UNIVERSITY OF GOTHENBURG

UNDERSTANDING ILLEGALITY AND CORRUPTION IN FOREST MANAGEMENT: A LITERATURE REVIEW

Aksel Sundström

WORKING PAPER SERIES 2016:1

QOG THE QUALITY OF GOVERNMENT INSTITUTE
Department of Political Science
University of Gothenburg
Box 711, SE 405 30 GÖTEBORG
January 2016
ISSN 1653-8919

Understanding illegality and corruption in forest management: A literature review
Aksel Sundström
QoG Working Paper Series 2016:1
January 2016
ISSN 1653-8919

ABSTRACT

This review synthesizes the literature studying illegality and government corruption in forest management. After discussing the theoretical connections between different types of corruption and illegal forest-related activities it describes the major trends in previous studies, examining cross-national patterns as well as local in-depth studies. Both theory and available empirical findings provide a straightforward suggestion: Bribery is indeed a "door opener" for illegal activities to take place in forest management. It then discusses the implications for conservation, focusing first on international protection schemes such as the REDD+ and second on efforts to reduce illegality and bribery in forest management. Key aspects to consider in the discussion on how to design monitoring institutions of forest regulations are how to involve actors without the incentive to engage in bribery and how to make use of new technologies that may publicize illegal behavior in distant localities. The review concludes by discussing avenues for future research.

Keywords: corruption, bribery, illegal logging, forest management, deforestation

Aksel Sundström
The Quality of Government Institute
Department of Political Science
University of Gothenburg
Aksel.sundstrom@pol.gu.se

"Illegal logging provides the greediest section of a society with increased wealth and power. It weakens local communities and breaks down the rule of law. It creates a situation where law-abiding citizens find it difficult to exist without buying into the lawlessness. It thrives on corruption, bullying and violence. Local people lose their resources and central government is cheated out of revenue."

(Currey and Ruwindrijarto 2001, p. 2)

Introduction

The governance of the world's tropical forests remains weak. Media reports and accounts from advocacy groups indicate that corruption is one of the major current problems facing the forestry sector. Recently, Greenpeace issued a report suggesting that timber in the Amazonas is transformed from illegal logging to legal paper through rampant corruption in government authorities. The report cites figures – based on data in which satellite images of forest cover decrease is matched with official records of logging – estimating that nearly 80% of the wood shipped from a certain Brazilian region is felled illegally (The Guardian 2014). Thus, this suggests that a recent increase in deforestation in the Amazonas was due to corruption in particular, as loggers could bribe their way into false contracts and permits.

More than a decade ago, Smith and Walpole (2005) asked, "should conservationists pay more attention to corruption?" Since then, several studies have debated how to measure and conceptualize the linkages between corruption in government authorities and the conservation of biodiversity and natural resources (Halkos et al. 2015). However, scholars note that there is a general lack of research on corruption in the conservation literature (Agrawal 2007; Hanson and McNair 2014; Smith et al. 2015). Within the field of forest management there has been a larger understanding for the need of addressing corruption and, compared to research on other types of environmental issues, a relatively large amount of studies have explored this topic. Yet, the knowledge from this literature has not yet been synthesized. That is, while studies repeatedly mention that corruption assists illegality in forest management, there is no review over this body of research.

The aim of this review is threefold: to provide a clear theoretical reasoning of how illegality and corruption affects forest management, to summarize the empirical findings from this literature in a thematic manner and to discuss what implications has for the outlook international protection

schemes such as the REDD+ and the efforts to reduce illegality and bribery in forest management. Through this review we find theoretical as well as empirical reasons for concluding that corruption and bribery indeed is a door opener for illegal practices to take place in forest management. Although illegality of forest management is a difficult concept to define, it is evident that its most aggressive shapes and forms – large-scale illegal logging in tropical forests – are enabled through corruption. We identify that key aspects to consider in the discussion on how to design monitoring institutions of forest regulations is how to involve actors without the incentive to engage in bribery and how to make use of new technologies that may publicize illegal behavior in distant localities.

This review proceeds as follows: It first discusses the definitions of the two concepts of illegality and corruption and briefly notes how the extent of these features has been estimated. It then outlines the theoretical relationship between illegality and corruption in relation to forest management. The third section of the review is devoted to empirical findings. The following section discusses implications for conservation programs and the final one concludes by outlining a future research agenda.

Theoretical perspectives

The scope of this review is limited to studying illegality and corruption in forest management. Hence, it does not discuss the reverse relationship, that is, the effects from having high-value forests on corruption in government institutions. The potential blessing for a country of having an abundance of natural wealth is often portrayed as a "resource curse," since this feature may in fact hinder domestic calls for reforms of democracy and accountability (e.g. Ross 1999). For instance, a recent NGO report suggests that corrupt leaders in Cambodia over the years have maintained power because of revenue streams from smuggling illegal timber to luxury markets in China (e.g. Global Witness 2015). Thus, the objective of this review is not to explain the occurrence of poor institutions, but rather to synthesize how the literature has dealt with the effects from illegality and corruption on forest management.

Defining illegality in forest management

In a context of forest management, the term "illegality" is a complicated concept: Legal actions in the forestry sector are not always justifiable (certain logging concessions may be questionable for a range of reasons) and some illegal acts may in fact be rather acceptable in the eyes of most people. As Irland (2008) notes, illegal actions often take place in a context of poverty and could include "people harvesting for building materials and fuel in areas prohibited under unwise, ill-considered, and unenforced paper 'logging bans'" (p. 191). Scholars have therefore considered using terms such as 'misuse' or 'destruction' of forests to define acts that are morally unwanted (Hafner 1998). Yet, these terms are imprecise and therefore not very useful. This is partly the reason why criminologists have suggested the term "conservation crime" instead of "green" or "environmental" crime, as it denotes a violation of formal conservation rules rather than an abuse of a vaguely defined environmental value. Scholars with a more ecocentric perspective, that view social inequalities as a root cause of harm to both the environment and humans, may have problems with such a definition of illegality (Gibbs et al. 2010). Taking this conceptual critique seriously, we support any attempts to discuss what illegality is, or ought to be, in forest management. However, what actions that are justifiable – or not – are in the end a normative issue and a conceptualization that is outside the scope of this review. Instead we use the terms "illegality" and "illegal acts" since they are widely used in this literature and among practitioners. Following previous authors (e.g. Wells et al. 2007) we define illegality in forest management as actions "which fails to conform to national laws and standards regulating forest resource allocation, forest management and extraction, processing, transport and trade" (p. 141).

Yet another potential problem of discussing illegality in forest management is that it risks putting the blame on the "smaller fish" while larger actors, that are perhaps better equipped at hiding their practices, continue their shady behavior (Richards et al. 2008). While we find it important that a discussion on illegality in forest management manage to keep such concerns in mind we see the merit of using this concept. Recent works within criminology investigate "conservation crime", discussing a wide array of unlawful behavior that has an impact on conservation practices (Gibbs et al. 2010). For instance, Solomon and colleagues (2015) state that "illicit or non-compliant human behaviors may occur in all ecosystems and range from subsistence illegal resource collection to poaching by organized criminal syndicates" (p.1). A point made by Gore (2011) is that there are linkages that seldom go studied between legal extraction and illegal actions – for instance, so-called "timber barons" often use the same roads as companies with contracts when moving their illegally

extracted trees. Moreover, she calls attention to the important linkages between illegality in the forest sector and organized syndicates: "The role of organized crime in deforestation includes a high degree of planning (e.g., conscription and outfitting of poachers) and sophisticated smuggling techniques (e.g., counterfeit documents, cargo concealment) for cross-border movement" (p. 2). Research holds that the enforcement of regulations is crucial for the sustainability of resource management (Dietz et al. 2003). While widespread compliance among resource users is not a sufficient criterion for sustainable outcomes, the likelihood of achieving such goals is generally held to be higher with widespread compliance (Platteau 2008). Compliance is a concept that may be viewed as a dichotomy, yet in practice the term refers to "the degree of adherence to rules, as when a person breaks some rules but not all, or respects most of the rules but not always" (Arias 2015, p. 134).

We believe thus that illegality, as a concept, is useful for the purpose of this review. Yet, what type of actions this denotes in the forest sector can be further specified. In detail, illegal logging is broadly defined as, "Timber harvesting-related activities that are inconsistent with national laws (or sub-national laws)" (Smith 2002, p. 3). These activities can thus vary from logging in a protected area or obtaining concessions illegally (Callister 1999). More specifically, Amacher et al. (2012, p. 93) see three types of illegal logging when a harvester breaks a concession contract:

> First there may be excessive harvesting known as leakage beyond concession boundaries, in that harvesters may remove more volume or log a greater area than is allocated by the contract. Second, harvesters may "highgrade," removing only the greatest valued trees or species and leaving low valued poorly formed trees … Finally, harvesters may shirk environmentally sensitive logging restrictions, instead using less costly unsustainable and unallowed harvesting techniques.

Then there is also a range of illegal activities related to income generating activities from forest use that may be illegal, but not yet considered illegal logging. For instance, harvesters may use specific means of "girdling" or "ring-barking" to kill trees so that they can be legally logged (Søreide 2007, p. 17). Contreras-Hermosilla (2002, p. 1) writes that crimes in forest managements also include "other sector operations such as forest products transport, industrial processing, and trade." Finally, Guertin (2003) provides further examples that are not logging per se, such as "illegal occupation of forestlands; Woodlands arson … Transfer pricing and other illegal accounting practices" (p. 11).

Defining corruption in forest management

Corruption is generally viewed as "the abuse of entrusted power for private gain" (Transparency International 2010). It is said that "corruption in monitoring institutions can usually be separated from political decisions" (Kolstad and Søreide 2009, p. 223) and political or grand corruption is often contrasted to bureaucratic or petty corruption (Hellman et al. 2000). This distinction refers to the level and on which magnitude corruption takes place (World Bank 2000): "The former is defined as an attempt to influence the setting of policy by making payments to politicians, while the latter reflects payments made in an attempt to avoid the consequences of a given policy" (Wilson and Damania 2005, p. 517). A typical example of petty corruption in forest management is when a harvester bribes a public official responsible for enforcing regulations to evade sanctions for rule violations, for instance, when cutting trees in a protected reserve. An illustration of grand corruption is instead when an industrial actor offers, or is asked, to bribe decision-makers to abstain from imposing legislative restrictions on logging in a certain area, for instance, through creating reserves (Callister 1999). Notably, the type of corruption that is possibly more common in the forest sector is referred to as collusive corruption and signifies behavior where the involved actors (harvesters and officials) collude to let illegal behavior go unnoticed. This can be separated from non-collusive corruption, where harvesting actors have to pay bribes to access services or documents they are legally entitled to without payments or delay (Smith et al. 2003).

There has been a discussion on whether or not corruption is a meaningful term since what actions that are seen as abusive may differ depending on the perspective of an observer. Thus, a "relativistic" critique from the scholarly fields of anthropology and political ecology holds that cultural norms and traditional authorities may create an acceptance of certain clientelist practices (Gore et al. 2013). While acknowledging that such a conversation is relevant, I chose not to engage in this discussion. I instead assume that there are behaviors that should be denoted as corrupt acts and that bribes, monetary as well as non-monetary, are one such type of conduct.

Theories of illegality-corruption linkages in forest management

The theoretical accounts for causal mechanisms from illegality and corruption on forest management outcomes described in this section draws on research that also study how corruption tends to increase pollution and other types of environmental externalities. These theoretical writings consist

of two main strands of explanations. One is focused on the large-scale and holds that (grand) corruption affects the substantial stringency of forest policy, as bribes and lobbying towards politicians could shape decision-making in corrupt societies (Fredriksson et al. 2004; Welsch 2004). Another explanation is focused on the small-scale and instead proposes that (petty) corruption hampers forest law enforcement, allowing loggers and harvesters to evade sanctions for rule violations and thus encouraging the overexploitation of forest resources (Smith and Walpole 2005; Tacconi 2007). Research also highlights three indirect effects. First, the literature discusses the negative effect of corruption on economic development, a process that supposedly could decrease the general harm on forests from economic activities (Damania et al. 2003). Second, some studies focus on political business cycles that bridge the divide between policymaking and implementation, that is, where politicians grant resource users lax enforcement during electoral times to maintain or gain power (Burgess et al. 2012; Min and Golden 2014).[1] Third, where corruption is widespread government funds allocated to conservation of natural resources are often embezzled. Therefore, money does not meet conservation needs and, thus, forest resources may increasingly be in risk of overexploitation (see Iversen et al. 2006; Cavanagh 2012).

In fact, the insight that bribery may affect forest management is so established that some authors have talked of a "forest corruption" (Kishor and Damania 2007). In a World Bank publication, Callister (1999) even suggests that "the terms 'corrupt' and 'illegal' forestry activities should be read as referring to the same generic issue" (p. 1). Similarly, Amacher (2006) notes that "clearly, corruption and illegal logging activities are unarguably intertwined" (p. 86). Studies that address the relationship between corruption and forest management outcomes give a range of examples on how these mechanisms may be visualized. For instance, Lee et al. (2015) notes:

> Since each individual harvester can gain from logging more trees than other harvesters, preventing unsustainable overharvesting requires establishing standards for legal logging. And when the tasks of monitoring and sanctioning harvesters according to those standards are delegated to third parties, corruption may arise. (p. 2)

[1] Related, Delacote (2007) notes that "concessions allocation is an important pattern of corruption and forest exploitation in developing countries. Indeed, corrupt regimes often use the allocation process to reward their political allies or to increase the wealth of their family and friends" (p. 56).

Moreover, such acts may be quite straightforward: "in exchange for a bribe, forestry regulators may provide certain individuals with preferential treatment (e.g., awarding a timber concession), or they may 'legalize' illegal operations" (Miller 2011, p. 2). It is noted that corruption opportunities may vary across the different stages of forest management, that is, during (i) design of concessions, (ii) award of concessions, and (iii) operation and logging (Søreide 2007). Even more specific, Milledge and colleagues (2007) develop a typology outlined by Rosenbaum (2005) to classify different types of bribes in the forest sector and timber trade in accordance with their intentions. As can be seen in Table 1, these types of behaviors give concrete examples of how corruption may look on the ground and how they, in turn, may facilitate illegal logging.

TABLE 1, EXAMPLES OF DIFFERENT TYPES OF BRIBERY IN TIMBER TRADE

Intention of bribery	**Examples of timber trade**
To get a discretionary favor	Obtaining harvest license, transit pass or export permit
	Securing clearance from village government to harvest
To get an incidental benefit	Facilitating rapid issuance of harvest license
	Soliciting bribes for legal goods at checkpoints
To get a scarce benefit	Special permission to export timber products for limited period
	Access to purchase limited supplies of auctioned timber
To impose a cost on others	Ensuring greater scrutiny over competitors' export cargo
	Instigate higher security risks to logs in open storage

Source: Milledge et al. (2007)

Robbins' (2000) understanding of illegality and corruption in forest management contributes further theoretical nuances. He focuses on poor rural communities where forest-related incomes are important for livelihoods and develops a model where bribery in government institutions alters existing regulations. Whereas the formal regulations *(de jure institutions)* outline how access and usage in forest-related activities should be conducted among villagers, corruption functions to disrupt these rules. Through bribes, *de facto institutions* instead render resource users with money and connections access to forest activities through illegal means and, as a consequence, deny others (with less economic and social resources) entry to these resources. Also Kahler et al. (2013) have stressed that the illegal use of natural resources may hinder the use of resources for harvesters that are legally entitled to such access. Hence, besides the ecological implications from corruption bribery may increase social inequality in a local context.

In the line with the above reasoning of potential side effects, others have suggested that corruption in forest management is especially troubling since it may be a sector where corruption first enters and creates norms and behaviors that then spread throughout society. Kishor and Damania (2007) argue that since forest concessions are so vulnerable from bribery they risk creating a "contagion effect" in which criminal networks gain experience from money laundering and disrupting legitimate trade flows, behavior which may then be applied to other sectors (p. 6). Thus, corruption in the forest sector may create further problems in the governance of society in general.

On a side note, Robbins (2000) notes that both neoclassical and Marxist-oriented theoretical accounts could reach the conclusion that corruption leads to unsustainable use of natural resources. From the former perspective, bribery enables the access of resources below optimal pricing, thus undervaluing scarcity and leading to a tendency of overuse. The latter perspective has a different view on what constitutes legitimate control over nature. Yet, in acknowledging that bribery enables capital accumulation among certain actors – "an illegal extension of capital's control of nature through the state" – Marxist accounts also would see corruption as detrimental for resource management (p. 431).

Empirical findings linking illegality and corruption

The extent of illegal activities in the forestry sector is notoriously difficult to estimate. One issue to take into account is that since deforestation and forest degradation stemming from legal practices are inherently hard to measure, any attempts to quantify illegal actions (which often go unreported) are therefore very much "guesstimates" (FAO 2005). The United Nation's Food and Agricultural Organization (FAO) publishes recent data on changes in global forest cover within the Global Forest Resources Assessment in five-year intervals (FAO 2006). However, these reports do not include established measures of illegal actions. With the increasing technological advances in aerial photography and satellite imagery the possibilities of making rapid analysis of current development increase. This may be welcome in policy circles as forest degradation increasingly receives attention as the issue of reducing carbon emissions gains attention in high-level diplomacy (see Herold et al. 2011). At any rate, in the absence of a precise figure, one may still conclude that illegality in forest management has large costs. The costs are not only ecological or social but also economical – on companies with legitimate practices (Forest Governance Integrity Program 2011) and also on countries as national treasuries lose revenues. For instance, older figures from the World Bank (from

2002) suggest that the lost revenue may be annual US$15 billion (cited in Guertin 2003; and on a side note one can see that these numbers are also being cited almost a decade later, e.g. Koyuncu and Yilmaz 2009; Storhaug 2012). Others make statements that should be received with care. Solomon et al. (2015) write, "illegal and illicit logging in protected forest areas has been linked to half the deforestation in tropical countries" (p. 2). Yet, there are reasons to be wary of such statements. That article refers to a study by Lee et al. (2015). But, to the best of my knowledge, this article only provides a different estimate, which nonetheless illustrates the grim estimations of illegality: Lee and colleagues (2015) state that based on figures from the FAO, "For some countries, such as Cambodia, Indonesia, and Bolivia, indicative estimates of illegal logging even exceed 80%" (p. 2). Other reports have focused on estimating how much illegal forest products are traded. For instance, Hembery et al. (2007) suggest that over 7% of the U.K. timber import comes from illegal sources (see also European Forest Institute 2005).

Corruption is likewise difficult to measure, often relying on annual perception- or expert-based assessments of national levels of corruption, issued by actors such as the World Bank and Transparency International. It has been pointed out that the use of such indicators may be problematic in the literature on natural resources since both the status of certain environmental resources and corruption levels vary within regions and across sectors of a country (Barrett et al. 2006). Yet, making use of the actual differences in aggregated levels of corruption between countries, we often find that corruption is mentioned anecdotally when stories of forest degradation in the Global South make the news. Similarly, biodiversity hotspots such as central Africa, South Asia and Southeast Asia – regions where the conservation of natural resources constantly have been highlighted by the international society as crucial – are also regions which receive notoriously bad assessment when the presence of corruption is evaluated (Transparency International 2011). Irland 2008 (p. 189) states, "nearly half of the world's forest is in nations with what [Transparency International] calls 'rampant' corruption. This includes several major nations with extensive forests and important biodiversity hotspots." Similarly, as noted by Trefon (2010), the dense tropical forest in the Congo Basin is the world's second largest after the Amazon, yet it is also characterized by some of the worst governance in terms of corruption in government.

Macro-level findings

The term macro-level is here used as an umbrella for studies with a quantitative large-*n* approach (often across countries but also across subnational units), that can be contrasted to the micro-level studies that focus on corruption on the local level and do so by the use of qualitative methods.

Within this vein of research, large-*n* studies have focused on many regions of the world. Four articles analyze patterns on a set of countries that are nearly global in scope. Meyer et al. (2003) study a sample of 117 countries from 1990 to 2000. They find that corruption (gauged by the World Bank "control of corruption" index from 2001) has a small but significantly positive effect on the rate of deforestation as measured with officially reported FAO figures. That is, their study indicates that countries with higher corruption witness a somewhat faster rate of deforestation. Wright et al. (2007) come to a similar conclusion, yet by using a different measure of forest conservation. Focusing on a smaller number of countries, spread evenly across the tropical region, they analyze satellite-based data on the effectiveness of combating fire as a proxy for illegal logging in 823 forest reserves. Their statistical findings suggest that protected forests are more effectively managed in countries with lower levels of corruption. Koyuncu and Yilmaz (2009) also report that corruption increases deforestation. They use three different measurements of corruption (the Corruption Perception Index (CPI), the International Country Risk Guide (ICRG) index and Business Intelligence (BI) index) and official figures on deforestation for three different time periods (1980–90, 1990–95, 1990–2000) over the approximately 100 countries that have more than 500 hectares of forest. Across all time periods and in the models with different corruption measures, their results confirm that deforestation rates increase with higher degrees of corruption. The focus of Ferreira (2004) is on the impact from trade regulations on logging, but deserves mentioning as she finds that corruption is a conditional factor. More precisely, studying official figures on deforestation rates in about 90 countries over the years 1990–2000, her study shows that trade liberalization has negative effects on forest cover when corruption (measured by the ICRG index) is widespread.

With regard to certain geographical regions, two large-*n* studies have explicitly studied corruption and deforestation in Latin America. Mendes and Porto Jr. (2012) focus on the Legal Amazon region of Brazil. They model a corruption index over 538 municipalities from this area by data based on an independent audit, that is, not perceptions-based figures. When analyzing deforestation – based on satellite imagery for the year 2004 – they first study the municipalities in nine federal states in the Amazon region. In this model they find no effects from corruption rates in municipali-

ties. However, when they proceed and examine Matogrosso and Pará, the two states with the most severe deforestation, they find that a part of the variance between municipalities within these two states is significantly attributed to rates of municipal corruption. Also focusing on Latin America, Bulte et al. (2007) address both corruption and deforestation, yet rather indirectly. They propose that land clearings and corruption interacts through subsidies to farmers. They use data on subsidies for nine countries (Costa Rica, the Dominican Republic, Honduras, Panama, Paraguay, Peru, Uruguay, Ecuador and Venezuela) over the period 1985–2001. They find a positive association over time between corruption and expansion of agricultural land, thus resulting in excessive deforestation. Yet, their analysis has some limitations, because the corruption measure is an aggregated governance score also taking democracy levels into account. Briefly it can be mentioned that these results to some extent mirror the findings of Barbier et al. (2005), in which corruption appears to be associated with cumulative land expansion in tropical developing economies. These authors examined land conversions during the period 1961–1999 in a large number of countries, assuming that agricultural land expansion is a proxy for deforestation. Their findings suggest that corruption tends to increase land conversions. However, it should be noted that this study is limited by the fact that the authors use one fixed figure for corruption per country for all years, based on a perception-based national estimate of corruption from 1997.

A large-*n* study with contrastingly reliable measures is the article by Burgess and colleagues (2012). They address the well-known problem associated with officially reported figures of deforestation (which we discuss further in the section below) by instead using fine-grained satellite imagery covering all of Indonesia from 2001 to 2008. This research design takes advantage of district-level elections over this period that are uncorrelated with other predictors of deforestation. Across these years they find evidence of "political logging cycles" in which forest cover is reduced before elections, confirming the theoretical link in which politicians and elites running for office send signals to officials to grant lax enforcement to logging rules to gain support in local elections. Similarly, Alesina et al. (2014) analyze this very data on deforestation in Indonesia. Their empirical analysis link corruption to deforestation outcomes: They show that variance between districts in ethnic heterogeneity correlates with both higher degrees of corruption attitudes (measured with two perception-based measures of corruption in Indonesian districts) and increased levels of deforestation. The argument of the paper is that ethnic heterogeneity affect deforestation through corruption as an intermediary variable.

Two macro-level studies find results that are exceptions in this vein of research, suggesting that aspects of "good government" may increase deforestation. Cisneros and colleagues (2013) analyze how a randomized audit of corruption (determined by authorities through a lottery) in 209 Brazilian municipalities affected deforestation, 2002-2009. Following the publication of auditing reports on corruption there was a rather sharp increase of deforestation in the municipalities under public scrutiny. They conclude that increased deforestation may be an unintended consequence from these audits that, in targeting other sectors than the ones dealing with land and forest issues may have diverted focus form monitoring activities in this sphere. A study focusing on the timber extraction of the European parts of Russia (Wendland et al. 2014) is the second exception to the trends in this literature. The study uses a satellite-based measure of forest cover of change between the periods 1990-2000 and 2000-2005 and finds that increased quality of governance in regions correlates with higher levels of deforestation. The authors propose that this may be because lower levels of corruption decrease overall transaction costs of business and thus attracts economic activities and resource extraction. It should be noted that the measure of governance is a composite indicator of these two time periods that includes much more aspects than corruption (such as levels of public participation), a fact that may decrease the strength of these conclusions.

Some limitations of the trends from these large-*n* studies deserve mentioning. A critique of several studies could be directed to both measurements and the manner of making inferences. Pertaining to measurements, using officially reported data on forest cover has obvious limitations. Besides being limited by simplifications, for instance to assign simple numbers on a forest cover when some forests are more dense or biologically important than others, one could question if net loss of forest covers should be a relative or absolute number when creating such a dependent variable (Koyuncu and Yilmaz 2009 use relative differences). In other words, is a big loss of forest cover in a tiny country really worse than a small loss of cover in a huge one? Further, there has been a debate on whether or not one can compare FAO figures on forest cover across time as measurements have shifted over the years (Angelsen and Kaimowitz 1999; Matthews 2001). Moreover, this reported data may in itself be affected by governments that have their own agenda (mirroring the case when China for years reported biased figures on fish catches to the FAO (see Watson and Pauly 2001)). Turning to the issue of research design, most of these studies are correlational and rely on observational data. Illustrate for potential problems with such designs, one could question the rationale of Meyer et al. (2003) to control for factors such as GDP that research repeatedly suggests is also affected by corruption. The gold standard of inferences in the social sciences – experimental studies

with randomized control groups – is not yet used in this literature. Since designing a natural experiment where corruption in government is assigned as a treatment is problematic, a way to proceed may be to use quasi-experimental approaches in future studies. For instance, by using matching techniques on subnational units where we have an estimate of corruption on the district level (such as in Brazil) and other observables on forest outcomes (cf. Nolte et al. 2013), this has potential for generating more robust findings.

Nonetheless, despite these limitations, few studies seems to find other patterns than the expected one. While there possibly may be a "publication bias" here – a study finding no effect between two variables, seldom gets published – this must be seen as supporting the predictions made by theory. However, to dig into the causal mechanisms causing corruption to let illegality take place in the forest sector, micro-level studies are more appropriate.

Micro-level findings

A number of in-depth studies showed in the early 2000's that corruption was rampant in the forest sector of Indonesia. Smith and colleagues (2003) conducted interviews with a larger number of key informants such as officials, timber industry actors and members of local communities in Kalimantan. They find that a system of legal timber permits was generally misused as bribes commonly enabled companies to harvest areas significantly larger than the authorized area. Interestingly, they describe that loggers increasingly take this chance during economic downturns: "one [informant] claimed that it was no longer possible to make profits without resorting to such means" (p. 300). Tying into the case of this country, Palmer (2001) describes how both large- and small-scale corruption exacerbate illegal logging in Indonesia. Corruption on the grand scale enables 'super-profit' for illegal forest concessions that violate legal terms, for instance, by re-logging premature areas, therefore disturbing plans for forest regrowth. On the smaller scale, bribery functions through the formation of local networks, consisting of sawmill agents, crews that fell the timber and government institutions that enable this to continue. Also focusing on Indonesia, Scotland (2000) states that this logging is going on under the nose of the country's military. Moreover, officials that are tasked to enforce forestry laws are active themselves in illegal felling of trees and sometimes sponsor logging gangs. He furthermore notes that corruption in the Indonesian judiciary makes these wrongdoings go unpunished. Similarly, a report by the NGO's Environmental Investigation Agency (EIA) and Telapak (2001) describes how endemic corruption in Indonesia is rooted in "money politics." In

this setting, local district governors can buy their positions and use collusion with timber barons as a way to get a return on this investment, through illegal logging. In fact, the report describes how Indonesian timber barons became highly influential politicians themselves: "At the core of the issue of illegal logging is corruption" (p. 21).

A thorough report by the Transparency International Indonesia-chapter (2011) study how bribery enables illegal behavior in the forest sector of three regions in the country. The report applies a framework that uses workshops, involving stakeholders from civil society, the private sector and government agencies, to generate primary data. Secondary data from technical reports, government publications, media sources and documents from the private sector, international donors and NGOs was used to complement these findings. In all three regions – Aceh, Papua, and Riau – bribery enables illegal activities in a range of ways; it makes logging operations expanding to protected areas, it acquires licenses as to make illegal operations look legitimate, it falsifies certifications, it manipulates data, it puts pressure on competitors that do not pay bribes, if affects spatial planning and makes public officials become own shares in logging companies.

The international NGO Human Rights Watch published a report in 2009, arguing that more than half of the timber 2003-2006 in Indonesia was felled illegally and that corruption was an inevitable condition of this outcome. The report uses industry-standard calculations that compares consumption with legal wood supply to estimate illegal logging, complemented with interviews with key actors (officials, analysts, advocates, journalists, and donors) in 2008 and 2009. It traces these figures to a system where loggers routinely pay bribes to avoid obtaining the proper licenses to cut and transport timber and where local officials face no consequences for failure to submit required reports for felled trees and revenues.

Bettinger (2015) studied a National Park in southern Sumatra, where encroaching farmers challenge protected land. Using one year of fieldwork around 2012 (ethnographic and archival research methods and interviews with informants such as village heads, elected officials, park officials, and forest police), the study finds that local politicians face electoral incentives not evict encroachers. Due to decentralization reforms the local vote is influential on the decision to forest use in protected land continue. Although not a form of bribery, this is still a type of corruption, since it implies that elected officials gain political power by sending the signals to bureaucrats not to enforce the rules of the National Park. In this context the call for building roads through the park – as to get

local residents to benefit from a timber boom – becomes a way for local politicians to gain support in relation to the national government.

As one of the influential studies on the specific topic of corruption in forest management, Robbins' (2000) accounts for corruption in the forest department in Indian Rajasthan. His research builds on interviews with 162 harvesters and forest officials in several villages adjacent to a wildlife sanctuary where only limited collection of fallen wood is allowed. Villagers get access to forest resources they are not legally allowed to harvest through weekly or monthly payments to a lower ranking forest guard. A share of this money is then divided and travels upwards in the bureaucracy, thus these actions are taking place with the consent of senior staff. Some richer harvesters gain access to the most valuable products by throwing parties where foresters get food and liquor. Harvesters that are not a part of this village-elite have to pay larger bribes to get access to forest resources of the same or lower quality. Since every villager is not in a position to pay such bribes, this resource extraction only benefits certain individuals while contributing to conservation rules not being enforced in practice and an overharvesting of forests in the area.

In another instance of forest corruption, Klooster's (2000) study of community forestry in Oaxaca, Mexico, uses site visits, interviews and literature reviews to show that logging interests give a disproportionate share of employment opportunities from milling and logging to wealthy community members. This is done to generate advantageous outcomes in locally elected assemblies. Moreover, the study shows that these interests have captured the community forestry management, leading to decisions favorable to the corrupt: "The forestry elite dominates communal institutions through intimidation, manipulating elections, dodging oversight, and discouraging participation in community assemblies. Threats, violence, bribes, and the manipulation of reciprocal obligations are common tools of internal politics" (p. 6).

A thorough report by the NGO Traffic (Milledge et al. 2007) focuses on a timber boom in the 2000's in Southern Tanzania. Interestingly, the Tanzanian Ministry of Natural Resources and Tourism has authorized this publication. This rich report shows how corruption is present at many different levels of forest management, local as well as national, and related behavior includes the direct involvement of senior officials in the trade of timber out of which a large portion is illegally sourced. Among other methods the authors carried out interviews with 87 stakeholders, out of which a majority were timber traders, a large portion were officials and a minority come from NGOs. Out of these, 82% believed in the assertion that log exports involved corruption. The re-

spondents also refer to a widespread perception that the presence of East-Asian traders, and especially Chinese traders, paid the larger bribes and therefore were one of the main hurdles for fighting corruption. The report concludes that during a national "timber rush" in 2003–2004 illegal logging in the study area rose, from 77% during 2001–2002 to 96%, at worst, during mid-2004 (p. 200). During these years corruption likewise increased rapidly.

Persha and Blomley (2009) study a number of sites in Tanzania and compare logging outcomes in centralized versus communally managed forests. They measured the extent of logging and pole cutting (prohibited in all sites) as a measure of management effectiveness. They also conducted interviews with forest management committee members, local government officials and village households. Through these interviews, they find that corruption seems to be a factor explaining poor forest management outcomes: Harvesters active in these areas describe how authorities generally did not enforce logging rules and loggers operated freely in both forests and, according to the study, villagers viewed this as an indication of corruption and collusion between logging interests and forestry officials.

Siebert and Elwert (2004) studied a region of Northern Benin during 1999–2000 and performed interviews with 34 actors in the forest sector as well as high-ranking officials and international experts. In general they find that bribery exists among officials in the forest sector and that harvesters' attitudes to such officials are contrasting depending on whether or not they are able to gain access to illegal resources through bribery or if they are denied this opportunity. Collusion between foresters and loggers has formed tight networks and officials sometimes engage in illegal logging themselves. It is cheaper for loggers to pay a bribe than obtain legal documents for extraction. Outsiders seldom notice this behavior since foresters do not need to declare any forest inventories or felling statistics to senior personnel in their bureaucracy. The study therefore concludes that this behavior threatens the last standing forests in the country. Also with a focus on a country in the African context, Gore et al. (2013) interviewed ten male residents living near a conservation area situated in northeastern Madagascar. They report that high-value Rosewood is cut down with false documents appearing legitimate and officials allow larger numbers of trees to be taken through bribes.

Focusing on Costa Rica, a study by Miller (2011) explores corruption through interviews with 15 experts from different areas of the forest sector (NGO leaders, legislators, officials and loggers). These persons portray a situation of widespread corruption that facilitates illegal logging. For instance, members of the police are said to take payments to allow truck drivers to transport wood

without necessary documents or permits. In another scenario the logger bribes an official in the forest department to issue a permit that is never stamped, so that a logger can reuse this several times and maintain that wood has been cut legally.

Pellegrini's (2011) field study of the Swat region in Pakistan, prior to the Taliban insurgency's spread to this area, uses interviews with an unspecified number of people from different stakeholder groups – both officials, scholars and locally elected elders as well as group discussions with harvesters – to tease out perceptions on illegality and corruption. This context illustrates "chronic" corruption and related situations include forest officials colluding with loggers to allow more wood extraction than legal limits allow. The report also discusses a "timber mafia" that pulls strings in the political sphere and pays bribes to enforcement officers to enable the trafficking of lumber.

Focusing on Honduras and Nicaragua, Wells and colleagues (2007) conducted a comparative case study in 2002, focusing on illegal logging and timber trade. They use secondary data paired with informant approximations and supply and demand analysis to estimate levels of illegal logging and trade. They trace a widespread practice of illegality to both grand and petty types of corruption. Examples of small-scale type of corruption in the two countries include practices of paying bribes to speed up the handling of documents as well as making officers ignoring illegal acts.

Furthermore, there are a number of studies where corruption is mentioned in passing as facilitating illegal actions in the forest sector. In the book *Shadows in the Forest*, Dauvergne (1997, p. 113) describes in a short passage the weak structure of forest management during the 1990's in Sabah and Sarawak in East Malaysia. Accordingly, logging companies removed the most valuable logs without regard to laws. He notes that "many forestry enforcement officers ignore violations in exchange for money or gifts" (p. 114). Moreover a situation in Sabah is described where politicians, timber operators and bureaucrats collude to siphon off value from legal timber trade flows – that would have become state revenue – through measures of counterfeiting species types on documents or underdeclaring volume and values of exports while giving kickbacks to customs officers. Downs (2013) mention that many of the commercial logging operations in Sarawak, a region of Malaysia, were run by the family or close political associates of the Chief Minister of Sarawak. The report also notes that police in Cameroon abstain from cracking down on illegal actions in commercial logging due to the ties to the political sphere. Richards et al. (2003) focus on Honduras and Nicaragua and synthesize the insights from a number of research outputs conducted in the region. They do not focus explicitly on corruption but conclude that there is "institutionalized forest sector corruption" (p.

283) in the two countries that enables widespread illegal logging. To illustrate, they say that in Nicaragua, illegal logging has eroded traditional institutions and corrupted indigenous leaders. A World Bank study (Goncalves et al. 2012) describes that in Honduras, in 2004, an Assistant Attorney General halted an investigation into illegal logging on the part of some of the country's largest timber companies just as prosecutors were reviewing relevant documents that were in the possession of the state forest administration agency: "When the public prosecutors resumed their work the next day, the documents had mysteriously disappeared" (p. 6). Corruption in the sector therefore not only has ecological but also social costs. Southgate et al. (2000) are an exception in this literature as they find evidence of non-collusive corruption in their study of Ecuador (i.e. behavior that denotes payment for legally entitled services rather than bribes to let legal violations go unpunished). In detail, they mention briefly in their study that loggers and harvesters describe that they have to pay a bribe to forest officials although they comply with all laws. In this sense, corruption becomes an extra cost for harvesters when working in this corrupt setting. Iversen et al. (2006) mention that there are cases in Nepal where money allocated to forest user groups was embezzled. Therefore, money did not meet conservation needs and, thus, such behavior had a negative outcome on forest management.

Finally, a number of such reports mention briefly the existence of corruption in forestry in a different range of settings. As such, Callister (1999) authored a World Bank report on corruption and forestry in which she emphasizes the negative influence on conservation from corruption. In this discussion she suggests that corruption in the forest sector is haunting management in a range of countries and gives examples from Cambodia and Papua New Guinea, where non-collusive corruption functions as an extra tax imposed on harvesters. A conceptual note by Palmer (2005) gives an historical description of how a "culture of payoffs" within public officeholders in Indonesia has corroded forest law enforcement. Similarly, Søreide (2007) mentions in passing that Malayan loggers bypass forest laws in Papua New Guinea through the use of bribery. She also notes that in the Democratic Republic of Congo the government continued during the early 2000's to sign deals with forest concession companies for logging rainforests although legal frameworks were supposed to hinder this practice. There are also anecdotal stories that are described in some writings that may effectively show the nexus of illegality and corruption in forest management. Accordingly, in the early 2000's Brazilian enforcement officials from the national environmental agency were filmed asking for a payment from a timber company employee in order to make a substantial fine imposed for illegal logging disappear (Laurence et al. 2001). Similarly, Shaxson (2007, cited in Kolstad and

Søreide 2009, p. 219) mentions the following account: "In Equatorial Guinea, the son of the president made millions on timber concessions while being minister of forestry, stating that 'I am a businessman first and a politician second.'"

To summarize, one can first note that a large portion of these micro-level studies are relatively old. Assuming that the situation they portray is still relevant, the main concern is perhaps the extent to which the practices illustrated in these local studies exist if one raises the scope of analysis to a larger level. For instance, are the small-*n* studies depicting a biased version of forest management in these countries? Is corruption in the forestry sector, although described vividly, still quite uncommon? While, the case studies suggest otherwise, the strength of this strand of the literature is not to estimate the extent of corruption but rather to present in-depth analyses of how this behavior interlinks with illegality and affects forest management.

To summarize the findings from the review reported above, Table 1 provides a schematic overlook. It describes briefly the focus and results of the 27 reviewed empirical studies and anecdotes from the 10 additional studies discussed above. Having concluded that this body of research finds corruption to cause illegal actions in forest management across a range of contexts, the next section focuses on what consequences this has for conservation management.

TABLE 2, THE SCOPE AND RESULTS OF STUDIES ON CORRUPTION AND ILLEGALITY IN FOREST MANAGEMENT SUMMARIZED

Macro-level focus

Study	Location	Concept/actors in focus	Design and material	Main findings
Alesina et al. (2014)	Indonesia	Deforestation, satellite imagery	Municipalities, 2001–2008	Ethnic heterogeneity linked both to corruption perceptions and deforestation rates
Barbier et al. (2005)	Africa, Asia, and Latin America	Conversions to agricultural land	Low- and middle-income countries, 1960–1999	Corruption increases land conversions
Bulte et al. (2007)	Latin America	Expansion of agricultural land	Nine countries, 1985–2001	Corruption increases expansion of agriculture land
Burgess et al. (2012)	Indonesia	Deforestation, satellite imagery	Municipalities, 2001–2008	Forest cover is reduced in cycles associated with municipal elections
Cisneros et al. (2013)	Brazil	Deforestation rates	Municipalities, 2002-2009	Following an audit and publicized corruption there is an increase in deforestation, potentially explained by unintended consequences from a public focus on other spheres
Ferreira (2004)	Global	Deforestation rates, national FAO figures	90+ countries, 1990–2000	Trade liberalization has negative effects on forest cover when corruption is widespread
Koyuncu and Yilmaz (2009)	Global	Deforestation rates, national FAO figures	100+ countries, 1980–1990, 1990-1995, 1990-2000	Corruption has a positive effect on deforestation rates
Mendes and Porto Jr. (2012)	Brazil	Deforestation, satellite imagery	Municipalities, 2004	Municipal rates of deforestation are partly explained by corruption
Meyer et al. (2003)	Global	Deforestation rates, national FAO figures	117 countries, 1990–2000	Corruption has a positive effect on deforestation rates
Wendland et al. (2014)	European Russia	Forest cover change, satellite image data	Districts, 1990-2002 to 2000-2005	An increase in a composite score of governance is associated with more deforestation, suggesting that “good” governance may increase forest extraction
Wright et al. (2007)	Tropical countries	Effectiveness of combating fire (a proxy for illegal logging)	823 forest reserves, 2002–2004	Protected areas are more effectively managed where corruption is low

Micro-level focus

Study	Location	Concept/actors in focus	Design and material	Main findings
Bettinger (2015)	South Sumatra, Indonesia	Encroachment in a National Park	Fieldwork in 2012, using ethnographic interviews with stakeholders as well as archival research	Local politicians shy away from evicting encroaching farmers from protected land to get electoral support
EIA and Telapak (2001)	Indonesia	Illegal logging and timber smuggling	Interviews with key actors, including	Local timber barons collude with local district governors, trading positions with gains

			loggers, as well as surveillance of actual logging activities, 1999–2000	from logging. Bribery enables the smuggling of forest products in the region of South-east Asia
Gore et al. (2013)	Northeastern Mada-gascar	Illegal logging and timber smuggling	Interviews with 10 residents living near a reserve	Rosewood is cut down with false documents appearing legitimate. Officials allow larger numbers of trees to be taken through bribery
Human Rights Watch (2009)	Indonesia	Illegal logging	Calculation that compares consump-tion with legal wood supply to estimate illegal logging, complemented with interviews with key actors (officials, analysts, advocates, journalists, and donors) in 2008 and 2009	The report refer to corrupt practices that are assumed to explain the widespread pattern of extensive illegal logging
Klooster (2000)	Oxaca, Mexico	Timber smuggling	Site visits, interviews, and literature reviews	Valuable positions in forest production, such as sawmill employment, are traded to get favorable outcomes from local decision-making
Milledge et al. (2007)	Southern (Mainland) Tanzania	Timber trade and exports	Interviews with 87 stakeholders (timber traders, officials, NGO representatives	Corruption facilitates the illegal exports of hardwood
Miller (2011)	Costa Rica	Illegal logging	Interviews with 15 experts (NGO leaders, legislators, officials, loggers)	Corruption facilitates illegal logging. Police take bribes to allow wood to be transported without necessary documents. Forest officials issue permits that are never stamped, so that a logger can reuse this document several times
Palmer (2001)	Indonesia	Illegal logging	Forest production and export figures, 1997–1998	Large-scale corruption enables forest concessions that violate legal terms, for instance, by re-logging premature areas. Small-scale corruption, involving sawmill agents, crews and government agents, results in illegal forest clearance
Pellegrini (2011)	Swat, Pakistan	Illegal logging and timber smuggling	Interviews with stakeholder groups (officials, scholars, elected elders, harvesters)	Forest officials collude with loggers to allow more wood for extraction than is legal. A “timber mafia” pulls political strings and pays bribes to enable the trafficking of lumber
Persha and Blomley (2009)	Tanzania	Illegal logging and pole cutting	Logging outcomes and interviews with key actors	Villagers in forest areas attribute nonexistent law enforcement to the collusion between loggers and officials
Robbins (2000)	Rajasthan, India	Illegal logging and harvesting	162 interviews with forest users and foresters, 1998	Corrupt practices enable certain elite actors in villages to bypass forestry laws and harvest forest beyond permitted levels
Scotland (2000)	Indonesia	Illegal logging	Desk study, secondary sources	Corruption that involves the military and police forces enables the smuggling of timber
Siebert and Elbert (2004)	Bassila, Benin	Illegal logging	34 interviews with key actors (officials, experts), 1999–2000	Collusion between forestry officials and loggers enable illegal extraction, and officials sometimes engage in these practices themselves
Smith et al. (2003)	Kalimantan, Indonesia	Illegal logging	Interviews with key informants (offi-cials, industry actors, local community members)	Illegal logging rises during political instability due to collusive corruption in the forestry sector

Transparency International Indonesia (2011)	The Indonesian regions, Aceh, Papua, and Riau	Illegal logging	Consultation with various stakeholders from civil society, private sector and government agencies, as well as using secondary information	Bribery enables illegal activities in a range of ways; it makes logging operations expanding to protected areas, it acquires licenses as to make illegal operations look legitimate, it falsifies certifications, it manipulates data, it puts pressure on competitors that do not pay bribes, if affects spatial planning and makes public officials become own shares in logging companies
Wells et al. (2007)	Honduras and Nicaragua	Illegal logging and timber trade	Secondary data paired with informant estimates and supply and demand analysis to estimate levels of illegal logging and trade, 2002	Bribes speed up the handling of logging contracts and make officers ignore illegal acts

Anecdotes of corruption and illegality in forest management

Study	Location	Anecdotal information
Callister (1999)	Cambodia and Papua New Guinea	Examples of corruption in the forest sector where non-collusive corruption functions as an extra tax imposed on harvesters
Dauvergne (1997)	Sabah and Sarawak, Malaysia	During the 1990's forestry officials could be bribed to enable forest law violations to continue unpunished
Downs (2013)	Sarawak, Malaysia and Cameroon	Political ties among loggers enable law violations
Goncalves et al. (2012)	Honduras	Judiciary system corrupted and documents in prosecution of illegal loggers disappears
Iversen et al. (2006)	Nepal	Money from international aid is embezzled and do not reach conservation projects
Palmer (2005)	Indonesia	A culture of payoffs" within public officeholders in Indonesia has corroded forest law enforcement
Richards et al. (2003)	Honduras and Nicaragua	Describes "institutionalized forest sector corruption" in the two countries that enables illegal logging
Søreide (2007)	Papua New Guinea	Malayan loggers bypass forestry laws through corruption
Southgate et al. (2000)	Ecuador	Officials ask harvesters and loggers for side payments although they comply with laws
Laurence et al. (2001)	Brazil	Enforcement officials ask for bribes to enable fines for illegal logging to disappear

Implications for conservation

The conservation of tropical forests has quickly become an important issue on the political agenda as forests are increasingly included in the discourse of "carbonization" associated with the high-level negotiations on reducing anthropogenic greenhouse gas emissions (cf. Vijge and Gupta 2014). As such, this is illustrated in the vast interest and financial resources invested in the REDD+ (Reducing Emissions from Deforestation and Forest Degradation) programs in recent years. However, awareness is growing that a key challenge for the success of these multibillion dollar programs is the presence of pervasive corruption in forests management.

The risk of REDD+ failure in corrupt countries

The donor initiated programs under the REDD+ banner include an umbrella of projects in which actors (individuals, communities and countries) that cut carbon emissions from forests are rewarded. Yet, herein lies also the well-known dilemma: "countries with the highest volumes of deforestation – and therefore a focus of REDD support – are also those with some of the poorest scores on established indicators of governance" (Bofin et al. 2011, p. 4).

Cavanagh (2012) studied a conservation program in Uganda funded by the World Bank and, by accounting for an investigation from a commission of inquiry, describes evidence of embezzled funds. Examples included infrastructure that was never realized and training of conservation officials that only resulted in "ghost employees" – the funds where instead pocketed. Moreover, payments in the size of nearly US$3 million "disappeared" when sent between ministries, indicating a link towards corruption in the higher echelons of society. The study also mentioned that a very similar case has been unraveled in neighboring Tanzania and notes that corruption in such sectors has implications, "also for the implementation of REDD+ schemes in East Africa. These schemes involve similar disbursements to conservation and forest management bureaucracies, or to nongovernmental organizations contracted to implement programmes" (Cavanagh 2012, p. 3). In line with this concern a number of authors have discussed REDD+ programs and highlighted the risks of making such investments in highly corrupt countries.

There are a handful of studies focusing on REDD+ programs in which corruption is mentioned indirectly. Hayes and Persha (2010) study community forestry field sites in Honduras, Nicaragua and Tanzania, respectively. It can be mentioned that they find instances where conservation

schemes receive little support from local community members due to corruption allegations towards officials. In Honduras, for instance, harvesters had little support for forestry rules since they accused the Ministry of Forestry of being involved in illegal timber trade. Amid widely held beliefs in communities that authorities are corrupt, the study suggests that the involvement of state agents in REDD+ schemes may be detrimental and in fact do more harm than good.

Brown (2010, pp. 260–262) sees that there are three likely sources for corruption in REDD+ programs: first, when a country determines the baseline for its historical levels of deforestation – corrupt agents stand to gain from overestimating domestic deforestation rates, as this would potentially generate larger funds that can be siphoned off. Second, in a context of tropical forests where land tenure is often unclear, agents could try to account for reduced emissions for projects that may overlap and such claims may become sorted out through the use of bribes. Third, a big opportunity for corruption is inherent in the need for monitoring and the existence of forest officials that potentially will be bought off to be silent over continued harvesting. A key issue within the REDD+ schemes is the corruption risks associated with the distribution of forest carbon rights, i.e. the compensation for not cutting down trees. As Downs (2015) notes, these rights are, compared to logging – where "communities may be able to see the amount of timber harvested and estimate their share of benefits" (p. 2) – characterized by a difficult calculation of market process of carbon and information asymmetries that may enable embezzlement of such funds. Adding to this, Tacconi and colleagues (2009) also note that grand types of corruption from agricultural interest groups could bribe decision-makers to refrain from establishing a REDD+ program in the first place. Facing these potential challenges of corruption, donors may refrain from investing in forest conservation schemes. It is therefore highly relevant to see what types of proposals have been made to reform these problems in governance of the forest sector in tropical countries.

Efforts to reduce bribery in the forest sector

As noted by Transparency International (2010, p. 2), "Corruption in the forestry sector appears to thrive where forestry officials are given broad discretionary powers with limited official oversight.

This may be exacerbated in remote areas where there is little opportunity for public scrutiny." So what can be done to reduce such behavior?[2]

There are some enterprises gaining influence that seek to reduce corruption in the forest sector. First there have been responses in governments, for instance through the Forest Law Enforcement and Trade Action Plan, the European Union's response to the problem of illegal logging and related trade in forest products. Such work is one way to reduce the *demand* for products that sustain illegality and corruption (see Søreide 2007). Tying into the issue of demand – though on the domestic side – Siebert and Elwert (2004) note that there is potentially a battery of reforms that target the local demand for forests products that often are illegal in origin. They propose these types of reforms and note that since many countries where charcoal and timber wood is used for subsistence cooking, alternative energy policies may help lower such resource use.

Related to the *supply* of such products, there are examples such as the Forest Governance Integrity Program, initiated by Transparency International's national chapters in the Asia-Pacific region, in which civil society attempts to provide tools for reducing corrupt practices. Examples of the outputs produced by this program are the manuals for risk assessments directed to practitioners (see Forest Governance Integrity Program 2011). Another initiative hosted by Transparency International is the Forest Integrity Network, a consortium of actors from private, public and advocacy sectors related to forest activities with the aim of curbing corruption. The program brings together environmental NGO's with anticorruption organizations. Gupta and Siebert (2004) describe this work in detail and mention that one of the ideas (a decade ago at least) was to establish a new measurement of forest corruption: "A forest sector 'transparency index' could point to the forms of corruption in the sector and identify countries and companies who are leading the way in good forest governance. A forest sector 'vulnerability index' could demonstrate impacts of forest sector corruption on different segments of society" (Gupta and Siebert 2004, p. 343). Moreover, they outline the need for developing a "Forest Corruption Fighters' Tool Kit" for activists on the ground and also for compiling a source of good practices that may inspire further progress. Rosenbaum (2005) draws on this work when presenting a number of reforms to reduce corruption in forest management. Among the thirty suggestions, these reforms generally target awareness in the public (campaigns through different channels), specify different ways in which forest officials can

[2] As Larmour (2011) notes, the reforms prescribed as anti-corruption measures in REDD+ programs is largely a product of how we conceptualize the causes and drivers for corruption to take place. Therefore, careful consideration of the nuances of corruption risks in REDD+ programs is needed.

be better monitored (through tracing performance or employment records), create ways in which citizens can complain and whistle-blowers obtain protection and, finally, increase transparency in individual concessions (by publishing exact facts on the Internet for each logging concession and the involved bidders) (see pp. 13–24).

Academic research has not yet provided simple solutions to the wicked problem of corruption in forest management but some trends in the literature are similar to the suggestions mentioned earlier from policy-oriented writings. There is a general insight that corruption vulnerability is not uniform across the different stages of forest management (cf. Søreide 2007). This point is picked up by Kishor and Damania (2007, p. 11). They outline the different types of vulnerabilities – from forest estates, through transport-export, milling and destinations – and suggest that interventions targeting corruption must take these steps into account. Bulkan and Palmer (2008) note that illegal logging is connected with the trafficking of other goods, such as drugs, weapons and humans. Combating the smuggling of these goods therefore requires holistic reforms that include a pallet of government administrations, including customs offices and communication with transit country ports. Yet, many reforms are difficult since corruption is pervasive in many authorities, not only forest administrations. For example, a forest certification scheme is possible to cheat by bribing the right officials to relabel goods (Bulkan and Palmer 2008). Therefore, a reformed monitoring in different steps of the process – of conserved areas, of concessions, of trade routes – is discussed in this literature.

Some scholars hence argue that one solution when corruption in state authorities governing forests is widespread is to *reduce* their involvement. Discussing local natural resource management in a Tanzanian context, de la Torre-Castro (2006, p. 11) proposes, "when state agencies are involved in corruption and rent-seeking, bottom-up initiatives may improve monitoring." Similarly, and explicitly discussing forest management, Pellegrini (2011, p. 121) notes, "In the case of a corruption ridden centralized forest management regime, institutional reform should move away from enforcement of existing institutions and promote communal management of natural resources by locals." This point is also advocated by Milledge et al. (2007), suggesting that one solution for monitoring tropical forests is to establish independent forest monitoring programs. These are defined as the "use of an independent third party that, by agreement with state authorities, provides an assessment of legal compliance, and observation of and guidance on official forest law enforcement systems" (p. 211), which could be designed as an intervention for a limited period of time.

Certain authors extend this reasoning to discuss how monitoring REDD+ schemes can be improved. Tacconi and colleagues (2007) suggest that other actors need to be involved: "the larger the share of REDD+ revenues controlled by government officials the greater the incentive will be for corrupt behaviour. Therefore, assigning the rights to REDD+ credits to individuals, communities and companies may reduce the incentives for corrupt behaviour in the public sector" (p. 173). Similarly, Brown (2010) sees promise in the combination of (a) bringing in more monitoring actors and (b) the use of new technologies:

> NGOs and international organizations must be brought into the oversight process. Current experiments in having NGOs help monitor forest preserves could be expanded and perhaps even done virtually. The World Resources Institute, for instance, already is using extensive satellite imagery to monitor and pinpoint deforestation throughout the world. (p. 264)

On this note, other authors discuss how *new technology* may enable public participation to curb corruption in forest activities. For instance, Cavanagh (2012, p. 4) notes that mobile applications are increasingly used by NGOs (e.g. the World Resource Institute's "Governance of Forests Initiative") to allow citizens to report abuse through texts, which can be published online and disseminated to stakeholders: "This could prove particularly useful in the case of conservation areas or forest reserves that are expansive yet bordered by densely populated communities, where access to basic mobile phone technology is often widespread."

Towards an agenda for future research

To summarize, this review attempts to synthesize current understandings of illegality-corruption linkages in forest management. It provides a discussion on defining the relevant concepts and a theoretical reasoning in this regard. The review reports the findings of two large research programs, one focusing on macro-level trends and one having a micro-level approach. The aggregated trend from the 27 reviewed empirical studies and anecdotes from 10 additional studies uniformly suggests that corruption of different scales enables illegality in forest management and that this phenomenon is not defined to a certain geographical region or time period.

With this being said, there are still reasons to note the limitations of the above conclusion. With regard to concepts, "illegality" remains somewhat problematic as a term. The review suggests that

future research further explore this notion in a normative discussion. For the empirical findings, there are two concerns to examine further. First, pertaining to large-*n* trends, existing studies often use data on illegality in forest management and corruption that has inherent problems, and the design of their cross-sectional studies have some problematic assumptions. The review therefore encourages researchers to improve these aspects, for instance, by designing studies that employ quasi-experimental matching techniques. Second, related to micro-level studies, these often remain limited by their (very) local design. That is, while they may manage to illustrate and explore the role of corruption and illegality in forest management schemes, the extent of such practices is seldom possible to estimate. The review therefore recommends future research to find ways of establishing methods to combine the strengths from both quantitative and qualitative methods. Finally, it is noted that the discussion on how to curb forest sector corruption is most often future-oriented. The review suggests that this literature engage in conducting studies of controlled policy interventions in which proposed reforms are studied in relation to observed outcomes with randomized controls. While such ventures are time-consuming and costly, and most likely require the participation of local authorities, they hold great possibility for our understanding of this pertinent issue.

One important aspect that requires further attention is that corruption poses a greater risk to forest management during transition periods and during events of "state failure." The study by Gore et al. (2013) is one example of research pinpointing that when political regimes are quickly weakened – in this case the Malagasy rule – opportunities of bribery and illegal logging are opened up. Laurence (2004) notes that one important aspect of Smith et al.'s (2003) study of illegal logging in Kalimantan was that the fall of a regime destabilized existing institutions: "This fuels collusive corruption and a 'looting mentality,' whereby rapacious overexploitation of resources becomes the norm" (p. 400). Laurence (2004, p. 401) further notes that "conservationists and resource managers should be keenly aware that political transitions (particularly those that result in a sudden breakdown of centralized control) could have severe environmental consequences." Future research may benefit from further investigating how state failure and regime transition affect opportunities for corruption in the forest sector.

This review finally identifies that future studies in this vein of research could address the lacuna of studies on this topic in an African context. It is possible that contextual and institutional factors could differ across regions and there is hence a need for investigating this relationship in a range of global settings. Transparency International (2010) and Callister (1999) note that much of this literature focuses on Asia-Pacific but neither Latin America nor Africa. The studies accounted for in this

review confirm a pattern in which Asia-Pacific is indeed visible, but does not support the notion that Latin America is missing from this literature. Rather, a possible pattern is that studies on corruption in forest management have so far seldom discussed this issue in an African context (a notable exception is Milledge et al. (2007) and to some extent Gore et al. (2011), Cavanagh (2012), Siebert and Elwert (2004), Persha and Blomley (2009) and Trefon (2010)). This may very well be another direction for future research to investigate further.

REFERENCES

Agrawal, A. 2007. Forests, Governance, and Sustainability: Common Property Theory and its Contributions. *International Journal of the commons* 1 (1): 111–136.

Alesina, A. C. Gennaioli, S. Lovo. 2014. Public Goods and Ethnic Diversity: Evidence from Deforestation in Indonesia. NBER Working Paper 20504.

Amacher, G. S. 2006. Corruption: A challenge for economists interested in forest policy design. *Journal of Forest Economics* 12: 85–89.

Amacher, G. S., M. Ollikainen, and E. Koskela. 2012. Corruption and forest concessions. *Journal of Environmental Economic sand Management* 63: 92–104

Angelsen, A., and D. Kaimowitz. 1999. Rethinking the Causes of Deforestation: Lessons from Economic Models. *The World Bank Research Observer* 14: 73–98.

Arias, A. 2015. Understanding and managing compliance in the nature conservation context. *Journal of Environmental Management* 153: 134–143.

Barbier, E. B., R. Damania, and D. Leonard. 2005. Corruption, trade and resource conservation. *Journal of Environmental Economics and Management* 50: 276–299.

Barrett, C., C. Gibson, B. Hoffman, and M. McCubbins. 2006. The complex links between governance and biodiversity. *Conservation Biology* 20 (5): 1358–1366.

Bettinger, K. A. 2015. Political contestation, resource control and conservation in an era of decentralisation at Indonesia's Kerinci Seblat National Park. *Asia Pacific Viewpoint* 56 (2): 252–266.

Bofin, P., M. L. du Preez, A. Standing, and A. Williams. 2011. REDD Integrity: Addressing governance and corruption challenges in schemes for Reducing Emissions from Deforestation and Forest Degradation (REDD). U4 Report 2011:1. Bergen: Christian Michelsen Institute.

Brown, M. L. 2010. Limiting corrupt incentives in a Global REDD regime. *Ecology Law Quarterly* 37: 237–267.

Bulkan, J., and J. Palmer. 2008. Breaking the rings of forest corruption: steps towards better forest governance. *Forests, Trees and Livelihoods* 18 (2): 103–131.

Bulte, E. H., R. Damania, and R. Lopez. 2007. On the gains of committing to inefficiency: corruption, deforestation and low land productivity in Latin America. *Journal of Environmental Economics and Managemen*t 54 (3): 277–295.

Burgess, M. Hansen, B. Olken, P. Popatov, and S. Sieber. 2012. The political economy of deforestation. *Quarterly Journal of Economics* 127 (4):1707–1754.

Callister, D. 1999. Corrupt and Illegal Activities in the Forestry Sector: Current Understandings and Implications for World Bank Forest Policy, Working Paper, World Bank, Washington, DC.

Cavanagh C. 2012. *Unready for REDD? Lessons from corruption in Ugandan conservation area*. U4 Brief 2012:3. Bergen: Christian Michelsen Institute.

Cisneros, E. J. Hargave, K. Kis-Karos. 2013. Unintended consequences of anti-corruption strategies: Public fiscal audits and deforestation in the Brazilian Amazon. Unpublished working paper.

Currey, D. and A. Ruwindrijarto. 2001. Introduction. In Environmental Investigation Agency (EIA) and Telapak (eds.), *Timber trafficking: Illegal logging in Indonesia, South East Asia and international consumption of illegally sourced timber*. London: Environmental Investigation Agency and Telapak.

Contreras-Hermosilla, A. 2002. Law Compliance in the Forestry Sector: An Overview. World Bank Institute: Washington, DC..

Dauvergne, P. 1997. *Shadows in the forest: Japan and the politics of timber in Southeast Asia*. Cambridge, MA: The MIT Press.

Delacote, P. 2007. *Forests and Development: Local, national and global issues*. PhD dissertation. Florence, Italy: Department of Economics, the European University Institute.

de la Torre-Castro, M. 2006. Beyond regulations in fisheries management: the dilemmas of the "beach recorders" Bwana Dikos in Zanzibar, Tanzania. *Ecology and Society* 11 (2): 35.

Dietz, T., E. Ostrom, and P. C. Stern. 2003. The struggle to govern the commons. *Science* 302 (5652): 1907–1912.

Downs, F. 2013. *Rule of law and environmental justice in the forests: the challenge of 'strong law enforcement' in corrupt conditions*. U4 Issue Paper, Bergen.

Downs, F. 2015. *Corruption and forest carbon rights: what can donors do to mitigate the risk*. U4 Policy Brief, Bergen.

Environmental Investigation Agency (EIA) and Telapak (eds.). 2001. *Timber trafficking: Illegal logging in Indonesia, South East Asia and international consumption of illegally sourced timber*. London: Environmental Investigation Agency and Telapak.

European Forest Institute. 2005. *Impact of the Reduction of Illegal Logging in European Russia on the EU and European Russia Forest Sector Trade*. European Forest Institute, Joensuu, Finland.

FAO. 2005. *Best practices for improving law compliance in the forest sector*. FAO Forestry Paper 145. FAO: Rome.

FAO. 2006. *Global Forest Resources Assessment 2005, Main Report. Progress Towards Sustainable Forest Management*. FAO Forestry paper 147. FAO: Rome.

Ferreira, S. 2004. Deforestation, Property Rights, and International Trade. *Land Economics* 80 (2): 174–193.

Forest Governance Integrity Program. 2011. *Analyzing corruption in the forestry sector*. Berlin: Germany: Transparency International.

Fredriksson, P. G., H. R. J. Vollenberg and E. Dijkgraaf. 2004. Corruption and energy efficiency in OECD countries: theory and evidence. *Journal of Environmental Economics and Management* 47: 207-231.

Global Witness. 2015. *The Cost of Luxury: Cambodia's illegal trade in precious wood with China*. Global Witness: Washington, DC.

Gibbs, C. E., M. L. Gore, E. F. McGarrell, and L. Rivers. 2010. Introducing conservation criminology: towards interdisciplinary scholarship on environmental crimes and risks. *British Journal of Criminology* 50:124–144.

Goncalves, M. P., M. Panjer, T. S. Greenberg and W. B. Magrath. 2012. *Justice for forests: improving criminal justice efforts to combat illegal logging*. World Bank Studies. Washington DC, The World Bank.

Gore, M. L., J. Ratsimbazafy, and M. L. Lute 2013. Rethinking corruption in conservation crime: insights from Madagascar. *Conservation Letters* 6 (6): 430–438.

Gore, M. 2011. The science of conservation crime. *Conservation Biology* 25 (4): 659–661.

Guertin C. 2003. Illegal logging and illegal activities in the forest sector: overview and possible issues for the Unece Timber Committee and FAO. European Forestry Commission, Presented at UNECE Timber Committee Market Discussions, October 7–8, Geneva.

Gupta, A., and U. Siebert. 2004. Combating Forest Corruption. *Journal of Sustainable Forestr*y 19 (1–3): 337–349.

Hafner, O. 1998. The role of corruption in the misappropriation of tropical forest resources and in tropical forest destruction. Transparency International Working Paper. Available online at http://resources.transparency.bg/download.html?id=235

Halkos, G., A. Sundström, and N. Tzeremes. 2015. Regional environmental performance and governance quality: A nonparametric analysis. *Environmental Economics and Policy Studies* 17 (4): 621–644.

Hanson, J. H., and D. McNair. 2014. Should conservationists continue to dodge the issue of tax dodging? *Oryx* 48 (3): 313–314.

Hayes, T., and L. Persha. 2010. Nesting local forestry initiatives: Revisiting community forest management in a REDD+ world. *Forest Policy and Economics* 12: 545–553.

Hellman, J., G. Jones and D. Kaufmann. 2000. *Seize the state, seize the day: State capture, corruption and influence in transition economies*. World Bank Policy Research Working Paper No. 2444. Washington, D.C.: World Bank.

Hembery, R., A. Jenkins, G. White, and B. Richards. 2007. *Illegal logging: Cut it out!* Report by World Wildlife Foundation (WWF), UK.

Herold M., R. M. Román-Cuesta, V. Heymell, Y. Hirata, P. Van Laake, G. P. Asner, C. Souza, V. Avitabile, and K. MacDicken. 2011. Options for monitoring and estimating historical carbon emissions from forest degradation in the context of REDD+. *Carbon Balance and Management* 6: 3.

Human Rights Watch. 2009. *Wild Money: The Human Rights Consequences of Illegal Logging and Corruption in Indonesia's Forestry Sector*. Human Rights Watch, New York.

Irland, L. C. 2008. State Failure, Corruption, and Warfare: Challenges for Forest Policy. *Journal of Sustainable Forestry* 27 (3): 189–223.

Iversen, V., B. Chhetry, P. Francis, M. Gurung, G. Kafle A. Pain, and J. Seeley. 2006. High value forests, hidden economies and elite capture: evidence from forest user groups in Nepal's Terai. *Ecological Economics* 58, 93–107.

Kahler, J. S., G. J. Roloff, and M. L. Gore. 2013. Poaching risks in community-based natural resource management. *Conservation Biology* 27, 177–186.

Kishor, N. and R. Damania. 2007. Crime and justice in the Garden of Eden: Improving governance and reducing corruption in the forestry sector. In E. J. Campos and S. Pradhan (eds.), *The many faces of corruption: Tracking vulnerabilities at the sector level. Poverty Reduction and Economic Management*. World Bank: Washington D. C.

Klooster, D. 2000. Institutional choice, community, and struggle: A case study of forest co-management in Mexico. *World Development* 28 (1): 1–20.

Kolstad, I., and T. Søreide. 2009. Corruption in natural resource management: Implications for policy makers. *Resources Policy* 34: 214–226.

Koyuncu, C., and R. Yilmaz. 2009. The Impact of corruption on deforestation: cross-country evidence. *Journal of Development Areas* 42: 213–222.

Laurence, W. F. 2004. The perils of payoff: corruption as a threat to global biodiversity. *Trends in Ecology and Evolution* 19 (8): 399–401.

Laurence, W. F., A. K. M. Albernaz, and C. Da Costa. 2001. Is deforestation accelerating in the Brazilian Amazon? *Environmental Conservation* 4: 305–311.

Larmour, P. 2011. Corruption in REDD+ Schemes: a framework for analysis. In A. Graycar and R. Smith (Eds.), *Handbook of Global Research and Practice in Corruption*. Cheltenham: Edward Elgar Publishing Ltd.

Lee, J.-H., K. Sigmund, U. Dieckmann, and Y. Iwasa. 2015. Games of corruption: how to suppress illegal logging. *Journal of Theoretical Biology* 367: 1–13.

Matthews, E. 2001. *Understanding the Forest Resources Assessment 2000*. World Resources Institute, Forest Briefing No. 1 (March).

Mendes, C. M. and S. Porto Jr. 2012. Deforestation, economic growth and corruption: A nonparametric analysis on the case of Amazon forest. *Applied Economics Letters* 19(13): 1285–91.

Meyer, A. L., G. C. van Kooten, and S. Wang. 2003. Institutional, social and economic roots of deforestation: a cross-country comparison. *International Forestry Review* 5: 29–37.

Milledge, S.A.H., I. K. Gelvas, and A. Ahrends. 2007. *Forestry, Governance and National Development: Lessons Learned from a Logging Boom in Southern Tanzania*. TRAFFIC East/Southern Africa / Tanzania Development Partners Group / Ministry of Natural Resources of Tourism, Dar es Salaam, Tanzania.

Miller, M. 2011. Persistent Illegal Logging in Costa Rica: The Role of Corruption Among Forestry Regulators. *The Journal of Environment & Development* 20 (2): 50–68.

Min, B. K. and M. A. Golden. 2014. Electoral Cycles in Electricity Losses in India. *Energy Policy* 65: 619-625.

Nolte, C., A. Agrawal, K. M. Silvius, and B. Soares-Filho. 2013. Governance Regime and Location Influence Avoided Deforestation: Success of Protected Areas in the Brazilian Amazon. *Proceedings of the National Academy of Science* 110 (13): 4956–4961.

Palmer, C. 2001. The extent and causes of illegal logging: an analysis of a major cause of tropical deforestation in Indonesia. CSERGE Working Papers. Centre for Social and Economic Research on the Global Environment, London, UK.

Palmer, C. 2005. The nature of corruption in forest management. *World Economics* 6 (2): 1–10.

Pellegrini, L. 2011. *Corruption, Development and the Environment*. Springer: Dordrecht.

Persha, L. and L. Blomley. 2009. Management decentralization and montane forest conditions in Tanzania. *Conservation Biology* 23 (6): 1485–1496.

Platteau, J-P. 2008. Managing the Commons. Social Norms and Beliefs. In Pranab Bardhan and Isha Ray (eds.), *The Contested Commons: Conversations between Economists and Anthropologists*. London: Blackwell-Wiley.

Richards, M., A. Wells, F. Del Gatto, A. Contreras-Hermosilla, and P. Pommier. 2003. Impacts of illegality and barriers to legality: A diagnostic analysis of illegal logging in Honduras and Nicaragua. *International Forestry Review* 5 (3): 282–292.

Robbins, P. 2000. The Rotten Institution: Corruption in Natural Resource Management. *Political Geography* 19: 423–443.

Rosenbaum, K. L. 2005. *Tools for civil society action to reduce forest corruption: Drawing lessons from transparency international*. Washington, DC: The World Bank.

Ross, M. L. 1999. The Political Economy of the Resource Curse. *World Politics* 51 (2): 297–322.

Scotland, N. 2000. *Indonesia Country Paper on Illegal Logging*. Prepared for the World Bank-WWF Workshop on Control of Illegal Logging in East Asia. Jakarta, 28 August.

Shaxson, N. 2007. *Poisoned Wells – The Dirty Politics of African Oil*. New York: Palgrave MacMillan.

Siebert, U., and G., Elwert. 2004. Combating Corruption and Illegal Logging in Bénin, West Africa: Recommendations for Forest Sector Reform. *Journal of Sustainable Forestry* 19 (1–3): 239–261.

Smith, J., K. Obidzinski, S. M. Wood, and S. I. Suramenggala. 2003. Illegal logging, collusive corruption and fragmented governments in Kalimantan, Indonesia. *International Forestry Review* 5: 293–302.

Smith, R. J., and M. J. Walpole. 2005. Should conservationists pay more attention to corruption? *Oryx* 39 (3): 251–256.

Smith, W. 2002. The global problem of illegal logging. ITTO Tropical Forest Update. 12 (1): 1–32.

Smith R. J., D. Biggs, F. A. V. St. John, M. Sas-Rolfes, and R. Barrington. 2015. Elephant conservation and corruption beyond the ivory trade. *Biological Conservation* 29 (3): 953–956.

Solomon, J., M. C. Gavin, and M. L. Gore, 2015. Detecting and understanding non-compliance with conservation rules. *Biological Conservation* 189: 1–4.

Søreide, T. 2007. *Forest concessions and corruption*. U4 ISSUE 3:2007. Bergen: Christian Michelsen Institute.

Southgate, D., P. Salazar-Canelos, C. Camacho-Saa, and R. Stewart. 2000. Markets, institutions, and forestry: The consequences of timber trade liberalization in Ecuador. *World Development* 28 (11): 2005–2012.

Storhaug, A. 2012. Measures to reduce illegal logging and illegal timber trade. SANMUN 2012 Environmental Commission, location unknown.

Tacconi, L. (Ed). 2007. *Illegal Logging: Law Enforcement, Livelihoods and the Timber Trade*. Earthscan: London.

Tacconi, L., F. Downs, and P. Larmour. 2009. Anti-corruption policies in the forest sector and REDD+. In A. Angelsen (ed.), *Realising REDD+. National Strategy and Policy Options*. CIFOR: Indonesia.

The Guardian. 2014. Brazil laundering illegal timber on a "massive and growing scale." Published May 15, 2014. Available online at http://www.theguardian.com/environment/2014/may/15/brazil-laundering-illegal-timber-on-a-massive-and-growing-scale

Transparency International Indonesia. 2011. *Forest governance integrity report. indonesia. Technical report*, Transparency International Indonesia: Jakarta.

Transparancy International (TI). 2011. Corruption perceptions Index report 2011. Available online at http://cpi.transparency.org/cpi2011/results/

Transparency International (TI). 2010. The status of information on corruption in the forestry sector. U4 Helpdesk answer. Available online at http://www.transparency.org/whatwedo/answer/the_status_of_information_on_corruption_in_the_forestry_sector

Trefon, T. 2010. Forest governance in Congo: Corruption rules? U4 Brief 2010 No 5. Bergen: Christian Michelsen Institute.

Vijge, M. J., and A. Gupta. 2014. Framing REDD+ in India: Carbonizing and centralizing Indian forest governance? *Environmental Science & Policy* 38: 17–27.

Watson, R. A. and D. Pauly. 2001. Systematic distortions in world fisheries catch trends. *Nature* 414 (6863): 534–536.

Wells, A., E. Del Gatto, M. Richards, D. Pommier, A. Contreras. 2007. Rural livelihoods, forest law and the illegal timber trade in Honduras and Nicaragua. In Tacconi, L. (Ed). *Illegal Logging: Law Enforcement, Livelihoods and the Timber Trade*. Earthscan: London.

Welsch, H. 2004. Corruption, Growth, and the Environment: a Cross-country Analysis. *Environment and Development Economics* 9: 663–693.

Wendland, K. J., D. J. Lewis, J. Alix-Garcia. 2014. The Effect of Decentralized Governance on Timber Extraction in European Russia. *Environmental and Resource Economics* 57 (1): 19–40.

Wilson, J. K. and R. Damania. 2005. Corruption, Political competition and Environmental Policy. *Journal of Environmental Economics and Management* 49 (3): 516-535.

World Bank. 2000. *Anticorruption in Transition - A Contribution to the Policy Debate*. World Bank: Washington D.C.

Wright, S. S., A. Sanchez-Azofeifa, C. Portillo-Quintero, and D. Davies. 2007. Poverty and Corruption Compromise Tropical Forest Reserves. *Ecological Applications* 17: 1259–1266