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Conservation sells, but who's buying? Analyzing market based approaches to conservation

Jan Breitling

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- After briefly reviewing these different governance approaches, this paper focusses on critically reviewing market based forest conservation and its main challenges. Market based conservation logic, like REDD+1 and Payments for Environmental Services (PES) has been very successful in finding its way into general environmental, but also specifically into forest governance and policies to address deforestation (Büscher and Arsel 2012, Castree 2008, McAfee 2012).

- This approach has been criticized for not addressing the root causes of deforestation, for not acknowledging the lack of markets for forest and ecosystem services, for ignoring the lack of financial capital, and for the many social and ecological consequences that might be triggered through this approach. This paper aims to add to the criticism against market based conservation for its apparent disregard of the identified underlying causes of deforestation and of the dangers and shortcomings of a purely market based approach to sustainably addressing deforestation and forest conservation.

1 "Reducing Emissions from Deforestation and Forest Degradation including the role of conservation, sustainable management of forests and enhancement of forest carbon stocks" – UN-REDD website, 2016

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Introduction

Deforestation is among the most important environmental challenges of our times, even though rates of deforestation appear to be decreasing (Angelsen and Rudel 2013, Hecht et al 2014). It affects biodiversity and climate change, and human security and livelihoods at many different scales. Several conservation paradigms have tried to address this issue, from "command and control" or fortress style, to community based and integrated conservation and development projects, and increasingly market based conservation approaches. After briefly reviewing these different governance approaches, this paper focusses on critically reviewing market based forest conservation and its main challenges. Market based conservation logic, like REDD+[2] and Payments for Environmental Services (PES) has been very successful in finding its way into general environmental, but also specifically into forest governance and policies to address deforestation (Büscher and Arsel 2012, Castree 2008, McAfee 2012). This approach has been criticized for not addressing the root causes of deforestation, for not acknowledging the lack of markets for forest and ecosystem services, for ignoring the lack of financial capital, and for the many social and ecological consequences that might be triggered through this approach. This paper aims to add to the criticism against market based conservation for its apparent disregard of the identified underlying causes of deforestation and of the dangers and shortcomings of a purely market based approach to sustainably addressing deforestation and forest conservation.

Deforestation

It is generally accepted that deforestation is one of the main phenomena of global environmental change, negatively affecting biodiversity and global climate change, as well as having serious livelihood and human security consequences for forest dependent communities, indigenous and non-indigenous (Constantino 2016, Yong and Pang 2015). It is widely recognized as one of the world's leading environmental problems (De Sy 2015, Lambin and Meyfroidt 2011, Grau and Aide 2008, Ewers 2006). Land use change and its main driver deforestation is seen as

2 "Reducing Emissions from Deforestation and Forest Degradation including the role of conservation, sustainable management of forests and enhancement of forest carbon stocks" – UN-REDD website, 2016

the biggest threat to global biodiversity, and tropical deforestation is estimated to contribute 17% of total greenhouse gas emissions (IPPC 2007; Ewers 2006). At the regional and local level deforestation has been linked to dire impacts regarding elevated rates of soil erosion, sedimentation of major rivers and other waterways, and increased frequency and severity of floods (Sanchez-Azofeifa et al 2002, Ewers 2006). These social and economic impacts could lead to serious consequences for human security, and could potentially increase the likelihood of increased poverty and arguably even of violent conflicts at local and regional scales (Maystadt et al 2015, Klare 2013, UNEP 2009).

The most common definition of deforestation is the one by FAO, which states that deforestation is defined as "the conversion of forest to other land use or the long-term reduction of the tree canopy cover below the minimum 10 percent threshold" (FAO 2010b).

Several global forest assessments have tried to measure the area of and the trends in the extent of the world's forests (FAO 2010, FAO 2015, MacDicken 2015). Humid tropical forests are of particular interest, since, even though they cover only about 6% of the world's land surface, it is estimated that they hold over 50% of the world's biodiversity (McCarthy and Tacconi 2011)

Our knowledge of concerning the distribution of tropical forests, their size, and the rates of change is very limited. MacDicken (2015) demonstrates that throughout the different FAO Global Forest Assessments data standards, variables and methods of measuring are far from constant over time. He argues that changing technologies must be taken into account and raises concern about historical data sets, which are constantly updated based on new estimations using high definition satellite imagery. The FAO acknowledges that their data is based on individual country estimates and measures (FAO 2010). Often times countries lack this data for certain time frames, or simply have no data at all, leading to inaccurate and misleading reporting. Even when countries in fact can measure deforestation and forest cover at regional or provincial level, these are often combined to come up with national statistics, and lack in the necessary precision. These national reports due to this compilation of spatially explicit data sources cannot truly reflect the specific areas, distribution and trends of the different forest types (MacDicken 2015). The Intergovernmental Panel on Climate Change (IPCC) has pointed out that for tropical countries, deforestation estimates are very uncertain and could be in error by as much as ±50% (IPCC 2007).

The statistical and methodological uncertainties are important to keep in mind when analyzing the different estimates of deforestation in the literature. A good

example of this inconsistency in deforestation rates is the following: Achard et al (2002) estimated that the annual deforested area for the humid tropics between 1990 and 1997 at $5.8 \pm 1.4 * 10^6$ ha. In their study 12 years later, Achard et al (2014) estimate the annual gross loss of tropical forests for the 1990s at $8 * 10^6$ ha. When compared to the FAO FRA 2010 report, which estimated the annual gross loss of tropical forests during the 1990s at $11.33 * 10^6$ ha, it becomes clear just how vague our knowledge of past deforestation rates is.

Achard et al (2014) state that for the next decade, 2000 to 2010, this annual gross loss of tropical forest decreased slightly to $7.6 * 10^6$ ha, due to reduced deforestation rates in the humid forests of Africa and Southeast Asia. Global Forest Watch reported that in 2014, tropical forests loss was significantly higher than that, namely 9.9 million ha.

One additional main source of uncertainty regarding the measuring of forest area and forest loss are the different and changing definitions of the terms forest, and deforestation (Putz and Redford 2010, Sasaki and Putz 2009). This has led the FAO to admit that the data presented in the different FRA reports should cannot and should not be compared (FAO 2010, MacDicken 2015). The FRA reports before 1980 did not have one globally accepted definition of the term forest. Therefore, individual countries used their own definitions, which resulted in each country reporting to different standards. Since 2000 there are globally accepted definitions of different terms such as forest area, forest, and deforestation, and they have not changed since.

In this sense, the most official and widely used definition of forest is the one by FAO (Putz and Redford 2010). The FAO's defines a forest as an area of ≥0.5 ha with ≥10 percent tree canopy cover, with 'trees' defined as plants capable of growing ≥5m tall (FAO 2001). This definition was used also by the Clean Development Mechanisms (CDM) of the Kyoto Protocol, but allowed each country to define 'forest,' as long as those definitions chose the minimum tree crown cover required as between 10–30 percent, the minimum area of this cover to be between 0.5–1.0 ha, and the minimum heights to which woody plants must be able to grow to be considered trees between 2–5 m (UNFCCC 2002, Sasaki and Putz 2009). Additionally, on a more detailed level, the FAO distinguishes closed (≥40 percent canopy cover) and open (10–40 percent canopy cover) natural forests from plantations. Putz and Redford (2010) manifest that this distinction is often overlooked and was, for example, not reflected in the CDM guidelines. They explain further that national laws vary even more in regards to what is and what is not considered forest, depending on slopes, timber production per ha per year, among others.

Several authors have claimed that in order to make sense of global, regional and national statistics on forest cover dynamics, and to be able to come up with any significant results and be able to draw conclusions on how to direct policies to deal with the problem of deforestation, it is absolutely necessary to come with a widely accepted definition of forest, deforestation, forest degradation and forest restoration. These definitions should be politically convenient and practical, culturally sensitive, ecologically reasonable, and technologically feasible (Putz and Redford 2010, Sasaki and Putz 2009).

Kleinn (2001) warns that oversimplifying a globally acceptable definition could lead to hiding the loss of what many people might value as forest, since any definition that is solely based on tree crown or canopy cover hides the fact that a forest is much more than just trees. Putz and Redford (2010) exemplify this issue by theorizing that under the FAO definition a very dense forest might lose between 70 and 90 percent of its canopy and no deforestation would have occurred. Bekessy and Wintle concur when stating that even a complete clear cutting of a forest area would still not count as deforestation, as long as young trees and plants with the potential to grow to over 5 meters are present on 10 to 30 percent of the area cleared. Another aspect mentioned by the FAO is linked to biodiversity of fauna, a forest could be degraded by overhunting or other processes leading to "defaunation", but this would not be counted for since, the trees still cover over 30 percent of the area, so the forest in theory is still there. Even worse, under the FAO definition, Putz and Redford argue that even if a natural forest is completely destroyed and replaced by an industrial tree plantation of genetically modified trees for oil or fiber on a short year rotation would not show up as deforestation, since there would be no change in "forest" cover (Putz and Redford 2010).

Together the issues of changing technology, uncertainty due to the dependency on national data, and the changing definitions, and the inadequate and too general definition of the FAO, make it clear why we can hardly know for sure what the level of deforestation has been and is today. New satellite imagery technology seems to be changing this problem, and future data on deforestation and general land use change will probably provide better results.

Causes of Deforestation

It has become increasingly necessary to identify the different main drivers of deforestation. The impacts of deforestation on biodiversity loss are now exacerbated by its contribution to greenhouse gas emissions and global warming. The need to study the causes of deforestation is fundamental for establishing policies and institutions to address deforestation at different scales. Despite this relevance, and

even though individual drivers have been identified and studied for quite some time now (Contreras-Hermosilla 2000) it is only recently that we are able to gather improved quantitative information on the importance of the individual drivers and activities causing deforestation at the national and global level. Nevertheless, especially for individual developing countries we still don't know exactly what driver or drivers are the most important in causing deforestation or degradation of forests (De Sy 2015, Hosonuma et al 2012). Traditionally, scientific research has been based on local scale studies or on regional, continental, or global levels (Contreras-Hermosilla 2000, Geist and Lambin 2002, De Fries et al 2010, Boucher et al 2011). All these studies have in common that they differentiate between proximate or direct drivers and underlying or indirect causes, taking into account that deforestation is never caused by single factors, but that multiple factors and direct and underlying drivers or causes act synergistically. In other words, there is a lot of overlap between and impact among the underlying causes and also direct drivers of deforestation, influencing each other in myriad and very complex ways (De Sy et al 2015, Kissinger et al 2012, Geist and Lambin 2002, McCarthy and Tacconi 2011). It is recognized that it is often more difficult to establish clear links between underlying causes and deforestation than between direct causes and deforestation. Direct drivers of deforestation are essentially human activities that directly affect the loss of forests and result from mostly very complex interactions of underlying or root social, economic, political, technological and cultural causes (Kissinger et al 2012, Geist and Lambin 2002).

Direct Causes

Direct causes of deforestation have traditionally been disaggregated into agricultural expansion, wood extraction or logging, and infrastructure expansion (Geist and Lambin 2002, Contreras-Hermosilla 2000). Other authors of more recent studies consider logging or wood extraction as mostly a direct driver of forest degradation, and not directly causing deforestation (Hosonuma et al 2012, Kissinger et al 2012) and have identified agricultural expansion overwhelmingly as the main driver of deforestation at a global scale (Kissinger et al 2012) and South and Central America (De Sy et al 2015). Infrastructure expansion is considered less important in these studies, even though road construction and other processes of creating access to formerly isolated areas has been linked to further deforestation and degradation of forests.

Agricultural expansion refers to a wide array of issues related to agriculture and its expansion into forest areas. This means that everything from shifting cultivation by local small scale farmers at the subsistence level all the way to large scale cattle ranching, permanent cultivation, and industrial scale agriculture in the hands of

transnational corporations of products for direct human consumption and feed for livestock and also biofuels, are included into this category. Agriculture is considered as the main driver of deforestation worldwide, but with geographical difference in the relative importance between commercial and subsistence agriculture. It is estimated that agriculture alone is responsible for approximately 75% of global deforestation (Kissinger et al 2012). When looking at different geographical regions, commercial agriculture is responsible for 65% of deforestation in Latin America, while in Africa and Asia it contributes to around 35% of deforestation. Local and subsistence agriculture is equally distributed among the three continents, accounting for 27-40% of deforestation (Kissinger et al 2012, Hosonuma et al 2012, Geist and Lambin 2002).

Wood extraction comprises commercial logging at industrial and community level as well as localized fuelwood collection and charcoal production. Wood extraction, or logging, has until recently often been blamed for most of the deforestation and degradation occurring in the tropics (Contreras-Hermosilla 2000). It is important to note, however, that logging often times means the extraction of relatively few individual trees per land area and therefore does not really deforest large areas directly. Wood extraction is mostly linked to forest degradation and not directly to deforestation, even though logging and timber extraction opens up access to landless peasants, and other agricultural actors, through clearing of forest areas and road construction for subsequent drivers of deforestation linked to agriculture. In Latin America and Asia, timber extraction and logging account for more than 70% of forest degradation. In Africa, fuelwood collection and charcoal production is the main degradation driver, while being of relatively low importance in Latin America and Asia (Hosonuma et al 2012, Geist and Lambin 2002).

Infrastructure extension includes any process of deforestation linked to mining, urban and other settlement expansion, transport, and dams and related activities of hydropower developments. Mining plays a larger role in Africa and Asia than in Latin America, although this might be changing in the present, since several South American countries are increasingly engaging in mining for their development. Urban expansion is most significant in Asia. Again, when reflecting on the increased and constantly increasing speed of urbanization processes around the world, and the changing dietary demands of an urbanized society, urbanization will most likely indirectly affect deforestation much more in the coming years. Also, as mentioned above, the opening of new roads and railways through and into formerly "isolated" areas, apart from the direct destruction of forest areas, opens up access to these areas and links them to already existing markets. Infrastructure extension should therefore be seen as more than just affecting forests by direct physical destruction, but mostly as the start of other processes like logging, migration and agriculture (Contreras-Hermosilla 2000, Geist and Lambin 2002).

Indirect or Underlying Causes

Overall, the main underlying driver of tropical deforestation and forest degradation is the current economic model based on infinite economic growth and profit maximization based on the export of primary commodities and increasing demand for timber and agricultural products in a globalizing economy (Kissinger et al 2012).

Underlying causes of deforestation have been segregated into different categories, again taking into account that these underlying drivers act synergistically and are almost never individually causing deforestation (Suich and Tacconi 2012, Geist and Lambin 2002, Contreras-Hermosilla 2000). Underlying drivers consist of an interplay of policy and institutional, demographic, technological, socio-cultural, and economic factors (Kissinger et al 2012).

Policy and institutional factors

At the institutional and policy level, authors have looked at three main categories of underlying drivers of deforestation: formal policies, governance failure, and property rights regimes. The formal policies that affect deforestation include any policy, like subsidies, taxes, prices related to agriculture and forest products, and on land use in general, as well as policy on economic development related to colonization, transportation, and infrastructure. These policies are of course not always intentionally biased against forests but often have serious implications for, and do contribute significantly to, deforestation (Contreras Hermosilla 2000).

Transportation policies, as mentioned above, affect forest area not only directly by destroying forest lands, but when new roads are built near or through existing forests, opening up physical access, but also alter economic values and increase the profitability of agriculture in these regions. This approach can also be seen from a different angle, by which the policies of new transportation networks are the result of the desire by some politically powerful groups to convert forests into agriculture lands (Contreras-Hermosilla 2000, Kaimowitz 1997). Roads can be required for mining and oil extraction, often in the hands of private companies, but ultimately stem from government policies.

Government policies that grant subsidies either directly to the forestry sector or to other related sectors often lead to intentional or unintentional deforestation. Subsidizing the clearing of land, as has been the case in many tropical countries during the last half of the last century has facilitated the deforestation of large forest areas (Kleinn 2002). Similarly, the hidden subsidy, present in the low charges paid by

national or international timber concessionaires, has been linked to high deforestation rates due to reducing the incentive of concessionaires to sustainably manage their forests. This underpricing of timber encourages the wasteful extraction and use of wood, as well as incentivizing the companies to obtain larger forest areas than necessary (Contreras-Hermosilla 2000).

Subsidies can also be granted directly or indirectly to agriculture. One argument describes how, by subsidizing agriculture, its profitability is increased, causing additional pressure on remaining forests, especially when agricultural land is scarce. This is explained through increases in profitability of agricultural land use. If agricultural production is made more profitable and more attractive, so the argument goes, agricultural activities will increase, affecting deforestation. One counter argument in this regard is that subsidies in agriculture might also lead to agricultural intensification. Agricultural intensification is often thought by to benefit forest conservation, since so the argument goes, less land has to be converted to agricultural production, due to the increased production per land unit, taking pressure on remaining forest areas. These two points of view are still debated and different case studies show contradicting results (Phelps et al 2013, Morton et al 2008).

A related topic related to policy and institutions is governance failure. In essence, this refers to the notion that existence of corruption and general lawlessness will negatively affect forest cover. Forest that are not effectively protected, due to the absence of the state because of lack of capacity or unwillingness to spend scarce resources on environmental issues, or due to corruption of government officials on different levels, would disappear or be degraded. Similarly, if there are unclear or nonexistent property rights, forests might suffer. Insecure land tenure might lead to "grab while you can" or open access institutions, similar to any other open access resources, which either lack any owners, or because of governance failure land tenure cannot be secured. In many regions of the tropics, the vast majority of forest areas is formally controlled by governments. The FAO reports that in Africa about 94%, in Asia between 80 and 95% are "managed" and controlled by governments. For Latin America, this rate is about 70% (FAO 2009, McCarthy and Tacconi, 2011). This is linked to the issue of market failures discussed below.

Technological factors

Related to subsidies, but more general, technology can have different effects on forest cover and deforestation. On the one hand, low levels of technology in agriculture can lead to what Contreras-Hermosilla has called land use "extensification", an expansion of agricultural land due to low productivity per land unit. On the

other hand, higher levels of technological inputs in agriculture could lead to processes of "automatization" of production, increasing unemployment, and increasing the amount of peasants depending on slash and burn agriculture, converting more forests into livelihoods based agriculture (Contreras-Hermosilla 2000, Geist and Lambin 2002). As mentioned above, there is an ongoing debate around the potential of intensifying agriculture for the conservation of forests. Agricultural intensification and the use of higher levels of technology could under this perspective lead to freeing up pressure on existing forests, through the concentration of agricultural production on the most profitable and central agricultural lands already cleared (Phelps et al 2013, Morton et al 2008).

Poor technological levels in the forest sector can also affect deforestation. First, poor technology in the extraction process leads to poor overall performance, due to high wastage during the actual tree felling and damages to the logs to be extracted and processed. This could lead to a need to cut down much more trees to be able to harvest a certain volume of timber. Additionally, low levels of technology in the energy provision of households in rural and some urban areas, related to a lack of alternatives to fuelwood, has obvious impacts on forest degradation and deforestation (Contreras-Hermosilla 2000, Geist and Lambin 2002).

Cultural, socio-political factors

Cultural and socio-political factors are key drivers to deforestation. Specifically, public values and attitudes, that if showing no or very little concern for environmental issues, or if dominated by public attitudes towards agricultural expansion for economic growth, contribute to deforestation to continue unabated. Similarly, if at the individual level the drive for more material and energy consumption prevails due to new or inherited modes of resource use exist, then less likely is this society going to put pressure on their government to address environmental degradation in general and deforestation in particular. These factors, although very hard to measure, are thought to contribute significantly to the ongoing processes of land use change, as can be seen in countries such as Paraguay and regions of Brazil, Bolivia and Argentina, where deforestation has risen sharply over the last 10 years (Grau et al 2005, Geist and Lambin 2002, Contreras-Hermosilla 2000). Again, these values might be very different among the various groups or sectors of a given society. Indigenous groups might have lived or still live under a value system that is much more conservation oriented, but often times these same groups lack the power to influence the general national cultural values (Constantino 2016).

Economic factors

The most visible and dominant underlying causes of environmental degradation in general, and deforestation in particular are related to economic factors, specifically market failures related to absence and distortions of markets (Muradian et al 2012). Market failures in this context refer to the failure to account for the costs involved in environmental degradation or destruction. In other words, the failure to take into account the loss of ecosystem services due to deforestation or degradation of forests is seen as a primary underlying cause of deforestation. If these market failures could be corrected, then the returns from protecting and conserving forests and their ecosystem services could in theory be sufficient (Suich and Tacconi 2012).

Homer Dixon and Blitt (1998) refer to market failures as being caused by the nature of the resource itself, or by the absence of markets for negative externalities of resource exploitation. If the resource, in this case forests, is of an open access quality, meaning that no one can control access or divide the resource into saleable units, then overexploitation of the forest, and finally deforestation will necessarily occur. Even when the access to the resource is controlled, so there is no open access regime, often markets simply don't exist for the negative externalities related to forest destruction. To clarify, the externalities are costs that, in this case, would be and most often in fact are borne by society at large, and often times by already poor rural communities. For example, one of the impacts of deforestation is erosion and the linked siltation of rivers that can damage fisheries on coastal zones.

In sum, deforestation and forest degradation are results of choices made by individuals, communities, entrepreneurs, corporations, governments and society at large. Contreras-Hermosilla (2000) argues that ultimately the main agents in these processes belong to the private sector, who react to the discrepancy between different values those of these actors and those of the rest of society. In other words, the value gained by private actors through processes that lead to deforestation often times might clash with values of other actors or society. A system that allows one powerful individual to overcome the common good, a system that is based on inequality in power, such as the neoliberal capitalist system could be seen as an example of what Galtung (1969) called structural violence.

The absence of markets for many environmental benefits, goods and services is a key aspect of economic factors as underlying causes of deforestation. The reasoning goes as follows: since ecosystem services have no monetary value attached to them, they cannot be valued and integrated into market decisions, and therefore suffer from a general absence of markets. are provided. If a forest is destroyed or

seriously degraded, the benefits that society or parts of society received are eliminated or seriously affected. Deforestation benefits economically some actors, and the costs, even though not monetarized are suffered by society at large (Suich and Tacconi 2012, Contreras-Hermosilla 2000). This absence of markets for environmental benefits and costs is the main reason for the increasing focus on market based conservation approaches linked to market based forest governance, discussed below in section 2.3. The following section analyzes the literature around forest resurgence and forest transition, observed in several parts of the world.

Dominant Paradigms in Forest Governance

In this section I will discuss the dominant paradigms in forest governance. This includes first a review of two traditional approaches, fortress conservation and integrated conservation and development projects, and second, I critically review contemporary market-based governance schemes.

Fortress Conservation

The idea that nature has to be isolated from human activity in order to save it has a long history, starting in the setting aside of land for the benefit of monarchs in Europe and later of the colonial elite in Africa. The posterchild of this approach is the well-known model of a national park. A land unit is declared protected, from human interference, and put aside, protecting it from human influence, except experts and scientists studying the biodiversity they are trying to protect. National parks where first established in the United States, and have proliferated throughout the world over the last 100 years.

Jim Igoe (2004) shows how this vision has three major components: first, the idea of ecosystems that have been threatened by human activity, but have now been restored to their original "pristine" condition; second, the idea that people evicted from these areas are outsiders, not originally indigenous to the unit of land to be protected; and three, that is it increasingly necessary to use financial resources from conservation to benefit local people through so called Integrated conservation and development projects, or community based conservation, which has appeared much more recently. The relationship between fortress conservation and community based conservation is unclear so far.

Community Based Conservation (CBC)

Integrated Conservation and Development Projects (ICDPs)

Linked to the fortress conservation model, is the more recent idea that conservation should not only benefit biodiversity of nonhuman species, but should also include benefits for local human communities. A plethora of projects have been initiated and are still ongoing that try to combine conservation with development. Key aspects of this approach are the use of tourism, in its varied forms, and programs of payments of ecosystem services, where local and national communities benefit directly and indirectly from the conservation of ecosystems and their functions and services (Roth and Dressler 2012).

Success under this approach is debated, and often times it seems to be that this dual approach creates little positive impact on both biodiversity and local communities. An ongoing academic debate is going back and forth arguing for more or less involvement of human communities. Reacting, in part, to this ongoing debate is the increased focus on market based conservation approaches to conservation (Wilshusen el al 2002, Roth and Dressler 2012).

Market Based Forest Conservation

Since the end of the 1980s the dominant and most influential environmental governance framework is informed by a market –centered paradigm (Sullivan 2012, Roth and Dressler 2012). Market based conservation has been hailed as an approach that can combine conservation and livelihood or development objectives by assigning monetary value to nature and through this monetizing and commodification save nature in the most efficient and effective way (Roth and Dressler 2012, McAfee 1999). Corson et al (2013) speak of a large transformation in international environmental governance through which market logics are paving the way for the Green Economy. The Green Economy should be understood not as one single idea or "thing", but as an assemblage market logics and market based mechanisms that are systematically applied to environmental governance at the global, regional and national levels. It should also be understood as something that is being created, and something that has not been finished yet. The fundamental assumption underlying these approaches is the definition of market failure as the source of environmental degradation, and therefore allow solutions to be cast in terms of improving market efficiencies through the establishment of conditions in order to make markets the prime vehicles to end and reverse this environmental degradation (McAfee 2012b). Sullivan (2012) shows how this incorporation of market logics into environment and conservation policy and governance over the last

two decades has led to a reconceptualization of the term "Nature", as something that can and has to pay for its own survival through constructs like payments for ecosystem services and finance mechanisms like REDD+, and carbon trading.

Büscher and Arsel (2012) and Brockington and Duffy (2010) state that the main response to the overall environmental crisis, including climate change, biodiversity loss, deforestation and the acidification of the world's oceans, has been neoliberal conservation, which they explain makes conservation compatible with global capitalism. Under this world view collective action, public planning and regulation are seen as inefficient and should be replaced by private initiatives, monetary pricing, and market exchange. All resources and services from nature (ecosystem services) are seen as tradable commodities (Pearce, 1989, OECD 2011, UNEP 2012, Wanner 2015). Advocates of this "neoliberal conservation" paradigm aim to include nature within the globalized capitalist economy, firmly believing in the market efficiency in environmental management. Every aspect of nature, its functions and individual components, the argument goes, should be quantified, privatized and finally sold and bought on local and global markets to assure its continued existence in the most efficient and optimal way. Additionally, this approach will be the best to deal with the burdens of pollution and resource depletion (Mol and Sonnenfeld 2000, McAfee 2012).

The privatization, monetary pricing and selling and buying, in other words the commodification of ecosystem services is by far the fastest growing form of the "neoliberalization" of nature (Bakker 2010, Castree 2006, McCarthy and Prudham 2004). At a fundamental level, this process is based on the assumption that these services and goods are only as valuable as their exchange values, their prices on the market, supposedly reflecting the individual preferences of individual market actors. This, in theory, promises a triple win outcome for nature, poverty and development, and capital, benefitting nature, society at large, including the poor, and private investors, and with minimal public expenditure.

It is clear, that this approach addresses the environmental problems humanity is facing as market failures, as discussed above, and the solution therefore is to reinforce capitalist modes of thought and interaction, using the market as a solution to the environmental crisis while promoting new methods of accumulation. Underlying this logic, is the conceptualization of nature of a subsystem of the economy (Suarez and Corson 2013, McAfee 2012b).

Once property rights are established and transaction costs are minimized, voluntary trade in ecosystem services will produce the most efficient, and practical outcomes with little or no need for state involvement. The functions of ecosystems,

and the creation of markets to trade in these functions is the foundation of the carbon market and similar payments for ecosystem services programs that are being implemented in several parts, some with long histories. This overall commodification of ecosystem functions has the potential to saving nature, reducing poverty, and simultaneously enables continued economic growth (McAfee 2012b).

A such, neoliberal conservation is the contemporary push to making environmental conservation not only compatible with capitalism but also a source for economic growth (Arsel and Buscher 2012) Market based conservation is one of the most prominent ways in which environmental governance has become influenced by the ascendance of neoliberalism itself. Neoliberalism has been the global dominant ideology since the early 1970s and has deeply affected the issue of environmental conservation by trying to make it compatible with capital circulation (Neves and Igoe 2012).

Market based conservation strategies aim to sell nature to save it (McAfee 2012b). They conceptualize nature as a whole as a provider of ecosystem services, ascribing property rights to the different functions and services of ecosystems, e.g. storage of carbon and shelter for biodiversity by forests, in such a way that the right to use these services can be traded at national and international markets. Two of the most prominent tools of this paradigm are Payments for Ecosystem Services (PES) and Reduced Emissions from Deforestation and Degradation (REDD+), through which nature is made part of the global marketplace, giving it, as McAfee (2012) states, its means to earn its right to exist.

Market based conservation logic has been very successful in finding its way into general environmental but also specifically into forest governance and policies to address deforestation. Payments for ecosystem services, REDD+ and carbon trade, conservation marketing and conservation finance mechanisms are examples of popular and influential mechanisms (Buscher and Arsel 2012).

Payments for Ecosystem Services - PES

The concept of Payments for Ecosystem Services can be seen as the operationalization of the conceptual framework that combines all of nature into the idea of ecosystem services. Ecosystem services are defined as the "benefits people obtain from ecosystems" (MA 2005). This concept promotes the systematizing, quantifying and monetizing the values of biodiversity and ecosystem functioning (Suarez and Corson 2013). Ecosystem services include carbon sequestration, water provision, biodiversity, scenic beauty and recreation for tourism, increased agricultural productivity, flood mitigation, erosion control, among many others, and have

been estimated to have a total economic value of 33 trillion US$ at the global scale (Costanza et al 1997).

This concept of ecosystem services has become the dominant way in which humanity think about the environment, and how it is conceptualizing its needs for and dependence on the rest of nature, and therefore impacted environmental governance and policy throughout the world (Suarez and Corson 2013).

PES transforms this thinking into a market based mechanism through which providers of ecosystem services are paid by the users or beneficiaries of these services. In theory, since demand for these services is increasing due to the degradation of the environment, and through deforestation, markets should be established to assure the constant flow of services to the demanding beneficiaries (Corbera 2012, Fletcher 2012).

The most comprehensive definition of the term Payments for ecosystem services is provided by Wunder (2015), where PES is defined as follows:

(1) voluntary transactions

(2) between service users

(3) and service providers

(4) that are conditional on agreed rules of natural resource management

(5) for generating offsite services.

This definition holds within it the key aspects of a strictly market based approach which leaves no place for the state or government involvement. The transaction, the buying and selling of a "service", is voluntary, and is strictly in the hands of independent consumers and providers of that service. Given this definition, there is no doubt that PES is at least in theory a prime example of a market based conservation tool.

Several countries have experimented with this type of, or similar, mechanism, and some have gained impressive experience throughout the last two decades. Mexico, Costa Rica, Ecuador, and Vietnam are some of the most researched and successful examples of countries who have implemented this mechanism with debatable and varied success (Daniels et al 2012, Fletcher and Breitling 2012, Sanchez-Azofeifa 2007).

REDD+

Reduced Emissions from Deforestation and Degradation (REDD+) has been conceptualized as a global PES program focusing mainly on the protection of carbon and biodiversity through the prevention of deforestation and forest degradation and the enhancement of forests through improved management and conservation of forest areas (Barbier 2012, Corbera 2012). This mechanism will in theory provide financial compensation to developing countries, where most of the deforestation occurs, based on fully measured, reported and verified emission reductions relative to a set baseline level (Loft et al 2014, Karsenty et al 2014). The implementation of REDD+ activities and projects is expected to generate ecological benefits by deterring processes of deforestation and also monetary ones. The key problem faced by most countries opting for REDD+ funds is to create the necessary governance structures to distribute benefits among key stakeholders in and effective, efficient and equitable manner. Similar to and basically copying experiences of countries that have already PES structures in place, the distribution can take different forms, from government to landholders, from private companies to landholders, but also from and within community to community and household to household scales (Loft et al 2014).

The main idea behind the REDD+ scheme is to create a global market for carbon credits that could and should finance the conservation and improvements of existing forests, in order to stop further deforestation and forest degradation, since they count for an estimated 17 percent of global greenhouse gas emissions, making deforestation a key issue and cause of global warming and climate change (Phelps et al 2011, Corbera 2012, Rosendal and Schei 2014).

Challenges to Market Based Forest Conservation

Castree (2010) demonstrates how the market based approach to conservation, or what he calls "neoliberalization of nature" has had mixed results, and how economic growth has often mostly benefited the private sector, achieving economic efficiency, while contributing little to nothing to decrease social inequity and injustice. This is linked to the fact that many PES programs have contributed to social inequality, instead of reducing it, by favoring large land holders through their payments instead of small forest owners (Wunder 2014). As a CIFOR report states very clearly, the access to and ownership of forest resources so important for women's livelihoods in forest-dependent communities is not reflected by current governance and policies. Gender inequalities, among other types of inequality, are not addressed sufficiently in REDD+ and similar market based approaches to forest conservation and climate change mitigation (Djoudi et al 2012, Agarwal

2009). By ignoring the importance of access to forest resources, e.g. non timber forest products, especially for women in many sub-Saharan African regions, existing gender inequalities are most likely to be perpetuated (Lennie 1999).

Rosendal and Schei (2014), Fletcher and Breitling (2012) and Fletcher (2010) show that the effectiveness of the Costa Rican PES, a posterchild of a supposedly market based approach to forest conservation, is still hotly debated and far from clear. It is unclear if the success of stopping deforestation is due to this PES program, or due to other factors linked to broader social and economic changes in the country and region. Additionally, the fact that the PES program has little in common with a truly market based approach raises important questions about the benefits of putting all our faith in market based approaches to save the forests of the world.

Muradian, et al. (2013) argue that market based instruments, like PES, and the global REDD+ initiative lack in effectively addressing the root causes of environmental degradation, large scale industrial agriculture, that there are serious concerns about ecological "additionality" (Daniels et al 2010) and social inequality, and that the success of market based solutions to conservation is threatened by financial unsustainability for lack of general funds, and rising opportunity costs (Phelps 2013). When analyzing the global PES program, REDD+, it is clear that the rising opportunity costs of conservation are not matched with the funds necessary to address these root causes.

Similarly, McAfee (2012) discusses the contradictions inherent in market based instruments and how the focus on economic efficiency clashes with social priorities, like poverty alleviation and addressing inequality, including gender, class and wealth, among others (Khadka et al 2014). Like stated before, often times it is more efficient to deal with fewer large scale forest owners than to include a huge amount of small scale forest owners in order to reach the ecological goals, which has negative outcomes for the secondary goal of alleviating poverty.

Furthermore, Larson (2011) demonstrates shortcomings of market based approaches to conservation, like REDD+, stemming from unclear tenure rights, and how these could potentially have negative social impacts for local communities and indigenous groups, especially women (Arwida et al 2016), linked to land grabbing by elites, increasing inequality and extreme poverty. The fact that often times men are the legal land owners is an important example of how gender inequalities can be reinforced through market based approaches to forest conservation. Already, before the global REDD+ program has kicked off, there are signs of violent evictions of local forest communities by states that are eager to show how their forests are protected or can be protected by the state.

Linked to this last point, Karsenty and Ongolo (2012) raise important questions about the potential for some states to even consider reducing deforestation through a market based system as REDD+, and cast doubt about the underlying reasoning of this scheme to achieve reductions in deforestation and carbon emissions through the payments to corrupt or ineffective and weak governments and states.

Finally, Corbera (2012) demonstrates how reducing nature to a collection of ecosystem services might lead to shifts in conservation logic and ethics, and contribute to the hiding of important interconnections between individual parts of complex ecosystems. Ecosystem services stem from the complex arrangements of the individual parts of ecosystems, and isolating them into tradable units does little to protect the benefits that are felt by local communities and society at large. Again, the importance of some forest resources might be overseen, because they are not tradable and therefore not recognized as an important part of the livelihoods of women and other members of forest dependent communities. This is another argument why women should be much more incorporated in discussions and decision making processes regarding forest governance (Djoudi et al 2012, Khadka et al 2014).

Conclusions

Summarizing, forest cover change, understood here as deforestation or forest cover loss and forest resurgence, is a complex and hotly debated issue in international environment and conservation literature, and a key issue in sustainable development (Robbins, 2011; Robbins, et al., 2011; Barbier and Tesfaw, 2012; Redo, et al., 2012; McCarthy and Tacconi, 2011; DeFries, et al., 2010). Deforestation remains a main global environmental challenge. The main underlying causes of deforestation are different forms of agriculture, with industrial agriculture being the main cause of forest cover loss. However, the net rate of deforestation appears to be declining since 2000, partly due to decreases in forest loss, but also due to increases in forest area in several countries (FAO 2015, Hecht, et al., 2014; García-Barrios, 2009; Angelsen and Rudel, 2013; Meyfroidt and Lambin, 2011). The market based approaches to forest governance seem to be disregarding these underlying causes of deforestation, discarding the critical voices that point at the weaknesses of this approach, namely the lack of funding, the inexistence of true local or global markets for ecosystem services, and the ever increasing opportunity costs of conservation due to increasing demand for more agricultural land, and therefore more deforestation.