Alternative models for carbon payments to communities under REDD+: A comparison using the Polis model of actor inducements

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ABSTRACT

Many tropical developing countries are considering using a form of Payments for Environmental Services (PES) to reward communities involved in Community Forest Management (CFM) for reducing carbon emissions and increasing carbon sequestration. Such payments would fall under the scope of national Reducing Emissions from Deforestation and forest Degradation (REDD+) programmes which will claim carbon credits or funding under future provisions of the UNFCCC (2009a). However, the implications of different systems of payment to communities have scarcely been considered. We suggest that there are at least three different bases on which payment could be made: payments for management inputs, for carbon outputs or for opportunity costs incurred. Almost all current PES systems involving communities are input payment based, although there are also a few proto-opportunity cost models; however it is usually assumed that carbon projects under REDD+ will be output (performance) based. We compare these three payment models with reference to criteria derived from the Polis model of public policy inducement (Stone, 2002), which facilitates a real world analysis in which the objectives of actors at different levels (international purchasers of carbon credits, national policy makers, intermediate agencies and local communities) and their interactions are considered. We conclude that output based payments may not be optimal for inducement of CFM carbon emission reduction and sequestration in national REDD+ programmes. We propose a system based on paying communities to measure and monitor their forest carbon stock, which could be combined with either input conditionalities or a bonus for good performance.

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1. Introduction

Community Forest Management (CFM), under which common property resource management is formalised with meaningful delegation of decision-making power from the state to the communities using the forest resources, has been shown to be an effective policy instrument for reversing forest degradation and enhancing carbon stocks (Chhatre and Agrawal, 2009). It is...
thus understandable that countries as diverse as Cambodia, Mexico, Papua New Guinea, Tanzania and Vietnam have explicitly advanced CFM as an element of their national strategies for achieving Reduced Emissions from Deforestation and forest Degradation (REDD+) under future international agreements (UNFCCC, 2009a). This is demonstrated by their readiness plans submitted to the World Bank’s Forest Carbon Partnership Facility and the UN-REDD programme.

Recognition of the potential for forest-dependent people to contribute to the sustainable management of forests is not new. Harnessing this potential contribution through appropriate policy instruments that reward good forest management practice is however not necessarily straightforward. CFM policy instruments are not permanent mechanical ‘fixes’ for forest management, but are really ongoing strategies for coordinating behaviour to achieve collective purposes. They evolve as behaviour and purposes change.

International REDD+ payments are likely to be made over to countries on the basis of average carbon gains over their whole forest territories in a given accounting period. If REDD+ is to succeed in stimulating effective CFM, mechanisms will be needed to channel rewards from the state to the communities. To be effective, such mechanisms must not only be perceived as fair by these communities, but must also recognise, and take account of, the inducements that all other involved parties require to ensure their participation in REDD+.

Countries proposing CFM as strategy within their REDD+ programmes have suggested using Payments for Environmental (PES) as the model, in which the service provided is carbon sequestration and storage in forest carbon pools (Angelsen, 2009). However, within this general concept there are many different ways in which payments could be made. Internationally, payments for carbon credits under REDD+ will be made on a strictly output basis (per tonne of carbon dioxide equivalent), and one option is that communities would also be paid by the state on this basis. However, almost all experience up to now on PES has been in terms of payments for inputs; land owners are paid a fixed amount per hectare to carry out or observe an agreed set of management practices. As we will show in the paper, other options are also possible. The different bases on which carbon payments might be made to communities have hardly been addressed in REDD+ literature to date, and need to be explored and evaluated.

The objective of the paper is therefore to compare different possible models of payments to communities for carbon services within national REDD+ programmes, and thus to develop insight into which models will be most effective in terms of incorporating CFM into REDD+. We do this as an analytic exercise based on theoretical reasoning rather than on empirical data, since there is very little experience with payments to communities for environmental services, other than input-based.

Instead of considering payments for carbon services as a voluntary market-based transaction, we view them here as a policy inducement, the commonest instrument for policy reform. This is a fundamental paradigm shift, not just a change in terminology. The shift enables us to tap into recent debates in policy science for a more realistic set of criteria with which to compare different payment options, taking into account the different objectives and interactions of actors at different levels in the REDD+ system (the international purchasers of carbon credits, national agencies which manage the REDD+ programme, intermediary agencies, and the local communities supplying the carbon services). We critically examine the assumptions of three types of payment system; output-, input- and opportunity cost-based, by means of the Polis model of inducements (Stone, 2002).

We contend that the Polis model allows for a real-world approach to the design of policy inducements as complex social processes rather than mere tools in the hands of policymakers, where the nature of the ecosystem service is perceived differently by different actors. Consequently, the inducements needed to encourage them to cooperate in the delivery of this service also differ substantially. The political dynamics at the local, national and international levels are all essential in determining a workable system of service delivery.

The next section reviews the Polis model, comparing it with the more standard ‘rationality’ approach to inducement theory and justifying it as a more appropriate model for the analysis of this kind of problem in PES. We derive a set of criteria from the Polis model which will be used to compare the different payment options. The payment options for carbon for CFM are then explained in some detail in Section 3, and in Section 4 we apply the criteria to evaluate them. The insights from this analysis lead us to propose a number of quite different payment systems in Section 5. Section 6 considers the conditions that would be necessary for any payment system to be successful, and conclusions are drawn in Section 7.

2. Rationality vs. Polis models of public policy inducements

In the 1980s, policy scholars challenged the dominance of what Stone (2002) calls the ‘rationality project’ of positivist policy science. Diverse contributions that came to be known collectively as ‘post-positivist policy analysis’ include: participatory policy analysis (DeLeon, 1989), critical policy analysis (Dryzek, 1989), political decision making (Stone, 2002), the argumentative turn in policy analysis (Fischer and Forester, 1993), deliberative policy analysis (Hajer and Wagenaar, 2003), and most recently, deliberative ecological economics (Zografos and Howarth, 2008). As Hajer and Wagenaar (2003) put it “whatever reformulation of policy sciences we can come up with . . . it must be up to the task of understanding and furthering the interests of . . . real-world, conflict-ridden, living communities.” (pp. 27).

A key tenet of post-positivist policy science is that politics is not an unfortunate obstacle that messes up clear-headed, rational analysis and hence must be bracketed out from policy science, but a valuable creative process (Stone, 2002). Policy analysts have a responsibility to reveal and clarify disputes over policy values, particularly where such disputes arise from a lack of clarity, or of understanding, regarding the science that underpins policy development. The model of society in Stone’s research is the Polis. The Polis represents the groups within society which debate the criteria, categories and (most importantly) the ideas which contribute to policy formulation. Stone uses the “market” model of society as a foil because it underpins the “rationality project” of standard policy discussions. In a “market” model of society, rational actors pursue their own self interest by trading with others.
With a few exceptions, literature on PES has taken a Rationality model perspective, in which PES is commonly defined as a voluntary market transaction of a well-defined, verified environmental service between a service buyer and a service provider (Engel et al., 2008). However, in practice the service is provided via a policy incentive rather than a transaction (Sommerville et al., 2009; Muradian et al., 2010) and these incentives may not always be economic. Seen as a policy incentive, PES involves positive inducements to bring about some desired social and environmental change. Every inducement can be seen as a system with three parts: an inducement giver, an inducement target and the inducement itself, and in the Rationality model, as described by Stone (2002, p. 266), the underlying assumptions regarding these parts are that:

(a) both the giver and target are unitary actors, capable of consistent and rational decision making,
(b) the target is oriented towards the future, is adaptable and will change behaviour to obtain future, and greater, rewards;
(c) inducements work when the problem is the intended or unintended consequence of purposeful human behaviour.

The meaning and value of the inducement to the receivers is clear and unambiguous.

The Rationality view posits that the givers (external actors and financiers of the PES services) want a measurable, monitorable, enforceable, sustainable ES supply. Their interest is to pay only for the actual services received – water, carbon, tigers, conserved biodiversity, etc. The targets (managers and/or owners of the resources which provide the ES, such as rural communities) want compensation for the actual costs and opportunity costs that they incur in providing those services. But in practice the dividing lines between these motivating forces are often blurred; and the driving force may in fact be various intermediaries, who have other goals, including profit or development, in mind and may collude with either the givers or the targets. Empirical evidence in PES research has started to challenge the Rationality view, presenting ideas more in line with Polis. For instance, Muradian et al. (2010) find that there is no clear distinction between givers and targets, and that in fact intermediaries often influence not only price, but also the definition of the service, and the conditions of transaction. As for the inducement itself “in many cases the characterisation of the commodity is fuzzy, based on inputs and assumptions (shared beliefs) about the causal relationship between land use and the provision of ecosystem services.” (Stone, 2002, p. 1206).

In the mainstream literature on PES, success and failure tends to be measured on two variables: whether the payments are efficient in improving and increasing the provision of environmental services (for the benefit of mainly external actors), and whether they are equitable in terms of social benefits to the managers of the environmental services (e.g. to communities). But efficiency of a given PES system will, in Polis terms, be affected by the way that givers and targets of the inducements interact, ally and collude, and by the influence of intermediaries on these relationships. This in turn will be affected not only by their strategic positioning in negotiating the deal, but also by their perceptions concerning the nature of elements in the transaction, that is, their historical relationships with the other actors, the political milieu, and the commodity itself.

For example, there is evidence that in many forest-related PES programmes, payments are made to land owners and communities who would probably not have cut the forest anyway (Muñoz-Piña et al., 2008; Sanchez et al., 2007), but who are behaving strategically (if you don’t pay we will cut it down). The givers (service purchasers) may also behave strategically, e.g. suggesting that their offer is a one-time opportunity, or that no other buyers are in the market. The role of intermediaries will therefore be crucial, in such tasks as ensuring effective targeting of inducements towards those who can effect genuine change, and in guaranteeing free flow of information. Whether these intermediaries are in fact, or are perceived to be, operating primarily in the interests of the givers or those of the targets will affect the credibility of the system.

There is also the question of what the targets (service providers) perceive as the product that they are supplying. It is rare that communities or other actors feel they are specifically and solely managing a particular ES, such as carbon or biodiversity. In reality they are managing certain resources or certain areas of land in a more holistic manner such that a wide range of environmental goods or services are maintained (or increased). Thus, though on paper the compensation is intended for a particular service, from the target actors’ perspective, the payment may be for the management activities provided, rather than a resource rent, leading to difference in perception regarding whether it is a market payment or a behavioural reward.

On the social benefits or equity question, one of the primary principles of PES according to many proponents is that participation is always voluntary, and cannot be forced on either party (Wunder, 2005). This has to do with the exchange being seen as a market deal, fully embedded in the Rationality model, and it can certainly be contested. However, as a policy inducement, a PES set up can easily be envisioned in which at least the purchasers (givers) are obliged to participate, and the payment is taken as a kind of tax, even if the providers (targets) participate voluntarily.

In terms of the distribution of the benefits, many PES systems have been primarily directed at individual land owners, with the unsurprising result that better-off people have been able to access the funds more than poor people (Sanchez et al., 2007; Pagiola, 2008; Miranda et al., 2003; Grieg-Gran et al., 2003). When PES is directed at whole communities for communal participation, however, the unified nature of the community (as the target of PES inducements) is very much in question. It cannot be expected that everyone in the community benefits equally, and here the question of intervening from outside in order to moderate elite capture of benefits introduces the contested issue of equity enforcement vs. local empowerment and the whole notion of a unitary actor. Some programmes have attributed their success to strictly egalitarian rules of distribution and transparency; but whether or not PES has any effect in reducing poverty of course depends largely upon the design of particular payment and reward schemes and surrounding governance and social conditions (Lee and Mahanty, 2009).
Stone’s “Polis” model of inducements can thus be helpful in the assessment of payment systems under PES because it allows the identification of key concepts which are of importance in how such payments work in practice. We have identified the following characteristics suggested by the Polis model in this context:

1. **Strategic behaviour:** It is to be expected that all parties indulge in strategic behaviour in order to further their interests in situations which are not clear from the beginning but allow room for manoeuvre.

2. **Collusion:** Givers and targets (and intermediaries) may not only enter into coordinated alliances; they may collude to manipulate outcomes.

3. **Different perceptions:** The meaning of the inducements may be different for different actors, as discussed above, but Stone also emphasizes that inducement strategies are “subject to ongoing negotiation and change.” Over time, all actors will interpret the services, and the corresponding inducements, differently. This may be particularly the case with abstract and highly-politicized concepts such as forest carbon.

4. **Technical assumptions about the relationship of inputs to outputs:** This concerns the gap or disconnect between what is assumed (by the givers) to be the result of the actions taken, and the actual result. There will also be gaps between the assumed (by givers) response of the targets to the inducement, and the actual response.

5. **Voluntarism as regards inclusion and exclusion:** The extent to which targets may choose to participate or not (voluntarism), but also the extent to which the givers may select which communities may be involved, that is, who are allowed to participate in the programme.

The first four of these characteristics are likely to affect the efficiency of PES systems, while the last will be more important in terms of the goal of equity.

### 3. The nature of carbon payments under REDD+

We now turn to the specific case of carbon payments under REDD+. We base our argument on the assumption that REDD+, as currently under UNFCCC discussion, will take the form of national programmes in which a country may sell carbon credits either as offsets or to a globally managed forest carbon fund, based on overall reductions in emissions across the country compared to an agreed reference emissions level at the end of a given accounting period (UNFCCC, 2009b). We also make the assumption that, as suggested in the Copenhagen Accord (UNFCCC, 2009c), REDD+ will incorporate measures for enhancing removals of carbon dioxide from the atmosphere as well as reducing emissions from deforestation and degradation. The implication of the policy discussion on REDD+ at COP15 in Copenhagen (UNFCCC, 2009a) was that rewards (credits) should be offered not just for emission reductions from lowered national deforestation and degradation rates, but also for increases in forest carbon stock (forest enhancement), as well as some kind of compensation for conservation of forest that is not under productive management, although the way in which the latter will be rewarded is still not clear (UNFCCC, 2009b; RECOFTC, 2010).

Although the design of a REDD-compliant benefit distribution system could learn much from experiences under PES schemes, there is a fundamental difference in that the final ‘buyers’ of REDD credits would be foreign entities rather than local companies or governments (UN-REDD, 2010). As noted already, credits would be issued not be on the basis of individual projects but on average achievements across the whole forest sector. To achieve the carbon dioxide reductions, however, most countries will find it necessary to develop a set of internal projects or incentive schemes. Despite this, it is by no means self-evident that the kind of payment system used internationally (on the basis of quantified tonnes of carbon dioxide) will also be used within countries.

At present, most community-based PES systems (for water, biodiversity, etc.) are based on a flat rate payment per hectare in return for a contractual agreement, e.g. not to cut the trees, or to carry out certain sustainable forest management practices. In other words, as noted above, the payment is perceived by the local provider (target of the inducement) as being for management and labour inputs, rather than output. At the end of the contractual period there is usually some monitoring to check that the agreement has been kept, but there are rarely any direct quantitative measurements of the inputs (let alone the outputs). In practice, as Benneker and McCall (2009) observe for the case of Mexico, PES does not involve a payment for quantifiable inputs in the form of man-hours or other measure of labour, because measuring these would be too complex, and possibly too divisive, especially within small communities. The payment is instead simply nominal, for activities carried out (firelines cut, fires put out, cattle control, enrichment planting, thinning, etc.) which may or may not be monitored. These could be considered surrogates for the inputs.

Imperfect information about emerging carbon markets has filtered down to forest-dependent communities and the basis for payments is in most cases very unclear to them (not least because these decisions have in general not yet been made clear by governments). However, forest carbon projects under the Clean Development Mechanism are output-based, and much of the REDD+ literature strongly stresses performance payments as the stimulus (Santilli et al., 2005; Wertz-Kanounnikov and Angelsen, 2009; Parker et al., 2009), which has given rise to the idea that REDD+ projects will also be output-based, and thus more akin to sale of a commodity (carbon) than to service provision. This illustrates the problem of variable interpretation of inducements as predicted under the Polis model. In a Rationality model of payments, it would not matter whether local communities and other actors (especially key intermediaries) interpret the environmental service under REDD+ as a commoditised form of carbon or not. In practice, of course, it matters enormously, since in most cases there is no close relationship between management inputs and carbon outputs. If a system of output payments is used, it could raise serious conflicts as regards the fairness of the reward system.

Within national REDD+ programmes, systems of payments to communities or other forest managers could in fact be based on any one of three principles, as elaborated below:
3.1. Output based systems

In an output based system, the owner/manager of the forest (e.g., a community), once registered as a participant, is paid on the basis of the tonnes of carbon emissions reduced and/or tonnes of carbon sequestered during the period of the agreement, compared to a baseline representing the trends at the beginning of the period. This is a miniature version of how international REDD+ payments will be made. This means that it can link directly to the State’s accounting system for carbon, and it has the character of providing a direct incentive for good performance; more carbon saved will result in higher payments, regardless of what inputs were needed to achieve this. It should appeal to the buyers (‘givers’) who can imagine a direct relationship between carbon payments and carbon sequestered. It implies however a detailed monitoring infrastructure, as accurate measurements of stock change will be required for each forest parcel individually and a complicated payment system in which each forest owner gets a cheque of a different size. The local transaction costs are therefore high, as are the costs of verification.

Payment by outputs has the advantage of transparency in terms of distribution of PES rewards. In an output based system, however, a question that the organisers will have to consider is: who is eligible to participate? Forest owners who have been carrying out forest management in such a way that forest enhancement has been taking place for some years, could only be considered to contribute ‘additional’ emission reductions if they were to increase their rate of forest enhancement still further. A different approach would be to confine REDD+ payments to geographical areas which are under ‘threat of deforestation’, if that ‘threat’ can be consensually defined. Yet, in either case, to exclude well-managed forests and reward instead those profligate forest managers who earlier allowed their forests to be decimated, and who therefore now have much more room to create carbon saving (which might be termed the ‘prodigal son’ model), would be damaging from a public policy point of view and might even provide a perverse incentive for good managers to terminate their sustainable practices. In any case, some areas of a country will be endowed with forests, in which there is much more growth potential than others due to climatic and soil conditions, so that carbon gains may have less to do with the community’s management activities than with natural conditions.

3.2. Input based systems

Input and surrogate input based systems as discussed above are very common in existing PES systems, and characterise the programmes offered by the government in Mexico for example. Under these programmes, a set of rules about forest management is established, and forest owners wishing to participate may apply to join, and will receive a fixed payment per hectare of forest they bring under this agreement. Part of the payment may be made at the beginning to encourage participation, and the remainder paid at the end, after inspection has shown that the management rules have been followed. The change in carbon stock may be roughly (conservatively) estimated for the purposes of national accounting, but is not important from the point of view of the forest owner. This system has the advantage of very low monitoring and validation costs and ease of financial administration, but limits the management freedom of the forest managers/owners, who would be obliged to comply with rules as laid down in the initial agreement. These rules, moreover, are related to often simplistic and possibly unfounded assumptions about the relationship between the agreed management actions and environmental impact, e.g., increased carbon stocks, or improved hydrological conditions (Muradian et al., 2010). Such technical uncertainties add to the possibilities for slippage between intended and actual outputs.

For the purposes of payment, the actual carbon gains would not need to be measured, although if credits were to be claimed at national level they would have to be estimated in some way.

The per hectare payment would thus not bear a direct relationship to the carbon produced, though hopefully there would be some functional environmental relationship between the change in carbon stocks and the management/activity payments, depending on the type of forest ecosystem and the forest management practices employed. The carbon PES transfers would have to be at a level which was sufficiently attractive to forest owners to encourage them to take part, given that there are alternative opportunities, as discussed next.

3.3. Payment systems based on opportunity costs

A system based on opportunity costs is one in which a payment is made essentially for not doing something (particularly deforestation, clearance of the forest for other purposes) rather than for doing something (such as introducing sustainable management practices). The payment is supposed to compensate (at least in part) the stream of revenue that would be lost over the years through maintaining the area as forest rather than converting it to an alternative more profitable use (agriculture, urban development). In general, this type of inducement may be more suited to forest properties which are in the hands of single owners than of communities, because when community-owned land is cleared, this is often the result of decisions made by actors outside the community, sometimes in collusion with one or a few individuals within the community, and sometimes completely independently. The Costa Rican PES system, which is mainly geared towards individual forest owners and is a payment for not cutting the forest, could perhaps be considered a type of proto-payment for opportunity costs, although no assessment is made regarding the magnitude of the real opportunity costs per forest unit.

A more sophisticated approach would estimate the value of the most likely alternative use (e.g., clearance of the forest for cultivation of maize, or sale for urban development) for every forest parcel. Then an offer could be made to forest owners, of a payment equal to (or very slightly more than) this opportunity cost if the owner agrees to keep the forest as forest. Offers could start from the bottom, i.e., to parcels with lowest opportunity costs. From a market point of view this might be rather efficient and result in the low average price for carbon as far as the buyer is concerned, provided transaction
costs can be kept down. Land owners and communities whose opportunity costs in clearing the forest can be met by the carbon rewards of not doing so, will participate, and the carbon price could be set at a level which would bring about the required level of conservation. This system can support social equity in the poverty alleviation sense in that those communities with the worst alternative opportunities come aboard first, i.e. those least endowed or most isolated. However the later entrants into the system (those with slightly higher opportunity costs) would have to be paid more, which would raise other equity questions.

In reality there may be serious difficulties in identifying what are realistic and feasible alternative ‘opportunities’ for any given piece of forest, including scenarios for new opportunities in the future. Once these are identified, the values of the alternative opportunities have to be estimated or surveyed at the level of individual land owners or parcels. The likely extended negotiations per parcel would bring considerable transaction costs, lack of transparency and many opportunities for strategic behaviour to influence the survey outcomes.

4. Analysing the REDD+ payment systems in terms of the Polis model

In a multi-actor environment such as that represented by a carbon PES system it is clear that all actors have to benefit if the system is to work. There could be various ways of identifying the categories of actors and characterising their underlying interests; here we have taken a simplistic view and classified the parties involved in REDD+ into four categories:

- Carbon credit buyers (foreign governments/companies), who are relatively consistent and homogenous in their search for the most economical means of dealing with reduction of global atmospheric carbon. Many though are also motivated by other objectives of development, equity, national security and ecological sustainability, and this complexity affects the simple clarity of their targets. These are the ‘givers’ in the terminology of the Polis model.

- National policy makers who design and lead REDD+ strategy, policy and implementation. Their immediate interest may be maximising revenue from forest carbon, but this may be tempered by a large number of other goals, since this group includes individuals and groups with diverse interests concerning REDD+, including biodiversity conservation, livelihood improvement, poverty alleviation, etc. National REDD+ programmes are likely to be created by cross-ministerial efforts with inputs also from civil society, and motives will clearly be very mixed. In Polis terms, this group can be seen as the intermediary if it is acting primarily as the channel by which carbon credits flow from the communities to the eventual global purchasers. But it may also be considered a giver, since it is not only responsible for designing the national system of inducements to forest owners or communities, but also for paying for the delivery of the carbon services in the first instance.

- Intermediary organisations which facilitate communities’ entry into the scheme and gain from it themselves. They will likely range from sub-national government departments (e.g. forest agencies), to international or national NGOs, and to consulting and brokerage companies. Their relationship with the local managers may be mutually dependent because their institutions also benefit from the scheme. However, they will be close to the national or international buyers and their goals are not necessarily purely financial.

- Local communities (the ‘targets’ in Polis terms) as environmental managers and service providers who must balance the sequestration or enhancement of forest carbon against other land uses and the more holistic multiple objectives for management of their lands and forests.

The interests of different actors will be met by different payment models, as we demonstrate in Table 1. Here we illustrate that if givers are really interested only in value for their money when they purchase carbon ES, they would probably opt for the opportunity cost model; but in reality we know this is not true, many givers are interested in a broader set of values even if these are not quantified, as illustrated for example by a recent call for a scoping study for UK’s REDD+ support programme (DfID, 2010). Developed country governments purchasing the carbon credits may be required by their electorates to apply at least minimum standards of environmental and social responsibility and pay a little more for credits which are environmentally and socially more benign. National policy makers have to deal with a quagmire of politically sensitive issues. The output payment system will, as shown above, bring them into the unpleasant situation of favouring those who have decimated their forests in the past, while not paying out to those who have always conserved their forests well. If they were to select the opportunity cost model they would face the huge transaction costs of negotiating individual contracts with each target, in which corrupt practices could flourish. While this might be seen as an advantage by some individuals involved, there is likely to be resistance to a system so easily open to favouritism. In practice, the flat rate input based payment system is the simplest and easiest for governments to manage. For intermediate organisations the differences between the models may not be so important, but we hypothesise that communities would be likely to prefer an input or input surrogate model. This is because such models provide for a wide range of environmental benefits and (managed) off-take of products for subsistence use, at the same time as the generation of carbon credits for the national account, which better fits the livelihoods approach. Communities would not be forced to maximise carbon stock to the detriment of other useful forest products or services, and the payment, though it might be lower than for output payments, would be known and steady, rather than unknown and variable.

In Table 2 we consider how the three payment systems measure up against the characteristics of a Polis system. This analysis highlights the various advantages of input or input surrogate types of payment, which make them particularly useful instruments when the aim is to reduce degradation in forests managed by communities. They are less subject to
<p>| Table 1 – Positions of parties as regards three alternative payment models. |
|---------------------------------|--|---------------------------------|--|
| <strong>Output payment model</strong> | <strong>Input and surrogate input payment model</strong> | <strong>Payment model based on opportunity costs</strong> |
| Foreign buyers (givers, in the Polis model) | Possibility to trace carbon credits to their origin may induce more confidence in value and legitimacy of credits | Payments based on improved management practices can promote better balance with other environmental benefits. This is important to some buyers (as today in the VCM); but if carbon credits are for large scale offsets by developed countries, this is a lesser consideration | In principle this can be the cheapest option (per tonne of carbon) for buyers under simple market principles |
| National policy makers (may be seen as either intermediaries or givers, in the Polis system) | Contentious politically because it can favour areas already badly degraded and their local managers; as well as areas climatically better endowed. The main advantages are that the basis for payments is transparent, and they are supposed to stimulate greater carbon savings | Cheapest and easiest in terms of transaction costs for policymakers. Provides opportunities to achieve broader goals such as biodiversity and poverty alleviation, to satisfy some interests of this group. But it is likely to produce fewer carbon credits overall | Model is designed to enable governments to purchase carbon from producers more cheaply (by starting with producers with lowest opportunity costs), but there are high transaction costs in negotiating payment levels for every parcel. The system is not transparent, and open to manipulation |
| Intermediary organisations (intermediaries in the Polis model) | Opportunities for intermediaries to earn by assisting communities with carbon measurements and management plans | Help with carbon and forest management plans | Opportunities to support and earn from formulating communities’ calculations of opportunity costs; and to assist with management plans |
| Communities (targets in the Polis model) | In theory, higher incomes from better performances and a free choice of management strategies. Communities may prefer not to maximise carbon income, but maintain other forest benefits. Levels of payment, which are ex-post, are uncertain. Temptation for communities to exaggerate their carbon gains, if taking own carbon measurements. | Choice of management strategy is restricted, pre-determined by policy. But it allows a broader range of forest values to be considered, and responds to communities’ ideas of holistic good management. This is greatly enhanced when payments are based, not on labour inputs, but on surrogate inputs, i.e. agreed tasks carried out, so that the level of payment is known in advance | Payments should balance losses from opportunities foregone, thus a no-regret solution. Communities with low opportunity costs – usually the more marginalised – should in theory benefit first, if they take the initiative and have the negotiating skills, but they will receive a lower per-tonne payment than later entrants in the system |</p>
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<th>Table 2 – Analysis of payment models in terms of Polis characteristics.</th>
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<td><strong>Output based payments</strong></td>
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<tr>
<td><strong>Efficiency criterion: slippage between design and response due to</strong></td>
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<tr>
<td>(i) Strategic manipulation by any of the parties</td>
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<td>(ii) Collusion between givers, intermediaries, buyers and targets</td>
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<td>(iii) Different perceptions of nature of product between parties</td>
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<td>(iv) Technical assumptions about relation of inputs to outputs</td>
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<td><strong>Equity criterion: the likelihood of equitable distribution of benefits is affected by</strong></td>
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<tr>
<td>(i) Extent to which communities themselves have choice about participating in the scheme (voluntarism)</td>
</tr>
<tr>
<td>(ii) Which communities are in practice encouraged/stimulated to participate</td>
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collusion and strategic manipulation, and the different perceptions of what is being paid for does not interfere with the production of the carbon ES as such. Opportunity cost models share some of these characteristics, although providing ample scope for collusion of some kinds. Neither of these models however provides inducements specifically for better (carbon) performance; output-related systems are likely to be more successful in this sense. In terms of equity, differences between the models are less clear, although the opportunity cost model as noted above would favour inclusion of the most marginalised communities first, although it would also have to pay higher carbon prices to communities which have better alternative opportunities (which tend to be the richer ones). Output based payments imply an ability to take risks, since the level of payments will not be known until the end of the accounting period, which may make this less attractive to poorer, more marginalised communities. In many existing PES systems using input payments, partial payment is made in advance, the remainder paid out at the end of the period after monitoring has shown compliance with the management instructions.

Input based models would presumably be linked to a system in which areas most at threat from deforestation are selected first, while under an opportunity cost model, in theory at least, the communities that would benefit most would be those with the least economic options, that is, the most isolated and marginalised communities. If the most important aim, from the point of view of the national programme, were to reach the poorest, then this last model might be the best choice, although as shown in Table 1, the transaction costs would be high. Moreover, as indicated in Table 2, communities with better negotiating skills and experience of tapping government subsidy payments (thus, probably not those with the lowest opportunity costs) would probably be the first in line in applying for entry into the programme.

5. An alternative payment model: payment for monitoring

The analysis above has shown that none of the three payment principles is likely to resolve all the underlying problems of efficiency and equity relating to carbon payment systems under REDD+, particularly those relating to the dynamic, uncertain nature of the social setting. An alternative, in which communities are paid not for the carbon itself as a commodity or as a service, but simply for measuring and monitoring the carbon, has recently been suggested. This is particularly important in view of the fact that measuring and monitoring are likely to present major transaction costs under any payment system. This is because much of the management by communities results in reduced degradation and increased sequestration (forest enhancement), rather than reduced deforestation. While levels of deforestation over time can be readily and cheaply measured using remote sensing, changing rates of degradation and enhancement, which on an annual basis are small compared to overall forest stock, require on-the-ground stock change measurements. If governments are planning to claim credits for the reduced degradation impacts of CFM, repeated detailed forest inventories will be required to quantify stock changes over time. But there are almost no developing countries where these data are currently available on the scale needed, and the cost of fielding national forestry teams to carry out the forest inventories would be beyond the reach of most, if not all, potential REDD+ participant countries.

In this context the Kyoto: Think Global Act Local Programme (K:TGAL, www.communitycarbonforestry.org: Skutsch, 2011; Karky, 2008; Zahabu, 2008; Peters-Guarin and McCall, 2010; Van Laake et al., 2009) has proposed that instead of paying people for carbon or management inputs or opportunity costs, they could be paid simply to measure the changing carbon stocks in their forest. This removes the payment from the realm of inducements completely; it is, rather, a payment for work carried out. Payment would be made on receipt of the data, regardless of whether this shows an increase or a decrease in carbon stock. As the K:TGAL project has shown, it is feasible to train local communities to make such surveys (Verplank and Zahabu, 2009) on an annual basis, much more cheaply than professional foresters. Involvement of communities in such monitoring is given in UNFCCC technical advice on REDD+ as an important option (SBSTA, 2009), and there are indications that community gathered data may be as reliable as forest inventory data gathered by professionals (Skutsch et al., 2011).

Monitoring-based payments would be paid as monitoring is carried out, so they could start immediately as part of existing REDD readiness programmes. Payment for monitoring would provide a reliable, regular and predictable source of income for local communities and incur significantly less complex transaction costs than, for example, an output-based payment system in terms of verifying claims. A major advantage of this approach from a Polis point of view is that the incentive to manipulate figures strategically to exaggerate carbon stock growth is eliminated since the community would not gain by presenting higher figures; and it would avoid the political difficulties of paying the ‘sinners’ rather than the ‘angels’. There would be no slippage due to differences in perception of what was being paid for.

This is not to say that payments for monitoring and measuring are free from politics. There is the question of what are considered ‘legitimate data’. Doubts about the capability of communities to take ‘scientific’ readings of carbon stocks are likely to be raised, not least by professionals and consultants who might find employment in this activity. But allowing this responsibility to communities may also be empowering; as Stone (2002) points out, counting makes people notice things more, and Chhatre and Agrawal (2009) have observed that communities that monitor, manage their forests more sustainably. Record-keeping may also stimulate reporting, so both of these effects may have spin-offs beyond any carbon payments. Keeping records can stimulate public demand for change, and to some extent the power to measure is related to power to control. If communities have the data that the state needs to claim carbon credits internationally, it gives them leverage and establishes some legitimacy of their claim for carbon rewards.

The downside of payment-for-monitoring is that while this may make it possible for a country to satisfy international
monitoring requirements cheaply, it would not provide any inducement at all for improved forest management and carbon conservation. For this reason, two possible hybrid models may be considered, explained below.

Hybrid model A: In order to ensure that carbon is in fact saved, a payment-for-monitoring system could come with input conditionalities: for example, payments could be offered only to those communities that are already managing forest sustainably, or as part of such a promotional package (i.e. monitoring plus some payment for inputs). Where communities are already receiving some payments or non-monetary benefits for good management, as for example in the Nepali CFM programme, payments specifically for carbon stock monitoring could be additional. The typical management activities in such CFM programmes (creating and maintaining fire breaks, excluding cattle from forests, preventing farm encroachments, preventing settlement creep, maintaining check dams and bunds, clearing watercourses, fighting fires, enrichment planting, biodiversity maintenance, limitations on firewood removal and removing invasive plants, etc.) are all likely to increase the sequestration of carbon. Hybrid model A is therefore a direct payment for the task of biomass monitoring, but given only when associated with sound forest management. The payments for monitoring could be a catalyst and important component of a larger, more holistic plan in which a variety of other benefits (such as sustainable off-take of local needed forest products) also flow to the community.

Hybrid model B: A purely monitoring-based or a purely output-based payment mechanism may not be optimum in many cases. A combination of the two (payment for monitoring plus some output based reward) could however satisfy all four parties involved. This dual payment system is analogous to a salary package for employees consisting of two elements; fixed income and share options. The ‘fixed income’ in this case is a regular payment for monitoring biomass and should be set at a rate that ensures the employees’ allotted tasks are conducted competently. The ‘share’ option in this case is a payment based on fluxes of forest carbon according to the REDD+ revenue generated at national or sub-national level, similar to a dividend based on a company’s share value. Hybrid model B is thus a combination of monitoring-based payment and revenue from an output-based payment (for carbon credits). Such a hybrid system recognises that any payment mechanism by itself, is imperfect according to the Polis model of inducements.

Local communities can perform monitoring work efficiently, and thus payment for this work will be worthwhile for them, even if the area being monitored fails to contribute to the achievement of results under a national REDD+ program. The resources spent on such community-level monitoring are ultimately part of the transaction costs of REDD+ implementation, and will have to be found from national revenue generated by REDD+ or from REDD+ readiness programmes, because even areas which do not gain carbon have to be included in the national accounts. A simple performance or output-based payment system, on the other hand, is not sensitive to the actual degree of control that a community has over the carbon outcome in their area of forest management. As discussed above, in practice such a system may lead to some communities being unfairly punished by a failure to achieve the levels of performance achieved nationally, due to events or circumstances beyond their control, such as climate or fire. Similarly, some communities may be rewarded disproportionately for positive results which occurred anyway even without their management influence. The aim of a dual payment system, therefore, is to provide a good balance of inducements so that communities deliver both efficient monitoring and effective management for REDD+.

6. Necessary conditions

All models for payment for carbon services are dependent for success on the level of control that communities are able to exercise over the use of their forests. An output-based payment system for REDD would in principle provide inducements for communities to manage forest areas for overall carbon gain, but such inducements will only work if communities have the necessary control over forest management planning and implementation. Where such autonomy is provided, as Chhatre and Agrawal (2009) demonstrate, the ability of communities to deliver gains in forest carbon is strong.

Another condition for success is that the overall benefits are greater than benefits without the REDD+ intervention. In Nepal, for example, cost-benefit analyses of Community Forest User Groups show that the monetary value of subsistence benefits (fuelwood, fodder, etc.) may exceed the costs of inputs in forest management (patrolling, protection, management, inventory) by up to six times (Satz, 2004). These benefits are likely also to outweigh any financial gains from carbon credits, so communities will only participate in a carbon scheme if they are able to continue to access a controlled off-take of locally needed forest products like sustainable woodfuel, fodder and collected foods (Karky, 2008; Karky and Skutsch, 2010; Blom et al., 2010).

Also in question is who owns the carbon credits generated by Community Forest Management activities. There is a fear that states may appropriate the carbon credit property right itself; countries have yet to introduce legislation which makes the ownership position absolutely clear (Basnet-Parasai, 2011). In some countries heated debate has been generated on this, a debate that never arose with previous PES schemes. It has everything to do with changes in carbon stock being rewarded internationally and therefore being considered a commodity. Even such issues as export taxes need to be considered in these terms. Clarity on this will be an essential condition for any REDD payments to communities.

Where tenure and management rights over community forests, and clarity over rights to the carbon credits from community forestry are not secure, it is unlikely that communities will be persuaded to undertake management activities for REDD+, whereas payments for monitoring carbon would still be possible. In countries where decentralised forest management strategies are not yet accepted policy, the establishment of community monitoring may be a first step towards the development of efficient payment systems for REDD+. In countries where community management is already well accepted, a dual system such as either of those...
above might be the better option. The more secure communities feel in their existing rights over forest tenure and resources, the higher the proportion of payments that can be made through an input-based system, thus reducing transaction costs for REDD+ programmes at the national level.

7. Conclusions

In this paper we have used the Polis model as a vehicle for exploring the attributes of different carbon payment systems that might be introduced under national REDD+ programmes. Although carbon payments are frequently posited as simple market transactions, they are likely to involve complex systems with multiple actors who interact in complicated ways. For such an analysis, the theory of policy inducements is better suited. From the Polis model we were able to derive a number of important characteristics of policy inducements which we used as criteria for comparing three different potential payments models. Our analysis shows that although performance based, output payments may in theory provide incentives to the producers of the carbon services, they may not necessarily be optimal within national programmes. Payments based on opportunity costs might seem to be the efficient from an economic point of view but also carry inequity and high political overhead costs. Overall, input based payment systems seem to satisfy the real needs of most parties somewhat better, even though they do not appear to provide a stimulus for higher levels of carbon savings.

Given the costly requirements for extensive detailed and frequent data on forest stock that REDD+ demands, we propose that a system in which communities are paid for their services in measuring and monitoring forest stock, combined either with conditionalities for forest management or with a supplementary payment related to carbon performance, should be seriously considered by policy makers.

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