

Review

Can REDD+ Save the Forest? The Role of Payments and Tenure

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Abstract: A recent policy response to halting global forest deforestation and degradation, and any resulting greenhouse gas emissions is REDD+, which also includes the role of conservation, sustainable management of forests and enhancement of forest carbon stocks. Although still in its infancy, the success of REDD+ will depend significantly on whether it can be economically viable and if any resulting payments are sufficient to cover the opportunity cost plus any transaction cost. Where tenure security over forest is weak, REDD+ can pose a risk for forest communities, who could be dispossessed, excluded and marginalized. This review of existing studies explores how payment for avoided deforestation, and forest tenure impact the success of REDD+ projects in terms of *effectiveness, efficiency and equity*. Effectiveness refers to the difference between deforestation with and without REDD+, efficiency refers to avoiding deforestation at minimal cost, and equity refers to the implication of REDD+ on benefit sharing. We conclude that the potential success or failure of REDD+ as a means to reduce deforestation and carbon emission on forest commons depends critically on designing projects that work within existing informal tenure institutions to ensure that carbon storage benefits align with livelihood benefits.

Keywords: REDD+; tenure security; deforestation; forest management; payment for ecosystem services

1. Introduction

Continuing loss of forest cover in developing countries, especially in the tropics, has become an increasing concern to researchers and policy makers [1–3]. This concern is a reasonable reflection of the multiple benefits of tropical forests, such as their support of human livelihoods, carbon sequestration, and biodiversity conservation. Forests directly support the livelihoods of 1.2 billion people worldwide through fodder, firewood, timber, and non-timber products [4]. In addition to its immediate bearing on livelihood, forests' role in ecological services via carbon sequestration has been of greater interest. The Clean Development Mechanism (CDM) of the Kyoto Protocol is an example. However, the fact that only afforestation and reforestation are eligible for carbon credit under CDM has led to criticisms. Many argue that while rewarding afforestation and reforestation is appropriate for most developed countries currently experiencing forest stock gain, avoided deforestation seems relevant to measure “additionality” in most tropical countries where deforestation is the major concern [4,5].

A recent policy response to criticisms on CDM is the mechanism for Reducing Emissions from Deforestation and Forest Degradation (REDD), which is an initiative created under the auspices of the UN Framework Convention on Climate Change (UNFCCC). There are many multilateral institutions as well as bilateral assistance and partnerships that countries can choose to access for support for their readiness to participate in REDD. For example, three UN Agencies—UNEP, UNDP and the FAO—have collaborated in the establishment of the UN-REDD program, a multi-donor trust fund that allows donors to pool resources and provide funding with the aim of significantly reducing global emissions from deforestation and forest degradation in developing countries. UN-REDD became operational in September 2008, with a \$75 million budget and potential funding of \$4 billion [6]. As of January 2012, \$151 million had been pledged by donors to UN-REDD with nearly \$120 million deposited [7].

The UN-REDD program and other REDD initiatives also serve as pilot mechanisms with the aim of eventually implementing “REDD+”, which goes beyond deforestation and forest degradation, and includes the role of conservation, sustainable management of forests and enhancement of forest carbon stocks [8]. REDD+ is to be a mechanism of a future international agreement negotiated under the UNFCCC as part of an overall post-Kyoto global climate change agreement, but many current bilateral and multilateral REDD initiatives are already evolving to implement the broader REDD+ agenda. Although still in its infancy, the success of REDD+ will depend significantly on compensation terms and forest tenure, among other factors. Thus, like any other payment for ecosystem services (PES) scheme, REDD+ can be economically viable and will be accepted by the provider if and only if the payment for the avoided deforestation and degradation is at least as large as the opportunity cost plus any transaction costs [9]. On the other hand, where tenure security over forest is weak, REDD+ can pose a risk for forest communities, who could be dispossessed, excluded and marginalized [4,10–12].

Our paper explores how payment for avoided deforestation and forest tenure could impact the potential success of REDD+ projects. We assess the linkage between payments and tenure on REDD+ in terms of effectiveness, efficiency and equity. *Effectiveness* refers to the difference between deforestation with and without REDD+, *efficiency* refers to avoiding deforestation at least cost, and *equity* refers to the implications of REDD+ on benefit sharing and poverty alleviation. These definitions of effectiveness, efficiency and equity employed here are specific to how these terms are used in the REDD+ literature and may differ from standard definitions. For example, our concepts of

effectiveness and efficiency are modified from common definitions found in economics textbook. Similarly, any definition of equity is contingent on which stakeholders are considered. Equity considerations are especially problematic for REDD+ projects and payment schemes as they are inextricably linked to multi-level governance dealing with different types of stakeholders [13].

As a result of our assessment, we identify an important interplay between payment for avoided deforestation and forest tenure, which the existing literature has overlooked. For example, other things being equal, the opportunity cost of standing forest is highest to a community facing the threat of eviction, suggesting that the payment required to involve the community could be the highest, to compensate for the implied highest risk premium [14]. At the same time, any payment could have repercussions on tenure security. Though REDD+ payments are meant to increase the value of standing forest, they might also increase the political incentive to confiscate the forest [11,12,15]. Therefore, we find that forest tenure considerations might have considerable efficiency, effectiveness and equity implications for potential REDD+ success, and that the linkage between tenure and payments may result in important tradeoffs among these three key criteria for success.

2. Tenure, Forest Commons Management and REDD+

Although still in its infancy, the success of REDD+ will depend significantly on the institutional arrangements for governing forest [4,12]. Institutional arrangements include the formal and informal rules and norms that define who has decision-making authority over a common, and the specific use, management, monitoring and enforcement decisions that are produced [16,17]. The focus of this review, in particular, is on the role of tenure security on communal forest management and the potential success of any REDD+ program.

Much of the existing literature that addresses the influence of institutional arrangements on forest management identifies secure forest tenure as a building block for sustainable management [1,4,10,18]. Forest tenure refers to the combination of legally or customarily defined forest-related rules that define who can use what resources, for how long and under what condition. The general consensus emerging from the existing literature is that, where tenure security over forest is weak, REDD+ can pose a risk for sustainable forest management and local communities, who could be dispossessed, excluded and marginalized [11,12,15].

Evidence shows that in most tropical countries access to forest is governed by informal customary systems [19]. For example in Africa, despite the *de jure* forest ownership claim of the state (95%), evidence shows that only about one percent of land in the continent is registered [20]. In most “off-reserve” forests. Despite the *de jure* claims by central governments, access to forest is *de facto* customary [21]. The unequivocal implication is that, especially in those countries where customary arrangements are dominant, REDD+ can only succeed by integrating this category of forest into the program. More importantly, evidence shows that the link between tenure security and possession of statutory land titles is not that obvious [22]. For example, in parts of Africa where customary land allocation prevails, the customary authority, such as a tribal or clan chief, grants individuals with secure rights for grazing and cultivation, without any legal title definition, registration, or government enforcement. On the other hand, high levels of tenure insecurity may exist even with statutory title.

This might happen when there is a lack of institutions with both legal backing and social legitimacy that are accessible by and accountable to the holders of property rights [23].

Where tenure is insecure, however, payments under REDD+ might encourage influential groups or even the government to occupy the forest and threaten claims by the poor [11,12,15]. These uncertainties could adversely impact long-term investments in REDD+ projects, undermine the permanence of forest carbon sequestration, and exacerbate inequality and poverty. To reduce such uncertainties, REDD+ should draw on the lessons learned from successful forest common management, including how customary tenure and governance rules reduce intergroup resource conflict and encourage sustainable use. Likewise, REDD+ might be able to improve the likelihood of forest common success by making forest conservation more profitable [24].

Thus, assessing the linkage between forest tenure and management of common forests on effectiveness, efficiency and equity grounds is essential for understanding the potential for REDD+ to be successful in promoting avoided deforestation in over a quarter of the world's forests. This paper reviews the latest developments regarding forest tenure, payments, and REDD+ success, which is measured in terms of "the three Es".

3. Effectiveness, Efficiency and Equity

Several studies indicate that a fully developed and properly designed REDD+ mechanism may yield considerable benefits in terms of reducing global deforestation and carbon emissions [25–28]. Forest degradation and deforestation currently contribute around 12% of global greenhouse gas (GHG) emissions from human activities [29], thus the impact of REDD+ on reducing such emissions could be substantial while at the same time generating substantial revenues for developing countries.

For example, one prediction is that a successful REDD+ scheme will reduce 90% of global deforestation at an annual cost of US \$30 billion [28]. It is also suggested that a REDD+ program that lessens global deforestation by 10% from 2005 to 2030 would provide 0.3 to 0.6 gigatonnes (Gt) in carbon dioxide (CO₂) equivalent GHG emission reductions at an annual cost of \$0.4 to 1.7 billion for 30 years [27]. A 50% reduction in global deforestation could yield 1.5 to 2.7 Gt in GHG emission reductions at a cost of \$17.2 to \$28.0 billion per year. In addition to a stand-alone scheme, REDD+ could be implemented as part of a post-2012 global climate agreement. Combining a REDD+ mechanism within a global policy to stabilize GHG emissions at 550 parts per million per volume by 2050 reduces global forestry emissions by 64 to 88%, lowers the total costs of the climate policy by 10 to 25% and decreases carbon prices by 8 to 26% [25]. Another study estimates that reducing global deforestation rates in developing economies through linkage with a global carbon market could generate annual carbon credit financing for developing countries of US\$2.2 to 13.5 billion [26].

Others are less sanguine, suggesting there are concerns about how such comprehensive global payments systems would work through REDD+ [6,30–32]. Major issues that need to be resolved include monitoring and verifying changes in deforestation rates in developing countries and their impacts on carbon emissions; ensuring that a carbon market for avoided deforestation does not adversely impact biodiversity and other forest ecosystem services; reducing losses in foregone agricultural and timber benefits; and designing an effective and expanded international payments system that includes more than a handful of donor and tropical forest countries.

However, one issue that has received comparatively less attention in the current discussions of the potential benefits and effectiveness of REDD+ is the implications of any future program for forest governance and management. There are two aspects of this problem. First, for REDD+ to be effective in slowing down global deforestation, it needs to be extended to provide incentives for conserving tropical forests under customary and communal tenure. As noted previously, about a quarter of global tropical forests fall under such tenure arrangements [19], and in some regions, such as Africa, nearly all forests are ostensibly owned by central government but the *de facto* governance of access and control of forest resources generally bears little relation to this claim [20]. Second, as REDD+ begins incorporating more tropical forests under customary and communal tenure, the result may be a significant impact on forest governance. Although there are efforts to promote community involvement in REDD+, funding and requirements for REDD+ may undermine the considerable progress that has been made to decentralize forest management in many developing countries [33]. Thus, to be successful on a global scale, REDD+ will need to include communal and customary tenure forests, but in doing so, such an expanded REDD+ program could potentially undermine decentralized governance of these forests.

Such a concern raises two important questions. First, does communal and customary forest tenure necessarily pose an obstacle to successful implementation of REDD+ schemes and payments? Second, under what conditions could communal and customary tenure lead to improved effectiveness, efficiency and equity of REDD+? To shed light on the answers to these questions, we draw on cross-country and individual case studies of carbon forestry and sequestration schemes involving customary and common tenure arrangements.

With respect to the first question, the answer is straightforward. Although weak tenure can pose a risk for sustainable forest management and local communities [4,10–12], it is incorrect to infer that communal and customary tenure will always result in poor forest management. Unfortunately, associating tenure security with the possession of statutory land titles is a prevalent misperception, despite the considerable evidence indicating that lack of title should not be automatically equated with tenure insecurity and poor resource governance [22]. Yet, such a misperception can still influence the design of carbon forestry schemes, with unfortunate outcomes. When carbon sequestration programs insist on imposing tenure security through land titling as a requirement for local communities participating in such projects, the poor tend to be excluded without necessarily improving overall effectiveness or success [5,11,23,34]. Thus, simply because forests are under customary or common forest management should not undermine the potential success of REDD+ schemes for such forests.

There is a growing consensus that protection of forest resources in those tropical countries where customary tenure is the norm can be viable only if local people are consulted and share the benefits from the carbon project [4]. At the same time, from a REDD+ perspective, projects implemented on communal forest land can significantly reduce transaction costs, such as negotiating, contracting, implementing and monitoring costs [11,34]. These transaction costs are much higher when dealing with multiple parties rather than a single party. As any REDD+ payment is likely to involve an avoided deforestation and degradation contract, customary authorities implement monitoring and enforcement in the communal forest. Also, indigenous communities are known to have extensive knowledge on the local ecosystem, tree species distribution, and age distribution of trees. Thus, engaging local communities would make the task of forest inventory and carbon stock measurement less costly [35].

When REDD+ is implemented on forests held as common property, care may be needed to avoid local elite capture of the benefits [11]. For example, in Cameroon and DR Congo, although customary chiefs are meant to manage resources on behalf of their community, many abused their power to the detriment of their community [36]. In general, where local leaders are considered legitimate and representative, forests under customary tenure are able to support successful carbon forestry projects [35]. The literature on participatory development in particular warns that in countries with high income inequality (such as those found in Latin America and Asia) the benefits of decentralization, such as better understanding of local conditions and improved enforcement and monitoring, can be outweighed by the accountability or “elite capture” problem [37,38]. This problem occurs, as noted earlier, when customary authorities are delegitimized [36], or when local communities have informational deficiencies [37]. In such instances, local communities are better served via a more centralized system. However, in more egalitarian communities characterized by historic land abundance, such as those found in Sub-Saharan Africa, local elite capture is less of a concern, implying that the benefits of decentralization through traditional tenure recognition would be more desirable for implementing carbon forestry projects [37].

Another concern is that REDD+ is a governance process involving multiple actors at global, national and local levels, which may not coincide in their interests and visions regarding forest governance [39]. More importantly, the fact that REDD+ activities are likely to be led by governments means that the decision on how local community can be involved in REDD+ projects remains within the virtue of each country’s national governments. It should also be noted that even when national governments choose to involve local communities, REDD+ schemes are likely to be regulated by national rather than customary law, which may impact significantly the extent to which customary tenure systems are recognized and protected under national legislation [36].

Since the late 1980s, mainly due to central governments’ failure to manage their own forests, many tropical countries launched policy initiatives to decentralize forest management, often in the form of co-management agreements between the government and indigenous communities, with the ultimate objective of encouraging contracts between these parties and other stakeholders. Co-management recognizes indigenous customs and institutions, and it may therefore be more cost-effective if in the long run transaction costs related to implementation, monitoring, enforcement and conflict resolution are lower.

Along these evolving governance structures, major initiatives such as UN-REDD, FCPF, and FIP, advocate forest tenure reforms that respect the rights of indigenous peoples and local communities. For example, the Forest Carbon Partnership Facility (FCPF) acknowledges the potential of REDD+ to serve as a catalyst in recognizing the rights of indigenous communities. The potential for REDD+ to improve tenure is among the FCPF criteria in selecting participating pilot countries [40]. Similarly, the Forest Investment Program (FIP) lists recognition of customary tenure as a criteria for selection of pilot countries, and further emphasize that intervention should benefit the poor, indigenous and local communities. FIP also has a special grant arrangement called the FIP Indigenous Peoples and Local Communities Dedicated Initiative, which will support, among other things, strengthening of customary tenure arrangements. There is also case study evidence that REDD+ and similar payments for carbon sequestration may actually be improving and even catalyzing reforms in favor of recognizing the communal and customary rights of some indigenous communities over managing local

forests [19,23,36,40]. However, although tenure reform is important in a REDD+ context, it should not be rushed to take advantage of “low hanging fruit” financial flows from REDD+. This could lead to “badly informed reforms that deepen inequalities rather than prevent them” [40].

Despite these efforts to promote community involvement in REDD+, however, there have been concerns that the implementation of these projects may undermine the decentralization of forest management [33,36,41]. As new sources of financing and resources become available through REDD+ the decentralization process, which has been partly motivated by financial constraints, could be halted, or even reversed, in countries where customary regimes are not fully protected. Evidence suggests that “with billion dollars at stake, governments could justify recentralization by portraying themselves as more capable and reliable than local communities at protecting national interests” [33]. For example, about 12 of the 34 nationally appropriate mitigation actions submitted by developing countries to UNFCCC were under centrally coordinated forest-based mitigation actions without mention of decentralization [33].

In sum, existing evidence suggests that communal and customary forest tenure does not necessarily pose an obstacle to successful implementation of REDD+ schemes. Surprisingly, if any, the concern is the other way round; the emergence of REDD+ may pose a risk to the livelihood of forest dependent households whose rights are not recognized.

The answer to the second question, whether communal and customary tenure can lead to improved effectiveness, efficiency and equity of REDD+, is much more complex. On the one hand, there is emerging evidence that, where protecting forests as a store of carbon is compatible with enhancing the livelihood benefits to local communities, avoided deforestation payment schemes could be highly effective. A study of 80 forest commons in 10 countries across Asia, Africa and Latin America suggests that there are three important conditions that lead to “win-win” outcomes concerning increased carbon storage and greater livelihood benefits for local communities [42]. First, both carbon storage and livelihood benefits are enhanced if local communities are allowed to manage larger rather than smaller forest areas. Second, both benefits are also complementary if communities gain greater rights locally to establish governance rules over the forests. Finally, where governments retain ownership of the land and governance is more centralized, forests tend to be overharvested. This is because, despite their *de jure* claim, many developing countries do not have the institutional capacity to implement forest policies, leading to *de facto* open access forests. Such findings suggest that, rather than endangering forest management for carbon sequestration, communal land ownership of forests might actually improve the incentives of local communities to accept compensation from avoided deforestation payments in exchange for deferring current livelihood benefits from forest commons to conserve them instead. On the other hand, if expansion of REDD+ leads to the opposite outcome, of recentralizing forest governance rather than supporting local management and governance of communal forests, then the incentives of communities to reduce forest use and degradation through avoided deforestation payments are likely to be diminished [33].

Greater involvement of local communities in monitoring and enforcement of forest commons also enhances long-term protection of forests [10,43,44]. Active monitoring and sanctioning by local communities give them a greater stake in the management of forests, which appears to be further strengthened if these communities are allowed to harvest and use forest resources. However, one study of 46 forests in six countries finds that conditions in community-managed forests are not statistically

different from government or privately managed forests, suggesting that full devolution of forest management to local communities may not be as important as involving them in monitoring and enforcement [43]. Similarly, a finding from a case study on Mexico's payments for hydrological services program (PSAH), which focuses on the conservation of existing forest cover (avoided deforestation), shows that forest conservation under communal forest tenure is not statistically different from privately managed forests [45]. Such case study evidence suggests that local communities under well-functioning customary tenure may be *effective* providers of REDD+.

Also, as noted earlier, projects implemented on forest commons can also significantly reduce transaction costs such as negotiating, contracting, implementing and monitoring costs, provided that customary, tribal or communal representation is strongly supported and representative [11,34]. For example, the Nhambita Community Carbon Project in Mozambique involves land held under customary tenure, where all land is registered in the name of the village chief and no household has individual title. The result is the village chief accepts and reimburses payments on behalf of the community [11]. Thus, where local elites and leaders have legitimacy as community representatives, customary and communal tenure arrangements are strong, clearly defined and transparent, and payments can be safely distributed from leaders to the rest of the community. In such situations, the efficiency of payment schemes can be increased by working through the existing community leadership structure. Once again, the implication is that a well-functioning customary tenure arrangement could improve the *efficiency* of REDD+ projects.

However, there are also exceptions to this outcome. For example, when REDD+ is implemented on forests held as common property by the community, care may be needed to avoid local elite capture of the benefits and payments [11]. For example, in Cameroon and the Democratic Republic of the Congo, although customary chiefs are meant to manage resources on behalf of their community, many abused their power to the detriment of their community and lost their legitimacy to redistribute payments [39].

Another problem to customary and common tenure arrangements is the threat posed by in-migration and squatting. In general, central government ineffectiveness coupled with high population growth rates in rural areas, civil unrest and conflicts, environmental degradation and changing economic conditions have exacerbated large-scale migration and the creation of squatters on common forest land throughout the tropics [46]. Under such pressures, communal and customary property management regimes can easily break down. Especially in Africa, squatters form an increasingly important component of rural demographics, and are considered responsible for the ongoing deforestation in the region, as has been documented for the Chyulu Hills in Kenya and in Zimbabwe [47,48]. Under such conditions, implementing REDD+ payments for avoided deforestation can have uncertain impacts. For example, it would be less costly to design a REDD+ for indigenous communities with strong customary tenure arrangements for managing forest commons rather than for migrants with weak forest tenure security. It would also be less risky. For a migrant community, if eviction occurs, the migrants will no longer be able to conserve the forest for carbon sequestration purposes. Thus, the REDD+ objective is undermined with the loss of forest tenure. Equally, REDD+ projects can pose a risk for such forest communities, who could at any time be dispossessed, excluded and marginalized [11,12,15]. In extreme cases, the result can be an incentive for government to intervene to the detriment of local communities and their control of forest resources. For example, in both Kenya

and Zimbabwe, the response of the government was to evict squatters forcefully and to exert centralized management of forest resources [47,48].

Equity considerations are also important for REDD+ schemes on common forest land. There is a growing consensus among researchers and policy makers that REDD+ can be an *effective* and *efficient* means of mitigating climate change. However, the perceived equity in the distribution of payments for REDD+ participation could also emerge as a critical issue in implementing the program [13,49–51]. This is mainly due to the fact that the primary aim of such programs is to pay local communities to preserve or sustainably manage forests, thus reducing forest-related carbon emissions *i.e.*, REDD+ is not envisioned as poverty alleviation or income redistribution program, as such equity is not the primary objective of the REDD+ design [13,50].

Trying to use such projects also to alleviate poverty or improve *equity* may lead to reduced *effectiveness* and *efficiency*. That is, carbon forestry projects cannot always serve both to achieve equity and improve carbon sequestration [52,53]. Evidence across many developing countries indicates that trying to “add on” poverty alleviation targets can increase the transactions costs associated with avoided deforestation programs, inhibit their implementation, and reduce their success in achieving their environmental objectives [9].

In addition, there is growing concern that, if REDD is purely about “lucrative stocks of carbon”, it may result in excluding poorer local populations [51]. Field experiments in Ecuador and Guatemala show that differentiating payments to smallholders might reduce the costs of implementing payment schemes, but as the poorest households engaged in subsistence farming are likely to receive lower payments than farmers with larger land holdings, such payments might increase rather than reduce income inequality [54]. An analysis of implementing an avoided deforestation program in the Brazilian Amazon reveals that institutional preconditions, such as land grabbing, insecure tenure and overlapping claims, would ensure that large landowners who are responsible for around 80% of deforestation would receive the greatest benefits from the scheme, whereas communities in forest commons could be excluded [55]. In southern Mexico, the increased conservation associated with a payment scheme has not only increased inequality but also food insecurity, due to the loss of customary agricultural land and hunting grounds available to poor households [56]. Such outcomes should be a major concern if REDD+ programs are increasingly extended to customary and common forest land. Where tenure is insecure and poorly enforced, payments under REDD+ will raise the value of the standing forest, and as a result, might encourage influential groups or even the government to occupy the forest and threaten claims by local communities and especially the poor and vulnerable members of those communities [11,12,15].

The tradeoff between equity and environmental quality appears to be more characteristic of local communities with unrecognized tenure or delegitimized local elites [40,41]. Spatial targeting of payments may be one way of both reducing costs of implementation (*efficiency*) and also ensuring that more benefits reach the poor (*equity*), as evidence from Costa Rica, Ecuador, Guatemala and Madagascar has shown [54,57,58]. Even in a poor African economy, such as Tanzania, a correctly designed payment program can provide an important source of funding for sustainable land use practices in agriculture while leading to greater watershed protection [59]. In the upstream catchment area of the Ruvu River, poor farmers face financial and technical obstacles to adopting sustainable land management that reduces deforestation, land degradation and erosion runoff. By providing institutional,

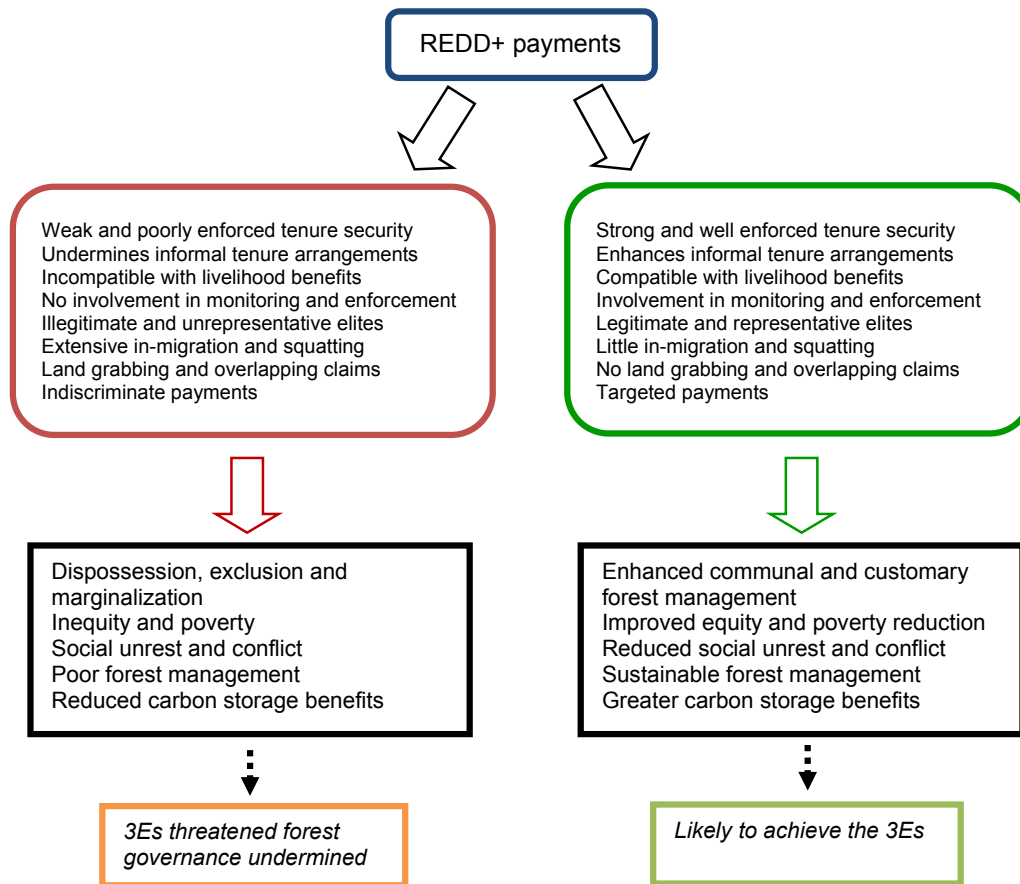
technical and financial support to farmers, a payment scheme for protecting the forested watershed delivers on these environmental goals while at the same time boosting crop productivity from improved soil conservation and fertility and thus raising farm incomes. The payment scheme is now trying to enhance sustainability by investing in an appropriate legal and institutional framework for long-term financing and expansion of sustainable land management among farmers to improve watershed management. This Tanzania example illustrates that, in some instances, it might be worthwhile to include additional costs to improve the equity outcomes of a payment scheme, provided that the result is to improve the overall success and effectiveness of the entire program in achieving its environmental objectives.

If REDD+ schemes can potentially offer significantly more benefits and incentives to poor households, then improved *equity* and *effectiveness* may be complementary goals. Evidence from Panama suggests that an avoided deforestation project offers many potential advantages to poor households, such as immediate and positive financial returns from payments, low labor investment, positive insurance value (*i.e.*, the households can still harvest resources and timber if the contract fails) and high perceived equity gains [60]. If these advantages are realized, then the project is capable of promoting carbon storage benefits alongside livelihood benefits, poverty alleviation and greater *equity*.

4. Results and Discussion

To summarize, successful implementation of REDD+ schemes and payments may not be adversely affected by communal and customary forest tenure. However, improved *effectiveness*, *efficiency* and *equity* of REDD+ under communal and customary tenure seem to depend on a number of important conditions. Figure 1 depicts in diagrammatic form the key conditions for success identified in our review.

As shown in the figure, under the right tenure and payment conditions, a REDD+ scheme could actually yield a number of self-reinforcing, positive outcomes for local communities with customary and common tenure arrangements for forest land. Favorable outcomes are more likely to occur if these informal tenure arrangements are strong and well-enforced, and if implementing the scheme enhances rather than undermines these arrangements. In addition, if the scheme also generates significant livelihood benefits for the local community and involves them in monitoring and enforcement forest protection, the REDD+ project is more likely to succeed. If payments are funneled through legitimate and representative local elites, then not only may some of the costs of the scheme be reduced but also local community leadership structures and cohesion may be reinforced. Lack of in-migration and squatting in forest areas, and the absence of land grabbing and overlapping claims on the land, will also enhance the likelihood of success. Finally, more effective targeting of payments could reduce costs and also ensure that more benefits reach the poor. Such conditions are more likely to improve the *effectiveness*, *efficiency* and *equity* of REDD+ projects on common forest land by enhancing communal and customary forest management, improving equity and poverty reduction, reducing social unrest and conflict, encouraging sustainable forest management, and finally, yielding greater carbon storage benefits. Ultimately, however, perhaps the greatest benefit to local communities is that, if such conditions enhance the overall success of REDD+ projects on forest commons, then it reduces the likelihood that control of such lands will be transferred to influential groups or the government.

Figure 1. Conditions for success of REDD+ schemes on forest commons.

5. Conclusions

Over a quarter of the world's tropical forests are under some form of customary and communal tenure arrangements. For REDD+ to succeed in improving the conservation, sustainable management of forests and enhancement of forest carbon stocks, then it must include forest commons managed under customary tenure arrangements. This review of the potential effectiveness, efficiency and equity of extending REDD+ schemes to forest commons sheds light on whether or not such efforts are likely to be successful.

First, it is clear that communal and customary forest tenure does not on its own pose a risk to successful implementation of REDD+ schemes and payments. However, in order for avoided deforestation projects to be effective in protecting forest commons, a number of important conditions need to be in place. These conditions are summarized in Figure 1 and discussed above. If the positive conditions outlined in Figure 1 are in place, then REDD+ projects on forest lands under customary or community management can lead to more effective forest protection and carbon storage, more efficient implementation with reduced transaction costs, and also improved equity and poverty alleviation. However, there is a danger that, if a REDD+ project tries to achieve other objectives such as poverty alleviation and improved equity rather than reducing forest-related carbon emissions, there may be a tradeoff in terms of reduced *effectiveness* and *efficiency*.

Second, a major concern about the inclusion of more forest commons in an expanded REDD+ is that it could potentially undermine the decentralizing of forest governance that is occurring globally [10,33]. We find that this outcome may not necessarily be inevitable. Although funding and other management requirements of REDD+ may promote more centralized forest governance, our review suggests that, under the right conditions, a REDD+ scheme could enhance decentralized governance of common forests by strengthening informal tenure arrangements and local community forest management.

Finally, more work needs to be done on understanding the conditions for successful avoided deforestation projects on common forest lands in developing countries, and on improving the enabling policies to support these conditions at the local community level. The trend in global forest governance is for more, not less, decentralized management, enforcement and monitoring of forests, including areas under community and customary tenure arrangements. REDD+ should be working to create the conditions that support this trend rather than ignoring or thwarting them.

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Conflict of Interest

The authors declare no conflict of interest.

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