under protection (Nelson and Chomitz, 2011). The reported effect was larger than for strictly protected areas in the same study. In the Brazilian Amazon, sustainable use and indigenous areas were more effective than early established

protected areas, but less effective than recent ones (Nolte et al., 2013).

Although logging concessions have often been associated with deforestation and forest degradation, they can potentially play an important role in biodiversity conservation (Clarck et al., 2009; Ramage *et al.*, 2013). Selectively logged forests maintain a high fraction of carbon stocks and species compared to old-growth forests (Putz et al., 2012). In Sumatra, forests allocated to commercial logging are as effective in reducing deforestation as protected areas, but are more prone to degazetting and are more affected by forest degradation (Gaveau et al., 2009, 2012). If zoning is weakly enforced by the State or concessionaires, indirect negative effects on biodiversity due to agricultural encroachment, hunting and roads are likely to be more important than direct effects of logging, as shown in the Congo Basin (Nasi et al., 2012). If zoning is not part of a long-term planning strategy, as in many developing countries, both protected areas and concessions may easily be degazetted to make room for more profitable land uses, such as mining and agro-industrial plantations (Mascia and Pailler, 2011). In Venezuela, designated concessions in forest reserves historically paved the way for conversion of forestland to alternative land uses (Rojas, 1993).

A review of logging bans in six countries in the Asia-Pacific region showed that they helped buy time for forest regeneration and for designing forest zoning schemes, allowing wood extraction to resume in a sustainable manner only after forest exploitation plans were implemented (Durst et al., 2001). Logging bans are only effective to conserve forests at the national scale when accompanied by policies to ensure alternative timber supplies.

Community forests represent a specific type of tenure and management regime, which acts as an enabling measure for zoning and conservation. Their effectiveness varies greatly with specific context, rights and management rules. Carbon stocks and biodiversity were found to generally increase with greater participation and rule-making autonomy (Chhatre and Agrawal, 2009; Persha et al., 2011). The main factors affecting effectiveness of community forests were the forest area per person, level of monitoring, and clarity of property rights (Pagdee et al., 2006; Nagendra, 2007; Agrawal, 2007). Decentralization cannot *per se* be expected to have unidirectional and positive environmental effects (Tacconi, 2007; Miteva et al., 2012). Bowler et al. (2012) found few rigorous studies on the causal effects of forest co-management on environmental and socioeconomic outcomes, despite anecdotal evidence.

2.2. *Eco-certification*

Eco-certification, also known as eco-labelling and sustainability certification, refers to programs that accredit goods and services that have met defined process standards meant to protect the environment and social welfare in the places of origin (Blackman and Rivera, 2011).

Consumer awareness and public legislation in developed countries contributed to the emergence of private-led standards to ensure the safety of food and other agricultural products. These standards are administered either by governments (e.g., organic certification), NGOs (e.g., Fair Trade, Rainforest Alliance), multiple stakeholders (e.g., Forest Stewardship Council), or individual companies (e.g., Starbucks' CAFE Practices verification program). In the case of forestry, for example, several certification schemes developed in parallel, including the Forest Stewardship Council (FSC), which is the product of a multi-stakeholder initiative (see below), and the Programme for the Endorsement of Forest Certification (PEFC), which is primarily an industry-backed initiative.

In the past two decades, more than 300 initiatives certifying that goods and services have been produced in an environmentally friendly manner have been launched in a wide range of countries and economic sectors (Ecolabel Index, 2013). Continuously raising voluntary standards aims at lifting industry norms, while allowing the most progressive companies to distinguish themselves from those doing business as usual. It can also raise mandatory standards, which lift up the poorest performers (Giovannucci and Ponte, 2005). In theory, the causal chain begins when eco-certification enables consumers who prefer green goods to identify and purchase them. Through this mechanism, clean producers would be rewarded for their efforts (through a premium, enhanced market access, and/or higher yields), while producers with unsustainable practices would receive an incentive to modify their practices so they can also access this differentiated market.

If that logic holds, eco-certification could be an important tool for addressing environmental problems in developing countries, provided that cost barriers can be overcome. Growing and processing timber, bananas, coffee, cocoa, and other agricultural products cause deforestation, soil erosion, and agrochemical pollution. These problems are hard to tackle using conventional top-down government regulation because producers are often small, numerous, and geographically dispersed, while regulatory institutions are undermanned and underfunded (Wehrmeyer and Mulugetta, 1999). Eco-certification schemes have the potential to sidestep these constraints by creating a supplementary private sector system of economic incentives, monitoring, and enforcement (Cashore et al., 2004; Dingwerth, 2008).

Not every eco-certification program will have these desirable effects (Blackman and Rivera, 2011). To be effective, a program must set and enforce standards stringent enough to ensure exclusion of "dirty" producers. It must also generate price premiums or other economic benefits high enough to offset the costs producers pay to meet certification standards and to get certified. Even then, program benefits can still be undermined by selection effects. Producers already meeting certification standards have strong incentives to select into eco-certification:

they do not need to invest in adopting sustainable practices to pass muster. But programs that mainly attract already-green producers do not drastically change producer behaviour and therefore have limited additional environmental benefits. Targeting rules can diminish this problem.

Rigorous assessment of the environmental effects of eco-certification is complicated by factors such as the selection effects just noted and technological progress that improves producers' environmental performance over time for reasons unrelated to certification. A failure to control for these factors can generate biased estimates of the benefits of eco-certification. Few studies have tried to measure the producer-level environmental effects of eco-certification, and even fewer have overcome the methodological challenges (Blackman and Rivera, 2011; Alvarez and Von Hagen, 2011). The bulk of these studies examined just two sectors (coffee and forest products) and two certifications (Fair Trade and the Forest Stewardship Council).

A handful of recent studies assessing producer-level benefits of coffee certification, while controlling for selection bias, have shown limited economic benefits from certification, but important social and environmental impacts under favourable contexts. For example, Rueda and Lambin (2013) found that certified farmers had adopted significantly more environmentally friendly practices than noncertified farmers, and that the strong institutional support of the Colombian Coffee Growers Federation for Rainforest Alliance certification was instrumental in generating social benefits for smallholders, reducing the cost of certification, and providing the extension services needed to help farmers join higher value chains and upgrade. Likewise, Blackman and Naranjo (2012) found that organic coffee certification in Costa Rica significantly improved growers' environmental performance. Ecosystem-level impacts are difficult to detect as certified farms are usually small, in highly fragmented landscapes, and geographically dispersed.

In the forestry sector, there is little evidence that certification has had globally significant environmental or socioeconomic impacts (Auld et al., 2008; Peña-Claros et al., 2009; van Kuijk et al., 2009; Dauvergne and Lister, 2010), but certification for tropical natural forests is relatively recent. There is abundant localized evidence of effects however (Durst et al., 2006; van Kuijk et al., 2009; Nasi et al., 2012). In some cases, forest certification had positive spill-over effects, e.g., through the clarification of land tenure in certified concessions in Brazil, Malaysia and Indonesia (Simula et al., 2004). In Latin America, logging companies had to comply with government laws, which were otherwise largely unenforced, to be certified (Espach, 2006). In the Asia-Pacific region, regional codes of practices based on the rules of certification were developed and promoted by national governments (Durst et al., 2006).

Initially, stemming illegal logging through price premiums and access to differentiated markets was the main argument used in favour of forest certification, but over time mounting

evidence suggested that such direct benefits are scarce (Gullison, 2003; Nebel et al., 2005). Other forms of indirect incentives arose, such as *signalling* (Rickenbach and Overdeest, 2006), i.e., the forest enterprises send a signal to final consumers, retailers and governments that they operate according to high and publicly verifiable standards; and *learning* or *streamlining*, i.e., the certified forest enterprises adopt new practices that render their activities more sustainable. *Learning* also applies to public policies, which can be modified when state officials apply certification standards, or part of them, to their own regulatory frameworks (Overdeest and Zeitlin, 2014).

2.3. Geographical indications

A geographical indication (GI) “identifies a good as originating in [a] territory (...), or a region or locality in that territory, where a given quality, reputation or other characteristic of the good is essentially attributable to its geographical origin” (INTA, 2013). Unlike eco-labelling, which informs consumers on *how* the good was produced, GIs mainly convey information on *where* it is produced, hence linking production to the socio-economic and environmental attributes of specific places (Barham, 2003). Each product protected by a geographical indication concerns small producing areas and is sold at prices generally higher than those of close substitutes. More than 10350 products benefit from GIs in the world, with 86% in OECD countries (Giovannucci et al., 2009). GI submissions from developing countries have increased recently, with a large potential for more tropical agricultural products to be registered.

GIs are protected by intellectual property rights through formal *sui generis* systems, trademarks (as in the United States), certification marks, collective membership marks, and denominations of origin (Giovannucci et al., 2009). The European Union has a stand-alone system with two types of GI designations: Protection of Designation of Origin (PDO; more than 600 products registered including 5 outside Europe) and Protection of Geographical Indication (PGI; more than 600 products registered including 8 outside Europe) (EEC Regulation No. 2081/92). Producers collectively manage each PDO and PGI, but product requirements are sanctioned by national governments. Verification of compliance is certified by a third-party organization.

PDO and PGI aim to promote and differentiate products, provide information to consumers on quality and traceability, increase farmers’ income, retain population in rural areas, and preserve traditional knowledge and products. GIs attempt to create a price premium to protect traditional practices from being standardized and to compensate higher production costs to compete with non-differentiated markets. Land use is indirectly affected by PDO and PGI because: (1) in theory, better environmental stewardship is required to preserve the “terroir” associated with the unique characteristics of the product, and (2) some requirements relate to land management practices (e.g., forage production for cattle feeding) (Barham, 2003; Giovannucci et

al., 2009). The few rigorous scientific studies found mixed impacts of GIs. PDO and PGI sometime promote more sustainable land use practices (Quetier et al., 2005; Giovannucci et al., 2009), but can also have no or negative effects when they are poorly managed and loose the link to their territory (Bowen and Zapata, 2009).

2.4. Multi-stakeholders initiatives

Concern about the impacts of largely undifferentiated global commodities such as soy, beef and palm oil in driving deforestation led civil society and private sector actors to establish multi-stakeholder initiatives (MSI). These are voluntary, market-based approaches that bring together many stakeholders for consultation, sharing of best practices, and eventually the negotiation of a set of principles, criteria, and indicators for more responsible production, sourcing, and manufacturing practices within or across a given sector or product. Many MSI result in the development of a standard that includes product labelling, as well as comprehensive verification, accreditation, and certification. However, not all MSI result in certification schemes: some commodity roundtables only develop environmental and social aspirational standards and/or share best management practices. While reducing deforestation has been a focus of these efforts, they also include provisions to ensure that production is legal, free of slave labour, and conducted without encroachment upon protected areas and indigenous lands. They sometimes include soil conservation, water use and pollution issues. MSI may also agree on voluntary moratoria, such as the Brazilian Soy Moratorium.

The Forest Stewardship Council (FSC) was the first commodity roundtable and has served as a model for subsequent ones. For credibility, roundtables require legitimacy, good governance, effective systems for reaching consensus, robust standards that are achievable but accepted by the market, and a system for addressing disputes. The development of standards requires information transfers involving stakeholders at all steps of the supply chain, which slows down the process but ensures buy-in from key sectors. Stringency is balanced to ensure a high level of uptake, while standards are designed to work towards continuous improvement. Critics noted that some roundtables tend to be weak or unable to reach agreement on some of the most difficult issues (Schouten and Glasbergen, 2012). Many standards fail to protect some valuable ecosystems from clearance and have so far not aligned with land-use planning and governance efforts (Braslett et al., 2011). The major roundtables have recognized that larger producers have a greater capacity to gain certification so are actively seeking ways to support smallholder certification.

Moratoria are an, often temporary, market exclusion mechanism. The soy moratorium in Brazil took shape in just a few months, following an NGO report linking illegal deforestation to

soy fed to chickens sold in major fast food chains. They provide quick fixes to urgent problems and only emerge following strong and targeted pressures. Because NGOs have limited resources and consumers' attention span is short, they have only succeeded for products or regions with clear global stakes, and where a few large actors control key points in the supply chain. They involve measures with low transaction costs – e.g., banning a type of product from supply chains – that are relatively easy to implement compared to the structural changes implied in roundtables. In the case of the soy moratorium in Brazil, the soy trader signatories agree not to purchase soy from any farms identified by the monitoring system (based on satellite imagery, aerial surveys and site visits) as having deforested after July 2006 (usually the date the moratorium was signed). Multi-stakeholder moratoria can include government actors, even if they are not held accountable to them. Indonesia's forest moratorium is an exception, being government led.

All roundtables' standards are third-party certified (Conroy, 2007). However, with a few exceptions such as the Better Cotton Initiative, roundtables do not include landscape-level monitoring systems, which makes it difficult to assess their broader impacts. Uptake by actors is often patchy. Leakage can go undetected. Periodic redesigning of the instrument during the implementation makes evaluation even more problematic. Moreover, given that commodity roundtables and moratoria are recent, there are few data to evaluate their effectiveness with a rigorous counterfactual. As any multi-stakeholder initiative, roundtables provide important benefits that are not directly related to performance by providing a forum to define sustainability standards among stakeholders and to discuss performance in a transparent way. Roundtable certification schemes enable scrutiny and increase corporate accountability in transnational commodity chains (Fortin and Ben, 2013). They have sometimes opened a space for competing, industry-led sustainability certifications (Ponte, 2013).

The implementation of moratoria is simpler to evaluate than roundtables because it is possible to measure the area of forest replaced by the relevant commodity before and after the moratorium, but attributing causality remains difficult given the multiple factors that influence deforestation. In Mato Grosso, soy was established on 18.5% of the area of forest cleared before the soy moratorium, and only on 1% after the moratorium (Macedo *et al.*, 2012). However, other factors contributed to reduce deforestation and soy expansion, and expansion of soy may have occurred outside of the Amazon biome or may have displaced pastures.

It is not clear how to replicate the success of the soy moratorium for other commodities. The cattle "moratorium" includes a far smaller proportion of the market and has faced greater implementation challenges (Greenpeace, 2010). For palm oil, the main market is Asia (especially India and China), where consumer environmental concerns are weak. As opposed to soybeans,

for palm oil consumers are not concerned about a specific biome (such as the Amazon) or about GM technologies. Therefore, shifting places of production is feasible. Indonesia recently renewed its moratorium on new concessions in primary forests, but the rapid oil palm expansion in other continents may indicate global-scale leakage.

2.5. Payments for environmental services

Payments for environmental services (PES) are a performance-based instrument, featuring voluntary, conditional agreements between buyers and sellers (Wunder et al., 2008). Different PES designs exist and private incentives are rarely sufficient (Kinzig et al., 2011). Although the desired service is usually identified, many PES target a specific place (e.g., a watershed) with multiple land-use threats and rely on land use/cover proxies rather than being commodity-dependent. Most PES compensate avoided action (e.g., not to deforest), but some induce actions (e.g., planting trees) (Wunder 2005). In some cases, PES may be seen as an insurance: given concerns about potentially adverse impacts of deforestation on water provision, actors in a watershed are ready to pay to avoid possible harmful consequences. Buyers can be monopsonic (e.g., hydroelectric power plant wishing to secure upstream quality flows), or the State can act in lieu of service users. These single-buyer arrangements can ease implementation by reducing transaction costs. Service sellers are often individual landowners, but sometimes also communities that enter into contractual arrangement requiring collective action. Except for some carbon credit transactions, PES seldom rest on market instruments directly linking private actors. In reality, most existing PES schemes are public or hybrid public-private instruments (Wunder et al., 2005).

Some argued that PES designs should be more sensitive to balancing efficiency and social distributive justice (Corbera and Pascual 2012, Muradian et al. 2010). PES were conceived as direct, performance-based and cost-effective incentives to constitute alternatives to the more indirect pro-poor investments for transforming livelihoods such as ICDPs (Ferraro and Kiss 2002, Wunder 2013). Nevertheless, in-kind or cash payments can help to invest into alternative livelihoods (Wunder 2005). PES and ICDPs thus overlap and hybrid schemes are the norm (Wunder et al. 2008). The types and scale of services also matters: for non-rival, non-excludable public goods of a global nature (e.g., carbon sequestration, biodiversity), public schemes are necessary to create the demand underlying PES (Farley and Costanza 2010).

The emergence and effectiveness of PES face economic, cultural and institutional challenges (Wunder, 2013). On the economic side, the willingness to pay of service users must be higher than the willingness to accept the payment on behalf of service providers. The perceived value of the service must therefore exceed the sum of the perceived value of the opportunity and

transaction costs. Concerning cultural factors, service providers have to feel motivated by the incentive to provide more services. PES may also induce crowding out of pre-existing intrinsic motivations for conservation - an issue for which there is limited evidence (Rode et al. 2013). Similarly, introducing PES to provide stakeholders with an additional incentive to comply with the law could undermine civic motivations and decrease compliance to constraining regulation. PES are designed to correct an externality for which, by definition, people are not inclined to pay. A “payment culture” needs to be created, e.g., if water is traditionally provided for free, the motivation to pay for securing clean water from upstream may be low. In terms of institutional preconditions, mechanisms need to be in place to ensure trust between users and providers, collect payments from service buyers and to ensure compliance from sellers (Muradian et al. 2010, Wunder 2013, van Noordwijk et al. 2012). For example, if there are no institutions in place to make citizens pay for their drinking water in an African city, then there is no vehicle to channel the PES (Ferraro 2009). Governments may be too weak to levy taxes to finance PES—which is how many PES have been organized. Moreover, free-riding avoidance mechanisms need to be created. On the provider side, clarity and security is required on who is holding rights of access to land and its use. This creates a problem in agricultural frontier regions with rapid environmental change but poor governance.

Few rigorous evaluations of PES impacts exist (Pattanayak et al., 2010), in part because PES initiatives are recent. Many impact assessments focused on the special Costa Rican case, where a national PES scheme was introduced when a forest transition had already begun (Pagiola, 2008). PES impacts in Costa Rica have been negligible or small nationally, with a moderate forest cover increase in some locations (Arriagada et al., 2012). Similar results were found for the Mexican national watershed PES: positive but modest impacts in reducing deforestation, limited by adverse selection bias and some leakage (Alix-Garcia et al., 2012). A regional PES scheme in China improved water quality, with a favourable cost-benefit ratio for both buyers and sellers of the service (Zheng et al. 2013). The smaller non-state, user-financed PES schemes may generally be more conditional, differentiated and targeted, but even less rigorous-quantitative impact evaluations exist for those (Wunder et al., 2008). However, assessments relying on a single quantitative impact metric may not ask the right question, and could miss both harder-to-assess indicators (e.g., forest degradation) and broader political impacts (Daniels et al., 2010). The long-term effectiveness of PES rests on sustaining the demand for services from buyers. For public- or donor-types PES projects, effectiveness depends on whether the rewards allow developing alternative livelihoods, and on the fairness of the agreement and accompanying rights (van Noordwijk et al. 2012).

3. Common interactions between instruments

3.1. Typology of interactions

As the above review made clear, the effectiveness of instruments to regulate land use depends on their institutional context, where multiple instruments typically interact in various ways. Interactions among instruments have significant implications on policy outcomes. Because most land use policies involve a mix of public and private actors, a typology of these interactions based on the functions performed by the different interventions is more relevant than one based on the actors involved. New regulatory mechanisms of land use generally serve best as a complement to command-and-control interventions. Most demand-led instruments require, as a minimum, compliance with public laws and regulations (Bostrom, 2003; Espach, 2006; Ebeling and Yasué, 2008). Smart “carrot and stick” policy mixes provide together the right balance of incentives to encourage leaders, and provide penalty threats to deter “free riding” laggards (Gunningham and Sinclair, 2002). Recent success in curbing deforestation in the Brazilian Amazon, for example, was primarily achieved through a combination of field-based law enforcement, including *in situ* confiscation of assets, with administrative cross-compliance measures, such as conditional credit access and commercial embargos as part of the soy moratorium (Hargrave and Kis-Katos, 2013). This was made possible by a new satellite-based environmental monitoring system (Assunção et al., 2013). Instruments can also substitute for each other – e.g., when a public regulation takes over a function that was fulfilled by a private instrument, which was itself compensating for a failure in formal governance. Different instruments can also undermine each other’s actions by prescribing conflicting management practices with different incentives, or crowding out intrinsic motivations to comply with pre-existing public regulations.

The main interactions between various instruments – i.e., complementary, substitution, and undermining effects - occur at the different stages or functions of the regulatory process (Lister, 2011; Gulbrandsen, 2013): agenda setting and negotiation; implementation; and monitoring and enforcement (Table 1). Two governance systems can be complementary when their agendas mutually reinforce each other – e.g., private standards fill policy gaps. They can operate the same functions in parallel but remain independent – they are “symbiotic” (Steering Committee, 2012). In this case, different instruments pursue the same goal but target different actors by using different enforcement tools - e.g., a certification system rewards the leaders who comply to extra-legal standards, while a public environmental law sanctions actors who violate the law. Or they can divide functions, for example when a certification program ensures implementation of norms designed through a government-led agenda-setting stage – they are “hybrid” (Steering Committee, 2012:74). Substitution (or “superseding” according to Steering

Committee, 2012) occurs when another governance entity replaces the private-led mechanism most often in the agenda-setting phase, through policy learning or norm generation - e.g., government adopt a private standard or implements a competing certification system. Conflicting governance systems can undermine each other at all stages of the policy process. Table 1 suggests that various instruments are more often complementary than antagonistic. Our proposed typology helps understanding how a combination of regulatory mechanisms allows fulfilment of all the functions required for effective governance.

3.2. Examples of interactions

Given the paucity of evidence on policy interactions, we identify the main ones based on a few examples. We focus on interactions between formal, public government-led regulatory instruments and new demand-led or market-based instruments, but interactions among these new instruments can also occur. In the agenda-setting and negotiation stage, substitution often occurs, as when governments endorse private-based instruments to support their own policy agenda, directly or indirectly, through cross-compliance instruments. Private standards can provide legs to forestry and agricultural services: they offer procedures and management strategies that can be adopted by governments, improving the overall legal standards and avoiding a race to the bottom whereby certification “adapts” to the weaker legal baselines (Cerutti *et al.*, 2011). In Guatemala’s Petén, there is a legal requirement for forest concessions to be certified (mostly FSC), in which case the intervention becomes a hybrid between command-and-control and market-based (Bray *et al.*, 2008; Blackman, 2013). Certification standards can also be adopted into law. Organic agriculture standards have been endorsed by USDA, which developed a legal standard. Adoption of private standards into public regulations is a privileged way to scale-up effective standards and develop a legal basis to compel laggards to increase their performance. Complementary interactions occur when governments sort out standards and assess their impacts. Government interventions include encouraging private standards to converge, inducing companies to share information and increase transparency, aggregating information, and regulating the use of labels. Governments may also create a “background threat” of designing or strengthening public regulations, to induce private actors to adopt their own sustainability standards. For example, the 1993 environmental regulatory reform in Colombia motivated the creation and marketing of an eco-certification program in the flower sector, “Florverde” (Blackman *et al.*, 2013).

In the implementation stage, private-public interactions are often complementary: governments are not direct implementers but create enabling conditions for private governance to be more effective and scale-up. The state enables infrastructures, technical extension, and

consular offices in support to international trade. Governments also help setting up the market – i.e., rule of law, contracts enforcement. Clarifying and securing land rights facilitates the investments needed to implement private instruments such as certification, and can constitute one step in the design of a PES scheme (van Noordwijk et al. 2012). Governments can remove bottlenecks in the supply chain – e.g., infrastructures to ensure traceability – that prevent effective private regulation, and increase consumer awareness and expectations for businesses. Substitution occurs when governments support scaling-up of standards by incorporating them into their own policy designs. Worldwide, there is a larger area under public than private PES schemes. Land use planning and subsidies can be used to encourage the adoption of standards in critical areas, protect key landscape elements, and target spatially threatened resources (e.g., in buffer zones and ecological corridors). For example, in Mexico the federal government chose to promote and subsidize FSC certification in specific states (Anta Fonseca, 2006). Public authorities can also subsidize or decrease taxes on certified concessions and products (Karsenty, 2010) - e.g., as suggested as part of the “Norway partnership” in the Congo Basin to decrease taxes for certified forestry companies and offer compensation (from the World Bank) to balance the states’ budgets. In the Forest Law Enforcement, Governance and Trade (FLEGT) Action Plan of the European Union (EU) aimed at banning illegal logging imports into the EU, existing certification schemes or certifying operators can be endorsed by the governments of producing countries as sources of legal timber (e.g., in Cameroon). The EU Timber Regulation Act of 2013 specifies, albeit without naming any specific scheme, that assurance of compliance of timber importers with applicable legislation (to prove the legality of timber) may be provided by “certification or other third-party-verified schemes which cover compliance with applicable legislation”. The EU has formally recognized the Roundtables on Responsible Soy (RTRS), Sustainable Palm Oil (RSPO) and Sustainable Biofuels (RSB) as EU Renewable Energy Directive (EU-RED) compliant voluntary schemes. Governments can also play a more direct role. As land managers, twelve state governments in the US realized that they can use certification as leverage to increase state forest agency funding: committing to certification gives them access to resources they were unable to get before. Having identified best management practices associated with different standards, governments can diffuse them more widely through extension services. Governments also play a major role to reward leaders by adopting sustainable procurement policies for their own consumption, whether it's domestically or through their development aid – as done by the Netherlands and the UK. Government-sponsored schemes affect private companies by creating markets for which access requires compliance with the standards. Another form of public-private interaction is through subcontracting and memoranda of understanding (MoU). In China, several local governments have signed MoU with Walmart to promote sustainability through their supply

chains.

Enforcement is often achieved through complementary interactions. Governments provide technologies and resources for monitoring and evaluation of standards. For example, the soy moratorium in Brazil relies largely on remote sensing technology (Rudorff *et al.*, 2011). Records from government sources (e.g., public health) provide information on compliance and effectiveness. Governments can also level the playing field by ensuring that claims of certified companies are verified, engaging in legal actions to punish cheaters, and thus enforcing accountability. Governments have a growing role to play in sorting out “false” sustainability claims as part of “green-washing” strategies. Further, once the traceability required by certification is in place, an authority can better track other social and environmental issues (e.g., slave labour and various forms of pollution). Governments – e.g. in Brazil - are starting to recognize this indirect benefit and increasingly support certification.

Hybrid governance coalitions can also address all stages of the regulatory process. The recent acknowledgement that more effective long-term action can occur if the public and private sectors work together has resulted in initiatives such as the Tropical Forest Alliance (TFA) 2020, an alliance between governments of the US, UK, the Netherlands and Norway, and the Consumer Goods Forum (which brings together over 400 companies) (USAID, 2013). TFA’s goal is to support deforestation-free supply chains. The UK government is also working towards a goal of no palm oil contributing to deforestation by 2015, by engaging with industry and NGOs.

3.3. Challenges

Public-private interactions also face difficulties and risks. There is reluctance on the part of public actors (EU, World Bank) to mix public and private mechanisms as it implies a public endorsement of private labels, which may risk violating WTO rules (European Commission, 2004; Brack and Bailey, 2013). It is also difficult to endorse one label without doing the same for others – e.g. FSC and PEFC for FLEGT. Most NGOs would welcome governments adopting their standards, to be able to focus on new issues at the forefront. However, states have to address issues comprehensively while private policy instruments usually focus on specific issues, areas and actors of greatest concern.

Governments, NGOs and corporations may also compete and hinder each other’s actions. Market-based instruments are more difficult to implement in countries with weak governance, but are not absent from these countries: Central African countries hold more than 4 million ha of FSC-certified forest concessions. Some of the obstacles are arbitrary changes in policies, governments plagued by vested interests, increased pressures on certified companies to pay bribes compared to non-certified ones, lack of recourse to counter false claims. Environmental

policies may be dictated by well-established corporations, leaving the weaker producers behind. Governments may also favour certain standards at the expense of others – e.g., the Indonesian government promotes among its main buyer governments (India, China, Malaysia) its own Indonesian Sustainable Palm Oil scheme (ISPO) rather than the global Roundtable of Sustainable Palm Oil (RSPO), which undermines the support for RSPO amongst palm oil producers in Indonesia (von Geibler, 2013). Finally, the pre-existence of certification schemes, roundtables, moratoria and other forms of private regulations can undermine governments' efforts to pass stronger regulations or, on the opposite, the development of legal norms can decrease incentives to adhere to more stringent private standards (Carlsen et al., 2012).

4. Conclusion

Globalization has created new connections between distant actors and land uses. It has also opened the opportunity to provide a more diverse and fruitful interplay among private companies, consumers, governments, and civil society to promote sustainability. Despite the recent enthusiasm for private-driven mechanisms, public regulations maintain an essential role of protecting basic environmental conditions, as well as providing the enabling conditions for private and hybrid initiatives, and pushing standards upward. Moreover, civil society plays a key supporting role within democracies in promoting fairness, long-term equity, and other ethical values as important non-market elements in the policy agenda. Private regulation cannot substitute for weak governance, be it caused by lack of state capacity, vested interests or corruption. However, private initiatives have the potential to address regulatory gaps and improve land uses practices and contribute to broader changes in governance, under appropriate policy mixes.

Public and private regulations may interact by playing complementary roles that create the following sequence of events (Conroy, 2007): (i) information campaigns create a widespread perception of an environmental problem; (ii) standards for sound land use practices are defined by involving various mixes of stakeholders, (iii) policy instruments allow implementation of these standards at an acceptable cost for private actors by providing compensation (price premiums, market access, payments), levelling the playing field, and creating enabling conditions; (iv) monitoring and auditing contribute to enforcement, with a threat of sanctions. Within this policy mix and sequence, eco-certification, GIs and PES being mainly incentive-based instruments, can reward leaders and scale-up effective practices. Punishing laggards relies strongly on the capacities of governments to integrate private standards into legal norms and private monitoring into legal sanction, and on multi-stakeholders initiatives backed by civil society's pressure. Governments also use land zoning to address land use issues comprehensively. The scalability of

each instrument varies greatly: while some are designed for specific products and/or landscapes (GIs, PES) or market segments (eco-certification), others have a greater potential to affect large territories (land zoning) or sectors (commodity roundtables).

Interactions between instruments make tracing the impacts from consumers to land use and environmental services a challenging task. Impact assessment and drawing causal inferences requires carefully sorting out the influence of contextual factors *versus* the role of the instrument itself. Given the paucity of empirical evidence on the effectiveness of single instruments and their partial effect within policy mixes, it is premature to propose optimal combinations of instruments. A rigorous comparative analysis is required that would need to include a large number of case studies representing various combinations of public and private policies. Several challenges are anticipated. Each case is likely to contain unique features that complicate empirical analyses. Time lags in impacts further complicate the evaluation of effectiveness, especially for subtle and side-effects (e.g., leakage). Finally, impact evaluation needs to account for path-dependencies: being involved in certification, PES or a roundtable modifies the future incentives of multiple actors.

More evaluation is needed but actions cannot be stalled until enough evidence has been collected. Progress on the learning curve associated with new standards can only be achieved through implementation. Evaluation should support incremental improvement of the effectiveness of instruments rather than sorting out the good from the bad ones. This calls for an adaptive management approach that builds monitoring into the implementation of an instrument to collect information that contributes to improve future management (Folke et al., 2005). In that way, corrective actions can be taken as the policy is implemented. This approach is sometimes referred to as experimentalist governance - i.e., a recursive process of provisional goal setting and revision based on learning from various approaches in different contexts (Overdevest and Zeitlin, 2012).

With favourable institutional and governance contexts, well-designed hybrid public-private instruments can be effective, but we still lack systematic evidence. We still need to know much more about how best to combine, sequence, and target different policy mixes. This feedback will allow for improving the design, implementation, and performance of new regulatory mechanisms of land use, including optimizing their interaction with traditional public policy instruments.

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