Rights to carbon and payments for services rendered under REDD+; options for the case of Mexico

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Version 14 August 2012

1. Introduction

Under the United Nations Framework Convention on Climate Change (UNFCCC), a new policy known as Reduced Emissions from Deforestation and forest Degradation, which includes the role of conservation, sustainable management of forests and enhancement of forest carbon stocks (REDD+), is being developed. If ratified by a quorum of the Parties to the UNFCCC, this will provide a means by which non-Annex 1 countries may be financially rewarded for reductions in their forest carbon emissions and increases in their carbon removals in forests. Unlike the Clean Development Mechanism (CDM) of the Kyoto Protocol, which supports reforestation and afforestation projects, REDD+ achievements will be computed at national level on the basis of all losses and gains within the entire forested territory of the country over a fixed accounting period. The financial arrangements at international level have not yet been agreed; many observers expect that in the short run rewards will be provided by a global fund to which Annex 1 countries contribute on a voluntary basis, but that in the long run a market system will develop, similar to that operating for the Certified Emission Reductions (CERs) generated by CDM projects. Under the market system, the certified REDD+ credits could be used by Annex 1 countries as offsets, as a partial contribution to reaching their Assigned Amounts Units (AAUs), i.e. their agreed emission reduction quotas. The negotiating texts are clear that REDD+ as a policy instrument will be performance based, that is, rewards will be paid strictly in proportion to verified achievements. It is not entirely clear in what ´currency´ the achievements will be measured. If they are considered to generate credits that are to be fungible with AAUs, then achievements will have to be measured in terms of tons of CO_2, and this appears to be the thinking of most negotiators at present (SBSTA, 2011). Amongst the conservation and environmental groups commenting on the process there have been suggestions that achievements could be measured in other terms, such as hectares of forest brought under sustainable management or conservation, but how this would mesh with normal accounting for carbon is unclear. In this paper we will assume that regardless of whether the finance is derived from a market or from a fund, the rewards will be calculated on the basis of tons CO_2 per annum, and to simplify the presentation we will refer to these rewards as ´carbon credits´ in either case.

The goal of REDD+ is to reduce carbon emissions through reducing rates of deforestation and degradation and by increasing rates of sequestration in tropical forests. To participate in this programme, non-Annex 1 countries such as Mexico, Brazil, Tanzania and Indonesia are confronted with the need, on the one hand, to provide reliable, up to date data on forest dynamics, and on the other, to adopt effective policies which positively influence the size of the carbon sink. At the same time, they need to develop transparent socio-economic structures to implement these two elements, all of which are major challenges. Countries such as these which have vast tropical forest ecosystems, tend to experience complex land use changes (Velázquez et al., 2010). Estimates of deforestation rates in the past have often relied on coarse, satellite-based

approaches of questionable accuracy (Hansen et al., 2010), and policies to control rates of deforestation have in many cases failed. For these reasons, it has long been suggested that rural, forest-based communities may play a key role not only in the sense of forest management, as the legitimate stakeholders responsible for the future of the forests (Bray et al., 2005), but also in terms of monitoring and assessing the carbon dynamics at the local level (Skutsch, 2011). But in order for this to occur, there is a need to create incentive structures which make it worthwhile for communities to adopt more sustainable and carbon conserving approaches for forest management.

In this paper therefore we focus on the question of incentive structures, discussing various options relating to the rights to the carbon rewards, from community to national levels, and expressly considering how the distribution of the financial benefits could be operationalised within the Mexican context. The paper is structured as follows. Following this introduction, we review the literature on carbon benefits, rights and ownership. We then present the case of Mexico, reviewing the policy antecedents to REDD+, followed by an assessment to the physical potential for REDD+. In section 5 we then outline the three basic options as regards distribution of benefits in REDD+, with some variants, and in the following section we identify the factors that will determine the feasibility and effectiveness of these different distribution systems. Section 7 evaluates the different distribution mechanisms against these factors and section 8 draws conclusions for the case of Mexico.

2. Carbon benefits, rights and ownership

Throughout the developing world, rural communities (1 to 1.7 billion people, according to the Forest Peoples´ Programme: Chao, 2012) depend in part or in whole on forests for their livelihoods. Consequently, improved community forest management has been identified by almost all participating countries as one of the major instruments to be used in their national REDD+ plans (Skutsch and McCall, 2012). However, since achievements are to be measured at national level, it is understood that the credits will be handed over to the national agency in charge of the REDD+ programme. There have been fears expressed in many quarters, particularly from community groups and NGOs representing indigenous peoples, that very little of this money will trickle down to the local communities or small forest owners (for simplicity referred to as ´communities´ throughout this paper) who will be responsible for reductions in emissions from deforestation and degradation. Moreover there are fears that governments may try to alienate such groups from the forests on the grounds that their livelihood uses are responsible for current losses of forest stocks, whether or not this is an accurate portrayal of reality. A clear example of this is the case of communities in the Rufiji delta in Tanzania (Beymer-Farris and Bassett, 2012). As noted by Marino and Ribot (2012) there is a danger that instruments used in REDD+ may expose already vulnerable communities to injustices of this sort. For these reasons there has been a movement towards explicit guaranteeing of rights of communities who are the primary stakeholders in REDD (REDDnet, 2011; Peskett, 2011), which Sikor et al (2010) identify as being right to participate in decision making, equitable distribution of benefits and recognition of forest people´s particular identities. The REDD+ negotiations therefore now include a section on Safeguards, which are intended among other things to protect the rights of local people in these regards. The dangers are seen to be most acute in countries where tenure of the forest is still largely in government hands, while the informal or traditional rights under which communities use them are

not enshrined in national legislation. Even where communities have some legal rights to forests, for example under contracts for community forest management, the national government often retains powers to evict communities or close the programmes ´in the public interest´ when it deems this necessary.

Proposals for a ´nested´ approach to REDD+ have been put forward by some groups (Pedroni et al, 2009, Chargas et al., 2011, de Gryze and Durschinger, 2010, Cortez et al. 2010), in part to strengthen the position of local communities, particularly in the context of fears that local communities may not always possess the legal rights to decide on land uses, as in some places higher levels of government may override local decisions. In some proposals for nested systems, credits would be calculated at the local level, and attributed directly to the communities involved (Cortez et al, 2010). The term nesting has also been used in a more general sense however, for example in the context of sub-national jurisdictions nesting within national ones and may not therefore always imply that the local projects receive all the credits generated at that level. Apart from other considerations, attributing all credits to the local level could result in accounting conflicts with the national approach to REDD+. Moreover, as we show below, there are major technical problems with assessing deforestation achievements at the local level.

In the academic and NGO literature there have been a number of studies analyzing the legal position of communities as regards rights to the benefits from REDD+, and the likelihood of an equitable distribution, based on experience from earlier programmes. Crippa and Gordon (2102), representing the Indian Law Resource Center, for example, base their argument on an analysis of international legal obligations of states and international agencies engaged in REDD+, and find, like Sikor et al. (2010) that in addition to the right to participation in decision making and to Free, Prior and Informed Consent (FPIC) in regard to REDD+ activities on indigenous territories, communities have the right to an equitable share of any benefits derived from these, including any climate funds or sale or trading of community credits. What is implied by ´equitable´ is of course open to question, although this source stresses the need for a transparent and inclusive process to determine how benefits are to be shared. Many consider that the main difficulty is the lack of clarity on land tenure, and the great local variations in this (Robles, 2011). Peskett and Brodnig (2011) reviewing carbon rights suggest that carbon can be considered a new form of property that has potential value because of the creation of carbon markets and funds, which raises the question of how rights to this property, and the associated rights to transfer and trade it, are to be determined. They suggest that clarity in terminology is first required (community, rights, etc) and that rules as regards duration of rights and levels of compensation need to be made explicit. The legal position as regards ownership of carbon may differ in different countries and rules relating to this need to be negotiated.

For example, in 2010 the state of Acre in Brazil adopted a system of incentives under law 2.308, in order to protect and enhance environmental services, including carbon. Specifically, the carbon programme (ISA-Carbon) will provide the necessary incentives to achieve the state's deforestation reduction goals. In this scheme, emission reductions are considered a service that can be contractual and traded in the market. The carbon rights do not belong to the owner of the land or trees but to those who provide the service.

In practice however only very few countries have developed laws on carbon ownership. Costenbader (2009) suggests various different possibilities, for example carbon could be considered indivisible as property from the trees themselves, and thus could not be sold unless the trees were sold: but on the other hand, it could be consider an alienable property, which would mean it could be sold separately. It could alternatively be considered a publicly-owned asset, regardless of forest and tree ownership (as for example in many countries minerals below the surface are often considered to be national property). Governments could hold this carbon in trust for the benefits of forest owners or the public, and may or may not have the power to sell the carbon stock or give it away. The transfer of rights to carbon may also be subject to a variety of conditions. There might also be a legal distinction between ownership and rights to carbon *stocks,* including any increases in stocks (which can be measured as standing, within the trees) and ownership and rights to *reductions in emissions of carbon* (which are counterfactual, measured against a baseline representing what would have happened in the future without intervention). There does not appear to have been any legal discussion regarding this distinction, although it is crucial in the design of REDD+, which will include both increases in stocks and estimated decreases in the rate of loss of stocks.

Corbera et al. (2011) argue that it is the combination of land tenure rights and carbon rights which will determine success of REDD+; without security in both senses, forest communities may have little incentive to participate. Clearly if local communities have no secure land tenure, they are unlikely to want to participate. But Corbera et al. make the useful distinction, also followed in this paper, between the case in which full carbon rights (including the right to trade and sell carbon credits under REDD+) belong in principle to all communities which have land entitlements, and the alternative, in which the carbon rights are held by the government, but in which financial benefits from sale of carbon credits could be distributed to eligible forest communities, subject to a system (such as Payment for Ecosystem Services, PES) which is managed by the government. The first case implies privatization and commoditization of carbon services as a form of property (albeit in most cases to communities rather than individuals). This follows what Okereke and Dooley (2010), in their insightful analysis of distributive justice philosophies associated with REDD, call ´market justice´. The second implies the right of participating communities to a share in benefits, but within a system which is publicly controlled, and in which the way the rewards are distributed may not be based directly on assessment of individual performance. This corresponds most closely to what Okereke and Dooley call ´communitarianism as justice´.

The choice between these two positions is in fact the key issue in the design of REDD+ benefit distribution systems, but as we will show in section 4, this choice is heavily constrained, not only, as Corbera et al. imply, by the desire of governments to retain control over this flow of resources, but by a range of technical considerations, most importantly the impossibility of identifying which, out the many communities which do not deforest in a given accounting period, would have done so in the absence of the REDD+ programme, and can thus be said to deserve the credits. This point, together with related issues such as the question of responsibility for any losses, is elaborated in some detail in section 5. First however we turn to the specifics of the situation in Mexico.

3. Antecedents to REDD+ in Mexico

Mexico is perhaps unique among non-Annex 1 countries in that 42.8% of its surface (82.7m ha) is covered by forested ecosystems and our own analysis, based on the Series IV maps of the National Institute for Statistics and Geography (INEGI) and data from the National Agricultural Registry (RAN), indicates that 58.8% of this (48.6m ha) is legally in the hands of just over 20,000 rural agrarian communities (two-thirds of the all such communities). These *nucleos* are either *ejidos* (agrarian villages set up and managed on a communal basis) or traditional indigenous communities (Figure 1). However, up until the 1970´s rights to process timber were retained by state and private timber concerns, meaning that communities could gain only limited economic benefit from the forests within their territory. During the 1980´s a process was initiated to abolish timber concessions and allow *ejidos* and communities the right to conduct forest management themselves, either by renting their forest rights directly to logging enterprises, on condition that "*comuneros*" were employed, or by carrying out their own forest management schemes. There were however many legal, environmental and technical restrictions, and permission was only granted by SEMARNAT (the Ministry of Environment) if the application was supported by a detailed forest survey and plan for management. Moreover, there were limits to felling in forests considered to be of particular ecological value, particularly cloud forests and lowland rainforests. However, a programme in the state of Quintana Roo demonstrated that communities could carry out sustainable timber management themselves, generating considerable income from community based forest enterprises. Studies have estimated that rural agrarian communities with more than 3000 ha of forest are in a position to conduct financially profitable sustainable forest management, provided they have strong community governments (Bray et al., 2007), and there are numerous case studies which show that *ejidos* and communities are able to manage their forests cooperatively, extracting timber on a sustainable basis (e.g. Lopez-Barrera et al., 2010). This positive experience is seen by many as evidence that rural agrarian communities could form a backbone of REDD+ in Mexico (SEMARNAT, 2010; Kaimowitz, 2008; Benneker and McCall, 2010).

However, in 1992 there was a major change in Article 27 of the Constitution, which led to the creation of the Agrarian Law. Where earlier, all land within the *ejido*/community had been in communal ownership, with individual members having the right to cultivate (usually equal sized) plots during their lifetime, and the right to pass these plots on to a single heritor, *ejidos* and communities may now elect to introduce a system of privatization /parcelization, after the land has been surveyed and registered under the Land Rights and Urban House Plot Certification Program (*Programa de Certificación de Derechos Ejidales y Titulación de Solares*, PROCEDE). 78% of *ejidos* and 44% of communities have had their lands registered by PROCEDE so far (Robles, 2011). This means that members may obtain land titles allowing them to sell their parcels to other members of the *ejido*, or to outsiders. The common property belonging to these settlements, such as forest land, has also been mapped by PROCEDE, and may optionally also be parcelized, but these plots can only be sold to *ejidatarios* from the same ejido, unless the assembly unanimously agrees to adopt a private property regime relating to these resources. In indigenous communities, however, communal land cannot be bought and sold at all unless there is a decision by the assembly to adopt an *ejidatorial* regime (Robles, 2011). Many *ejidos* have parcelized their forests; for example, in villages where pine resin is harvested, each *ejidatario* is allocated a few hectares for collection, and in the tropical deciduous forests (which are largely dry

forests known as *selva baja* in Mexico) where the primary benefit of the forest is from grazing, fences can often be seen within the communal forest, ensuring that individual cattle herds are kept in the patches allocated to their owners. Where communities have set up timber industries (particularly in the pine/oak forests at temperate altitudes) it is more common to find community-wide forest management plans and sharing of the revenues through the community institutions. In others where the village has no processing facilities, individuals frequently fell and sell timber to external buyers with or without the approval of the community institutions, often flouting national laws in the process (Hajjar et al, 2012). All communities and *ejidos* however officially need to comply with the Law for Sustainable Forest Development and require a management program to manage their forest.

In general, parcelization of individual plots might be expected to lead to a more skewed distribution of land holdings, but other, less recognized impacts have affected the group known as *avecindados*. *Avecindados* are usually younger sons of *ejidatorios* who did not inherit the family plot, and whose livelihood depends mainly on sale of labour to other *ejiditarios*, as well as women who are not heads of households. It is worth noting that *avecindados*, since they have no land titles, are not eligible for government programmes and subsidies relating to land, and have no rights in the *ejido* assembly which makes all decisions about land management. In many villages, however, *avecindados* were in the past permitted to make use of the common property, for example to graze their cattle. In the context of de facto parcelization of forests, this group, which may make up to 50% of the population of any given *ejido*, is particularly vulnerable to loss of access to natural resources.

Mexico is also perhaps unusual among non-Annex-1 countries in that it has already promulgated a range of programmes in the area of community forest management and Payment for Environmental Services (PES). In contrast with community management in e.g. Nepal and Tanzania, where management generally consists of controlling off-take of firewood and minor forest products and grazing within the forest, usually in forests of relatively low commercial value, in Mexico the term community forest management is always used in connection with projects for timber extraction, usually though not exclusively in the commercially valuable pine forests. Following the programme in Quintana Roo, the National Forest Commission introduced a policy instrument known as *Programa de Desarrollo Forestal Comunitario* (PROCYMAF, 1997-2003) which focused first on three and later on six states, followed by PROCYMAF II (2004-2008), which was implemented first in six and later in 12 states, both with support from the World Bank. Under these programmes communities could get financial support for developing sustainable timber extraction plans and setting up the infrastructure required for small scale timber processing. Grants covered the costs of a professional technician (selected by the community) to prepare the required planning document, though officially this was produced on a participatory basis and it had to be approved by the assembly before submission. 599 communities participated in the first programme and approximately 980 in the second, and there is much evidence for the success of this type of approach in Mexico (Klooster and Masera, 2000; Bray et al. (2005), etc). After PROCYMAF II ended, the programme continued with financing from the federal government and it changed its name to '*Programa de Desarrollo Forestal Comunitario*'. In 2010 it expanded to all 32 states.

A programme for payment to communities for hydrological services (PSAH) and one for biodiversity and carbon (CABSA) started in 2003 (they are now combined in one programme of PSA, *Pago por Servicios Ambientales*). Through the program, the areas designated as water or biodiversity reserves within the village forests are fenced to exclude cattle and extraction is limited to deadwood for firewood (i.e. it is a conservation instrument). Payment is on a flat rate per hectare per year for five years. For example for biodiversity the payment is 382 pesos/ha/year for five years in dry tropical forests and 700 to 1,100 in cloud forests, depending on the risk of deforestation. A total of 5,900 rural settlements and small property owners entered the programme between 2003 and 2011, building up from around a few hundred per year to more than a thousand per year from 2007 onwards, and resulting in 3.2m hectares being brought under conservation. Even though these mechanisms have provided subsidies that do not represent real environmental markets, they can offer some understanding of how payments might be applied to a future REDD+ programme. The carbon programme however involved afforestation/reforestation following the CDM model, under which the conditions were too exacting for many communities to be eligible; few were successful in their application for support, and this part of the CABSA was soon dropped.

Mexico is also relatively advanced in relation to REDD+, and has fully supported international negotiations on this policy particularly as regards the need to involve and benefit forest communities, following the Bali Action Plan in which it is clearly stated that REDD activities should involve the legally recognized inhabitants of forested areas, respect their traditional knowledge and support their social and economic development (UNFCCC, 2009). Mexico in fact made a submission to the SBSTA later that year elaborating on these issues, stressing the need for prior and informed consent and capacity building, respect for land property rights, and the potential role for communities in monitoring their carbon stocks (Perron-Welch, 2010). Moreover there has been an extensive process of national consultation on-going since 2010, through a taskforce called Comité Técnico Consultivo REDD+, which has around 100 registered members of civil society, and specialized working groups within it. The issue of carbon rights has been particularly contentious, and the importance of this issue was underlined by the passing of amendments to the paragraphs on environmental services in the regulations relating to the Sustainable Forest Development Law, in April 2012. These state clearly that in the context of international agreements and national arrangements, economic instruments (note: not financial) will be developed for conservation and improvement of environmental goods and services which are in the public interest and which are generated by sustainable forest management by owners (*propietarios*) and other legitimate owners (*legítimos posesores*, which could be interpreted as including the *avecindados*) of forest land. Environmental services are defined in broad terms (´tangible and intangible benefits generated by ecosystems, that are necessary for the survival of the natural and biological systems taken together, and which provide benefits for human beings´), although environmental goods are not defined. The law seems to imply that the economic benefits will be in the form of rewards (which can be interpreted as ex-post payments, on provision of the services), rather than as incentives (ex ante), although this is not explicitly stated. However, the law does not say that the owners of the forest land will be the owners of the environmental good/services (carbon), or that they will have the rights to sell or trade these goods/services. Further, it does not say explicitly that they will receive economic benefits in measured proportion to what they produce, e.g. on a ton CO2 basis for example (it is vague/non-

committal on this point). Nevertheless the law has been hailed internationally as a major step forward in ensuring that communities will receive the benefits of REDD+ (UN-REDD, 2012).

Furthermore, in June 2012, President Calderon signed the decree of the General Law on Climate Change which provides for national goals in both mitigation (it specifically mentions the need to halt deforestation and degradation) and measures for adaptation to climate change. A key element of the bill is the establishment of a Climate Change Fund which will be constituted by a number of sources, including resources from certified emission reductions. The funds will be used for different actions, including REDD+ activities. Under this law, REDD+ resources will go in a first instance to the government and would then need to be redistributed to different actors. This law provides further evidence that a system of private ownership of forest carbon rights is probably not at the moment envisaged by the government in Mexico.

What is evident is that successful sustainable management of forests by communities is the central issue if REDD+ is to succeed in Mexico. The facts that communities have secure tenure of the forest (in contrast with the situation in many other parts of the world), and that Mexico has experience with a variety of programmes supporting community forest management, are often seen as solving the basic difficulties, but this is too simplistic a reading of the situation. Large numbers of people have emigrated temporarily from rural Mexico, either to urban areas or to the USA, leaving behind their natural resources. This could result in less pressure on forests, but on the other hand, to some extent it leaves them open to uncontrolled extraction by others who may have less at stake in long term sustainability but aim for short term benefits before the owners return. The outflow of experienced people from rural communities has also undermined communal governance structure in some places, meaning that communal decisions on forest management may be flouted by members of the community in pursuit of their personal self-interest. In other areas, in spite of the existence of well-established communal government structures, illegal criminal organizations invade communal territories, terrorizing and extorting local inhabitants and carrying out disastrous logging actions at will. Moreover, there is some doubt as to the security of forest tenure, particularly in territories belonging to indigenous communities. A considerable proportion of these lands have not been surveyed by PROCEDE because of local disputes over ownership, and Robles (2011) suggests that this may make it more difficult for these communities to enter into REDD+ agreements.

As noted above, there are increasing numbers of communities conducting forest management projects, both for sustainable timber extraction and under PES, but the successful cases in terms of timber management are almost always found in communities which have relatively large areas of high density temperate forest and a high level of community organization, while although successful PES projects are found in a variety of ecosystems, they also tend to involve communities that have a large total forest area and so can afford to set aside part of this for conservation (Alix-Garcia et al 2005). These cases of forest management are excellent examples, but do not reflect the conditions in many communities, where forest management is often in a precarious situation, and therefore to assume that existing forest management and PES programmes could be expanded to include all communities with forests is naïve, to say the least. Thus, although clarifying the rules on rights to carbon and to the benefits from REDD+ will be an important aspect in designing a successful REDD+ programme

for Mexico, we recognize, along with other authors (Hajjar et al., 2012, Corbera et al, 2011) that this is only one of many uncertainties involved.

4. The physical potential for REDD+ in Mexico

Deforestation rates in Mexico, though high during the 1970´s and 1980´s when government actively encouraged clearance for agriculture and grazing, have fallen dramatically in recent years (Table 1), particularly in the temperate forests; there has in fact been an increase in the area of pine forests in the period 2002-2007 (Table 2). The most severe losses are currently in the tropical deciduous forests (selva baja) although the rates of loss are significantly lower today than they were ten years ago. Here much of the clearance is for pasture (clearance may even be subsidized by grants from the Ministry of Agriculture) or for cultivation. This type of forest, though very rich from a biodiversity perspective, holds little commercial value for the local population, who generally refer to it as *´monte´* (wasteland). Reducing the rate of deforestation in these areas is possible, but the opportunity costs would have to be taken into consideration; the question is whether revenues from REDD+ would be sufficient to make retention of these forests worthwhile in the eyes of the communities and the individuals who currently clear them.

Data from the national forest inventory show that a very large proportion of forest of all types is degraded (last column in table 2); degradation is particularly severe in pine and other temperate forests, but also in the selvas. Programmes of the type promoted by CONAFOR (PROCYMAF, PSA, described above), despite being formally justified in terms of reducing deforestation, are in fact much more suited to reducing degradation and for promoting forest enhancement (increases of standing stock). Sustainable timber management ensures that the off-take is managed in such a way that natural re-growth is stimulated, and keeps biomass levels, if not at the level of intact forests, at least stable; PSA programmes, which are conservationist, also promote natural restoration of forests that have been subject to slow degradation in the past. These programmes succeed because the opportunity costs of the alternative are generally rather low. Villages generally select areas of forest which are not under direct threat of deforestation, and even at the low per hectare rate of payment can earn a welcome income with relatively little pain. Dealing with degradation, and enhancement of forest stock with which it is usually paired (since most actions to reduce degradation also result in increases in growth rates) may, in many ways, be easier than reducing deforestation, as there are already good examples of public policy instruments which have been reasonably successful.

In reality however there are opportunities in all three areas: for reduction of deforestation, for reduction of degradation, and for forest enhancement. The instruments used under REDD+, which could involve incentives, rewards, or regulations, would however have to be tailored to the specifics of the type of forest and their respective drivers of current loss, and would have to be designed with a clear understanding of the opportunity costs in each case. In the following sections we move on to consider the range of possible benefit distribution systems and the technical considerations in calculating carbon achievements, which may limit the options as

regards distribution, before comparing the pros and cons of different distribution rules in section 6.

5 The range of possible rules for distribution of rights/benefits.

In section 1, two opposing positions as regards reward systems were identified from the literature: case 1, in which communities are entitled to full carbon rights, including the right to trade and sell carbon credits arising from the management of forests in their territories, and case 2, in which the carbon rights remain with the government, but communities are entitled to some economic rewards for their achievements in providing the carbon services.

Following Balderas Torres and Skutsch (2012), we suggest that within Mexican national REDD+ architecture there could in fact three major options, one of which comes in two variants (Table 3).

In Option A, all carbon credits are calculated at community level and attributed directly to each individual community, according to the size of the carbon savings each community has achieved in terms of reduced deforestation, reduced degradation and forest enhancement. Under this option, communities would be completely independent of government (apart from e.g. verification of results) and would receive marketable credits at the end of the accounting period in proportion to their achievements, from the international REDD+ agency, and could sell these on carbon markets. At first glance this approach seems to be equitable in the market sense, since it provides rewards in proportion to achievements. There would be few if any restrictions on the kinds of management activities the communities could apply. The reductions in deforestation, reductions in degradation and forest enhancement would be measured in terms of tons CO2 per annum and, since they are considered marketable commodities in the same sense as other forest products such as timber or resin, we would suggest they are referred to as *environmental goods.*

In option B, all carbon credits for reduced deforestation, reduced degradation and forest enhancement are calculated at the national level and are attributed in the first instance to the national government. Following this, one of two distribution paths could be followed:

B1. All credits are handed over to participating communities in proportion to their individual locally monitored achievements; communities would be able to sell these credits on carbon markets. Communities would be almost independent of government (apart from registration, reporting and verification of results) and would be able to manage the forest with few restrictions. As with Option A, the carbon savings would be considered to be commodities (*environmental goods),* and distribution approach appears to be ´equitable´ in the market sense (output based).

B2. Government sells the credits internationally and the money is distributed among all participating communities, but essentially on a flat rate per hectare, not directly proportional to their achievements. Rates could vary such that areas with higher opportunity costs or more vulnerable forests would receive a higher flat rate. Communities would follow specific management activities, and payment would be made after checking that these activities have been carried out, but without

measurement of results in terms of carbon achievements. This is the model used in Mexico´s current PSA programme; communities would not have to engage themselves in the market to sell credits. In this case, the carbon achievements can be considered to be *environmental services*, for which communities would be entitled to some rewards, rather than commodities or environmental goods. A variant on B2 might be that government sells the credits and pays communities based on the individually estimated opportunity costs they face in participating in REDD+, as advocated for example by Newton et al. (2012). This would appear on the face of it to give the most economically efficient solution, but in reality the transaction costs of such an approach would be overwhelming, as each community would have to be assessed separately to determine its opportunity costs and there would be endless opportunities for fraud and corruption. For this reason we do not consider it further in our analysis.

In Option C credits for reduced deforestation and degradation are attributed in the first instance to government, for later distribution via B2. Credits for forest enhancement are however attributed directly to the community. Under this scheme, communities would have two sources of income, one a flat rate payment for implementation of sustainable forest management practices (that reduce emissions from deforestation and forest degradation), and one on the basis of credits for forest enhancement, which are based on measurable achievements. These credits could be sold by the community independently, either to government, or to an independent market (Balderas Torres and Skutsch, 2012). The reduced deforestation and degradation would be rewarded as an *environmental service* while the credits for forest enhancement would be seen as *environmental goods.*

6. Factors that impact the feasibility and effectiveness of different distribution systems

There are a number of important technical considerations that impact the feasibility and effectiveness of systems for distribution of benefits, and these need to be taken into account while selecting one.

6.1 Measurement of achievements.

It is important to understand that under REDD+ credits are never issued just because a forest owner does not deforest. They are issued to the extent that forest owners have not deforested *but would have done so*, without REDD+; in other words, for the difference in the deforestation *rate* before and after REDD+ (i.e. for additionality). We can only distribute the credits which represent this difference, and the challenge is to find the fairest way of doing this.

At the national level, it is done by estimating the past rate of deforestation and projecting it forwards, over the time to be covered by the accounting period, in what is usually called a Reference Emission Level. Let us say the national rate of deforestation has been 0.7% per annum in the recent past and it is considered that this would be likely to continue in the future, if there were no REDD+. However, because we are successful with REDD+ activities, we find at the end of the accounting period that it has been reduced to 0.5% per annum. Then the difference – 0.2% per annum - can be computed in carbon terms and credited, and the country may sell the credits on the market. The deforestation rate is of course an average over the whole country.

Normally baselines would be set for regions within the country in a similar way. Against these, the average improvements with REDD+ can be calculated, credits issued, and sold. When it comes to the distribution of the credits, however, the problem is to know exactly which forest owners did not deforest. Let us say that in a region with particularly high rate of deforestation there are 1000 forest parcels owned by communities and that in the past, 30 of them cut the forest down every year (3% annual deforestation). With the REDD+ programme, we succeed in reducing this rate of loss in this region to 20 (2% annual deforestation). This means we can claim credits for the equivalent of 10 forest parcels per year. But at the end of the first year there are 980 communities which still have their forests, who have clearly not deforested this year, and at the end of the second year there are 960, and so on. But to which of them do we then attribute the credits? They could all say that they had been intending to cut down the forests, but didn´t, because of REDD+. The point is that where deforestation is unplanned and unsanctioned (as is usually the case), there is no way of knowing exactly who, in the counterfactual case, would have deforested.

The alternative would be to set up a baseline for each forest parcel individually, since it is likely that the communities will not cut down their entire forest, but only part of it, in any one year. Then it would appear that we can measure exactly what each community has achieved. The problem with this is that it creates a perverse incentive. A community which has been very careful with its forest in the past will have had little or no deforestation and degradation in the past. Hence, it shows no improvement if it does not deforest in the REDD+ accounting period, and it cannot be attributed any credits – which is clearly grossly unfair. Particularly when another community, which has in the past has a high rate of deforestation, decides to reduce this rate and can earn a lot of credits in doing so. This is known as the ´Angels and Sinners´ Dilemma. We are giving credits to the `bad guys` for mending their ways, but we cannot give credits to the guys who have always been good. The most important point here is that this kind of policy is not likely to succeed, as it goes completely against people´s notions of justice. It is more likely to encourage people to cut their forests than to preserve them.

Corbera et al (2011) note in passing that in most independent REDD+ type projects which are already operating in the voluntary carbon market, individual participants cede their rights to credits to the organization which has set up the whole project, and receive payments indirectly. The reason this is done is for exactly the reasons given above: it is simply not possible to identify which of the many participants would have deforested, but did not. The project therefore ensures that everyone receives some payments, by dividing the value of the few credits earned between all. There is no hidden political motive here; it is just a question of practicality.

The exception to this rule is the case of forest enhancement. Unlike reductions of deforestation and degradation, which as explained above are essentially counterfactual, increases in forest stock can be physically measured on site in each and every forest parcel. If a forest inventory is carried out in year 1, and again at the end of the accounting period, a positive difference indicates carbon savings which can be directly attributed to the forest parcel itself.

6.2 Consistency in national accounting

Under a UNFCCC led international REDD+ programme, countries will be assessed at national level for their carbon achievements. What they do with the credits and how they arrange the benefit sharing will almost cettainly be left to individual countries to decide under the principle of subsidiarity. However, it is clear that in accounting for credits internally, any sub-national (regional) baselines would have to sum to the national baseline (REL/RL). Baselines at the level of individual forest parcels (i.e. at community level) would also have to sum in the first instance to the regional baseline. This would be almost impossible to carry out in practice, which is another reason (in addition to the Angels and Sinners Dilemma) why it is unlikely that baselines will be developed at individual community level.

6.3 Timing of benefits

Credits are issued at the end of an accounting period (a 2 year period is likely to be agreed under the UNFCCC for REDD+), after results have been measured and verified, which will clearly take additional time. This would be true whether credits are issued to government or directly to participating communities. While governments may be able to obtain credit to cover costs of the programme in the interim, and might use this to set up a revolving fund to make annual payments to communities on a PES basis, it is very doubtful that communities will be willing to wait for their payoff of credits, particularly as they may have to foot the bill up front for costs associated with the management.

6.4 Certainty about size of benefits

The number of credits to be issued is only known after all accounts have been rendered at the end of the accounting period. In systems in which communities receive credits, it will be very uncertain till the last moment how many they will receive and what their market value will be (akin to having no knowledge at all about what the yield and selling price of their agricultural crops will be). In systems where indirect payments are made on the basis of standard PES incentives, communities will be more secure in knowing what they will receive, particularly if, as suggested above, the payments are made annually.

6.5 Leakage

Under national REDD+ programmes, credits are calculated at national level and they are issued to governments on the basis of the total savings of forest carbon the country has achieved over an accounting period and over their entire forest territory. It is quite possible that gains in one area due to a strong regional programme promoting reduced deforestation are partly offset by losses in another part of the country (by increased deforestation in this other region). In part, the losses in the second region may be the indirect result of the conservation activities in the first, since they may be caused by displacement of activities such as logging or clearance for agriculture (leakage), from the one to the other. On the other hand they may just reflect different policies in the two regions. The country however will only receive credits for the overall net improvements over time compared to the national baseline.

This means that the region which has been successful in reducing deforestation may not be able to receive what it considers its full quota of credits, since the country will not

have sufficient credits available for this. Among other things, it means that credits cannot be distributed between regions until all the calculations have been made and the balance is known. Credits cannot simply be issued to individual parts of the system without regard for what has been going on in other parts. And this implies that there will always have to be some kind of central agency or credit ´bank´ overseeing the final distribution of credits among the many participating parts.

Of course, there could be ways of dealing with the shortfall of credits due to losses in some areas. Regions that lose carbon stocks might be fined the equivalent of the value of the carbon credits lost, for example – but such punitive measures have not yet been discussed in Mexico and are unlikely to be considered politically feasible at least in the short run. We should not forget that deforestation generally occurs for very good economic reasons; and it is not a crime.

Some REDD+ agencies have therefore suggested – in addition to monitoring of leakage belts that would deal with direct, local leakage from the project, which in itself is already a cumbersome and expensive exercise- that a buffer fund of credits should be set up (using a fixed proportion of credits from each area, which are not paid out but are kept to deal with any overall shortfalls, whether these are directly related to the project or simply the result of other losses at national level). However, it is difficult to estimate what the likely extent of shortfalls would be, and the accounting would be rather complicated.

6.6 Responsibility for losses and non-permanence

The permanence of carbon saving is an issue which has plagued discussions on REDD+ from its start. If credits are issued for reduced deforestation in one accounting period, but the deforestation occurs nevertheless during later period, this is considered to be a form of temporal leakage. The question is, who would be legally responsible for the losses incurred; generally this would be seen to be the owner of the credits. If credits are issued to communities, the likelihood is that they would have to answer for any future reversals, which could be a disincentive for them to participate (administrations change at community level and a new leader may not feel committed to the promises of the previous regime). If the ownership of the credits, and the associated responsibility is held by the country as a whole, it would be easier to carry the burden through a buffer fund or an insurance policy.

6.7 Responsibility for transaction costs related to sale of credits

There are considerable transaction costs connected with the issuance of carbon credits, and considerable economies of scale too. The cost per credit will obviously be vastly higher if every community attempts to sell its own credits, than if the sales were made centrally and in bulk.

7. How technical considerations restrict the policy options

The technical considerations listed in section 6 impose quite severe restrictions on many of the options that were proposed in section 5 These options are evaluated against the

identified factors in table 4. This analysis shows that systems in which all benefits are calculated on an output basis at the level of the individual community are in practice almost impossible to implement. The greatest impediment is the impossibility of assessing which communities are in fact responsible for declines in deforestation rates, but consistency with national accounting is also a problem, and the fact that communities would have to wait till the end of the period, for an uncertain pay-off, combined with very high transaction costs, is likely to be a killer factor. Hence options A and B1 appear to be essentially infeasible. Option B2 on the other hand would function in a similar way to the current PSA programme in Mexico: communities would be paid a flat rate for carrying out forest management activities thought to result in reductions in deforestation and degradation, but the government would be the owner of the credits, and would be responsible for all the monitoring and marketing involved in their sale. Option C is a variation of this, in which credits for reductions in emissions from deforestation and degradation are claimed by the government, but credits for forest enhancement, which can be measured on site, would be the property of the community, who would have the right to sell these.

In options A and B1, payments are tied to achievement of the community (in terms of tons of CO2); in options B2 and partially in C, they are not. Some observers believe that communities will strive harder to achieve, if they are paid in terms of outputs, but this may certainly be questioned. This notion derives from neo-liberal theories of productivity, which may not apply at this level. It is probable that communities who involve themselves in REDD+ are doing so not only for economic reasons but rather because of other non-financial co-benefits which they gain through a more sustainable approach to forest management. This is in addition to the fact that communities may be ready to take a lower payment if it is more secure and involves less work, which is the case for B2. Option C however allows for a combination of the ´pay by results´ and the flat rate payment system, and may therefore ultimately be the best choice.

It should be noted however that even if the structure selected for the design of the system for distribution of benefits is fixed for the whole country (since this could be considered a legal or even constitutional matter), the actual incentives paid under the PSA type of system envisaged in B2 and C could vary according to a number of criteria, such as the level of threat of deforestation in different zones and the intrinsic value of the forest, as well social indicators (a decision could be made, for example, that payments would be higher for example in areas with a high level of social marginalization), or payments could be made in different forms in different areas, depending on local conditions.

8. Conclusions

In terms of rights to carbon and to the financial benefits of REDD+, our analysis shows that there are a number of important technical limitations on how these could be distributed. Most importantly, attribution of ownership of the carbon saved through reductions in deforestation and degradation is virtually impossible at the level of the individual community or small forest parcel owner. This is because it is not possible to identify which of the many individual owners would, in the absence of REDD+, have deforested. Other problems associated with attributing ownership at this level include the fact that all achievements at the individual level would have to tally with national

accounts, implying the need for integrated baselines, which would be an administrative nightmare. On the other hand, attribution of increases in stock can be made at the individual level, since these can be physically measured *in situ*, starting from a zero baseline at the start of the accounting period.

Systems in which economic incentives for reduced deforestation and degradation are paid out on a pre-determined, flat rate basis in return for agreed improvements in management practice are much easier to implement from a technical-accounting point of view and are in many ways much fairer than systems based on payment quantified by performance level (tons CO2 saved), although option C, which allows for local level attribution of ownership of credits for forest enhancement, provides a middle way.

Above all, we believe that it is important that the system of benefit distribution is made explicit so that people will know what they can expect and what they are letting themselves in for, and thus can make rational decisions in advance about whether to participate or not. To this extent we concur with Corbera et al (2011). We also recognize also that tenure is not everywhere as secure as it is in Mexico, and that in most countries improvements in this regard will be essential before REDD+ can take off.

For the specific case of Mexico, we draw the following conclusions.

1. Despite a favourable forest tenure regime and a long history of state supported community forest management of various kinds, there are a number of hurdles that face the implementation REDD+ at community level.
2. Effective REDD+ policy instruments, with associated incentives at community level, are particularly needed to deal with the continuing loss and degradation of tropical deciduous forests (selva bajas), which are under most pressure from grazing, and which have little value as timber.
3. The community level approach is only applicable in the approx 60% of forests owned by communities, and not all of these communities have local institutions which are strong enough to sustain communal management. Moreover there are areas of the country where lawlessness prevails, and communities are unable to defend their forests from outsiders. To speak of rights to carbon and equitable distribution of benefits makes no sense in these areas.
4. Although the recent amendments to the Sustainable Forest Development Law referring to environmental services specify that members of communities and *ejidos* will receive economic benefits from the provision of carbon services, it is not clear whether non-members, such as *avecindados* will benefit.
5. The law does not specify on what basis the payments will be made. Following the arguments made in this paper, we propose that a mixed system (option C) offers the greatest advantages. Under this, reductions in deforestation and degradation would be measured in tons CO2 and seen as environmental services. The carbon savings would be considered to be the property of the state, although the funds generated from the international sale of the related credits would be used to finance flat rate payments for improved management of forests (whether for extractive purposes or conservation) at community level, very much as PES payments are made today. Increases in stock – forest enhancement – which are physically measurable at the level of the individual forest parcel, would be considered environmental goods, since they are actually present in the form of

carbon, not carbon dioxide, and would be considered property of the owner of the trees. As such, the owners would be free to calculate the equivalent CO2 credits and market these in any way they feel appropriate.

Acknowledgements
The research behind this paper was carried out in connection with three projects: ¨Linking local action with international treaties in climate change in the dry tropical forests of Mexico¨, financed by the Netherlands programme Science for Global Development (WOTRO); ¨Addressing forest degradation in Mexico through REDD+¨, financed by Climate Works; and ¨Estudio para determinar el estado de degradación y potencial de restauración en ecosistemas forestales bajo manejo de la Cuenca Baja Del Río Ayuquila¨ financed by the Junta Intermunicpal del Rio Ayuquila with support from CONAFOR and the Agence Francais de Developpement (AFD). Alejandro Velazquez would also like to acknowledge financial support from DGAPA-UNAM (IN218510). We are grateful to Fernando Gopar for assistance in the preparation of Figure 1. The responsibility for the conclusions presented in this article rests entirely with the authors and may not be taken as representing the views of their organizations or of those that provided research sponsorship.

Table 1: Rates of deforestation in Mexico over recent periods

Data source	Historical period	Absolute annual deforestation rate (ha/annum)	Annual % loss (based on start date)
FAO/FRA	1990-2000	347,000	0.503
	1990-2005	318,000	0.462
	2000-2005	206,000	0.397
INEGI database	1996-2002	278,000	0.402
	1996-2007	224,000	0.324
	2002-2007	158,000	0.233

Source: SEMARNAT, 2010

Table 2: Deforestion and degradation by forest type, Mexico

	Annual losses 1993-2002 (ha)[1]	**Annual losses 2002-2007 (ha)[2]**	**% of sample plots with signs of degradation in the period 2004-2007[3]**
Coniferas	29,498	+928	86
Coniferas-latifolias	35,190	8,889	82
Latifolias	42,920	1,167	83
Selvas altas y medianas	111,170	84,782	50
Selvas bajas	131,373	70,153	73
Otras	3,885	8,912	40
TOTAL	354,035	155,152	

Source: [1,2]: SEMARNAT, 2010; [3]: derived from data in the National Forest Inventory, INFyS. Discrepancies between these and others figures quoted in the literature are mainly explained by differences in classification systems used, since forested ecosystems are not clearly defined; also by differential data availability between regions (Velázquez, 2008).

Table 3 Options for benefit distribution systems

↓	A **All carbon credits are calculated at community level and attributed directly to the individual community, according to the size of carbon savings each community has achieved, though reduced deforestation (D), reduced degradation (D) and forest enhancement** (conservation and sustainable management are measured in terms of reduced D&D)	**B** **All carbon credits for reduced D&D and forest enhancement are calculated at national level and attributed (in the first instance) to the central government**		**C** **Credits for reduced deforestation and degradation are attributed in the first instance to government, for later distribution (via B2). Credits for forest enhancement are attributed directly to the community.**
		B1 **The credits are then handed over to communities on the basis of their individual achievements.**	**B2** **Government sells the credits internationally, and the money is distributed among the communities, but on a flat rate, not proportional to their achievements.**	
Advantages for communities	Communities would be completely independent of government (apart from e.g. verification of results), and would receive marketable credits at the end of the accounting period in proportion to their achievements in reducing emissions and enhancing sequestration. They would be free to carry out any kinds of management activities, with no restrictions.	Communities would be almost completely independent of government (apart from e.g. registration and verification of results), and would receive marketable credits at the end of the accounting period in proportion to their achievements in reducing emissions and enhancing sequestration. They would be free to carry out any kinds of management activities, with no restrictions.	Communities would not have to bother with selling credits and would know in advance what their payments would be. (But they would have to agree to carry out certain defined forest management activities, with less choice than in A or B1)	Communities would have two sources of income, one a flat rate payment from government for implementation of sustainable forestry practices, and one on the basis of credits for forest enhancement which are based on measureable achievements. These credits can be sold by the community independently.
Conceptualization	Reduced emissions from D&D and increased sequestration due to forest enhancement are all considered *environmental goods* which the community owns and has the right to sell as commodities	Reduced emissions from D&D and increased sequestration due to forest enhancement are all considered *environmental goods* which the community owns and has the right to sell as commodities, after proportional allocation of the credits for these out of the central ´bank´ of credits.	Reduced emissions from D&D and increased sequestration due to forest enhancement are all considered *environmental services* for which the community has the right to compensation.	Reduced emissions from D&D are considered *environmental services* for which the community has the right to compensation. Increased sequestration, which can be measured in increases in carbon stocks, is considered an *environmental good* which the community has the right to sell.

Table 4 Factors affecting feasibility and effectiveness of different distribution options

	A	B1	B2	C
1: Measurement of achievement/baselines	Requires a D&D baseline at the level of each individual community. Unfortunately, this results in the ´Angels and Sinners´ dilemma. Communities which have never deforested will never be able to earn credits under REDD+, even if they do not deforest in the future. Those that earlier destroyed their forests can earn a lot of credits. This is a perverse incentive structure, and furthermore it is likely to be very unpopular. .	Requires a D&D baseline at the level of each individual community. Unfortunately this results in the ´Angels and Sinners´ dilemma. Communities which have never deforested will never be able to earn credits under REDD+, even if they do not deforest in the future. Those that earlier destroyed their forests can earn a lot of credits. This is a perverse incentive structure, which is likely to be very unpopular. .	Does not require a baseline at the level of the community, but one at the municipal or regional level, which gives the average rate of loss due to deforestation and degradation in the past and average rate of growth of stock in the forest when protected. All communities which register in the programme and carry out the required sustainable management or conservation activities, would qualify for payments (not credits), at a flat rate per hectare, as in the current PSA programmes. Payments could possibly be higher in areas where the threat of deforestation and degradation are higher, where forest is more valuable from a biological point of view, or where costs of management are higher.	Does not require a baseline at the level of the community, but one at the municipal or regional level, which gives the average rate of loss in the past. All communities which register in the programme and carry out the required sustainable management or conservation activities, would qualify for payments (not credits) for reduced deforestation and degradation, at a flat rate per hectare, similar to payments made under the current PSA programmes. In addition, if stock is monitored at the beginning and end of the accounting period and can show growth, credits could be applied for which they would then be free to sell independently (the baseline is the stock at the start of the period) . As in B2, payments for forest management could vary according to underlying circumstances
2: Consistency in national accounting	For reasons of consistency in accounting, the national baseline would have to represent the sum of all the individual baselines at community level, which would be very difficult in practice. In practice, credits cannot be issued to individual communities directly, since the total number available has to be computed first at the national level. There will always have to be some sort of intervening agency or ´bank´ that holds the credits until the national accounts are clear at the end of the period.	To form the basis for the distribution of credits from government to communities, the individual baselines at community level would have to sum exactly to the national baseline, which would be very difficult in practice.	Government would have to estimate up front the likely total carbon savings to be achieved over the whole country and compute the payments they are able to make, based on the estimate of funds they will receive from sales of the credits. There would be no problem of reconciling crediting at the local level with the national.	Government would have to estimate up front the likely carbon savings to be achieved over the whole country for D&D and compute the payments they are able to make, based on the estimate of funds they will receive from sales of the credits. There would be no problem of reconciling crediting at the local level with the national. National accounts would cover D&D only (using a REL). Forest enhancement would be outside national accounts. Local baseline for enhancement would simply have to demonstrate there was no enhancement ongoing before project start.

3: Timing of benefits	Communities must wait till end of accounting period and finalization of accounts before they can receive their credits.	Communities must wait till end of accounting period and finalization of accounts before they can receive their credits	Payments could be spread out and paid annually, some up-front payments could be made if a revolving fund is created	Payments for D&D could be spread out and paid annually, some up-front payments could be made if a revolving fund is created. However, the credits for forest enhancement would only be issued at the end of the accounting period.
4: Certainty regarding size of benefits	Communities will be unsure of the quantity of credits they are to receive until the end.	Communitieswill be unsure of the quantity of credits they are to receive until the end	The size of the payment is known to all (provided the required management activities are carried out)	The size of the payment for D&D is known to all (provided the required management activities are carried out). The payment for credits for enhancement would not be known till end of the period.
5: Leakage	The number of credits available for each community can only be calculated after the achievements of the whole country have been estimated, to avoid leakage. If there are losses in other parts of the country, a community which has been successful may get fewer credits than it believes it has ´earned´. This could be highly de-motivating.	The number of credits available for each community can only be calculated after the achievements of the whole country have been estimated, to avoid leakage. If there are losses in other parts of the country, a community which has been successful may get fewer credits than it believes it has ´earned´. This could be highly de-motivating.	Communities would not have to worry about leakage; it would not affect their payments.	Communities would not have to worry about leakage; it would not affect their payments.
6: Responsibility for losses and non permanence	Borne by the community	Borne by the community	Borne by the state	Borne by the state
7: Responsibility for sale of credits (including the transaction costs of this)	Individual communities would be responsible for selling their own credits on the market at the end of the accounting period, after a verification exercise. The transaction costs of selling such small amounts of credits would be enormous.	Individual communities would be responsible for selling their own credits on the market at the end of the accounting period, after a verification exercise. The transaction costs of selling such small amounts of credits would be enormous.	Government would sell the credits in bulk for the whole country, resulting in much lower average transaction costs	Communities would be responsible for selling the credits for forest enhancement.

References

Alix-Garcia, J., de Janvry, A., Sadoulet, E and Torres, J.M. (2005) An Assessment of Mexico's Payment for Environmental Services Program**.** Comparative Studies Service, Agricultural and Development Economics Division, FAO; Rome.

Balderas-Torres, A. and Skutsch, M. (2012) Splitting the difference: a proposal for benefit sharing in REDD+. Forests, 3 (1)

Benneker, C. and McCall, M. (2009) Are existing programs for community based forest management and conservation suitable REDD strategies? A case study from Mexico. EFTRN News 50, 1-8

Beymer-Farris, B.A., and Bassett, T.J. (2012) The REDD menace: resurgent protectionism in Tanzania´s mangrove forests. Global Environmental Change 22 (2) 332-341

Bray, D.B, Duran, E., Merino-Perez, L., Torres, M and Velázquez, A. (2007) Nueva evidencia: los bosques comunitarios de México. Agrupación Sierra Madres S.C. CONAFOR

Bray, D.B., Merino-Perez,L., and Barry, D. (2005) . Community Forests of Mexico: Managing for Sustainable Landscapes Austin: University of Texas Press.

Chao, S. (2012) Forest peoples: numbers across the world. Forest Peoples Programme, Moreton-in-Marsh, UK.

Chargas, Th., Streck, C., Seifert-Granzin, J., Olander, R., and O`Sullivan, R (2011) Nested approaches to REDD+: an overview of issues and options. Climate Focus and Foresty Trends, Washington DC

Corbera, E., Estrada, M, May, P., Navarro, G. and Pacheco, P (2011) Rights to land, forest and carbon in REDD+; insights from Mexico, Brazil and Costa Rica. Forests 301-342

Cortez, R., Saines, R., Griscom, B., Martin, M., De Deo, D., Fishbein, G., Kerkering, J and Marsh, D. (2010) A nested approach to REDD+; structuring effective and transparent incentive mechanisms for REDD+ implementation at multiple scales. The Nature Conservancy and Baker McKenzie.

Costenbader, J (ed) (2009) Legal frameworks for REDD: Design and implementation at the national level. IUCN Environmental Policy and Law paper no 77.

Crippa, L.A. and Gordon, G. (2012) International law principles for REDD+; the rights of indigenous peoples and the legal obligations of REDD+ actors. Indian Law Resource Center, Washington DC

de Gryze, S. and Durschinger, L. (2010) An integrated REDD+ offset program (IREDD) for nesting projects under jurisdicational accounting. Terra Global Capital, San Francisco.

Hajjar, R.F., Kozak, R.A. and Innes, J.L (2012) Is decentralization leading to 'real' decision-making power for forest dependent communities? Case studies from Mexico and Brazil. Ecology and Society, 17: 1

Hansen, M.C.; Stehman, S. V.and Potapov P. V. (2010) Quantification of global gross forest cover loss. PNAS 107 (19) 8650-8655.

Kaimowitz, D. (2008) The prospects for Reduced Emisions from Deforestation and Degradation (REDD) in Mesoamerica. International Forest Review 10 (3) 485-495

Klooster, D and Masera.O. (2000) Community forest management in Mexico: carbon mitigation and biodiversity conservation through rural development Global Environmental Change 10, 259-272

Lopez.Barrera, F., Velázquez, A., and Merino, L. (2010) Explorando los determinantes del buen manejo forestal comunitario. Interciencia 35 (8) 560-.567

Marino, E. and Ribot, J. (2012) Special issue introduction: Adding insult to injury: Cliamte change and the inequities of climate intervention. Global Environmental Change 22 (2) 323-328

Newton, P., Nichols, E.S., Whaldener, E. and Peres, C. (2012) Consequences of actor level livelihood heterogeneity for additionality in a tropical forest payment for environmental services programme with an undifferentiated reward structure. Global Environmental Change, 22 (2) 127-136

Okereke, C. and Dooley, K. (2010) Principles of justice in proposals and policy approaches to avoided deforestation: towards a post-Kyoto climate agreement. Global Environmental Change 20 (1) 82-95

Pedroni, L., Dutschke, M., Streck, C., and Estrada, M. (2009) Creating incentives for avoiding further deforestation: the nested approach. Climate Policy 9:2, 267-276

Perron-Welch, F (2010) Reducing emissions from deforestation and forest degradation: Mexico's solution for offsetting emissions while respecting indigenous and local community rights. Centre for International Sustainable Development Law and the International Development Law Organization,

Peskett, L. and Brodnig, G. (2011) Carbon rights in REDD+: exploring the implications for poor and vulnerable people. World Bank, Washington DC and REDDNet.

Peskett, L. (2011) Benefit sharing in REDD+: exploring the implications for poor and vulnerable people. ODI: London.

REDD-Net (2011) Carbon rights and REDD+. REDD-Net Bulletin 03.

Robles, F.F. (2011) Carbon rights in REDD+: the case of Mexico. REDDNet.

SBSTA (2011) Item 4 of the provisional agenda: Methodological guidance for activities relating to reducing emissions from deforestation and forest degradation and the role of conservation, sustainable management of forests and enhancement of forest carbon stocks in developing countries: Views on methodological guidance for activities relating to reducing emissions from deforestation and forest degradation and the role of conservation, sustainable management of forests and enhancement of forest carbon stocks in developing countries. Submission by Belize and 19 other countries. 35th session. Durban, 28 November to 3 December

SEMARNAT (2010) Visión de México sobre REDD+; hacia un estrategia nacional. Comisión Nacional Forestal (CONAFOR).

Sikor, T., Stahl, J., Enters, T., Ribot, J., Singh, N., Sunderlin, W. and Wollenberg. L. (2010) REDD-Plus, forest people´s rights and nested climate governance. Global Environmental Change 20 (3) 423-425

Skutsch, M.(ed) (2011) Community forest monitoring for the carbon market: opportunities under REDD. Earthscan, London

Skutsch, M. and McCall,M.K. (2012) The niche for community forest management in REDD+. Unasylva, forthcoming

UNFCCC (2008) Bali Action Plan (Decision 1, CP13). Report of the Conference of the Parties on its 30th session, Bali, 3 to 15 December 2007 FCCC/CP/2007/6/Add.1

UN-REDD (2012) Mexico adopts landmark REDD+ legal reforms. UN-REDD Newsletter 28

Velázquez, A., Mas, J.F., Bocco, G. and Palacio-Prieto, J.L. (2010) Mapping Land Cover Changes in Mexico, 1976-2000 and applications for guiding environmental management policy. Singapore Journal of Tropical Geography. 31 (2010) 152–162

Velázquez, A. (2008) . La dinámica de la cubierta forestal de México. Página de la Sociedad Mexicana de Física (http://www.smf.mx/C-Global/webCubFor.htm).