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“Hybrid institutions”: applications of common property theory beyond discrete property regimes

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Abstract: Property rights theory has contributed a great deal to global understanding of the factors shaping the management, governance and sustainability of discrete property regimes (individual, State, commons). Yet as the commons become increasingly altered and enclosed and management challenges extend beyond the boundaries of any given unit of property, institutional theory must extend beyond discrete property regimes. This paper argues that as natural resource management challenges grow more complex and interconnected, common property theory in the Ostrom tradition remains an essential component of successful management solutions – for common pool resources, public and private goods alike. Building on the commons and externality literature in general, and the Ostrom and Coasean traditions in particular, we propose the use of the term “hybrid institution” to explore the governance of common or connected interests within and between diverse property regimes. Following a general introduction to a set of propositions for encompassing this expanded realm of application of commons theory, we use the literature on integrated natural resource management to frame the scope of “commons” issues facing rural communities today. Empirical and action research from eastern Africa and logical arguments are each used to illustrate and sharpen the focus of our propositions so that they can be tested and refined in future research. This analysis demonstrates the instrumental potential of the concept of hybrid institutions as a framework for shaping more productive engagements with seemingly intractable natural

resource management challenges at farm and landscape scale. Our analysis suggests that central elements of the Ostrom and Coasean traditions can be complementary explanatory lenses for contemporary resource conflict and management.

Keywords: Common pool resources, common property regimes, externalities, hybrid institutions, self-organization, tenure

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1. Introduction

The relative role of the state, individuals and collectivities in governing common pool resources has long been a subject of debate. These debates have often hinged on an assumption of neat boundaries between different forms of resource tenure (public, private, communal). While there is a growing body of literature acknowledging the linkages and blurred boundaries between discrete property types, rights holders and property regimes¹ (Vondal 1987; Bruce et al. 1993; Geisler 1993; Ostrom 1994; Quiggin 1995; Schmid 2001; Fairfax et al. 2004; Shahar 2008; Sikor 2008b), these categories continue to frame many of the academic debates on natural resource tenure and governance. In this paper, we argue that many contemporary natural resource management challenges do not fall within neatly inscribed units or categories of resource ownership or governance, but are characterized rather by their interdependencies. By their very nature, these challenges require collective solutions. We therefore explore the applicability of the theory of the commons – namely, the properties of self-governing institutions² – for fostering collective responses to these challenges.

¹ We define property regime as “a particular set of arrangements regulating the preservation, maintenance, and consumption of a resource.”

² While the use of the term institutions in this paper and the definition provided by North (‘institutions are rules of the game in a society, or more formally, are the humanly devised constraints that shape human interaction’ – North 1990) are consistent, we take a polysemous approach – incorporating the notion of “decision structures,” as in Ostrom (1994).

Drawing on our prior fieldwork for illustrations, we show that a host of “commons-type” natural resource management problems persist despite widespread awareness and concern among resource users. We explore the nature of incentive structures behind the status quo, and explore alternative governance arrangements that would be required to produce equitable and economically efficient outcomes. We argue that a productive way forward lies on the interface between two areas of scholarship: the governance of common pool resources (Hardin 1968; Ostrom 1990) and the governance of externalities (Pigou 1932; Coase 1960). These scholars laid out detailed arguments in support of privatized vs. collective governance of the commons, and for autonomous (free market or contract-based) vs. hierarchical (state regulatory) governance of externalities. This paper introduces the concept of “hybrid institutions,” which we define as *an institutional arrangement³ governing the interdependencies among discrete property holders and regimes*, whether defined by structure (linkage among entities with jurisdiction over discrete property regimes) or mode of governance (balance between self-organization and formal regulation as complementary instruments of governance).⁴

Following a theoretical overview of the key debates characterizing the governance of common pool resources and externalities, we pose a series of propositions for testing through future research. We then use a set of logical arguments and empirical data to explore how these propositions hold up under scrutiny. We finish with a discussion of the implications for natural resource scholarship and governance.

2. Governing common property resources and externalities: past framing

The property rights literature in political science and economics describes open access resources as being governed by a *res nullius* property regime (ownerless and generally free to be owned). Two policy implications have been derived from the existence of such a regime: the need for privatization to facilitate exclusion, and direct government intervention and control of the resource in question to prevent the destruction of its value through overexploitation (see, for example, Jodha 1984). These two scenarios are perhaps best embodied in the classical debates between Hardin and Ostrom on the one hand, and by Pigou and Coase on the other. The first may be described as a debate over the viability of individual vs. common property regimes, and the second over the relative importance of spontaneous market-based vs. regulatory approaches to governing property rights.

³ Davis and North (1971) define institutional arrangement as “an arrangement between economic units that governs the ways in which these units can co-operate and/or compete”.

⁴ This usage is similar to the definition employed by Sikor et al. (2008), who observe the emergence of hybrid institutions connecting public and private actors, actions, resources and property rights in natural resource governance.

2.1. Governing common property resource regimes (Hardin vs. Ostrom)

In discussing common property, it is important to differentiate between the properties of the resource, the ownership of that resource and the institutions governing resource use and management (NRC 1986). The primary observation featured in the literature with regards to the resource itself is the properties of the resource that shape the likely effectiveness of different forms of ownership and governance. Berkes et al. (1989), for example, define common pool resources as a class of resources for which exclusion is difficult and joint use involves subtractability⁵ (Berkes et al. 1989). Common examples include rangeland resources, forests, fisheries, water and wildlife (Feeny et al. 1990). Resource ownership, on the other hand, may be classified as public, private or communal, based on the characteristics of the rights holder – whether the state, individuals or collectivities. Finally, the term “property regime” refers to a particular set of arrangements regulating the preservation, maintenance, and consumption of the resource. The most common distinction in this regard is between open access and restricted access regimes as applied to common pool resources, in which the former lack any clearly defined property rights and the latter are characterized by a set of institutionalized rules governing behaviour. The tendency to confound the resource with the property regime has led commons scholars to draw a clear distinction between common pool resources (the good) and common property regimes (the system of governance).

According to Hardin’s seminal paper *The Tragedy of the Commons* (1968), the open access and unrestricted demand for a finite good in common pool resources inevitably leads to over-exploitation, requiring enclosure or privatization of the commons. This parable has had a remarkable impact on both policy debates and academic enquiry into natural resource management. While definition and description of the problem of managing resources characterized by non-exclusive property rights and conflict predates Hardin’s story by many years, it remains the central story by which the problem has been examined.

The assumption of the inevitability of resource degradation under common property regimes has been extensively critiqued by Elinor Ostrom and colleagues. The Ostrom tradition has clarified how groups of users can create institutions to fulfil a set of functions required for managing resources sustainably – exclusion, allocation among users, and conditions of transfer – in situations where individual property rights fail to carry out these functions. By studying a large number of case studies from traditional common property regimes across the world, they have distilled a set of features common to institutions that have proved effective in ensuring the sustainable management of common property resources. These include a clearly defined community of resource users; a clearly defined resource; the presence of clearly defined rules clarifying rights, responsibilities and sanctions for non-compliance; effective monitoring systems; “graduated” sanctions matched

⁵ Subtractability is where the level of exploitation by one individual directly affects what is available for other users to exploit.

to the level of the offense; conflict resolution mechanisms that are cheap and easy to access; minimal recognition of rights to organize; and systems for adaptive management (ability to modify rules as the need arises) (Ostrom 1990; Pandey and Yadama 1990; Wittayapak and Dearden 1999). Each of these factors plays an important role in influencing levels of mutual trust as well as expectations of what may be gained through cooperation (Blau 1964; Burns et al. 1985). Determining what makes collective management possible and effective – both in terms of the nature of the resource and the nature of human institutions – has been a fertile area of scholarship. What emerges out of this dialogue is an understanding of the institutional requirements of sustainability for different property regimes under “archetypal” natural resource management challenges (Table 1).

2.2. Governing the social effects of private property: externalities (Coase vs. Pigou)

The accepted economic model demands individualization of control over resources. This then requires individualized private property rights. But the imperative to divide control over resources among atomistic agents is, at the same time, the mechanism responsible for creating some of the limitations of that very same model. Through atomization, the number of borders among economic agents increases, thereby amplifying transaction costs and hence contributing to the generation of externalities.

– Vatn and Bromley 1997, 146

The second debate revolves around the realization that actions of one or more economic agents may cause uncompensated physical and/or economic effects

Table 1: Institutional foundations to sustainability under diverse forms of property for “archetypal” NRM challenges.

Form of resource tenure	Institutional requirements for sustainability
Private	The incentives of private ownership will ensure individuals invest in long-term returns on their property. State action is required only to regulate and protect property rights
Public	The state will ensure sustainable natural resource management through the unambiguous allocation of use rights and enforcement of regulations
Communal	Effective self-governing institutions are required (and sufficient) for managing common property resources sustainably due to their ability to exclude. Key institutional features include: <ul style="list-style-type: none"> • Collective choice rules (locally formulated rules governing the distribution of rights and responsibilities) • Graduated sanctions (enforceable punishments for non-compliance with collective choice rules, matched to the level of the offense) • User group (and resource) that is of manageable size and clearly bounded • Anticipated benefits of self-organizing are equal to or greater than the costs • Conflict resolution and adaptive management mechanisms

(positive or negative) for others, giving rise to externalities. Standard examples are the harmful effects of a factory's smoke on those occupying neighbouring properties, stray cattle which destroy crops growing on neighbouring land, or damage to surrounding woods caused by sparks from railway engines (Pigou 1932; Coase 1960). There are two main traditions which have defined the approach to externalities – the Coasean and the Pigouvian. Both scholars concur that if self-interest does promote economic welfare, it is because human institutions have been devised to make it so (Coase 1960). However, they differ on the institutional mechanism involved. Pigou, in *The Economics of Welfare* (1932), argues that governments can correctly perceive market failures or “internalize externalities” by making the actor causing the negative effect liable for the damage caused. “Pigouvian taxes” – fees levied to correct the negative externalities of a market activity, which operate through compensation for damages and/or incentives for curtailing the activity – are named in his honour. Pigouvian taxes are just one of an array of potential policies that result from the central idea that government intervention in the functioning of markets is necessary to correct externalities.

Ronald Coase, in his 1960 article *The Problem of Social Cost*, argues that this approach ignores the “reciprocal nature” of the problem. His main concern is in regards to the presumptive entitlement of the party being harmed. Coase argues that avoiding harm to party B would also inflict harm on party A, and that the real problem is to avoid the more serious harm. In devising and choosing between social arrangements, Coase argues that one should have regard for the *total effect*. Coase and many influenced by his writing are convinced that government is likely to do a poor job of correcting externalities for many of the same reasons they exist in the first place – limited information about the valuation that heterogeneous individuals place on the resource, and a resulting inability to “correctly” impose incentive-driven or regulatory solutions. Take the example of a farmer whose runoff affects a downstream neighbour. In order for government to impose an efficient corrective policy, the cost to the farmer of controlling runoff and the economic cost of the negative “downstream” effects must be known. Both parties in this example have incentives to misrepresent those costs. The government agency with responsibility must then craft, implement, and enforce a solution that affects the economic well-being of both parties. It has often been argued that the information and administrative burden can be large relative to the potential gains from correcting the externality. The path forward in the Coasean tradition lies in understanding how a set of individual property rights can be assigned and enforced in a way that minimizes the transaction costs of making decisions about the way a resource is used. Once these rights have been established, the argument goes, the natural logic of markets and self-interested profit maximization will result in an economically “efficient” management of the resource. Coase argues that economic efficiency “requires determining which party could change behaviour most cheaply. On this view, the responsible party

should be the one whose modified situation is cheapest for society to bear” (Vatn and Bromley 1997, 139).⁶

It is important to note here that even though resources used in the creation of externalities may be owned exclusively by a single entity, externalities connect two distinct units of property and/or forms of tenure in a causal relationship. The clearly bounded forms of resource tenure in Table 1 seem to break down. Recognition of the reciprocal nature of externalities would seem to require a qualification in the institutional requirements for sustainability for private property – namely, that self-organization (or in economics parlance, “bargaining”) among the involved property owners is required in the management of social costs or externalities, due to the limitations faced by government in correctly imposing incentive or regulatory solutions.

2.3. Implications for property rights and institutional theory

By restricting property rights theory to discrete property regimes, a whole array of “commons”-type problems associated with the relationships between (like and unlike) property regimes is missed. So, too, are the myriad of informal means through which diverse property types, decision-making units and property regimes interact (Dahlman 1980; Vondal 1987; Geisler 1993; Sikor 1998b; Raymond and Fairfax 2002). Furthermore, we risk losing the explanatory power of common property theory for a whole set of problems characterizing contemporary landscapes – where externalities and economic inefficiencies resulting from non-cooperation and aversion are the norm. As a result, opportunities for theory of the commons to contribute toward socially-optimal (“just”) and economically logical (“efficient”) solutions are largely lost. We argue that the in-depth understanding gained from the commons literature on the institutional requirements for sustainable natural resource management (e.g. the underpinnings of individual incentives to cooperate) has a great deal to offer problems defined by the interactions among discrete property regimes and the move toward more equitable and economically efficient outcomes.

In the next section, we pose a set of testable propositions that can help capture the opportunity for synergy among Ostrom and Coasean traditions and the realm of theory that lies in the interaction among discrete property holders and regimes. In order to operationalize these propositions, we introduce the concept of “hybrid institution” as it applies to property rights theory. One of the most common uses of the term “hybrid” is by the economist Williamson,

⁶ The lack of universal applicability of Coasean solutions to large externality problems has been well-established – problems of free ridership and high transaction costs create insurmountable barriers to spontaneous efficiency improving agreements for externality problems involving large numbers of people and complex chains of causation. Our intent is not to idealize Coasean solutions, but to emphasize the positive aspects of the paradigm in situations where resource conflict takes place on a political and geographical scale where negotiation is possible – which includes many contemporary conflicts in the developing world.

who defines three generic forms of governance within the private sector: spot market, hybrid, and hierarchy or firm (Williamson 1991a,b; 2002). Spot markets, characterized by “faceless transactions and spontaneous order in the market” (Williamson 2002, 6), are the least cumbersome. However, they are ineffective for addressing conflict between bilaterally dependent parties, for which intentional support via hierarchy (internal organization in the form of firms) or hybrid contracting (contractual frameworks that may be interpreted adaptively as learning and change occur) is warranted. Given the transaction costs associated with heavy administrative requirements, “the efficient governance response to added needs for cooperative adaptation is to first move transactions from spot markets to hybrid contracting and, if unmet needs for added coordination persist, to hierarchies” (Williamson 2002, 12).

The notion of hybrid institutions proposed in this paper is not the middle ground between markets and hierarchically structured transactions. Rather, it is an institutional arrangement governing the interdependencies among discrete property holders and regimes. Several parallels may, however, be drawn between modes of governance in the private sector and the management of interdependencies among (similar or distinct) property regimes. First, the degree of intentional ordering of relationships is gradual, and has a direct bearing on transaction costs of governance. Secondly, the hybrid may be seen as a “compromise mode of governance for managing bilateral dependency”, minimizing transaction costs of “hierarchical” organization but also facilitating cooperative adaptation (Williamson 2002, 12). Thirdly, while “hierarchy” is defined differently (internal organization of market transactions in the form of firms in one case, and State intervention and control on the other), it is considered by both to be an organizational form of last resort – increasing transaction costs, but necessary if unmet needs for added coordination persist (Williamson 2005). Finally, as illustrated by the case study material below, the functioning of hybrid institutions often depends on the creative combination of autonomous (market), self-organizing (contractual), and state regulatory (hierarchical) approaches to the governance of interdependencies.

3. Theoretical propositions

The central arguments in this paper are framed around a set of propositions. These propositions are posed both to expand the current framing of “commons” issues so as to reflect the realities of contemporary landscapes, and to enable empirical testing of the arguments advanced through either case studies grounded in logical arguments or action research experiments.

3.1. What is governed?

As discussed above, the conventional definition of common pool resources is a class of resources for which exclusion is difficult and joint use involves subtractability (Berkes et al. 1989). Often associated with common property regimes, the “commons” are generally considered as *communally-owned* and

managed *natural* resources or territories. We argue that the definition of the commons should expand to include: (1) common or connected interests within other forms of property (public, private); (2) the interdependencies among discrete units or forms of property (public-private-communal), including externalities; and (3) other types of common goods that are not forms of natural capital, but nevertheless influence natural resource management. This builds upon the work of authors who have illustrated the prevalence of other forms of property within the commons (Dahlman 1980) and those illustrating the interpenetration of public and private property (Geisler 1993; Sikor 1998b).

Proposition 1 – Contemporary landscapes are characterized by a host of natural resource management challenges involving common or interconnected interests among users which fall outside the realm of – but nevertheless share certain properties and institutional challenges with – common pool resources⁷ and common property resource regimes.

Proposition 2 – Crucial elements of the commons literature – most notably, the principles of self-governing institutions for sustainable management of resources where conflict (or the potential for conflict) exists – provide valuable contributions to conceptualizing and addressing contemporary resource and environmental problems outside the realm common property regimes.

3.2. Who governs?

The standard analysis of governance arrangements from the property rights and economics literature places emphasis on singular entities in the management of natural resources. While for Hardin the solution to common pool resource management lies in the individual or the State, the work of Ostrom and colleagues emphasizes the potential of self-governing institutions (communal governance). Similar debates have characterized the literature on governance of externalities, with the Pigouvian tradition arguing for government regulation and Coase inspiring support for private or market-driven solutions. While government has a crucial role to play for Coase (assigning and enforcing individual property rights), the focus is rather on the limitations of government knowledge and foresight in designing effective incentives or regulations to guide individual behaviour. We argue that the nature of contemporary natural resource conflicts, inequities and inefficiencies, as well as the deficiencies of unitary institutional arrangements in many contexts, often require compound or “hybrid” governance regimes involving complementarities among individual, State and communal governance (see also Dahlman 1980; Geisler 1993; Fairfax et al. 2004). In other words, too doctrinaire a commitment to self-organization or unitary forms of governance may overlook other governance arrangements that in combination might work better.

⁷ Those characterized by subtractability and difficult exclusion.

Proposition 3 – “Hybrid” governance arrangements involving two or more entities (individuals, the State, local institutions), and integrating self-organization with more regulatory approaches, can be more effective than self-organization within any given property regime for governing contemporary environmental challenges under the conditions of weak governance characterizing large areas of the developing world.

This compound proposition highlights the need to bridge institutions governing discrete units of property in order to address the expanded scope of natural resource management problems, while also recognizing that self-organization may not be effective under all circumstances. The insight that cooperative governance negotiated within a group can lower the costs of exclusion and enforcement, produce specialized knowledge about the resource being governed, arrange effective compensation, and generate compromises effectively is necessary but not sufficient for (many) contemporary resource conflicts. State participation may be needed to aid in exclusion, provide technical assistance and legal certainty to self-governance solutions, or provide clarity on the governance regime that the state will recognize if no mutually agreed management solution can be found.

This proposition builds upon the work of Victor Ostrom (Ostrom et al. 1961; Ostrom 1994) on polycentric systems, in which there is a ‘division of labour in the exercise of authority relationships applicable to rule-making (legislative authority), rule enforcement (executive authority) and monitoring performance (accounting, auditing, and investigative authority)’ and ‘binding authority depends on concurrence among multiple decision structures’ (Ostrom 1994). Yet in this application, polycentrism must extend beyond a division of labour among diverse government agencies to include “clubs” and “polity-forming” forms of governance (Skelcher 2004) in order to capture the self-organizing and government-public hybrids, respectively.

3.3. How is it governed?

Our analysis points in directions other than those we as economists normally follow... issues such as moral commitment, collective standards, social norms, and network processes may attain a higher position in the understanding of externality policy.

– Vatn and Bromley 1997, 148

As specific governance solutions must be adapted to context, the next proposition focuses on the generic *properties* of governance arrangements that can ensure sustainable management of an expanded set of natural resource management or “commons” challenges. We argue that in addition to certain governance features known to apply to common property regimes (rules clarifying rights and responsibilities, graduated sanctions, keeping costs within the scope of anticipated benefits), additional features are needed to manage an expanded scope of contemporary natural resource management challenges.

Proposition 4 – “Hybrid” approaches that build upon the principles of self-governing institutions⁸, but link discrete units of (like or un-like) property and combine self-organization with more formal regulatory approaches, hold more promise for addressing many contemporary “commons” problems than self-organization within discrete property regimes.

Factors contributing to undesirable but widespread natural resource management behaviours include the perceived or real costs associated with shifting to alternative management scenarios and the resulting outcomes in the control and use of resources; and the absence of effective enforcement mechanisms to support existing or new rules and regulations. Economic costs of shifting to more desirable or equitable natural resource management behaviours may be in the form of transaction costs (Vatn and Bromley 1997) or of economic losses associated with the shift to alternative resource management arrangements (Coase 1960; German et al. 2006a). There is therefore a need to minimize the economic costs of governance arrangements to enable feasible solutions to relatively intractable natural resource management challenges. Considering the reciprocal nature of “social cost” in the governance of externalities (Coase 1960) could be one way of addressing the perceived cost of improved governance. Hybrid solutions may have an important role to play in minimizing transaction costs or enhancing enforceability of State laws or collective choice rules. Hybrids that include elements of private property regimes also have the potential to facilitate compromise in the form of (full or partial) compensation for parties who may lose from a move to more fair or efficient outcomes.

4. Testing propositions: empirical and logical arguments

In the next three sections, empirical and logical arguments are leveraged in support of each of the four propositions. The empirical material is derived from action research carried out in 2003 (diagnostic work), 2004 and 2005 (action research) in long-term ecological research sites managed by the African Highlands Initiative (AHI), an ecoregional programme of the Consultative Group on International Agricultural Research (CGIAR). One of the authors (German) was directly involved in supporting national teams of scientists and development partners to identify natural resource management concerns of local actors beyond the farm level, to draw on theory to design an approach for facilitating local communities and interest groups to devise their own governance solutions to problems of local concern, and to support the observation and documentation of lessons and findings.

4.1. Propositions 1 and 2 (What is governed)

We explore the first proposition related to “what is governed” through analysis of the results of a participatory diagnosis of landscape-level natural resource

⁸ For example, rules clarifying rights and responsibilities, graduated sanctions, keeping costs within the scope of anticipated benefits.

management problems carried out by AHI in sites distributed throughout the eastern African highlands (German et al. 2006b; 2008). Posing a common set of questions to socially-disaggregated focus groups of farmers (selected on the basis of gender, wealth, age and location of their plots on the landscape), landscape-level NRM concerns of local residents in select sites of Ethiopia, Kenya and Tanzania were identified (see German et al. 2006c for the methodology). From this analysis, it is clear that there are many natural resource management challenges which remain unaddressed *despite* widespread local concern and understanding about these issues. In other words, lack of knowledge or awareness of natural resource degradation is *not* the fundamental problem – despite the abundance of rhetoric in development circles suggesting this to be the case.

While the host of issues identified may be classified in any number of ways, it is clear that the following categories of natural resource challenges occur frequently:

1. *Problems associated with common pool resources.* Examples include degradation of springs and waterways (affecting both water quality and quantity); degradation of communal rangelands from overgrazing; poor distribution and theft of irrigation water; failure to maintain irrigation infrastructure; failure to maintain village roads; loss of biodiversity (indigenous trees, crops and fodder); and fires and theft in community forests.
2. *Problems associated with common or interdependent interests connecting discrete units of (public or private) property.* Examples include the effects of neighbours' land use practices on the prevalence of pests, diseases and weeds (which easily spread across farm boundaries); destruction of property from uncontrolled burning on neighbouring plots; loss of soil, seed, fertilizer and property due to excess run-off from upslope plots; negative effects of fast-growing boundary trees on adjacent farmers' fields; crop destruction from freely grazing livestock (in areas where livestock are otherwise zero grazed); lack of respect for farm boundaries; and theft of private property (crops, fodder) from neighbours' fields. These diverse examples are similar in their failure to meet one or both of the characteristics known to characterize common pool resources – subtractability or difficult exclusion – while still representing examples of resource conflict, inequity or inefficiency among an interdependent set of actors.
3. *Problems associated with interdependencies among “un-like” forms of property (public-private-communal).* Examples include encroachment of individual property on the commons (rangelands, forests, paths, roads); relationships among property regimes linked temporally (e.g. open access grazing and dung collection on communal land that becomes private cropland during the rainy season, affecting crop productivity); degradation of common property resources from practices carried out on individual land (e.g. spring degradation from use of pesticides or cultivation of ‘thirsty’ trees); crop

destruction from freely grazing livestock (in areas where livestock are otherwise grazed in communal areas); “illegal” use of protected area resources and conflict between protected area officials and local communities; negative effects of trees used by the government for road stabilization on adjacent cropland; conflicts associated with paths or cattle tracks passing through individual property; deliberate destruction of water sources located on private property; and problems associated with land privatization (e.g. inequitable access by women and the poor).

4. *Opportunities lost through failure to cooperate in governing other types of resources.* While most of the above challenges may be said to represent opportunities lost through failure to act collectively, there are a host of issues that do not reflect problems *per se* – but for which greater benefit or efficiencies would be achieved by acting collectively. Many of these apply not to land (natural capital), but to other forms of capital that help to capture value from property rights associated with land and natural resources. These include collective investments in infrastructure which would save time or money or raise productivity (e.g. community mills, irrigation canals and dams, terracing, community bull centres); cooperation in accessing input or output markets; cooperation in community works (schools, roads); collective governance of exogenous development resources for more widespread benefit (e.g. managing the bias toward wealthy, male farmers exhibited by agricultural extension).

Clearly, resource conflicts characterized by common or connected interests are considerably broader than the way that they have generally been characterized in the literature (Proposition 1). They encompass concerns about *diverse forms of property* (public, private and communal); common or connected *interests which connect diverse forms of property*; and the *governance of other forms of capital* (human, financial, physical) that serve as complementary development resources to natural capital.

We argue that many of these challenges exist not due to farmer ignorance, but rather due to the absence of governance arrangements that help translate concern into behavioural change (Proposition 2). Steins and Edwards (1999) and Kerr (2007) suggest that the properties of many watershed issues (high exclusion costs, subtractability) and the need to balance interests both within and across diverse interest groups to generate agreement on regulations about resource access, allocation and control may underlie this gap. Support for this argument in the case study material is indirect. In other words, the very fact that these problems were identified by farmers suggests awareness and concern about them; the fact that they remain unaddressed *despite* this concern suggests an absence of collective choice or formal regulatory arrangements to enable solutions. Support for Proposition 2 can only be addressed by exploring the incentives underlying the status quo and the institutional requirements for solving these problems. The first part of this will be addressed here, and the second part in the sections which follow.

As the first set of natural resource management challenges – those of the “classical commons” – has received the bulk of scholarship on the commons, we focus our discussion instead on the last 3. If we look at the nature of incentives underlying inaction or avoidance in these “other” types of natural resource management challenges (those highlighted in #2 through 4, above), we see that often times, one or more actors is benefitting from a status quo that is otherwise harmful to others – externalities in these densely settled rural landscapes are rife. These benefits can be derived from *not having to invest* in activities that would primarily reduce damages to others. Examples include reducing or channeling excess run-off from one’s fields; adjusting agricultural practices to reduce damage to neighbouring plots from fire, pests or disease; or use of paths that cause one to walk further but do not bring negative effects on cropland. Benefits can also be derived from the *economic advantage* associated with the status quo. This may be seen in the greater economic returns derived from Eucalypt plantations when cultivated near springs; reduced damage to one’s own crops when Eucalypts are pushed to farm boundaries; the economic efficiency associated with freely grazing livestock (e.g. access to cheap fodder, reduced labour invested in feeding); or the benefits derived from hoarding public services for oneself. Finally, a few of these problems may be associated with simple *failure to communicate* and understand the interests of other parties. An example may be seen in the use of “harmful” trees to line public roads, where other trees may be equally suited to road stabilization but minimize harm to farmers’ fields.

4.2. Proposition 3 (Who governs)

While results of empirical research were leveraged in support of Propositions 1 and 2, here we use a set of logical arguments to support the propositions related to “who governs”. As one moves from conventional definitions of the commons to an expanded scope of analysis of common and connected interests related to diverse forms of property, those responsible for making decisions in different property regimes must ultimately interact. For “Type 2” commons characterized by common or connected interests within any given property type (public or private), we can no longer talk of single management entities as we are now dealing with the interconnectedness of discrete units of property of the same type (e.g. the interactions among adjacent units of private property). The same may be said for “Type 3” commons, which are characterized by similar interdependencies but between different types of decision-makers (the State, individuals, collectivities).

Improved management given these interdependencies requires action by either the State (e.g. a regulation governing how damage will be curtailed or compensated) or by the landowners involved (e.g. to negotiate the most economically efficient outcome). Where self-organization among different property owners is possible, institutional parallels emerge with self-organizing institutions governing common pool resources. This supports the applicability of common property theory to a much broader set of NRM challenges and property regimes (Proposition 1).

Where regulation by State actors is involved, “hybrid” governance arrangements will be required (e.g. State – private individuals; State – private individuals – local institutions), supporting Proposition 3. Even where self-organization is possible to govern relations among discrete units of property, the State will often have a role to play in providing legal backing to negotiated agreements or contracts – given the economic costs of enforcement, the free rider problem or the “embeddedness” of emerging governance arrangements in existing social relations (Granovetter 1985). The last of these includes the difficulty faced in sanctioning one’s friends, relatives and neighbours.

One example of this is in the way that users exclude outsiders from access to resources. In cases where collective solutions set limits on the individuals who can make use of a natural resource or an environmental sink, state participation is increasingly required to enforce those limits. In other words, “conflict between bilaterally dependent parties can now arise for which intentional (sometimes hierarchical) support is warranted” (Williamson 1992, 6). This again supports the need for hybrid forms of governance integrating self-organization with more formal regulatory approaches (Proposition 3).

It is clear that “Type 4” commons issues characterized by opportunities lost through failure to act collectively require some form of cooperation among actors – whether spontaneous or regulated. While this supports Proposition 3 in part (the need for hybrid institutions to link individuals, State actors or collectivities), support for “hybrid” approaches linking self-organization with regulation can be less easily supported through logic alone. The vast literature on the effectiveness of self-governing *customary* institutions and the paucity of case studies illustrating how these institutions have been built where previously absent does, however, allude to the challenges associated with building such institutions. Further evidence is needed on the conditions under which self-governing institutions can emerge when faced with contemporary challenges. The increasing impingement of the State and the market on traditional economies and the heightened pressure and conflict over scarce resources (e.g. water) make the spontaneous formation of collective solutions increasingly challenging.

4.3. Proposition 4 (How is it governed?)

In order to explore solutions to the problems which are prevalent despite widespread local awareness and concern, it is instructive to examine the cases in which solutions to these problems have been found. The Ostrom tradition provides both the intuitive story and the intellectual underpinnings for action research into governance institutions for managing natural resources in situations of conflict or lost opportunity among user groups. The idea that effective governance requires both the specialized information that user groups possess and the negotiated development of a set of rules by participants has been productively built into the design of governance arrangements for addressing landscape-level NRM challenges that remain despite widespread local awareness and concern. We

present case studies from action research⁹ where these NRM challenges have been addressed as a means to distill some generic properties of hybrid governance arrangements (Mazengia et al. 2006; German et al. 2008).

4.3.1. Problems associated with common or interdependent interests connecting discrete units of (public or private) property

As illustrated above, a host of landscape-level NRM issues may be characterized by common or connected interests associated with other forms of property – whether private or public. Most of those identified in the eastern African highlands were associated with common or connected interests which create interdependencies among discrete units of private property. One such class of issues concerns pests, disease and weeds which move across farm boundaries. As the land use practices of one farmer may affect the prevalence of pests on other farms, many of these issues may be classified as classical “externality” problems. However, in other cases, the problem may persist due to the simple absence of collective action and governance arrangements for addressing the problem. A case study on porcupine from the Wolaita region of southern Ethiopia helps to illustrate the nature of incentive structures in inaction and elements of effective solutions (Begashaw et al. 2007; German et al. 2008).

The primary objective of action research in Wolaita was to identify effective approaches for mobilizing collective action for porcupine control. As much of the learning in action research takes place during implementation, distilling the critical ingredients to success can often be best done in retrospect – once a problem is solved. In the case of porcupine control, the critical ingredients included:

- The sharing and collective application of previously specialized local knowledge on porcupine control methods;
- Identification of local institutions effective in mass mobilization, and engaging them in a leadership role for mobilizing collective action on specified days; and
- Development of collective choice rules through: (i) facilitated negotiations between different interest groups to generate solutions acceptable to all (with an emphasis on highly affected farmers and farmers less affected by porcupine but whose cooperation is necessary for effective pest control); and (ii) development and formal state endorsement of local by-laws to ‘give weight’ to local agreements and provide an additional avenue for dispute resolution.

Monitoring and data collection were also used to evaluate the effectiveness of the approach. Review of legislation to ensure there are no regulations on porcupine capture or culling was also done, but was not an essential ingredient

⁹ These case studies are derived from the action research phase of the project described above, carried out by one of the authors (German) and her colleagues.

to local problem-solving *per se*. Results included capture of 958 porcupines in a small area, a four- to five-fold reduction of yam and sweet potato damage, and improved health and welfare from reduced efforts in policing fields at night (Begashaw et al. 2007). It is important to note the critical role of collective choice rules for addressing issues connecting private property, and the role of government in endorsing and supporting the application of these rules.

4.3.2. Problems associated with interdependencies among “unlike” forms of property (public-private-communal)

A second set of landscape-level NRM issues is characterized by common or connected interests (“interdependencies”) among “unlike” forms of property. While this set of issues shares many of the features of the above set of issues connecting “like” property forms, the differences in how each party or decision-making entity is defined (whether in terms of numbers or level of influence) may shape the institutional requirements – whether in terms of process or outcomes. Two case studies are discussed here: one connecting private and communal property, and the other connecting private and public property.

The first case study comes from the Galessa highlands of central Ethiopia, where water for domestic consumption is sourced from unprotected springs. According to local residents, they face problems of declining water quantity *and* quality. This case study deals with the former; in particular, excessive water consumption by a Eucalypt wood lot cultivated on private land just adjacent to the spring. Refusal of the landowner to accommodate the needs of the larger community was a source of conflict for more than a decade. The entrenched nature of the conflict meant that the project team was unable to encourage the landowner to come to the negotiating table. Local elders were therefore called upon to use moral persuasion to encourage dialogue. A large community meeting was held in which the mediator ensured the views of both the landowner and the community were listened to. Negotiations proved difficult at first, but the landowner finally offered a concession to protect his relationship with his neighbours: that if all households in the village cultivate one seedling and plant it elsewhere on his farm, he will remove the woodlot from the spring. An agreement had effectively been reached. Yet implementation proved more difficult. While the landowner did harvest a large part of the woodlot nearest the spring, these trees eventually began to coppice. Failure to translate the original agreement into a detailed implementation plan (the “what”, “who”, “where” and “when”) meant that the expectations on both sides had not been effectively voiced or reconciled. During follow-up negotiations, the landowner demanded more from the community while offering less, namely: (i) that others invest all the labour and materials for fencing and establishing the new woodlot; (ii) that he only eliminate the Eucalypts once the new trees are mature; and (iii) that he remove only a portion of the woodlot closest to the spring. Local authorities were brought in to support negotiations drawing on national laws on riparian zone protection, and gestures of reconciliation were again forthcoming. However, the negotiations eventually broke down due to the

landowner's discovery of another law requiring full financial compensation for land investments.

In this case, lessons on what is required to address the problem are learnt by the hurdles faced rather than by what worked. First, negotiation among the different interest groups proved to be an effective mechanism for the development of collective choice rules and for sharing the costs of sustainable management of the resource. Moral persuasion also helped to move the parties toward dialogue – suggesting the potential to leverage the central role of social relations and reputation in shaping economic behaviour (a form of social “embeddedness”) to achieve more equitable and efficient outcomes. Yet dialogue and collective choice rules alone were insufficient for ensuring that agreed solutions were implemented in practice. While by-laws were never formulated to give legal weight to resolutions, this oversight was later compensated for through state involvement in the application of national laws. State involvement was therefore necessary not only to clarify property rights, but for supporting the application of collective choice rules. The latter is most crucial where interests of the two parties are highly divergent.

The second case study comes from eastern Uganda, where the establishment of Mount Elgon National Park required the expulsion of the indigenous Benet from their customary lands. This has caused decades of hardship and resentment between the Benet and government officials. The main objective of this action research case study was to identify an effective approach for improving livelihood and environmental outcomes through improved cooperation between local communities state conservation authorities (Uganda Wildlife Authority). A second objective was to provide a model for protected area co-management that addresses the slide of public property into the “open access regimes” that commonly result when the state lacks resources for enforcement and levels of resentment by local people are high. Early results of the research effort were positive, including the re-negotiation of the suite of “legal” and “illegal” practices (expanding the number of days allowed into the park and resources that can be harvested) in exchange for community commitment to policing the park against those lacking customary rights (Tanui et al. 2007). The following elements may be seen as key to enabling rapprochement following decades of conflict:

- Early gestures of reconciliation (UWA supporting the Benet with technologies to replace resources that had been lost through park establishment, and an agreement by the Benet to respect UWA's “bottom line” of biodiversity conservation); and
- Balanced concessions for the common good (increased access rights in exchange for Benet support to policing the park against outsiders).

It is also anticipated that joint agreement on criteria and indicators for monitoring forest condition and performance of the hybrid governance arrangement, and

active monitoring systems, will be required to sustain these early successes – as illustrated elsewhere (Prabhu et al. 1999).

4.3.3. Opportunities lost through failure to cooperate in governing other types of resources

The final action research case study illustrates the application of common property resource theory to the management of other types of resources – in this case, those that provide complementary values to land and natural resources. This case study is again derived from work done in the Wolaita region of southern Ethiopia, and came about through an inquiry into how local and external institutions shape the distribution of resources within the population. It concerns the strong bias observed in extension agencies toward working with wealthy male farmers.

The main objective of the action research was to develop an effective approach for enhancing equitable access to seed by women and poorer households. As a success case, the key ingredients to improved governance of technologies as exogenous development resources can be distilled in retrospect. These included:

- A shift to low-risk forms of credit in the form of seed repayable in-kind (at harvest);
- Development of collective choice rules through: (i) facilitated negotiations between different interest groups (by gender and wealth) to generate solutions acceptable to all; and (ii) development of local by-laws to ‘give weight’ to local agreements; and
- Use of moral persuasion by local leaders rather than formal enforcement at the time of credit repayment to hold people accountable to their prior agreements while reducing the social costs of enforcement.

Results included improved access to technologies by women and poorer households, improved rates of repayment of credit as compared to the national extension system, and livelihood improvements linked to the specific technologies being disseminated (Mazengia et al. 2006). Once again, we see the role of collective choice rules (producing socially-balanced solutions), moral persuasion (as complementary to formal by-laws) and state support to local agreements (in the form of extension reforms and the threat of rule enforcement) as critical ingredients to success.

Each of these action research case studies illustrates the need for “hybrid” governance arrangements among individuals, collectivities and/or the State. While it could be argued that the “incipient” nature of the case studies and resulting hybrid institutions suggests that these are institutional forms rather than multi-stakeholder arrangements emerging to resolve specific conflicts (Hemmati et al. 2002), these are problems that will not go away with temporally discrete interventions and require the evolution of self-perpetuating institutional innovations. The incipient nature of case studies used to construct a set of arguments (and ‘emergent’ hybrid forms)

should not detract from the unique institutional features that enable the problems to be resolved. It is well recognized by the authors, however, that the forms taken on by hybrids are likely to evolve in the process of institutionalization¹⁰ – and that greater understanding may be acquired through the continuous study of evolving institutional forms. The above case studies also illustrate the applicability of principles of self-governing institutions – previously theorized in the context of common property – to a larger suite of commons-type problems. These include resource users participating in setting rules that affect them, the need for sanctions in support of collective choice rules and the need for these sanctions to be graduated or matched to the level of the offense (Ostrom 1999). These principles are seen in these case studies in the form of the negotiation process, in the resulting by-laws (which specify rights, responsibilities and sanctions for non-compliance), and in the tendency to ignore rules that are either too strict or too loose to be meaningful. In short, these case studies provide support to Proposition 4.

5. Discussion

The case studies illustrate that the evolution of hybrid institutions for the resolution of conflict over resources can simultaneously address issues of fairness and efficiency. Fairness is enhanced by providing a framework within which actors may negotiate self-governance arrangements – solutions arrived at through participation and negotiation are seen as legitimate. The participation of the state as a means of enforcing negotiated agreements is more likely to be seen as protecting fair outcomes than as external imposition of rules under these circumstances. Efficiency – enhanced sustained economic value of the resource – can be substantially improved through hybrid solutions linking individual property, state regulatory functions and common property type institutions. This is shown in the porcupine example, where principles of self-governing institutions (e.g. collective choice rules for the sharing and application of indigenous knowledge, coordinated actions to enhance economic efficiency) were employed to address problems cutting across discrete units of private property and supported through state regulatory functions. Here, successfully avoiding free rider behaviour was the key to addressing the problem, something that would assume increasing importance should such “incipient” institutions become institutionalized. The participation of the state provided assurance and enforcement in the form of formal legal sanctions, allowing the collectively efficient behaviour to manifest itself through increased credibility of collective choice rules. Efficiency is also enhanced in cases where elements of private property and compensation are involved. In the case study on Uganda’s Mt. Elgon National Park, providing the Benet compensation in the form of increased rights to resource use served as effective compensation for their support of, and participation in, the exclusion of outside users of the park’s

¹⁰ As in defined in Jepperson (1991) – namely, the process of attaining a social order or pattern that has attained a certain state or property through its chronic reproduction.

resources. It is also interesting to note that the social effects resulting from the use and exchange of private goods refer to third parties, whereas the social effects resulting from using a good with common pool characteristics involve CPR users that are perpetrators and victims at the same time. The governance of natural resource management problems with unequal effects present greater challenges for finding solutions which all parties can “buy into” due to the fairness problem (namely, balanced distribution of costs and benefits to all parties). This is a curious twist on a theory which has always posed common pool resource challenges as the more difficult to manage on all accounts.

The case studies and discussion suggest a number of important implications for the institutional foundations to sustainability under diverse forms of resource tenure (Table 2). The most important is the need for a more nuanced understanding of the nature of challenges affecting different forms of property, and the need for hybrid-type solutions to a suite of common NRM challenges affecting multiple property units, forms and users.

Table 2: Institutional foundations to sustainability under diverse forms of property for an expanded set of “Commons” challenges.

Form of resource tenure	Theory	Reality	Implication
Private	The incentives of private ownership will ensure individuals invest in long-term returns on their property. State action is required only to regulate and protect property rights.	Trans-boundary effects, and inefficiencies and inequities (due to externalities) of individualized solutions, make collective action essential	“Hybrid” governance regimes among interdependent private property owners (self-organized), plus hybrids with recognized public authority ^a where needed to ensure compliance with negotiated solutions
Public	The state will ensure sustainable natural resource management through the unambiguous allocation of use rights and enforcement of regulations.	Corruption; conflict; management with inadequate information; resentment by holders of customary rights; <i>de facto</i> open access where enforcement is weak	“Hybrid” governance regimes between individuals or collectivities and the state (self-organized or supported by recognized public authority to sanction and enforce)
Communal	Effective self-governing institutions are required (and sufficient) for managing common property resources sustainably due to their ability to exclude.	Rapid change introduces new drivers and challenges, connecting CPR to other actors and exogenous drivers; difficulty of applying sanctions “from within”	Support to adaptive governance through multi-stakeholder processes involving old and new actors to re-negotiate collective choice rules; “hybrid” governance regimes linking common property regime with recognized “public” authority to sanction and enforce

^aAs Sikor (2008a) points out, this may mean the State, but may also extend to political communities or other publically recognized authorities.

While these common principles are instructive, we do not wish to propose any formula for hybrid institutions – this is not a case of including elements of all property regimes as a universal solution to all resource conflicts or inefficiencies. The value of this concept is that it provides a framework for creative approaches that combine the strong points of particular governance arrangements in order to address and overcome the weaknesses of discrete property forms and the regimes governing these. The government’s power lies not in its ability to “correctly” impose incentive-driven or regulatory solutions (a weakness pointed out by Coase), but in its ability to sanction and enforce locally-crafted solutions more likely to derive economically efficient and socially just outcomes. Reciprocally, the lack of ability to enforce collective agreements and exclude outsiders that can plague self-governing institutions (for common pool resources and interdependencies among like and un-like forms of property) can be ameliorated by the State’s authority and resources. The ability to use compensation to make outcomes fair and acceptable to groups that would otherwise be unwilling to support cooperative arrangements can be a key element in crafting economically efficient and socially acceptable solutions to conflict, lost opportunity and unsustainable use of natural resources. None of these approaches is essential in every application, and the way that they are combined will depend idiosyncratically on the people involved, the history of resource conflict, and the characteristic of the natural resource problem itself. Understanding how given combinations of these factors predict the effectiveness of particular types of institutional arrangements would be a productive next step in enhancing the usefulness of the proposed framework to real-life applications.

6. Conclusions

Our main conclusions relate to the set of propositions that have been highlighted and prioritized for further research. First, a much broader set of issues may be productively encompassed with the scholarly insights and lessons from practice found in the commons literature. Ability to find solutions to a host of relatively intractable natural resource management challenges through simple application of principles of self-governing institutions suggests that the fundamental gaps are not ones of knowledge and awareness, but of governance. Several of the case studies illustrate the potential of extending the principles of self-governance to a larger suite of “commons-type” problems, and the potential role of “hybrid” governance arrangements linking decision-making entities with jurisdiction over discrete units and/or forms of property. This was seen in the need to foster governance arrangements among discrete units of private property (as in the case of porcupine control), among different forms of resource tenure (as in the case of private woodlots affecting a communal resource) and among individuals with common interests so as to maximize collective benefit (as in negotiated access to technologies). This approach also shows promise in facilitating the creative combination of spontaneous and regulatory approaches, as seen by the need

for formal by-laws and/or other forms of state support to local agreements to translate agreements into action. We believe that our proposed concept of hybrid institutions offers a useful lens on NRM and is thus a potentially productive area of future scholarship and practice.

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