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# Property Rights Regimes and Natural Resources: A Conceptual Analysis Revisited

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**Summary.** — More than two decades ago, Schlager and Ostrom (1992) developed 'a conceptual schema for arraying property-rights regimes that distinguishes among diverse bundles of rights'. The conceptual framework has profoundly influenced research on natural resource governance, common property, and community resource management. However, currently natural resource governance has changed dramatically, challenging the applicability of the conceptual schema. There are now many more social actors involved in resource management than the local communities at the focus of original analysis. Additionally, resource management increasingly provides access to various kinds of benefits from outside the immediate context, including indirect benefits such as payments for environmental services and results-based payments for REDD+. These changes demand addition of new property rights to the original framework. Those changes of governance process demand addition of property right to original framework. This paper updates the conceptual schema in reaction to changes in natural resource governance, proposing three specific modifications on the focus of use rights, control rights and authoritative rights to come up with a framework that distinguishes eight types of property rights. We apply the framework to three purposefully selected governance interventions in China and Laos that include the provision of indirect benefits in addition to the direct benefits derived by local people from natural resources. The empirical application shows how contemporary governance changes may not lead to local people's outright dispossession, since they continue to possess direct use rights to natural resources. However, local people may be excluded from control and authoritative rights, which are exercised exclusively by state agencies and international actors. The latter make available indirect benefits to local people, which may or may not translate into use rights in the sense of policy-based entitlements. The empirical insights suggest the possibility of a wider trend of 'compensated exclusions' in natural resource governance.


*Key words* — property rights, governance, natural resource, compensated exclusion, forests, China, Laos

## 1. INTRODUCTION

More than two decades ago, Schlager and Ostrom (1992) developed "a conceptual schema for arraying property-rights regimes that distinguishes among diverse bundles of rights" (249). The conceptual framework has profoundly influenced research on natural resource governance, common property, and community resource management. Many researchers have used the conceptual schema and the idea of property as bundles of rights to move beyond simplistic categories of state, private, and common property, and to distinguish different kinds of common property regimes (Benda-Beckmann, Benda-Beckmann, & Wiber, 2006). A prominent illustration is the comparison of four governance arrangements in India and Nepal in Agrawal and Ostrom (2001).

The conceptual schema has also informed practice in natural resource governance because its application yields direct implications for sustainable resource governance: Schlager and Ostrom (1992) suggest that "[d]ifferent bundles of property rights [...] affect the incentives individuals face, the types of actions they take, and the outcomes they achieve" (256). Natural resource management tends to be more sustainable if local people participate actively in resource governance, as demonstrated for forests (Andersson & Gibson, 2006; Baland *et al.*, 2010; Chhatre & Agrawal, 2009). Consequently, international donors, nongovernmental organizations (NGOs), and some governments have developed new forms of collaborative resource management that facilitate local communities' participation in decisions about management objectives and practices, going beyond the recognition of mere use rights (e.g., Edmunds & Wollenberg, 2003). Social and environmental activists have drawn upon the schema to lobby for the devolution of extensive bundles of natural resource rights to local people (Rights & Resources Initiative, 2012).

Yet, natural resource governance has changed dramatically over the past two decades, challenging the applicability of the conceptual schema. There are now many more social actors involved in resource management than the local communities at the focus of Schlager and Ostrom's (1992) analysis. More often than not, local, national and/or international organizations of a private, non-governmental, or public nature engage in practices or make rules relevant to resource management in

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a particular site (Agrawal & Ribot, 1999). Additionally, neither local communities nor the state can be assumed to be homogenous or act as a single actor. Local communities are often divided internally, with the consequence that different bundles of rights apply to different community members (Agrawal & Gibson, 1999). Similarly, states include a variety of actors with different mandates, resources, and interests (Ribot, 2004).

Additionally, resource management increasingly creates access to various kinds of benefits provided from outside the immediate context. Indirect benefits such as payments for environmental services (PES) or shared tourism revenues complement directly derived benefits, such as timber or the spiritual value enjoyed by local people. The provision of payments and other kinds of external support is entering policy in many countries as natural resource degradation diminishes the available direct benefits, and increasingly affluent societies attribute rising importance to non-productive uses of natural resources (e.g., Bennett, 2008; McElwee, 2011). Indirect benefits are also gaining importance for local resource managers due to governments' reluctance to devolve natural resource management where it involves significant material and immaterial values (Ribot, Treue, & Lund, 2010).

Payments to local resource managers or other forms of external subsidy assistance may become a primary component of the global Reducing Emissions from Deforestation and Forest Degradation (REDD+) mechanism. The introduction of such policies and programs is different from the past emphasis on project-based support since they provide indirect benefits on a more permanent and institutionalized basis. Providing payments and compensations to local actors as a new mode of governance aimed at improving or maintaining ecosystem services transforms local decision-making and property right arrangements beyond the notion of "bundles of rights" (Phelps, Webb, & Agrawal, 2010).

Thus, there is a need to update the conceptual schema introduced by Schlager and Ostrom (1992), particularly by incorporating insights from the analysis of decentralization (Agrawal & Ribot, 1999) [1]. The update requires a shift in the premises underlying the framework by recognizing the multiplicity of social actors and significance of indirect benefits, i.e., attention to a more comprehensive set of relationships among social actors with regard to direct and indirect benefits. Yet, it would benefit from retaining the simplicity of the original framework because simplicity allows comparisons and affords influence on practice. The update gains from maintaining property rights as the central concept, property rights being understood as all kinds of relationships among actors with respect to objects (Bromley, 1992; von Benda-Beckmann & von Benda-Beckmann, 1999). The focus on property rights, as they apply in practice, provides an important "bottom-up" perspective on natural resource governance that is complementary to analyses centered on the relationships between different governmental actors (Agrawal & Ribot, 1999).

We develop an updated version of Schlager and Ostrom's (1992) conceptual schema in this paper. [2] We propose three specific modifications to come up with a framework that distinguishes eight types of property rights. We apply the framework to three purposefully selected governance interventions in China and Laos that include the provision of indirect benefits in addition to the direct benefits derived by local people from natural resources. The empirical application shows how contemporary governance changes may not lead to local people's outright dispossession, since they continue to possess direct use rights to natural resources. However, empirical application also shows that local people are generally denied higher order property rights, with control and authoritative rights to natural resource exercised exclusively by state agencies and international actors. The latter make available indirect benefits to local people, which may or may not translate into use rights in the sense of policy-based entitlements. Thus, international organizations and norms increasingly influence natural resource management on the ground while local communities' exclusion is compensated through indirect benefits.

The paper begins with the conceptual discussion on how Schlager and Ostrom's (1992) framework can be updated usefully. It then proceeds to apply the framework to the three cases before it compares and synthesizes key insights from the three cases. The paper concludes with a discussion of the theoretical and practical insights to be gained from applying the updated framework.

## 2. UPDATING THE CONCEPTUAL FRAMEWORK

Schlager and Ostrom's (1992) conceptual schema distinguishes five types of property rights: the rights of (physical) access, withdrawal, management, exclusion, and alienation. [3] Underlying the distinction is the idea that rights are nested, i.e., that the first-order rights of access and withdrawal depend on the exercise of the second-order rights of management, exclusion, and alienation (Ostrom, 1994). The difference between first-order and second-order rights relates to "the difference between exercising a right and participating in the definition of future rights to be exercised" (Schlager & Ostrom, 1992: 251). In particular, management refers to the "right to regulate internal use patterns and transform the resource", thereby shaping the possibilities for withdrawal rights (Schlager & Ostrom, 1992: 251).

This framework has rightly been critiqued for its static nature, whereas property rights are often dynamic (e.g., Rocheleau & Ross, 1995). Property rights may be ambiguous in a particular setting, as different social actors claim rights to a resource through material and discursive means (Fortmann, 1995; Peluso, 1996). Moreover, many situations are characterized by the presence of multiple and overlapping legal systems, something commonly referred to as legal pluralism (Benda-Beckmann *et al.*, 2006). As people relate their claims on natural resources to multiple legal systems, property rights come to overlap, and claims sanctioned by different legal systems get to compete with each other (Sikor & Lund, 2009). Consequently, negotiations over access to and control over natural resources tend to make property rights a lot more dynamic than captured in Schlager and Ostrom's (1992) schema.

Nevertheless, the conceptual schema offers opportunities to take concise snapshots of natural resource governance at particular times and places and to compare different governance arrangements to each other. These advantages continue to hold even if one leaves the narrow confines of the original schema to develop a more comprehensive framework. The schema is able to accommodate a wider set of social actors that relate to the direct benefits derived from natural resources and indirect benefits associated with them. It can be adjusted to consider intra-community variation (Agrawal & Gibson, 1999), social factors differentiating villagers such as gender (Agarwal, 2001), and situations in which more than one "village community" holds rights to a resource (Tubtim & Hirsch, 2005). Similarly, it is open to consider the involvement of other kinds of social actors in resource governance, such as NGOs, private companies, and international organizations. Last but not least, the framework can accommodate a variety of state actors at the local and national level, thereby integrat-

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ing the findings of decentralization research (Agrawal & Ribot, 1999; Ribot, 2004).

We develop the property rights framework in three directions (see Figure 1). First, in connection to Schlager and Ostrom's (1992) operational-level right, we distinguish between the rights to obtain direct and indirect benefits and name all first-order of right as "use rights" for reasons of convenience. In our opinion, "use" communicates the nature of these rights more intuitively than "withdrawal" in our opinion. Also, note that we drop access rights from the list. Rights of physical access may not be too important as a separable right in many situations (cf. Agrawal & Ostrom, 2001: 489). Moreover, the term "access" is commonly used to refer social actors' ability to benefit from resources (Ribot & Peluso, 2003). As for use right, it is consisted of "direct use rights" and "indirect use rights". Direct use rights refer to the right to obtain direct benefits derived from a resource (e.g., catch fish, harvest water, cut timber, etc.). Indirect use rights are about the right to obtain indirect benefits associated with a resource, such as cash payments, the use of public goods, in-kind support, etc. The latter relate to what Bromley and Hodge (1990) term "presumptive policy entitlements". In contrast to project-based support, policy-based provisions allow social actors to develop the reasonable expectation that they are the legitimate recipients of such indirect benefits over a period of time. Policy-based provisions thereby turn into enduring entitlements, according certain actors use rights to indirect benefits. Illustrative examples are the agricultural and rural development payments made in the European Union (Bromley & Hodge, 1990; Sikor, 2005). [4] "Use" communicates the nature of these rights more intuitively than "withdrawal" in our opinion. Also, note that we drop access rights from the list. Rights of physical access may not be too important as a separable right in many situations (cf. Agrawal & Ostrom, 2001: 489). Moreover, the term "access" is commonly used to refer social actors' ability to benefit from resources (Ribot & Peluso, 2003).

Second, we expand the second-order rights by integrating rights of transaction and monitoring. We also refer to all second-order rights as "control rights", departing thus from Schlager and Ostrom's (1992) notion of collective-choice rights. These rights are about "control" in the sense that they determine the scope of direct and indirect use rights [5]; they can also go beyond local communities' collective-choice processes with other non-local actors being involved in the exercise of control rights (e.g., resource use monitoring by conservation NGOs). As in the original schema, management refers to the right to regulate internal use and transform the resource (e.g., to restrict fishing to particular species or times) Exclusion is about the right to determine who has use rights to direct and indirect benefits (who can extract water, receive payments, cut a tree, etc.). Monitoring refers to the right to monitor the use of direct benefits (e.g., observe fishing operations) and indirect benefits (e.g., audit payments) as well as the state of the resource (e.g., assess carbon stocks). It is a separable and significant right as illustrated by the attention to transparency in resource governance (Lyster, 2011) and current debates about participatory carbon/forest monitoring with regard to REDD+(Balderas & Skutsch, 2012; Danielsen *et al.*, 2013).

Transaction rights relate to the activities required for the realization of benefits. In the case of direct benefits, they are about who has what right with regard to the activities required to obtain the products of a resource (e.g., cut timber) and per-use of them (e.g., sell timber). Distinguishing these transaction rights from direct use rights is important because the rights to conduct harvest operations and freely market natural resource products is often withheld from villagers even where they have use rights (Ribot *et al.*, 2010) For example, villagers in China and Mexico have been found to possess rights to the revenues gained from logging but are denied the right to conduct the logging operations themselves (Bray, Antinori, & Torres-Rojo, 2006; He, 2016). As for indirect benefits, these rights are about handling the involved contractual matters, such as the collection and disbursement of payments. Again, this is an important distinction from indirect use rights because villagers may hold rights to receive payments but not be granted the right to make decisions about the disbursement and distribution of the payments. In Vietnam, for example, the provincial government holds the right to receive and disburse payments from forest service; in turn, this right may be exercised to retain the payments received from service buyers, instead of disbursing them to forest holders (McElwee, 2011:420).

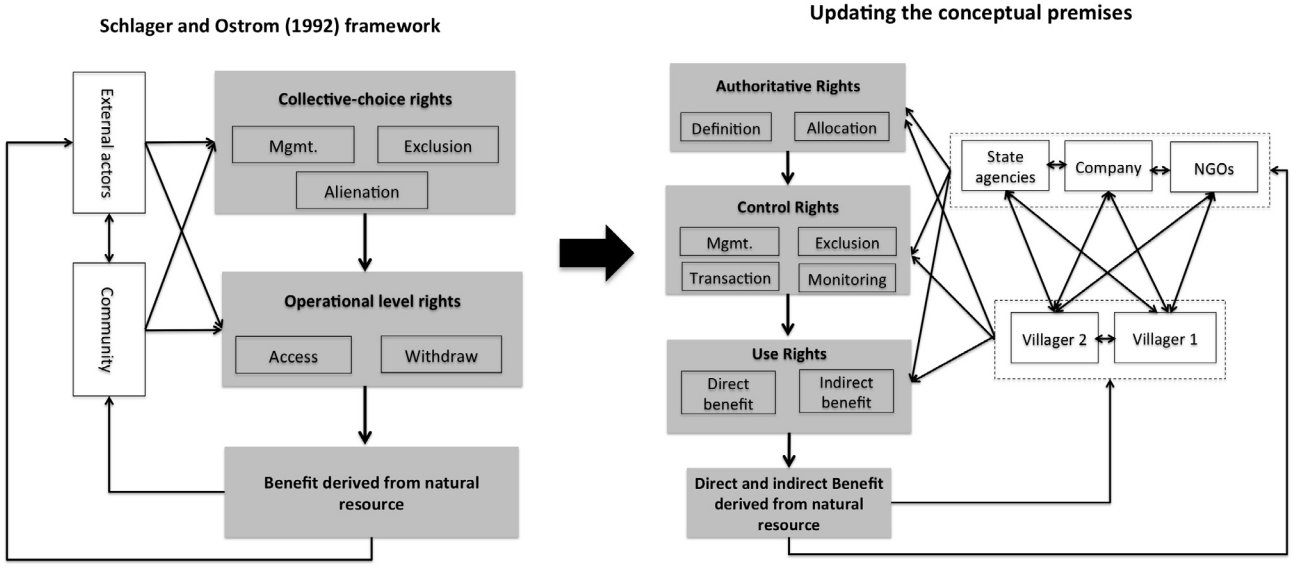


Figure 1. *Comparison between Schlager and Ostrom's and updating framework.*

Third, we add a third-order rights to Schlager and Ostrom (1992), which we call "authoritative rights" since they empower their holders to authorize control rights. Just as control rights define the scope of use rights, authoritative rights determine the control rights applicable to particular resources, for example by defining minimum environmental standards (Ribot *et al.*, 2010). They exert direct influence on the exercise of control rights, as Ostrom recognized in work subsequent to the publication of the 1992 article. [6] They can be held at local, national state or global levels, i.e., they are not necessarily held by central state agencies although those exert dominant influence on resource management in many countries (Agrawal & Ostrom, 2001: 489).

We suggest the utility of distinguishing two types of authoritative rights, which we term the rights of definition and allocation. Definition rights are about the discretionary space [7] available for the exercise of control rights. For example, central governments typically confine management rights by classifying forest for either production or protection purposes, which in turn shapes the rights available to land managers. Or, customary rules may declare a particular water source to be a spiritual site, perhaps in line with global rules on cultural heritage, which may in turn condition a village community's right to exclude villagers and others from extracting water. Central governments often define the scope of control rights by designating land as forest, propagating scientific forestry and defining proper land management practices (Forsyth & Walker, 2008; Peluso & Vandergeest, 2001). They also confine their scope when they regulate harvest quotas and allowable logging practices (He, 2016; Smith *et al.*, 2006). Yet, central state actors are not the only ones possessing definition rights since other kinds of actors, such as customary leaders, influence the scope of control rights in many contexts. Definition rights are increasingly held by international bodies, i.e., inter-state agreements such as the UNFCCC (Loevbrandt, 2009; Lyster, 2011) and non-governmental bodies such as the Forest Stewardship Council (Cashore, Auld, & Newsom, 2004) and Climate, Community and Biodiversity Alliance (Suiseeya & Caplow, 2013).

**Textbox.** Eight types of property rights

**Use rights** are the rights to enjoy benefits, including
1. *use of direct benefits*: the right to obtain benefits directly derived from a resource
2. *use of indirect benefits*: the right to obtain indirect benefits associated with a resource

**Control rights** refer to various kinds of "second-order" rights to determine the scope of use rights. They include the rights of
3. *management:* the right to regulate use and transform the resource
4. *exclusion:* the right to define who has use rights
5. *transaction:* the right to handle the activities required for the realization of benefits
6. *monitoring:* the right to monitor the use of benefits and state of the resource

**Authoritative rights** are "third-order" rights to define control rights. They include the rights of
7. *Definition:* the right to define the discretionary space for the exercise of control rights
8. *Allocation:* the right to assign control rights to particular actors

Allocation refers to the right to assign control rights to particular actors. It relates to alienation in Schlager and Ostrom's (1992) original schema, which is defined as "the right to sell or lease" control rights. However, in the original definition, it is commonly, control rights are assigned to particular actors through legal acts under national law, international rules, customary arrangements, etc. then, the user would sell or lease out the control right. Allocation, on the other hand, is broader when we take the consideration of indirect benefit and multiplicity of social actors. In most situations, there are various actors which demand control rights over forests, or would qualify for the exercise of such rights (Edmunds & Wollenberg, 2003; Ribot, 2004). This multiplicity requires decisions about which actors get to exercise control rights. The actor making such decisions can be considered to have an allocation right. For example, the central governments of Indonesia exercised allocation rights when they shifted control rights on forests away from centralized forest departments to district governments at the end of the 1990s (Wollenberg *et al.*, 2006).

Thus, updating the original schema developed by Schlager and Ostrom (1992) we end up with a framework that distinguishes eight types of property rights (see Textbox). The updated framework, we suggest, facilitates analysis of contemporary changes in natural resource governance. Especially, by examining who is holding a more diverse array of property rights, this framework helps examining how communities may be compensated for being excluded from the exercise of higher level rights. We now set out to demonstrate its analytical power by applying the framework to three forest governance arrangements in East Asia.

## 3. METHODS AND STUDY SITES

The research has followed a comparative case study approach, involving a total of ten governance interventions in China, Indonesia, Laos, and Vietnam. In this paper, we present results from three cases in China and Laos to exemplify governance interventions under which indirect benefits are disbursed to villagers, whereas others seven cases the indirect benefit largely remain hold by either government or international organization. This selection also allows us examine the changes of governance in natural resource when the emerging indirect benefit received by local communities. The selected governance interventions are the Sloping Land Conversion Program (SLCP) and a Voluntary Carbon Market Project (VCMP) in China and a tourism revenue-sharing initiative in the Nam Neun—Nam Et Phou Loei (NN-NEPL) park in Laos. Two of the interventions, the VCMP in China and NN-NEPL in Laos, involve international NGOs, allowing us to examine governance arrangements that include a wider set of actors at local, national, and international levels.

For the study of each governance intervention, we have selected a field site to analyze their actual operations on the ground (see Table 1). These sites are not representative in a statistical sense, but are expected to allow us moving beyond the study of policy regulations and program guidelines to understand property rights in practice. Because actual property rights often differ from legal codes and policy texts, we deemed it necessary to apply our conceptual framework in particular sites to examine the governance interventions "from the ground up". As such, we also intend to demonstrate this framework could be applicable to non-forest natural resource, although the primary focus on those three cases study is forest.

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Table 1. *The study sites*

| Governance intervention | Village | Location | Forest type | Land use issue |
|---|---|---|---|---|
| Sloping Land Conversion Program (SLCP) | Pingzhang | Baoshan, China | Sub-tropical forest dominated by pine plantations | Upland farming vs. Tree plantations |
| Voluntary Carbon Market Project (VCMP) | Zhoujiabo | Tengchong, China | Sub-tropical forest dominated by mixed stands and fir plantations | Upland farming vs. Tree plantations |
| Tourism revenue -sharing in Nam Neun—Nam Et Phou Loei (NN-NEPL) | Sonekhoua Homephanh | Viengthong, Laos | Tropical rainforest dominated by natural mixed stands | Human use vs. Conservation |

Data collection in 2011–12 included various methods. In each site, we began with a round of exploratory research that combined key informant interviews, group discussions, and transect walks to identify the relevant actors and their claims on the forest. In a second round of in-depth research, we conducted a total of 53 interviews with key informants (village leaders, state officials, NGO staff, etc.: $n = 33$ in China and $n = 20$ in Laos), 64 semi-structured interviews ($n = 48$ in China and $n = 16$ in Laos) with randomly selected villagers and numerous informal conversations with villagers and government staff to describe actual forest uses and distil the property rights held by various actors.[8] We also reviewed policy and project documents related to forest-related interventions, such as legal texts, national, and provincial policy guidelines, local government and project reports, contracts, management plans, protection and management regulations, etc.

Data analyses involved two steps. We first performed a descriptive analysis of each intervention by relating our data to the eight types of property rights in the conceptual framework. This yielded an understanding of property rights regimes in each site. We then compared the property rights regimes to each other to reveal similarities and differences between them. We follow these two steps when discussing our results in the following.

## 4. PROPERTY RIGHTS REGIMES IN CHINA AND LAOS

### (a) *The Sloping Land Conversion program (SLCP) in Pingzhang, China*

*Background:* China's central government initiated the SLCP in 1999 in response to the cessation of flow in the Yellow River and major floods in the Yangtze and other basins (Bennett, 2008; Xu *et al.*, 2004). The SLCP has sought to convert cropping land on steep slopes into forestland by offering payments to farmers in return for tree plantations. The payments stretched over a period of five or eight years depending on the type of tree planted, and were extended by another five/eight years in 2006 at half the original rate. The SLCP resembles the diverse PES schemes that have sprung up all worldwide (He, 2014; Li *et al.*, 2011). It may be the world's largest since it has provided payments to some 124 million farmers.

In Pingzhang, an administrative village with a population of 1680, farmers established 87 ha of tree plantations on their previous farmland under the SLCP, which account for 10% of their total agricultural land. They planted pear trees in 2002, for which they received subsidies for a total of ten years, and walnut trees in 2005, which are accompanied by payments for 16 years. Most farmers welcomed the SLCP since it provided support in their livelihood transition from land-based production to a combination of on-farm activities with migration (He & Sikor, 2015).

*Use rights:* Farmers hold use rights to all *direct benefits* derived from the tree plantations in correspondence with their land certificates[9]. Their rights include the fruit harvested from pear and walnut trees, the latter promising to become the most significant source of cash income in the village. The use rights extend to the agricultural crops and medicinal plants intercropped by farmers in initial years (He *et al.*, 2009). The conversion from agricultural to forestland implies that farmers' land certificates have duration of 70 years instead of 30 years. However, the uses of the land allowed under the SLCP are highly restricted, as discussed below.

Similarly, farmers possess use rights to virtually all of the *indirect benefits* associated with the plantations. They receive an annual subsidy of $576/ha for five (pear) or eight (walnut) years, followed by such payments at half this rate for another five or eight years. The county forest department's entitlement under SLCP looks small in comparison, as it is limited to $115/ha in the first year to fund the provision of free seedlings to participating farmers. As this payment, the farmers signed a contract with government to ensure they do not convert their afforested land back to agriculture purpose and maintain the forest to reach a certain survival rate during the project period.

*Control rights:* Five state units share the control rights over the tree plantations: the county forest department, the provincial finance department, the township government, the ministry of finance and the State Forestry Administration.[10] Farmers' exercise of control rights is restricted to the sale of fruit harvested from the tree plantations.

The county forest department and township government possess *management and exclusion rights* since they together make the mandated decisions in the implementation of the SLCP. They select the tree species to be planted, specify the silvicultural methods farmers have to employ, and impose restrictions on farmers' land management practices. They also zone the area in which farmers are eligible for payments without consulting villagers, which has caused significant dismay on farmers' side (He & Lang, 2015). They exercise significant leverage on the location of eligible areas since the national criterion of exceeding 25 degrees of slope leaves plenty of room for interpretation.

*Transaction and monitoring rights* involve a wider set of state units. Timber transactions are generally subject to approval from the county forest department and township government under a harvest restriction called "Quota System" (He, 2016). With this quota system, the county and township officials can exercise the power to decide what and how much can be harvest, although the tree and forestland is holding by farmers.

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Financial transactions are handled directly by the provincial finance department, which disburses the subsidies against a certificate of tree survival rates in farmers' plantations. This certificate is issued by the county forest department, which is in charge of monitoring plantations. The financial transactions between the provincial finance department and farmers are monitored by the ministry of finance together with the State Forestry Administration.

*Authoritative rights:* Central state units hold the authoritative rights over the tree plantations farmers planted in Pingzhang under the SLCP. China's central forest agency, the State Forestry Administration, possesses the *rights to define* the control rights exercised by lower level state units, with the sole exception of payment rates, which are set by the State Council. The Administration defines the discretionary space available to the lower level units narrowly. For example, the State Forestry Administration specifies the minimum survival rate to be met for the disbursement of payments, defines what kinds of areas and tree species could be covered under the SLCP, mandates the application of certain silvicultural practices, regulates intercropping in newly established plantations, and requires that the involved land is legally converted from agricultural to forest land. It is also the central state define the allocation rights are shared between the State Forestry Administration and State Council, since the former assigns the management and exclusion rights to the township government and county forest department, and the latter allocates transaction and monitoring rights to the involved county forest and provincial finance departments as well as the ministry of finance.

In sum, as a state-led program, the tree plantations established under the SLCP in Pingzhang connect farmers to a variety of state units in a governance arrangement that is centered around the state and highly centralized. Farmers enjoy use rights to direct and indirect benefits but do not participate in the exercise of control and authoritative rights. The latter are shared among various local and central state units, whereby five local units share control rights and two central state units possess authoritative rights. In sum, China's State Forestry Administration uses its definition rights to delimit the discretionary space available to the control exercised by local state units and to restrict the use rights held by farmers in a narrow manner. As a result, local line state agencies concentrate the power for implementation, while farmers are excluded from decision-making and compensated with indirect benefits (subsidies).

### (b) *A Voluntary Carbon Market Project (VCMP) in Zhoujiabo, China*

*Background:* The Forestry Department of Yunnan Province, Conservation International (CI), and The Nature Conservancy (TNC) teamed up in 2004 to implement the VCMP in three counties of Yunnan province. Drawing on a donation of the 3 M company, the three organizations selected Tengchong County as a pilot site for a total investment of around USD1 million. They have provided payments and in-kind support to local farmers planting a mix of native trees on previous agricultural land. The project was approved as a small-scale afforestation and reforestation project under the Clean Development Mechanism (CDM) and was awarded Gold Rating under the Climate, Community and Biodiversity Alliance (CCBA).[11] It covers a total of 468 ha of mixed forest in the surroundings of the Gaoligongshan Nature Reserve, involving 1,367 villagers in four villages next to a state-owned and another privately owned forest farm. A first sale of carbon emissions reductions occurred in 2008, when TNC/CI sold verified emissions reductions of nearly 21,000 tons on the voluntary carbon market for a price of $10 per ton.

We examine the VCMP's operations in Zhoujiabo, where the project assisted 50 households in planting native trees on an area of 15 ha in 2005. Zhoujiabo is an administrative village of 635 households, who live mostly from upland farming. The project targeted an area where farmers had grown corn and wheat for their own subsistence. Its staff successfully convinced farmers to plant trees due to the low productivity of agriculture. Nevertheless, farmers today feel that they have experienced a significant loss because the payments do not match up to the benefits foregone from converting agricultural land to tree plantations.

*Use rights:* Farmers possess use rights to all *direct benefits* derived from the involved land, as they holding the certificate of land as forestland. They are allowed to collect firewood and non-timber forest products (NTFPs) in the tree plantations and are generally expected to receive the revenues made from the sale of timber after the projects terminates in 2035. Similarly to the SLCP, most land certificates have changed from agriculture to forestry, extending their duration from 30 to 70 years, but also restricting the allowable uses.

Farmers share the use rights to *indirect benefits* with TNC/CI and the county forest department. In 2008, when TNC/CI sold verified emissions reductions for a period of five years they retained 25% of the carbon revenues as a transaction fee. Farmers received 60% of the carbon revenues, which translated into $266 per ha of planted trees (for five years). The remaining 15% went to the county forest department. In the future, the plan is to reduce farmers' share to 53%.

*Control rights:* The county forest department, township government, and TNC/CI share most the control rights over the tree plantations. Although TNC/CI do not have a permanent presence in Tengchong County, they participated in the exercise of control rights via technical consultants and the TNC/CI office in Kunming.

The county forest department and TNC/CI together possess *management and exclusion rights*. In 2005, they selected tree species after some consultation with villagers and zoned the areas suitable for tree plantations. They also defined the required management practices to be performed by farmers, such as the conduct of thinning operations every five years. Since then, farmers' role in management has been restricted to the provision of required silvicultural operations and labor for pest control, fire protection, etc. The county forest department selects the farmers planting trees, and recruits the ones performing silvicultural management.

*Transaction rights* are divided between local state units and TNC/CI. The county forest department and township government allocate harvest quotas for timber, as discussed for the SLCP above. The county forest department also handles the disbursement of payments to farmers and laborers. In contrast, TNC/CI possess transactions rights related to carbon. They sell verified carbon emissions reductions on the international markets and decide about the allocation of available funds from the initial donation and transaction fee for management operations without consultation of the county forest department.

The county forest department, provincial forest department and TNC/CI share the *monitoring rights* over the tree plantations established in Zhoujiabo. The county forest department assesses tree survival and growth, checks compliance with the required silvicultural practices, and hires farmers as guards to protect the plantations against theft, fire and other forms of destruction. The provincial forest department audits the

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disbursement of carbon payments to farmers by the county forest department. TNC/CI sends in designated consultants every few years to verify carbon stocks.

*Authoritative rights:* China's State Forestry Administration shares authoritative rights with international bodies. *Definition rights* are exercised by the State Forestry Administration, for example by way of the restrictions imposed on the management of land designated for forestry, and the regulations applicable to the allocation of timber harvest quotas. Additionally, definition rights are also held by the CDM and CCBA. The CDM confines the discretionary space available to the exercise of management, transaction and monitoring rights by issuing methodologies for the calculation of carbon stocks, verified emissions reduction, and the verification of carbon stocks. [12] The CCBA influences the exercise of control rights through its standards for the protection of local communities and biodiversity, such as the requirement to inform and consult local people. In contrast, *allocation rights* are largely held by the State Forestry Administration. TNC/CI would not have been able to participate in the exercise of control rights without the Administration's authorization.

Thus, despite some differences, VCMP and SLCP share state-centered and centralized governance arrangements: the state exercises control and authoritative rights without participation by local farmers: central state agencies hold authoritative rights and define control rights in a restrictive manner, whereas lower level state units are confined to control rights. Yet, the governance of the VCMP significantly departs from the SLCP due to the involvement of international actors in the exercise of control and authoritative rights. TNC/CI holds control rights together with local state units, and the CDM and CCBA possess authoritative rights next to China's State Forestry Administration. Although the governance arrangement remains very much centralized, the involvement of international NGOs introduces some counterbalance, with shared decision-making power at the control right level. Local farmers however are generally excluded from the processes of project planning and implementation and remain simple beneficiaries of indirect benefits.

### (c) *Tourism revenue-sharing in NN-NEPL, Laos*

*Background:* The Wildlife Conservation Society (WCS) and NN-NEPL park administration started the tourism revenue-sharing project in 2009 with funding from the United States Fish and Wildlife Service. The project seeks to attract tourists to visiting the park, and to share the revenues generated from ecotourism with people living next to the park. The objective is that local people find jobs with the private tour operators, and that a share of the revenues is channeled into village development funds. The share depends on the number of wildlife sightings reported by tourists, which in turn is expected to provide an incentive for villagers to stop hunting protected wildlife. From 2012, the project included 14 villages in the revenue-sharing.

Sonekhoua is a village of 180 households located next to the main ecotourism site. Due to its vicinity, members of 33 households find occasional employment in tourism as tour guides, boatmen, cooks, and camp managers. Homephanh is another village of 81 households, but too far from the tourist track to enjoy employment opportunities. Both villages operate development funds which receive a share of the tourism revenues annually and finance small development activities such as the purchase of communal equipment and supplies. Nevertheless, people in both villages share the profound sentiment that the gazetting of the park in the 1990s caused a significant loss of access to land and other resources.

*Use rights:* Since the creation of the NN-NEPL park in 1993, villagers have been deprived of use rights to *direct benefits* with the exception of NTFPs, unprotected wildlife, and construction wood and firewood from unprotected tree species. They are not allowed to extract NTFPs and timber for commercial purposes, hunt protected wildlife, clear land for cultivation, or graze livestock. Their use rights are formally limited to land outside the park's core zone but in practice extend into the zone on a customary basis. As for *indirect benefits*, villagers hold restricted use rights to the revenues generated from ecotourism. These are restricted in their size, since tour operators keep most of the revenues and profits made from tourism, and depend on the tour companies complying with their obligations toward villagers. Moreover, only people from Sonekhoua enjoy these use rights, which for example, translate into a $7.50 daily wage and allowance for villagers serving as guides. The park administration and WCS also hold use rights to a share of the tourism revenues in form of the park entrance fee (USD3/visitor) and allowance for the WCS guide (USD9/day).

*Control rights:* The park administration and WCS possess control rights jointly. WCS's influential role finds visible evidence in the location of their offices in the park headquarters and the permanent presence of WCS staff, including an international advisor. Villagers' involvement in the exercise of control right is negligible in comparison. The district government possesses formal rights to be involved in matters requiring active involvement of the local population, such as the ecotourism initiative, but has little influence in practice.

WCS and the park administration possess *management and exclusion rights*. They together designed the park management plan, identified the wildlife species to affect villagers' share in the generated revenues, and selected the villages included in the ecotourism initiative (the latter after formal consultation with the district government). In contrast, village committees' role is restricted to disseminating information on wildlife conservation regulations and project rules to villagers. They have a role in pre-selecting candidates for employment in tourism, but do so according to criteria drafted by the park administration and WCS (Wildlife Conservation Society, 2010).

WCS possesses the *transaction rights* on indirect benefits and jointly executes *monitoring rights* with the park administration. WCS collects the applicable share of revenues from the tour operators, receives tourists' reports about wildlife sightings, accordingly calculates villagers' shares in revenues, and disburses payments to individual villagers for services rendered and to the village development funds. The organization also purchases communal equipment and supplies once villagers have identified their priorities for the use of the funds accrued in a year. In contrast, villagers can handle all transactions related to direct benefits (NTFPs and unprotected wildlife). As for *monitoring rights*, the park administration holds the formal mandate to monitor the protected wildlife and enforce restrictions on the park's use. In practice, it receives significant technical and financial support from the WCS in monitoring, which means that the two exercise the right of monitoring together. The village committees are in charge of monitoring the use of indirect benefits, mainly the equipment and supplies purchased from the development funds.

*Authoritative rights:* The Ministry of Natural Resources and Environment holds exclusive authority over the NN-NEPL park according to Lao legislation, yet in practice WCS participates in the exercise of authoritative rights. WCS exercises *definition rights* by defining the overarching objectives of park

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management, the allowable range of potential users, and required monitoring together with the Ministry. The organization has played a key role in raising the potential of and framing the debate about ecotourism with involved actors at the national and local level, bringing to bear its own international experience and codes of good practice. *Allocation rights* are held by the Lao central government, particularly through its mandate to designate jurisdiction over parts of the national territory to a park administration, and to regulate the operation of international organizations in the country. By gazetting the NN-NEPL area as a national protected area, the central government allocated all control rights to the park administration.

In sum, the tourism revenue-sharing initiative in NN-NEPL resembles the VCMP in China as it combines a state-centered governance arrangement with the involvement of an international NGO. The park administration holds control rights accorded by the central government and the Ministry of Natural Resources and Environment. WCS exerts significant influence on the exercise of control and authoritative rights, and holds a small share in indirect use rights. Yet in contrast to the VCMP, the involvement of the international NGO leads governance in NN-NEPL to be less centralized than in the VCMP because WCS brings to bear their strong presence on the ground on the exercise of authoritative rights. The increasing role of international NGO enable the further power sharing and balancing in NN-NEPL, while the farmers are remaining excluded from higher level of decision-making in the program, as lacking the mechanism for local participation from the very beginning of planning and implementation process when the project is setting up.

## 5. THE GOVERNANCE ARRANGEMENTS IN COMPARISON

Application of the property rights framework allows comparing the governance arrangements (see Table 2). The three arrangements differ in the social actors involved, and how use rights, control rights, and authoritative rights are distributed among them.

Villagers possess use rights to direct benefits in all three arrangements. However, the material significance of these direct use rights varies significantly among the three sites (see Table 3). Direct use rights translate into the most sizable material benefits in the SLCP due to the selection of walnut as a highly valuable commercial tree crop. [13] Villagers' material benefits are significant in NN-NEPL because villagers rely on wild meat as an important source of protein and on trees for construction materials. The material benefits derived from direct use rights are small in the VCMP since the land is degraded.

Our results mirror a key finding of wider research on participatory forest management: the use rights devolved to local people are often restricted to secondary forest products and, therefore, do not translate into tangible material benefits (Edmunds & Wollenberg, 2003; Springate-Baginski & Piers, 2007). In our cases, land use restrictions limit the benefits that villagers can derive from their use rights in the VCMP and NN-NEPL, particularly the bans on cultivation and hunting of protected wildlife. The situation is different in Pingzhang because walnut plantations are highly profitable, and because walnut is considered to be an "ecological tree" and subsidized for 16 years under the SLCP.

A new element in the governance arrangements arises from the indirect benefits which complement the direct benefits accruing to villagers in all three sites. Indirect benefits are overall as significant as direct benefits in terms of their material value, although that varies between sites (see Table 3). Despite the high commercial value of walnut, the payments disbursed by the SLCP offer critical support in the initial years and contribute to the profitability of walnut plantations. In contrast, two thirds of the benefits derived by villagers from the VCMP are due to the payments, yet even with the payments, revenues are low. In NN-NEPL, the benefits derived by villagers from their indirect use rights are currently low, but could become more significant if the number of tourist arrivals increased. [14]

Moreover, villagers' access to indirect benefits may translate into use rights over time. In all three sites, not only villagers but also government officials, the staff of international NGOs, and other involved actors have come to see the provision of indirect benefits as "presumptive policy entitlements" in the sense of Bromley and Hodge (1990). Villagers, in particular, have built up robust claims that they are entitled to compensation for the restrictions imposed on their land use, as we have argued for Pingzhang elsewhere (He & Sikor, 2015). At the same time, these indirect use rights depend on commitments of actors unaccountable to communities. They are less robust than rights certified in legal codes or administrative regulations. They may be stronger where villagers hold tenure rights to the relevant land, i.e., in the SLCP and VCMP, as reflected in villagers' higher share in total indirect benefits. This would match the insights of other research about the influence of land tenure on local people's ability to benefit from environmental payments (Corbera & Brown, 2010; Mahanty *et al.*, 2013).

Villagers are not the only actors that may command over use rights to indirect benefits. As indirect use rights develop in the three governance arrangements, some of the other actors claim a share in them. This is most apparent in NN-NEPL, as the tour operators keep the largest share of tourism revenues to themselves, and villagers' rights to a share of the revenues depends on operators transferring them. Yet even in the VCMP, villagers receive 60% of the carbon finance only, the rest being divided between TNC/CI and the county forest department. These insights demonstrate how other actors, such as INGOs and private companies, are able to establish rights to indirect benefits in similar ways as villagers although they do not possess any rights to the land itself. They develop use rights to indirect benefits by virtue of their superior command over finance, networks, and expertise (Corbera & Brown, 2010; Mathur *et al.*, 2014).

How does villagers' share in indirect use rights compare with the proportion of project-based funds reaching villagers? The evidence from the VCMP and NN-NEPL suggests that the benefit-sharing may be more favorable to villagers in the case of indirect use rights. Villagers did not receive any significant share in the initial investments made by TNC/CI and WCS. The large majority of the funds raised for the VCMP and management of NN-NEPL go toward the NGOs' operational costs, consultant fees, and state budgets. Villagers' shares in indirect benefits, therefore, are significantly more sizable than in the initial investments, although they are not the only ones possessing indirect use rights.

While villagers hold use rights, they do not participate in the exercise of control or authoritative rights, as has been noted in much research over the past 15 years (Ribot, 2004; Ribot, Agrawal, & Larson, 2006; Tacconi, 2007). Despite extensive international efforts of promoting decentralization most governance arrangements "assign no more than the operational-level rights [...] to those whom the program is supposed to

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Table 2. *The governance arrangements in comparison*

| | SLCP (China) | VCMP (China) | NN-NEPL (Laos) |
|---|---|---|---|
| ***Use rights*** | | | |
| Direct benefits | Farmers (fruit and crops) | Farmers (NTFPs, firewood, and timber after 30 years) | Villagers (NTFPs, unprotected wildlife, construction wood, and firewood) |
| Indirect benefits | Mostly farmers, minor share held by county forest department | Farmers (largest share) with TNC/CI and county forest department | Company, WCS, villagers, and park administration share tourism revenues |
| ***Control rights*** | | | |
| Management | County forest department and township government select tree species and determine management practices | County forest department and TNC/CI select tree species and determine management practices | Park administration and WCS develop management plan |
| Exclusion | County forest department and township government zone eligible areas | County forest department and TNC/CI zone suitable areas; county forest department selects farmers | Park administration and WCS select villages and issue rules on selection of villagers; village committees select villagers |
| Transaction | villagers sell fruit; county forest department and township government allocate harvest quota for timber; provincial finance department disburses payments | county forest department and township government allocate timber harvest quota; TNC/CI sell carbon credits; county forest department disburses payments to farmers | WCS disburses payments received from tourism company and purchases collective goods paid from village funds |
| Monitoring | County forest department assesses tree survival rates; ministry of finance and State Forestry Administration inspect provincial finance department | County forest department assesses tree survival rates; provincial forest department inspects disbursement of payments; TNC/CI verifies carbon stocks | Park administration and WCS monitor forest use and payments |
| ***Authoritative rights*** | | | |
| Definition | State Forestry Administration specifies range of allowable tree species and management practices | State Forestry Administration, some influence by CDM and CCBA | Ministry of Natural Resources and Environment issues regulations, WCS draws on code of practice and international norms |
| Allocation | State Forestry Administration allocates management and exclusion rights to county forest department; State Council allocates transaction and monitoring rights to provincial finance and county forest departments | State Forestry Administration allocates the rights of management and exclusion to county forest department and TNC/CI | Central government assigns control rights to park administration and issues operating permit to WCS |

Table 3. *Monetary values of direct and indirect benefits*

| | SLCP | VCMP | NN-NEPL |
|---|---|---|---|
| Direct benefits | | | |
| | • Walnut harvested from planted trees<br>• crops planted between trees | • Timber after 30 years<br>• NTFPs | • NTFPs<br>• non-protected wildlife<br>• construction materials |
| NPV direct ($/ha) | 6,257 | 448 | 1,154 |
| Indirect benefits | | | |
| | • Free seedlings<br>• cash payments for 16 years | • Free seedlings<br>• carbon credits | • Tourism revenue-sharing<br>• tourism jobs |
| NPV indirect ($/ha) | 3,894 | 966 | 19 |

*Note:* Net present values (NPVs) are rough estimates over a 30-year period and calculated for comparative purposes only. USD 1 = 6.5 CNY in 2011.

benefit" (Agrawal & Ostrom, 2001: 492). The power structure in our three governance arrangements can be characterized as state-centered because the exercise of control and authoritative rights largely remains in the hands of state actors. If villagers are involved then it is in a very restricted manner, such as the village committee in NN-NEPL that selects villagers for employment in tourism—according to rules set by WCS and the park administration.

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Yet, our comparative insights indicate the potential for significant changes in state-centered natural resource governance, which may promote power sharing and balancing. The governance arrangements characterizing the VCMP and NN-NEPL are different from the highly centralized SLCP. In the SLCP, control rights are located at the local state and authoritative rights at the central state, and central state units impose narrow restrictions on the exercise of control rights. In contrast, in the VCMP and NN-NEPL international NGOs participate in the exercise of control rights on the ground. Thanks to their financial prowess, they are able to get involved in natural resource management, supplementing or even taking the place of local state units. They may do so in a very visible manner through staff placed with local state units, such as WCS in NN-NEPL, or in more indirect ways, such as CI and TNC in the VCMP.

Another significant change in natural resource governance may originate from the influence of international norms on the exercise of authoritative rights. The exercise of formal authoritative rights is no longer the sole prerogative of central state units, such as China's State Forestry Administration. Instead, international conventions such as the Convention on Biological Diversity and CDM, transnational rules made by hybrid organizations such as the CCBA, and codes of good practice issued by international conservation organizations influence the exercise of authoritative rights. Their influence speaks to the globalization of natural resource management, whether it is in biodiversity conservation (Rodríguez *et al.*, 2007) or forestry (Lyster, 2011; Suiseeya & Caplow, 2013).

It remains to be seen how the involvement of international NGOs and influence of international norms connects with centralizing and decentralizing forces in natural resource governance. It has been argued that international initiatives, particularly REDD+, may reinforce (re-)centralizing tendencies in governance (Milne, 2012; Phelps *et al.*, 2010; Sandbrook *et al.*, 2010). Our insights from the VCMP indicate how internationalization may bolster centralized governance arrangements: the involvement of TNC/CI closely follows the line of command within China's state structures, and the CCBA certification did not lead to significant involvement by villagers. Yet, the involvement of international NGOs and effects of international norms may also help to counterbalance centralizing forces and change power structure, as indicated by NN-NEPL. There WCS assumes an important role in creating new linkages between resource management on the ground and policy-making in the capital, and introducing international norms which seek to strengthen villagers' rights.

## 6. CONCLUSIONS: COMPENSATED EXCLUSIONS?

The insights derived from the three governance arrangements indicate the analytical power of the updated property rights framework although they are not generalizable in a statistical sense. The framework offers a bottom-up perspective on actual practices and relationships in natural resource governance that is applicable to a wide range of natural resources and geographical contexts. It considers a large diversity of actors at local, national, and international levels and the increasingly common provision of indirect benefits. It is able to capture the emergence of new types of rights, in particular use rights arising from the provision of indirect benefits and authoritative rights defining the scope of control rights. The framework is sufficiently simple to allow comparisons between governance arrangements in different sites, and identify similarities and differences among them. It simultaneously offers a lens that is differentiated enough to open up black boxes commonly encountered in research and policy, such as simplistic categories of ownership, common property, and state.

Application of the updated property rights framework to three governance interventions in East Asia suggests novel transformations of natural resource governance. It is nothing new to note that local people remain excluded from the exercise of control and authoritative rights (e.g., Ribot *et al.*, 2006). Nor does it surprise that villagers' rights to direct uses are restricted to secondary benefits (e.g., Edmunds & Wollenberg, 2003). However, increasing reliance on the provision of indirect benefits may be a novel transformation, particularly if local people's access to these benefits may over time give rise to enduring indirect use rights. However, access to indirect benefits may or may not develop into use rights over time, and these indirect use rights may be of variable strength and enforceability since they remain amenable to revision by policy-makers.

Our empirical insights from China and Laos suggest the possibility of a wider trend of "compensated exclusions" in natural resource governance. As villagers remain excluded from the exercise of control and authoritative rights, they may gain access to various indirect benefits to complement their limited rights to direct benefits and, possibly, compensate them for their exclusion from control and authoritative rights. The provision of indirect benefits and development of indirect use rights may work to reinforce the exclusions if indirect benefits are seen as a form of compensation. Compensated exclusions differ from other trends observed in natural resource governance, such as privatization (Mansfield, 2008) and "green grabbing" (Fairhead, Leach, & Scoones, 2012; Mahanty *et al.*, 2012; Mahanty *et al.*, 2013). Compensated exclusions do not involve local people's outright dispossession from natural resources but exclude them from direct resource benefits and governance in other ways—yet simultaneously seek to compensate their losses through the provision of indirect benefits.

Other novel transformations may originate from the changing influence of international actors and norms on natural resource governance. Our empirical insights indicate the possibility of two new pathways through which international actors and norms affect governance on the ground besides their direct involvement in the exercise of control rights (e.g., by operating protected areas together with state agencies). First, an increasing set of international norms, including inter-state agreements, voluntary standards and codes of good practice, influence national governments' exercise of authoritative rights. The REDD+ agreements under the United Nations Framework Convention on Climate Change, the Convention on Biological Diversity, the Forest Stewardship Council and the guidelines issued by international conservation organizations are just a few examples. Common to all these agreements and norms seems to be the attempt to influence the exercise of authoritative rights over natural resources for example through minimum environmental standards (Ribot *et al.*, 2010). The other new pathway consists of efforts by international organizations, including NGOs, consultancies and traders, to establish use rights to indirect benefits. International actors not only seek a share in indirect benefits but also work to get their shares institutionalized as indirect use rights in various forms, such as through institutional overheads in PES, brokerage fees in voluntary carbon markets, and operational costs in REDD+ actions (cf. Corbera & Brown, 2010).

These findings indicate the practical benefits of applying the updated property rights framework to analyzing PES and REDD+. PES and REDD+ may provide unprecedented pay-

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ments to local people, and these may be viewed as important incentives for enticing their compliance with management restrictions, or means to cover opportunity costs (Stern, 2007; Wunder, 2005). Yet, considering them as compensated exclusions would highlight the importance of looking beyond payments to consider villagers' role in the exercise of control and authoritative rights (Beymer-Farris & Bassett, 2012; Leggett & Lovell, 2012). Attention to the involved exclusions would suggest the need for efforts to enable villagers' participation in PES and REDD+ design and implementation through collaborative forms of policy-making and participatory resource governance on the ground. Or to put it more crudely, making PES and REDD+ work depends not only on getting the level of payment right and identifying the correct recipients but also on involving local resource managers in design and implementation in a meaningful manner.

Our final point is about the effects of compensated exclusions on the sustainability of natural resource use. Understanding the effects of governance on resource use was a key concern in Schlager and Ostrom's (1992) article. The article, together with many local case studies preceding and following it, establishes the hypothesis that the sustainable management of common pool resources requires that local people possess not only use rights but also control rights (Agrawal & Ostrom, 2001: 492, 508, Chhatre & Agrawal, 2009). If correct, the hypothesis does not bode well for the potential of compensated exclusions. What incentive would local people have to conserve natural resources except the expectation of future compensation? What would happen once the payments pause or stop? Natural resource governance may require local people's involvement in the exercise of control and authority in order to facilitate sustainable natural resource use.

## NOTES

1. Previous efforts toward updating Schlager and Ostrom's conceptual schema include those of Mohammed and Inoue, 2014a, 2014b who analyze decentralization in natural resource management by incorporating directly Schlager and Ostrom's (1992) different types of property rights into Agrawal and Ribot's (1999) framework of Actor-Power-Accountability.

2. The title of our paper mimics the title of Schlager and Ostrom's article to acknowledge the intellectual legacy.

3. We do not repeat the definitions of the five rights here for reasons of space, and because we do not want to duplicate the discussion below. Also, as noted by Schlager and Ostrom (1992), *de facto* property rights originate not only from the state (*de jure* rights) but also from other kinds of legal systems, such as various forms of customary rules.

4. Our argument on policy-based entitlements is different from contemporary work on how carbon forestry and emissions trading may commoditize carbon and thereby create "new forms of exchangeable property" (Corbera & Brown, 2010: 1739; see also Mahanty *et al.*, 2013).

5. We prefer the term "control" over Schlager and Ostrom's (1992) "collective-choice rights" because control emphasizes the political dimensions of these rights and resonates with the common distinction between access to natural resources and control over access (Ribot & Peluso, 2003).

6. For example, Agrawal and Ostrom acknowledge that "for communities to possess collective choice-making capabilities, some rules at a constitutional level [. . .] must give them this authority" (2001: 489; see also Ostrom, 1994). The neglect of third-order rights is a thread running through Ostrom's work. Social actors exerting more direct influence on resource governance are considered to be "external authorities", which may threaten villagers' autonomy to "determine access and harvesting rules without external authorities countermanding them" (Ostrom, 1999: 4). It may be due to this blind spot that her empirical results on the influence of autonomy on collective action have been inconclusive (Poteete & Ostrom, 2004: 15–16).

7. We take this term from Jesse Ribot's work on decentralization in natural resources management (e.g., Ribot *et al.*, 2010:4).

8. We acknowledge two challenges faced in the research. First, capturing actual rights was difficult for uses deemed illegal, in particular hunting in NN-NEPL. In response, we supplement our data with preliminary insights gained from interviews, food diaries and plot interviews by Neil Dawson and Laura Rasmussen in 2014. Second, although we spoke to all kinds of villagers (of different wealth, status, ethnicity, gender, etc.) we realize that a full understanding of differentiated rights would require further study. Our results suggest that villagers generally held similar understandings of the applicable property rights and possessed the same types of rights, causing us to speak of "villagers" and "farmers" in the following discussion. Yet, we are aware that in-depth research may reveal contestations among villagers hidden from our view.

9. Two basic types of land use certificates are delivered to smallholder farmers in China. Agricultural land use certificates entitle farmers with rights for 30 years, while forestland use certificates grant rights for 70 years. The latter long-term contract is expected to encourage smallholder investment in forestry (He, 2012). Whereas both certificates entitle farmers to a range of property rights, including land transfer, inheritance and mortgaging, they also establish that forestland cannot be used for agricultural purposes (He, 2012). Within the SLCP framework, farmers' agricultural land use certificates are changed to forestland use certificates once afforestation of the agricultural land is complete (He, 2014). Thus, it becomes impossible for farmers to convert the land back to an agricultural status.

10. The administrative village (e.g., Pingzhang) is the lowest level in China's administrative hierarchy, followed by the township, county, prefecture, province and central level.

11. TNC/CI initially conceived of the pilot as a reforestation project under the CDM but subsequently re-oriented it toward the voluntary carbon market, for which they sought the CCBA rating.

12. For example, the country forest department and TNC/CI knew that they had to select deforested land for reforestation that had been barren for at least 20 years.

13. Note that the material benefits are much lower in the pear plantations established in the first round of SLCP implementation in Pingzhang.

14. Does the amount of indirect benefits suffice to compensate villagers for losses incurred from the land use restrictions? Answering this question goes beyond the scope of our research. The evidence available to us on both the VCMP and NN-NEPL indicates that the value of indirect benefits does not compensate villagers fully. This would match observations made in other comparable interventions (To *et al.* 2012 on PES Vietnam).

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