

International Journal of the Commons

Vol. 12, no 2 2018, pp. 217–250

Publisher: Uopen Journals

URL: <http://www.thecommonsjournal.org>

DOI: 10.18352/ijc.852

Copyright: content is licensed under a Creative Commons Attribution 3.0 License

ISSN: 1875-0281

Catalyzing self-governance: addressing multi-faceted collective action dilemmas in densely settled agrarian landscapes

Laura German

Department of Anthropology and Center for Integrative Conservation Research, University of Georgia, Athens, GA 30605, USA

lgerman@uga.edu

Abstract: This paper summarizes lessons learnt from efforts to pilot institutional innovations to address locally salient natural resource management challenges in the eastern African highlands, where dense human settlement and steep slopes lead to a tight coupling of interactions among adjacent land users, landholdings and property regimes. The collective action problems present in these heterogeneous landscapes include common pool resource dilemmas, as well as other “commons-like problems” involving shared or intertwined interests that cut across a range of property regimes. By creatively embedding design principles derived from long-enduring common property regimes into facilitation strategies, solutions to longstanding, relatively intractable resource management challenges (e.g. pest management, excess run-off) were forged through collective choice arrangements. Solutions involved not just restricting access and creating incentives for users to invest in a shared resource (e.g. through clear allocation of rights and duties), but negotiating creative solutions to match provisioning with diverse forms of benefit or to minimize/offset losses that would otherwise accrue from efforts to minimize harm to others. The paper’s contributions are threefold. First, it illustrates how self-governance is not just a feature of long-enduring common property regimes, but may be catalyzed in many situations in which it is absent. It also illustrates the applicability of Ostrom’s design principles in complex and heterogeneous landscapes involving a diversity of natural resource forms, tenure regimes and collective action problems. Finally, it illustrates the crucial importance of bringing an institutional lens to bear on classic “technological” challenges such as soil erosion control, pest management and on-farm biodiversity conservation.

Keywords: Collective action, eastern Africa, micro-politics, process, self-governance

Acknowledgements: First and foremost, I would like to acknowledge the contributions made by regional research team members in laying the conceptual groundwork for the program as a whole, and by national site teams who collaborated in the design of interventions and facilitated their testing on the ground. While the theorization of the experiences in this article is my own, the design and testing of interventions and documentation of lessons learnt was a broad-based collective endeavor focused at site team level. Furthermore, with linguistic barriers largely restricting my own contributions to the site team level (facilitating planning, accompanying process interventions as an observer, and then facilitating post-process reflection and re-planning), credit for the actual facilitation of community-level processes falls fully to researchers and extension personnel within the respective benchmark sites. As such, this paper is in many ways co-authored by them. The names, areas of expertise and organizational affiliations of 25 core collaborators are profiled in the introductory material for the book *Integrated Natural Resource Management in the Highlands of Eastern Africa: From Concept to Practice* (German et al. 2012), which profiles the methodological and process innovations of AHI's journey from inception. I would also like to acknowledge the intellectual leadership of the late Dr. Ann Stroud,¹ who served as Regional Coordinator of AHI from 1998 to 2006 and provided both direction and inspiration for this work. I would also like to acknowledge Dr. Jürgen Haggmann for instilling in Ann, and indeed all of us, the commitment to “enter the system” rather than study it as detached observers. This work would not have been possible without the sustained financial contributions to AHI from the International Development Research Centre and the Swiss Agency for Development and Cooperation, or the small grant from the Collective Action and Property Rights program of the CGIAR focused on the collective action component of this work. Finally, I would like to thank the insightful comments of two anonymous reviewers and the corresponding Editor-in-Chief, Dr. Michael Schoon.

I. Introduction

Institutions have long been recognized as both driver of and solution to environmental challenges (Hardin 1968; Ostrom 1990; Young 2003). Failure to effectively regulate rates of extraction of renewable resources; to address the exclusion and rivalry challenges of common pool resources; to close loops for non-renewable resources; to limit pollutants to biodegradable materials or keep effluent within the limits of what aquatic ecosystems or the global climate system can absorb; and to reconcile competing interests in land and resources underlie many contemporary resource tragedies (Feeny et al. 1990; Bavington 2010). Problems of fit, or the (in) congruity between ecosystem properties and attributes of the institutions created to guide human interactions with these biophysical systems (Young 2003, 378),

¹ † Died May 2007.

abound. This calls for new types of institutional responses. Institutional reforms are called for not only because institutions are thought to be the sources of these problems, but because institutional solutions provide one of the primary hopes for addressing them (Young 2003).

The work of Ostrom and the wider community of students and scholars whose work speaks to hers have shown how communities of users can self-organize to manage common pool resources sustainably by agreeing among themselves how to regulate resource access and use (Ostrom 1990). Yet it leaves largely unanswered the questions of what happens when these systems break down; whether self-governance is a viable option for addressing emergent environmental challenges at diverse scales; and whether it can be catalyzed where absent. These questions are often asked in scholarship of the commons yet addressed only theoretically (see, e.g. McGinnis and Ostrom 1992; Schlager 2004), while efforts to put design principles into practice in community-based projects tend to lack a research component to harvest lessons learnt. This paper seeks to address these questions while bridging the theory-practice divide by exploring the role of process innovations in catalyzing self-governance where it is absent, and bringing research into the design of interventions and observation of the dynamics of community-based innovation processes. Process innovations as applied here are deliberate facilitation strategies designed to bring social theory to bear on social learning, organizing and action at community or organizational levels.

The paper explores these questions in the highlands of eastern Africa, where high population density and steep slopes lead to tightly coupled interactions among adjacent landscape units and diverse property regimes. Lessons are drawn from an ecoregional research program operating in multiple benchmark sites in the region from the mid 1990s to the late 2000s, and aiming to support highland residents to address environmental challenges of local concern. It demonstrates that many of the challenges typically viewed by agricultural research and extension organizations and NGOs as biophysical problems to be addressed through technological solutions, such as soil erosion, crop pests and diseases, involve collective action dilemmas that call for *institutional* responses. Failure to recognize this undoubtedly constrains the effective resolution of the environmental challenges facing local resources users, and contributes to the ongoing failure of interventions.

Following a literature review, in which the work of commons scholars and theoretical discussions of process are reviewed, the methodology is discussed. Results are then presented in two sections: a summary of collective action dilemmas identified in the diagnostic phase of the project, and an analysis of changes induced through process innovations for select case studies in which land users were involved in a series of steps of deliberation, negotiation and planning to facilitate their own solutions to identified dilemmas. The paper concludes with a discussion of lessons learnt and their implications for policy and practice.

2. Literature review

2.1. Lessons from long-enduring common property regimes and collective action scholarship

Common pool resources may be defined by two important characteristics that make their sustainable management particularly challenging (Berkes et al. 1989; Feeny et al. 1990). The first is low excludability, in which the physical nature of the resource makes it costly, and sometimes virtually impossible, to control access by potential users. The second is high subtractability or rivalry, a situation in which each user is capable of subtracting from the welfare of other users. Subtractability leads to the *potential* for divergence between individual and collective rationality, in which the benefits accruing to individuals extracting one more unit of a resource come at the expense of collective interests in sustaining that resource (Feeny et al. 1990). Yet as highlighted by many scholars, these “collective action dilemmas” have been addressed by diverse institutional arrangements. It is thus essential to separate the intrinsic nature of the resource (common pool) from the properties of the regimes that govern the use of that resource (Ostrom 1986).

Most institutional scholars recognize four tenure or resource management regimes which vary according to the “structure of rights and duties characterizing the relationship of individuals to one another with respect to that particular environmental resource” (Bromley 1991, 22; see also Feeny et al. 1990). They include state property, private property and common property, in which ownership and use rests in the hands of the state, individuals or corporations, and a specified user group, respectively. The fourth is open access – in which there are no rights, duties or authority system (Feeny et al. 1990; Bromley 1991). Any one of these may be applied to the governance of common pool resources, and with the exception of open access (which tends to fail in ensuring sustainable use) there is no simple one-to-one relationship between property-rights regime and outcome (Feeny et al. 1990). Success (and failure) may be found under all three of these regimes, not only the two recognized by Hardin (state, private). This observation has not been duly reflected in environmental scholarship, policy and practice. Recognition of common property or “limited-access commons” has been overlooked by institutional scholars historically (Demsetz 1967; Hardin 1968) and remains unrecognized in government policy and practice in many countries. Some scholars attribute this failure to the tendency to view property as a thing rather than a social relationship² (Ostrom 1990; Bromley 1991).

Through detailed study of long-enduring common property regimes (CPRs), Ostrom (1990) further identifies the properties of the regimes that have managed resources sustainably under common property arrangements. While there is some ongoing debate over their completeness, Ostrom’s initial principles are largely validated by Cox et al. (2010) – who offer a more disaggregated formulation of

² And to the subsequent failure to understand the distinction between the properties of a resource and the properties of the institutional overlay or regime (e.g. Hardin 1968).

them (see Appendix). In considering the possibility of catalyzing collective action where it is absent, it may be worth looking beyond the features of successful, long-enduring CPRs, to the diversity of dilemmas faced by non-cooperating groups and the diversity of mechanisms through which successful collective action may in turn emerge. Heckathorn identifies several different causes of social dilemmas, including “issues of coordination, in bargaining over how gains are to be divided, or in lack of trust that the other will cooperate” (Heckathorn 1996, 253). It would seem that interventions to address these dilemmas should target the source of the constraint.

2.2. Beyond discrete tenure regimes and apolitical renderings of property

While self-organization and the principles underlying it have been used to debate the relative merits of distinct property regimes (e.g. Feeny et al. 1990; Bromley 1991), there has been less effort to explore the relevance of these ideas to interactions between distinct property regimes or to hybrid property forms. This reflects a wider tendency in both government policy and institutional scholarship to think of property regimes, ownership, and public and private forms of organizing as discrete and mutually exclusive domains (Bromley 1991; Ostrom and Hess 2008; Sikor et al. 2008). The remarkable persistence of the notion of discrete property regimes is curious in light of the long history of scholarship recognizing blurred boundaries (“impure public goods,” “property continua”); public interests in private property; the restrictions and obligations that often accompany the use of private land; the social costs incurred from individualized decision-making in the absence of such restrictions;³ the benefits of negotiated and flexible access to private and common property; and the differentiated bundle of rights and rights holders that define property (Hume 1740; Pigou 1932; Coase 1960; Olson 1965; Bromley 1991; Schlager and Ostrom 1992; Blewett 1995; Cornes and Sandler 1996; Thebaud and Batterbury 2001; Krier 2009).

Approaches to addressing the social costs of individualized action⁴ have been much debated. Privatization was once thought to be the ideal approach to internalizing costs and benefits, because it ties each owner’s actions to consequences that only the owners themselves would incur (Demsetz 1967; Krier 2009). Yet even with individually owned parcels of land, it is still unlikely that all costs and benefits of the owner’s uses will be felt exclusively by him, her or them (Krier 2009). Others have argued for privatization because it minimizes the transaction costs associated with negotiating more equitable solutions (Olson 1965; Demsetz 1967). A parallel idea was explored in the scholarship of Ronald Coase, who drew on the notion of reciprocal cost to argue for negotiated solutions to externality

³ Most notably, externalities, or situations in which “the action of one economic agent influences the utility of another, and there is no mechanism for compensation” (Cornes and Sandler 1996, 5).

⁴ Note that Bromley takes issue with the notion of social cost, stating what is actually at issue in environmental disputes is that the “private interest of one party (Alpha) is against the private interest of another (Beta)” (Bromley 1991, 19).

problems between the two parties, over government intervention. Rather than framing the problem as avoiding harm to the aggrieved party, Coase argued for having regard to the *total effect* of solutions on both parties. For Coase, this was best achieved by assigning individual property rights in a way that minimizes the transaction costs of making decisions about the way a resource is used, and letting the market do the rest – typically through direct negotiation of contract-type solutions (Coase 1960). Yet this begs the question of what motivations would guide private landowners to engage in negotiations to internalize costs. With property rights typically conveying not just the right to benefit oneself but also a right or privilege to harm others (Demsetz 1967; Bromley 1991), there are as many reasons why holders of these rights would choose not to internalize externalities.

While economists have tried to address this question through a focus on transaction costs and utility,⁵ more critically informed social scientists point to the political dynamics of institutions and property. There is increasing recognition that property rights are not just neutral instruments that help to convey expectations which can reasonably be held with respect to one's dealings with others (Demsetz 1967) or the result of "voluntary exchanges between relatively equal actors who are seeking mutually welfare-enhancing outcomes" (Gibson 1999, 11), but a terrain of struggle at all levels of social organization – from families to communities, social classes and states (Peluso 1993; Ribot and Peluso 2003; Robbins et al. 2009; Sikor and Lund 2009; Hall et al. 2011; Hardin 2011; Borrás and Franco 2012). Even under private ownership, externalities cannot therefore be assumed to be resolved through open negotiation of costs and benefits on an even playing field. These perspectives highlight the role that individuals play in structuring institutions that benefit them; their differential access to resources that enable them to do so; and the uneven distributive outcomes of the institutional arrangements that often result (Bromley 1991; Knight 1992; Gibson 1999). Yet there are also social and institutional forces within society that have a bearing on the likelihood of such equity-enhancing transactions, from emotions to social bonds; reputation and social status; social conventions, norms and institutions; and state laws governing public accountabilities (Hand 1986; Knight 1992; Flam 2000). With these factors highly context-specific, it is impossible to predict based on a simple cost-benefit calculus the circumstances under which the costs and benefits of social interdependencies surrounding resources and property will motivate actions that accommodate multiple interests in land. And with the stakes for human societies and the ecological processes we are a part of so incredibly high, there is a need to consider what factors might push things in the right direction. Much has been said about design principles and "rules of the game". Less has been said about the role of facilitated change processes in enabling self-organization to emerge, or the extent to which these can be structured to induce a more equitable distribution of costs and benefits.

⁵ Demsetz (1967), for example, argues that to internalize an externality the gains from internalization must exceed the cost of a transaction in the rights between the parties (Demsetz 1967).

2.3. Process in conservation and development

One of the earliest treatments of process in the encounters between local communities and outside agents of change was Paolo Freire's book, *Pedagogy of the Oppressed* (Freire 1970). While conceptualized within the realm of education rather than community "development", the method and substance of Freirean pedagogy makes it an essential point of reference for those interested in processes of local empowerment. He coins the word *conscientização* or critical consciousness to refer to the processes by which the oppressed, "recognize the causes of their oppression, so that through transforming action they can create a new situation, one which makes possible the pursuit of a fuller humanity" (47). For Freire, this occurs through praxis: "reflection and action upon the world in order to transform it" (51). Crucial to the appropriation of such ideas within development circles, Freire seeks to break down unequal relations of knowledge and authority separating teachers and students (or outside change agents and land users), by engaging in pedagogies *with*, not *for*, the oppressed. He asserts that neither holds the key to liberation, but that it emerges in dialogue.

Early treatments of process in conservation and development also focused on moving away from top-down models of development to ones in which local actors were the primary agents in their own development. Despite his own acknowledged indebtedness to Freirean pedagogy⁶ and others writing on process from within development circles (e.g. Biddle and Biddle 1965), Robert Chambers is widely recognized as pioneering these ideas. His writing on reversals in development learning and management (Chambers 1983) and farmer and community participation (Chambers 1994a,b) are unparalleled in their influence on development practice. While Chambers stressed the need for multifaceted changes among development professionals (personal awareness, concepts, values, behavior) (Chambers 1997), his most enduring and widespread contributions were methodological. He advanced Participatory Rural Appraisal, "a growing family of approaches and methods to enable local people to share, enhance and analyze their knowledge of life and conditions, to plan and to act" (Chambers 1994a, 953). To differentiate this from the vast majority of research methods which remain extractive in nature, PRA methods are perhaps best thought of as *process* – defined here as a planned and facilitated set of interactions among members of a community, organization or other collectivity designed to catalyze social learning, planning and action. The 1980s and 1990s witnessed a proliferation of approaches to community participation and empowerment, from those to enhance farmer participation (on-farm research, farmer participatory research, participatory technology development) (Farrington and Martin 1987; Byerlee and Tripp 1988; Walters-Bayer 1989; Haverkort et al. 1991; Chambers 1994) to paradigms

⁶ Their 1965 book, "*The Community Development Process: The Rediscovery of Local Initiative*", defines process as "a progression of events that is planned by the participants to serve goals they progressively choose" (Biddle and Biddle 1965, 79).

for conservation and environmental management (adaptive collaborative management, community-based natural resource management, co-management, community conservation) (Murphree 1995; Buck et al. 2001; Horwich and Lyon 2007).

The unbridled enthusiasm that accompanied early efforts was quickly met with disillusionment, as critiques of participatory process highlighted the potential for participation to constitute more “tyranny” than empowerment as change processes are subject to manipulation by outside actors and interests (Cooke and Kothari 2001). Critiques have highlighted absence of democratic process and limited local ownership of projects; accountability to outside actors and their conceptions of development or conservation; failure to address complex power dynamics and changing entitlements; forms of patronage and control embedded in development practice; and negative social and economic outcomes (Stirrat and Henkel 1997; Thompson and Homewood 2002; Campbell and Vainio-Mattila 2003; Mosse 2005; Goldman 2011; Greiner 2012). Other authors have highlighted the role of process in producing obedient knowledge and subjectivities (Gibson and Marks 1995; Agrawal 2005; Igoe et al. 2009) – a possibility that Freire recognized long ago.⁷ Recent writings in the social sciences have also situated decentralized and participatory trends within wider economic restructuring, as a response to popular uprisings following the neoliberal reforms of the 1980s (Hilgers 2010). Decentralized governance processes must therefore not only be seen as a way to make governance more responsive to the people (World Bank 2000; Ribot 2004), but also as a way to ‘accommodate potentially explosive political forces’ (World Bank 2000, 107) and to bolster popular legitimacy for undemocratic policies through discourses of procedural legitimacy (Ferguson 1995). Thus, process must be seen not just as a way to enhance local control or to handle complexity and uncertainty in conservation and development (Mosse et al. 1998), but as a tool with the potential for complex and contradictory roles in these arenas – ones which depend deeply on the context, how methodological tools are deployed, and the capacities and ideological alignments of outside facilitator-practitioners (see, for example, Bell 1994). The question addressed here is whether that tool, wielded in such a way as to acknowledge the political dynamics and uneven stakes of institutional change, can be used responsibly while achieving more equitable cost-benefit distributions in the environmental arena.

3. Methodology

3.1. Program context and research sites

The experiences profiled in this paper took place in the context of the African Highlands Initiative (AHI), an ecoregional research program established in 1995

⁷ Drawing on Hegel, Freire states, “if what characterizes the oppressed is their subordination to the consciousness of the master, ... true solidarity with the oppressed means fighting at their side of transform the objective reality which has made them these ‘beings for another’” (Freire 1970, 49).

as a collaborative initiative between the Consultative Group for International Agricultural Research (CGIAR) and the Association for Strengthening Agricultural Research in Eastern and Central Africa (ASARECA) to improve livelihoods and reduce environmental degradation in the densely-settled highlands of eastern Africa (Ethiopia, Kenya, Tanzania, Uganda). AHI had just completed Phase II, during which time the program had established select benchmark sites in each country to serve as living laboratories for the development and testing of approaches for integrated natural resource management before institutionalizing their use in key partner organizations (Figure 1). In recognition that many environmental challenges involved processes playing out beyond the farm level (where efforts had focused to date), the program underwent a shift in focus in Phase III from farm to “watershed” level innovations. With the nexus of decision-making and action shifting from household to landscape level, a new research component was added on understanding and catalyzing collective action. This paper reports on the work that falls under this theme.



Figure 1: Focal countries and AHI benchmark sites.

3.2. Methodological approach

Rather than drawing on conventional research methods to understand the system but not intervene, or seek to intervene without any systematic method for capturing lessons learnt, we were to employ action research (Checkland 1991; Checkland and Holwell 1998). Rather than studying systems, we were to enter them and engage in change processes in partnership with highland residents (Hagmann and Chuma 2002). Since there was limited methodological guidance on how to go about this or how to do it in the context of a watershed management program, much of our early efforts were focused on developing an institutional infrastructure for social learning and innovation at watershed, site team and regional levels, and then using this to operationalize an approach to participatory watershed or landscape management itself (see German et al. 2007a; German and Stroud 2007). A grant from the Collective Action and Property Rights (CAPRI) system-wide program helped us to articulate the role of collective action within this program-wide context. Yet with much of the writing on collective action emphasizing its abstract principles (Olson 1965; Lichbach 1996) or focused on successful cases of self-organization (Ostrom 1990⁸), we were left largely to our own devices in figuring out where collective action might be desired by the resource users themselves or how to catalyze collective action where absent. As part of the CGIAR, we were also expected to use action research not only as a participatory approach to addressing environmental issues of local concern, but to generate generalizable lessons in the form of “global public goods” (conceived of as research products – publications, technologies, methodologies, etc. – with a value beyond the direct research sites). Thus, the work consisted of a multi-layered approach in which participatory processes of problem identification, planning, implementation and monitoring at community level served as the central axis of innovation, onto which a layer of systematic observation was added to facilitate the generation of lessons for a global audience (German et al. 2012; see also German and Stroud 2007).

Action research is defined here as a collective, iterative, self-reflective (and ideally, critically reflexive) form of inquiry undertaken by participants in a social learning and change process, and oriented towards addressing a collectively perceived problem or enhancing the understanding of practice in order to improve practice (drawing on McCutcheon and Jung 1990; Kemmis et al. 2014; Herr and Anderson 2015). It thus involves both theory and practice (Baskerville and Wood-Harper 1996; Avison et al. 1999), “simultaneously assist[ing] in practical problem-solving and expand[ing] scientific knowledge, as well as enhance[ing] the competencies of the respective actors” (Hult and Lennung 1980, 1). The iterative nature of action research is widely understood to involve cycles of planning a change, acting and observing the processes and consequences of the change,

⁸ See also the Digital Library of the Commons (<https://dlc.dlib.indiana.edu/dlc/>); International Forestry Research Institute (<http://www.ifriresearch.net>); and the Collective Action and Property Rights Program (<http://capri.cgiar.org>).

reflecting on these processes and consequences, re-planning, acting and observing, and so on (Colfer 2005; Kemmis et al. 2014). It is widely recognized as “inquiry that is done *by* or *with* insiders to an organization or community, but never *to* or *on* them” (Herr and Anderson 2015, 4). However, the need to generate global public goods *in addition to* localized problem solving makes it useful for our purposes to differentiate community-based action research or “participatory action learning” from the action research undertaken by outside researchers (see German and Stroud 2007; German et al. 2012) – as the research and learning are oriented towards common *as well as* distinct purposes. The common purpose is figuring out to solve a site-specific problem of local (common or differentiated) concern; yet onto that is layered a purpose of generating lessons and public goods (e.g. methodologies) of interest to a global audience.

Researchers schooled in positivist as well as poststructuralist research traditions struggle with the epistemological and political dimensions of action research. The ‘validity problem’ has been the focus of criticism by the former, given limited replicability and formal data collection. To address the need to keep one’s “intellectual bearings in a changing situation”, Checkland and Holwell suggest generating a “recoverable research process” through advanced declaration of the epistemology in terms of which findings will count as knowledge (Checkland and Holwell 1998, 13, 9). In addition to specifying an area of concern (participatory INRM rooted in locally salient problems), a framework of ideas (watershed/landscape, collective action, institution, power) and a methodology (action research), as these authors suggest, we employed an additional set of tools to document lessons being learnt at community and site team levels. These included participatory monitoring and evaluation, in which land users identified and monitored change in perception-based variables and site teams used a process documentation tool for systematic reflection and documentation. While the former focuses more on intermediate outcomes, the latter emphasizes process (methods as planned, methods as revised during implementation to account for unexpected challenges); outcomes (what went well, what did not go well); the relationship between them (what should be adjusted next time, based on immediate outcomes); and lessons learnt (including, crucially, about process itself). As such, evidence that any given outcome had been achieved resides in the process (whether the specified aims of the intervention had been achieved, according to participants); what was documented about it by the research team; and the results of participatory monitoring. The political, ontological and intersubjective dimensions of the process raised by poststructuralist perspectives are the more challenging to address. While processes were intentionally designed to surface divergent interests or ‘stakes’ surrounding identified environmental concerns and to foster negotiation between diverse interest groups (see below), these critiques are addressed only implicitly – by grounding problem framing, planning and monitoring as much as possible in local languages and deliberative processes.

These processes for working with groups of land users to support their own self-led change process while deriving wider lessons served as a generic method-

ological scaffolding within which the work on collective action was to take place. This involved two key steps. First, it was widely understood that for collective action to be an achievable goal, it was essential to ground the local innovation process in issues of concern to local residents. Second, we needed to design and test a facilitation process to catalyze collective action among watershed residents to address identified concerns. The first required a participatory process of problem identification and prioritization to identify locally salient concerns. For this, site teams employed socially-disaggregated focus group discussions to surface issues of concern, using pre-tested questions (see German et al. 2007b for details). In recognition of the heterogeneity of interests and values within local communities (Brosius et al. 1998; DeFilippis et al. 2010) and of the need for collective action or “self-organization” to be driven by a common purpose (Olson 1965; Ostrom 1990), a second step in participatory problem identification involved socially-disaggregated ranking of the concerns identified in the first step. Issues of high priority across lines of difference – whether gender, age, landscape location or other factors – were considered to have high potential for collective action. Issues prioritized highly by only some groups were also considered to be worthy of consideration.

To design a facilitation process to catalyze collective action among watershed residents in addressing prioritized issues, we looked to collective action theory (Olson 1965; Ostrom 1990; Lichbach 1996) – drawing most heavily on the work of Ostrom, as well as team members’ experience in community organizing. For each issue selected for further action, a detailed planning process was carried out in each benchmark site – first among site team members, and then with community members. In addition to participatory planning processes within community fora (where institutional dimensions to the problem were left largely unexplored), select issues were targeted for a more in-depth look at the institutional dimensions to the problem. The question guiding this work was, “If local residents are motivated to address this issue, as suggested by the participatory problem diagnosis and ranking, why are they not already self-organizing to address it?” Was it a simple issue of the transaction costs of organizing exceeding any benefits to be gained from organizing? Or were there reasons also *not* to cooperate? For each issue or concern, we therefore conducted a situation analysis to understand the dynamics involved. Interest groups were systematically identified and consulted ahead of time, so as to identify their interests and positionality with respect to the identified issue and to engender trust in the process. This was followed by the facilitation of a multi-stakeholder negotiation in which the interests of identified parties were brought to the table, with the aim of forging ‘socially-optimal’ solutions based on the principle of minimum harm. The facilitation strategy thus sought to *intentionally surface divergent interests in land*, and to foster negotiated outcomes among diverse interest groups.

In certain types of collective action dilemmas, one party was found to benefit from the status quo (even if harming the other party), and thus have an incentive *not* to engage in actions to minimize harm as solving the problem would

often require curtailing actions that provide important benefit streams. To offset these costs, solutions often involved the identification of livelihood alternatives that would complement institutional solutions (German et al. 2009). If a solution could be forged through dialogue, the agreement was further articulated through a set of negotiated (collective choice) rules to govern the rights and duties of each party, and sanctions for non-compliance. In some circumstances, participants expressed an interest in formalizing these agreements through local government recognition of community by-laws; in others, there was a preference for informal arrangements and “moral persuasion”. In each instance, an implementation and monitoring plan was established to clarify actions, responsibilities, a timeframe and how both actions and their effectiveness would be monitored.

If we are to map this generic process onto identified design principles of long-enduring common property regimes, it is possible to see how the facilitation process is designed to engender many of the principles that emerged organically through processes of self-organization among users (Table 1). For example, stakeholder identification and consultation played a similar role to the specification of boundaries of the user group and the issue of concern, akin to Principle 1A. Stakeholder analysis and negotiation support were also designed to foster a mutually acceptable re-negotiation of rights and duties (and their underlying cost-benefit distributions), in line with principle 2B (congruence between appropriation and provision rules), and provided an opportunity for the formulation of collective choice rules (Principle 3) – including those related to sanctions for non-compliance (Principle 5). The development of plans for participatory monitoring and evaluation also helped incorporate a monitoring component into implementation for some of the issues (Principle 4).

4. Results

Results are presented in two parts. The first section summarizes the landscape-level concerns identified by local residents during participatory problem identification, which are explored in terms of the underlying collective action dilemmas that have served to inhibit their effective resolution in the past. The second section describes site team experiences in catalyzing self-governance around a sample of these identified concerns.

4.1. Identified collective action dilemmas

Within many of the landscape-scale “environmental” problems identified by local residents (e.g. excess run-off, declining water quality), it was possible to identify collective action problems or social dilemmas which were operational and hindering efforts to self-organize. These may be defined as situations in which multiple individuals would benefit from a certain action, but for which the associated cost or incentive structure make it implausible that any individual would take initiative to solve it alone; or where there is a divergence between individual and collective rationality (where actions that are individually rational lead to suboptimal out-

Table 1: Relationship between facilitation steps and Ostrom's design principles.

Design principle	Facilitation step(s)/technique(s)	Explanation
1: Boundaries (emphasis on boundaries of users)	Identification of "stake"-holders, or those with divergent interests vis-à-vis the issue at hand	While distinctive in form from the Ostrom principle, the purpose is the same: to identify those individuals whose involvement is needed to address the issue at hand.
2: Congruence (emphasis on appropriation and provision)	Stakeholder analysis (Who gains/loses what?) – Stakeholder consultation – Negotiation support to identify institutional and technological solutions (by-laws, cost minimization efforts)	Each of these steps is designed to match the benefits to any given party with the costs to that party. Stakeholder analysis enabled the identification of who gains and losses what from the status quo, and from any effort to address the problem. Stakeholder consultation aims to minimize the perceived risks of engaging in voluntary negotiations, for example by agreeing on procedural elements or establishing principles or criteria to guide negotiations. Negotiations themselves, guided by the principle of minimum harm, aim to balance the costs and benefits of action by mitigating harm done (e.g. through efforts to mitigate the costs of curtailing certain land uses); balancing concessions or provisioning with anticipated benefits; or allocating the costs of provisioning (often in the form of labor) to those standing to benefit from that action. <i>Note: Each of these actions also contributes to aspects of principle 2A (congruence of costs and benefits with local social conditions).</i>
3: Collective choice arrangements	– Negotiation support (negotiated rule formulation)	Similar to the Ostrom principle, the idea is to have all of those affected by the operational rules to participate in formulating them.
4: Monitoring	– Monitoring plan included as one output of the negotiation	As with Ostrom, emphasis is placed on compliance with agreed actions (monitoring of users). It also emphasizes effectiveness in resolving the problem, yet this is not always defined in terms of resource condition; another common indicator was the mitigation of livelihood costs.
5: Graduated sanctions	– Negotiation support (negotiated rules on consequences for non-compliance, and means of enforcement)	The negotiation of rules includes the negotiation of consequences for non-compliance. The negotiation process also involves forging agreement on the means of enforcement – whether through formal state recognition of formulated by-laws, or self-enforcement. The participatory nature of this process in some cases gives rules and/or their enforcement a 'graduated' character – with sanctions or enforcement procedures adapted to the circumstances at hand.
6: Conflict resolution mechanisms	– Stakeholder analysis – Negotiation support	Unlike Ostrom's principles, conflict resolution was integrated into the process as a means of enabling the emergence of collective action during the planning process (in the stakeholder analysis and negotiation support stages), rather than something that comes afterwards. Nevertheless, such mechanisms are likely to evolve as part of the monitoring process.

comes for all) (Olson 1965; Heckathorn 1996; Ostrom 2000). Yet these were not the only types of dilemmas identified by resource users for which collective action would be a suitable antidote. Others involved interests that cut across discrete property units and regimes.

Four categories of collective action problems were identified, as follows (see also Table 2):

1. *Common pool resource challenges.* This first set of issues involved classic dilemmas surrounding the management and sustainability of common pool resources, such as the difficulty of exclusion, high subtractability, and the inability to control free riders in both appropriation and provisioning. These dilemmas were prevalent in rangelands (in the form of nutrient mining and deforestation); in the extirpation of culturally important indigenous tree and fodder species; in the degradation of springs (from run-off and biological contamination resulting from the failure to separate human water from livestock); in the management of community woodlots (theft); protected area management (exclusion practices); and the management of community infrastructure and livestock (low provisioning).
2. *Inefficiencies of individualized action.* Other collective action problems involved the effect of transaction and start-up costs inhibiting the evolution of collective action around issues of common concern, despite the gains in efficiency or effectiveness that would result. In such cases, failure to act collectively tended to result in limited returns on financial or labor investment. The most prominent example was pest management, in which the scale of intervention (plot/farm) is poorly matched to the scale of the problem (landscape and beyond) and thus highly inefficient, if not downright ineffective. Other concerns related to the failure to access resources (e.g. draft power) that might otherwise be accessible through the pooling of financial capital to increase buying power through shared ownership (albeit at some risk).
3. *Externalities.* A number of identified concerns involved externalities, in which the “utility” or welfare of some land users was affected by actions not under his/her control, because land use decisions were made by private land users who fail to consider the social costs of their actions (e.g. van den Bergh 2010). With high population densities and steep slopes contributing to the tightly coupled interactions among adjacent landscape units, interactions among adjacent units of (mostly private) property were highly salient concerns among watershed residents. Concerns falling in this category involved interactions between two identifiable units of adjacent private property (e.g. crop destruction from stray fire or livestock, tree-crop competition), diffuse interactions between units of private property across the landscape (e.g. excess run-off, burial of fertile valley bottom soil from hillside erosion, pests), externalities from private to common property

Table 2: Collective action dilemmas present in AHI benchmark sites.

Identified concern	Country	Nature of the dilemma
<i>Common pool resource challenges</i>		
Loss of indigenous tree species	Ethiopia (Ginchi)	Failure to adequately address the exclusion problem, coupled with the institutional uncertainties associated with periods of institutional uncertainty associated with regime change (feudal to socialist to capitalist), have led to loss of all indigenous trees outside of protected areas and sacred forests
Low soil fertility in outfields	Ethiopia	Seasonal transitions between private cropland and open access grazing in outfields induces nutrient mining by incentivizing landowners to extract all crop residue before liberating private cropland for communal grazing. Absence of institutions to regulate dung collection and the use of dung as cooking fuel exacerbates this by encouraging dung extraction from outfields.
Loss of indigenous crop and fodder species	Ethiopia (Areka)	The combined effects of drought and failure to regulate access to communal grazing areas has resulted in the loss of indigenous fodder species important to livestock. Absence of collective in-situ conservation of indigenous landraces, valued for their greater adaptability to suboptimal growing conditions, has contributed to their loss in the face of government extension services and food insecurity (seed consumption).
Declining water quality in springs	Ethiopia (Ginchi)	Failure to regulate use among users and by livestock undermines water quality by failing to separate drinking areas for livestock and human use.
Ineffective regulation of access to protected areas	Ethiopia, Uganda	Local land users have no incentive to invest in a resource that they have been excluded from, yet the state has limited capacity (and incentive) to exclude – resulting in state-induced “tragedies”*.
Low investment in the management of shared resources	Tanzania	Collective action surrounding shared resources (community bull, maintenance of community roads and schools, mill) suffers from low levels of provisioning*.
Theft of trees from village woodlots	Tanzania	Constraints to, and high cost of, exclusion; failure to adequately curtail free riding*.
<i>Inefficiencies of individualized action</i>		
Pest management	Ethiopia, Tanzania	<ul style="list-style-type: none"> – Individualized efforts to police fields at night to avoid crop loss from porcupine is costly (in time, health consequences) and often ineffective as porcupines travel up to 14 km in a night (Areka). – Erosion of traditional ecological knowledge among the youth has reduced collective action in pest control, undermining the effectiveness of these practices and contributing to the incidence of cutworms (Tanzania).
Shortage of oxen	Ethiopia (Ginchi)	Private ownership of oxen makes access to draft power inaccessible for most families; collective ownership and use was seen as a possible solution.

Table 2: (continued)

Identified concern	Country	Nature of the dilemma
<i>Externalities</i>		
Loss of seed and fertilizer, destruction of property, from excess run-off	Ethiopia, Tanzania, Uganda	Limited incentive to invest in drainage structures among upslope farmers (where water damage is less of a problem) exacerbates uncontrolled run-off to downslope farmers. Addressing the problem requires the coordination of drainage among all landowners, even those with limited incentive to invest.
Reduced crop productivity from boundary trees	Ethiopia (Areka), Tanzania	Landowners' interests in securing farm boundaries and minimizing competition between trees and their own cropland cause them to locate woodlots along their farm boundary, increasing tree-crop competition on adjacent farmland*.
Burial of fertile valley bottom soil from erosion	Tanzania	Advanced stages of erosion on upper slopes means that soil deposited in valley bottoms (where cash crops are grown) is now infertile. Addressing the problem requires the cooperation of owners of hillslope plots who stand little to gain, while scale-dependencies increase the magnitude of the challenge.
Crop destruction from stray fires and livestock	Tanzania	Failure of private landowners to invest in activities to ensure fire does not pass farm boundaries, and the costs (in labor, fodder access) of regulating livestock movement, increases the incidence of crop loss on neighboring farms*.
Drying of springs from fast-growing trees	Ethiopia, Tanzania	Landowners' interest in maximizing yield from fast-growing trees by locating woodlots near springs conflicts with collective interests in safeguarding the water supply for humans and/or livestock*.
Externalities from trees marking protected area boundary	Tanzania	Eucalypts planted to clearly demarcate/safeguard the boundary of a national park generate externalities for neighboring communities, such as the drying of springs or competition with adjacent cropland*.
Pest management	Ethiopia (Areka)	Landowners growing crops not susceptible to vertebrate pest damage have limited incentive to invest in pest control, yet with pests crossing farm boundaries their failure to act has consequences for other land users.
<i>Common interests in state or private property</i>		
Limited/inequitable access to resources from protected areas	Uganda	Indigenous communities evicted from a national park face the threat of physical violence when attempting to access culturally important resources, yet outsiders with no customary claims are able to secure access through bribes*.
Inequitable access to government extension services	Ethiopia (Areka)	Failure to establish institutions to self-govern exogenous development resources, coupled with the preference among extension agents to work with "innovative" male farmers, has resulted in elite capture of government extension by wealthy male farmers.
Pest management	Ethiopia (Areka)	Those with coveted knowledge on traditional pest management practices have no incentive to share their knowledge with others, as they are often paid to help others with pest control*.

- (e.g. drying of springs from the cultivation of fast-growing trees on private land), and negative externalities from the management of state property (e.g. negative effects of fast-growing trees marking national park boundaries on adjacent cropland and common property). These dilemmas, manifested as complaints about the actions of upslope or adjacent land users, were found to have negative effects on agricultural productivity, returns on investment, and access to basic resources (e.g. water for domestic use).
4. *Failure to consider common interests in state and private property.* A final category involved lesser known concerns that could be classified as common interests in state and private property. While externalities could be lumped in this category, the items classified here are distinct from externalities in their tendency to be defined in terms of concern over *limited access* to these resources rather than harm done through their management. In the context of state property, this included limited (and inequitable practices associated with) access to culturally important non-timber forest products in protected areas formerly occupied by indigenous groups and governed under customary norms of tenure; and inequitable access to public services (e.g. government extension services). Yet it also related to the intellectual property of individual watershed residents who were found to hold coveted knowledge of interest to others (e.g. the most effective local pest control practices).

It is important to recognize the overlapping nature of items falling within this and other themes, with some issues defined by more than one set of features. For example, there is some overlap between externalities and common interests in private property. Yet this overlap is incomplete, as illustrated by shared interests in intellectual property associated with highly specialized knowledge on pest control. While there is also some overlap between common pool resource management challenges, externalities and common interests in state property in the case of protected area management, the issue can be broken down into components that map more readily onto discrete themes.

The tendency to treat collective action problems as those that lead to suboptimal outcomes *for all* (Ostrom 2000) requires mention of a number of situations in which solutions to highly salient problems failed to emerge not because of the classic collective action problems or dilemmas (transaction costs, divergence between individual and collective rationality), but because the status quo is conferring some (often economic) advantage to one of the parties. In such cases, those deriving benefit streams from actions that are otherwise harmful to other parties have at least some incentives *not* to engage in collectively negotiated outcomes. In such cases, collective action is unlikely to emerge in the absence of a re-definition of property rights (Bromley and Hodge 1990) or bargaining over the re-distribution of gains and losses. These have been marked with an asterisk in Table 2.

The diversity of collective action challenges identified by watershed residents illustrates that the challenge is not just one of “individual decisions cumulating to a tragic overuse and the potential destruction of an open-access commons” (Ostrom et al. 1999, 278, in reference to Hardin 1968), but the absence of institutional solutions to induce individuals (or state management agencies) to account for the social costs of their management decisions, to reconcile competing interests in the benefit streams emanating from private property and the commons, or for neighbors to cooperate in optimizing returns from private property. Problems of subtractability and free riding are features found not just in common pool resources, but in different degrees across a range of resource forms and property regimes, and are joined or compounded by externalities or simple inefficiencies associated with individualized action. With such issues not featuring much in the institutional literature, it begs the question of what the solutions to such dilemmas might look like in practice.

4.2. Catalyzing self-governance

This section explores select case studies from Table 2 to illustrate the dynamics through which collective action emerged or failed to take root through process innovations.

4.2.1. Externalities and common interests in private property: damage to private property from excess run-off

In the participatory diagnosis of landscape-level NRM concerns, excess run-off emerged as a prominent concern of land users. With problem framings steeped in crisis narratives surrounding population growth and land degradation (Tiffen et al. 1994; Blaikie 1985) and long frustrated by farmers’ apparent indifference, many site team members expressed surprised by farmers’ apparent concern with “soil erosion”. Yet the framing of the problem differed both between sites and between farmers and researchers in each site. In Ginchi, a participant in a focus group discussion raised the issue of “loss of seed and fertilizer from excess run-off” as a concern. Later on, as the site team sat together to make sense of findings, one team member had documented this as “soil erosion.” Present in the focus group discussion and recalling the initial framing, I asked them to reflect back on the farmer’s own words, and whether the two were in fact the same thing. This conversation led to multiple realizations. First, the issue as expressed by the farmer reflects a concern about the immediate economic costs of excess run-off rather than loss of soil per se – which plays out over longer time frames. While soil fertility was raised as a concern in several sites, it was not always linked to erosion per se (in Areka, it was instead linked to changing government policy on fertilizer subsidies – leading farmers to make fewer soil amendments, and leaving the soil “addicted” to fertilizer once the subsidies dries up).

Secondly, if we are to view the issue through a lens of differentiated interests or ‘stakes’, misinterpreting farmers’ motivation as one of avoiding soil

loss would mislead us into thinking that the primary motivation for intervention would lie with those experiencing the highest rates of soil loss historically – typically upslope farmers. After looking into the institutional nature of the challenge and associated collective action dilemmas, we came to realize that the primary motivation for intervention tends to lie instead with farmers on the lower slopes who experience the greatest losses (loss of or damage to seed, fertilizer, crops, built infrastructure). Yet even this interpretation oversimplifies things. Movement of soil across the landscape also matters, and how people at different landscape locations experience the phenomenon depends not only on the landscape location of their homes and fields but on the nature of the soil being deposited. Soil deposition in downslope locations and valley bottoms in Lushoto was initially experienced by those farming these areas as beneficial, given the high fertility of the deposited topsoil. In later stages, however, they complained of fertile valley bottoms (where the main cash crops are grown) being buried by infertile subsoil. Soil deposition was no longer advantageous to these farmers.

So how do these differentiated interests play into addressing the problem expressed by farmers? First, viewing the issue as an exclusively biophysical problem obscures the differentiated costs and benefits associated with the current situation and any efforts to address the “problem”. Furthermore, by viewing it as a problem of soil loss rather than destruction of property or “soil gain”, we misidentify those most likely to be motivated to invest in efforts to address it. In the case of excess run-off, while downslope farmers are experiencing most harm, “soil conservation” (infiltration and drainage) structures are actually needed on the upper slope – creating an imbalance in those bearing the costs and those reaping the benefits of intervention. In Kabale, this problem was addressed by facilitating negotiations between upslope and downslope farmers. Upslope farmers had no interest in investing in structures on their land because they had little to benefit from them, would have to allocate scarce land to these structures, and they are labor-intensive to build. The negotiated solution was for downslope farmers to do the hard work of building check-dams on these farmers’ fields, thereby minimizing the costs associated with action. This resulted in major increases in farmer investment in water management structures as compared to prior efforts emphasizing a purely technological approach to problem diagnosis and planning (with water trenches expanding anywhere from 47% to over 2000% in different villages). Participatory by-law reforms allocating duties to all hillslope farmers to build infiltration and drainage structures on their land stood as a backdrop to these processes, and may well have incentivized upslope farmers to participate despite the costs to land area. Yet the primary lessons from this case relate to the need to look beyond narrow framings of the problem (“soil erosion”) to farmers’ own concerns; to view the problem and interventions through an *institutional* lens; and to adequately understand differentiated interests and concerns to ensure that congruence between costs and benefits (Principle 2B) is built into solutions.

4.2.2. Inefficiencies of individualized action and common interests in private land: control of vertebrate pests in Areka

Areka has long been recognized as a region of food insecurity, and targeted for food aid (Balta 2016). One of the most salient concerns raised by farmers in this site was crop damage from the crested porcupine, which not only resulted in major losses of important staple crops but was associated with a heavy labor burden and health problems linked to household efforts to police fields at night. With porcupines known to travel long distances in search for food (up to 15 km in a single night⁹), individualized efforts to control the pest on very small plots (<0.5 ha on average) were extremely inefficient.

On the surface, this appears to be an issue for which interests of all farmers would be aligned. Yet by taking an institutional approach to problem identification and planning as outlined in the methodology – in particular the stakeholder analysis and consultation, we were able to identify two collective action dilemmas. The first was associated with the crops grown by different farmers: some grew crops highly susceptible to porcupine, while others grew crops that are rarely affected. This made for highly uneven incentives for “provisioning”, in the form of labor investment into porcupine control. The second dilemma was that associated with the unevenness of local knowledge on porcupine control – with one or two farmers widely recognized as being particularly skilled at porcupine control. Often paid to control porcupine on their neighbors’ fields, they were reluctant to share their coveted knowledge. Yet effective control of the pest at landscape level depended on it. A third pseudo-dilemma also arose with respect to farmers’ uneven participation in the Safety-Net Program, a cash-for-work program that pays food insecure households for time allocated to public works (roads, schools, etc.). Households ineligible for this program were initially uncooperative, arguing that it was the responsibility of Safety-Net farmers alone to carry out community development works (German et al. 2012). Negotiation support strategies targeted these collective action dilemmas by bringing diverse interest groups to the table.

Further planning with those knowledgeable about local control methods highlighted the need to adapt the control method to particular landscape niches, for example graveyards where digging is not possible. A list of landscape level “treatments” was therefore devised and applied on designated “mass mobilization” days (Begashaw et al. 2007). Short training sessions were given by farmers knowledgeable about local control efforts and by site team members knowledgeable about chemical control methods, and agreements were reached on who is to contribute to which control methods in which landscape niches. Local by-laws were formulated to support the actions agreed upon through targeted negotiations and through village-level planning of the coordinated application of different control

⁹ <http://www.arkive.org/north-african-crested-porcupine/hystrix-cristata/video-09a.html> (accessed June 12, 2017).

methods in different niches.¹⁰ Negotiations in this site assumed the form of “moral persuasion” (local government to watershed residents, and among residents themselves) rather than neutral facilitation of dialogue, and were thus less effective in balancing differentiated interests and concerns and ensuring congruence between the costs and benefits of action. Negotiations with those knowledgeable of local pest control methods led to these individuals bearing the costs of action (foregone future income streams) for the benefit of the majority, and negotiations surrounding the Safety Net program led to the joint conclusion that porcupines are a problem to both parties and affect each group equally, requiring efforts by all. Yet the intervention was hugely successful in addressing the problem. 958 porcupines were killed or trapped during the month when crop damage is typically at its peak, and farmers reported 80% reductions in crop damage, reduction in illnesses due to weather exposure, and – perhaps most salient in the minds of local residents – a reduction in time spent policing fields at night.

This case study highlights the need to look beyond discrete property regimes to the common interests at stake in the management of private land. It also highlights the inefficiencies of individualized action for certain types of environmental challenges. Where these inefficiencies are of significant magnitude, they may serve as a powerful constraint to mobilizing behind a common cause – even despite the incongruencies between provisioning and the resulting benefit streams. As for the principles of long-enduring common property regimes, this case illustrates the benefits of acknowledging divergent stakes in the negotiation process and resulting by-laws (Principles 1A and 3) in engendering buy-in to collective action processes. This last finding resonates with the finding that procedural forms of legitimacy often serve to offset limitations in substantive legitimacy (Suchman 1995). The case also illustrates the need to match the scale of the institutional solution to the scale of the problem, which is broadly in line with Principle 1B.

4.2.3. Managing exclusion in common pool resources and common interests in state property: from conflict to co-management in Mount Elgon National Park

People-park relations surrounding Mount Elgon have a troubled and at times violent history. The mountain’s forests and moorlands were once inhabited by Benet hunter-gatherers. When the British declared the area a Crown forest and gazetted it as a forest reserve in the 1930s, they rendered ongoing occupation and use of the reserve illegal with the stroke of a pen. Yet through an informal understanding, customary residents were allowed to continue hunting and gathering in the forest and cultivating the moorlands – an arrangement that had been fairly effective in keeping forests intact (German et al. 2012). When the area was designated Mount Elgon Forest Park in 1983, all people still residing within the park’s boundaries were forced to leave. When it was later designated a National Park, the

¹⁰ Prior to doing so, team members looked into the protected status of porcupine to ensure they are not endangered. Classified as Least Concern on the IUCN Red List, the control efforts proceeded.

park's management shifted from the Forest Department to the Uganda Wildlife Authority – leading to tighter restrictions on access. Grazing and cultivation in the moorlands were banned, and any remaining houses burnt down – further souring relations between customary users and the Ugandan government. While local forest guards came to accept bribes from local elites (many of them from ethnic groups with no customary claims to the area) to harvest resources illegally, Benet women entering the park to gather forest products without paying bribes were physically abused. A government-induced resource tragedy was in the making (see Feeny et al. 1990; Bromley 1991; Blewett 1995).

Here, the roots of the collective action dilemma are largely ideological: ideologies linked to Western notions of wilderness and the nature-culture dichotomy, and negative stereotypes about the harmful effects of local resource management practices. By forcefully removing not just Benet residents but also their institutions from forests and rangelands, any existing controls on access were eroded. Being replaced by state institutions unable to regulate access (address the exclusion challenge) on their own, the area was now being exploited not just by neighboring Benet communities with customary rights in the area, but by outsiders. The primary collective action dilemma thus existed at the level of park guards, whose personal interests trumped the collective interests of both the Benet and the wider conservation community. In the process, both conservation and livelihood aims were undermined.

The intervention consisted of efforts to consult both sides on their views and grievances. We found that those at higher levels within UWA were highly motivated to address the exclusion problem as well as to implement co-management policies passed in 1995 but never implemented on Mount Elgon due to the extreme animosity marking UWA's relationship with local communities. Part of this motivation stemmed from an ongoing court case brought by the Benet against the Government of Uganda. Early steps in the process involved trust-building and sensitization on the perspectives of the other party. To engage in dialogue, UWA wanted some assurance that biodiversity conservation would be pursued as a “bottom line” objective in the process. The Benet were seeking recognition for their customary rights to the area and grievances, as well as concrete livelihood improvements. A first gesture of reconciliation was needed to break the impasse. In need of wood and fodder, community members had expressed an interest in seedlings being grown in UWA nurseries – providing one such opportunity. Following the provision of seedlings to the community, a multi-stakeholder dialogue was scheduled and facilitators worked with both parties ahead of time to prepare for dialogue. Community members were asked ahead of time to identify and consider how to best to advance their interests while posing no significant threat to the conservation objectives of UWA. During the meeting, the two interest groups successfully negotiated rights and duties for co-management, legalizing rights to harvest certain non-timber forest products (e.g. honey, bamboo shoots) in exchange for community assistance in reporting illegal activities within park boundaries. This case study illustrates how conflict resolution may be needed

as an input to self-organization (or co-management) as well as a product of it (Principle 6). To move beyond the impasse in this case, it was also necessary to address head-on the perceived or real risks of engagement keeping people from dialogue – whether by acknowledging UWA’s concerns over bottom lines or considering the implications of engagement for the Benet’s court case. It also illustrates the crucial importance of getting the boundaries between “legitimate users” and “nonusers” right (Principle 1A). By failing to differentiate between those with legitimate historical claims to the area and others, UWA had compromised their ability to effectively regulate access by tapping into the interests of local people to also defend their interests by restricting access to outsiders. Yet for local community members to engage in such provisioning, it was necessary to restore benefit flows of value to them by involving them in the modification of rules governing access (Principles 2B and 3).

4.2.4. Common pool resource challenges: resource degradation in hybrid tenure regimes in Ginchi

In Ginchi site, extensive unfenced outfield areas are nutrient-poor and almost devoid of trees. Most “investments” (manure, high-value crops, trees) are channeled to fenced infields located adjacent to homesteads. Farmers identified multiple problems associated with outfield management: declining quality and quantity of water in springs, loss of indigenous tree species, loss of seed and fertilizer from excess run-off, low soil fertility, and feed and fuel shortage (in order of importance). Institutions play a decisive role in shaping the status quo. While infields are always managed as private property, tenure regimes in outfields rotate both spatially and seasonally – involving various combinations of private farmland, restricted access grazing (common property) and unrestricted grazing (open access). During the rainy season, villages designate some hillslopes for annual crop production in private plots and others for restricted access grazing, switching them during the subsequent rainy season. With the absence of rules governing dung collection, all dung that falls in the restricted access grazing areas is collected for fuel and for soil fertility amendments for nutrient-rich infield plots – mining outfields of nutrients. During the dry season, both areas (private farmland, restricted access grazing) shift to open access, with livestock free to roam between villages. Before liberating private cropland to open access, livestock are left to graze crop residues as a way to privatize benefit streams. Nutrients are further mined through this process. With the absence of perennial vegetation, fertilizers that are applied are readily washed away through run-off. In this site, integrated approaches involving perennial vegetation and/or soil bunds to enhance infiltration; drainage ditches to channel water from fields; and cash crops (to incentivize investments) were envisioned to address the identified problems in an integrated manner. Farmers had gone on a cross-site visit to a region of Ethiopia famous for its soil and water conservation and outfield innovations, and were enthusiastic to apply some of the lessons back at home. However, the complexity of the institutional challenge proved too great to overcome for most of the outfield challenges.

Broadly speaking, the two main interest groups identified through the stakeholder analysis include village residents and outsiders, with whom norms of reciprocal grazing access prevail. Yet shifting from open to restricted access commons in the dry season was not seen as feasible given the loss in reciprocity that would ensue with neighboring villages (and related benefit streams) and the difficulty of regulating access with the main road passing through the village. Farmers then considered the possibility of establishing trees (e.g. apple) and “soil conservation” (water infiltration) structures through a gradual approach, one small area of the catchment at a time, by restricting all livestock (even village livestock) until trees matured enough to resist trampling and browsing. Yet collective action dilemmas also emerged in an abstract sense in the course of planning. Those farmers with infields in the designated area were seen as gaining an unfair advantage by grazing their livestock on other people’s fields without reciprocating for a period of time, something that was flatly rejected. Finally, it was agreed that common drainage ditches would be established, cutting across farmers’ fields. Yet even there, collective action dilemmas emerged from farmers’ resistance to allocate a portion of their barley plots to these structures. While it may have been in the interests of all to better manage drainage, it was in the interests of none to host the structures required to do so. What this case study illustrates is that failure to effectively reconcile the costs and benefits associated with institutional innovation (Principle 2B) may pose insurmountable barriers to addressing even highly salient environmental challenges, even when motivations exist to do so. This is in part shaped by the nature of the collective action dilemma. When these dilemmas are compound and multi-faceted, as illustrated here, they are extremely challenging to address even through institutional approaches. This case also highlights the level of theoretical and methodological sophistication required of the facilitation team, in understanding the nature of collective action challenges, how they constrain options for institutional innovation, and its implications for the creative management of the deliberative process.

5. Discussion and conclusions

Work by political scientists and others has highlighted the ability of self-organized groups of resource users to sustain common pool resources through self-governance arrangements, thus questioning widespread assumptions about the harm caused in communal management and the inevitability of public and private property regimes. Elinor Ostrom’s work, in particular, highlighted key design principles that enabled groups of users to overcome collective action dilemmas and in so doing, sustain both the resource and local livelihoods (Ostrom 1990). This paper explores the relevance of Ostrom’s design principles not in sustaining long-enduring common property regimes, but in catalyzing solutions to entrenched environmental challenges where self-governance is weak or absent. It explores this question in the context of an ecoregional research-for-development program operating in eastern Africa, the African Highlands Initiative.

The paper illustrates that beneath challenges which are widely perceived to be biophysical in nature and thereby best suited to technological solutions (soil erosion, pest management, etc.), are a suite of incentive structures and social dynamics which have served as barriers to the resolution of concerns that are otherwise highly salient locally. Within each of these environmental challenges lie collective action dilemmas that call for social and *institutional* responses. Yet such responses must not just be built on apolitical understandings of institutions which assume voluntary exchanges between relatively equal actors with a common purpose of mutually welfare-enhancing outcomes (Gibson 1999). Rather, they must explicitly recognize the distributive nature of the status quo, and the *re*-distributive nature of efforts to modify it. Without efforts to proactively surface divergent interests and foster negotiations surrounding the acceptability of redistributive options, the costs of innovation will be too high – thereby hindering efforts to address identified problems. Failure to recognize the inherently social and political underpinnings of “environmental” challenges undoubtedly constrains their effective resolution, and contributes to the ongoing failure of technological solutions – such as the decades-long, largely unsuccessful effort to get farmers to adopt soil conservation technologies.

The nature of identified collective action dilemmas was highly variable. Some involved classic exclusion and subtractability challenges associated with common pool resources, such as rangeland degradation, extirpation of culturally important indigenous tree and fodder species, and spring degradation. Other dilemmas were found to involve classic externality problems shaping interactions among adjacent units of private property (e.g. farm boundary management, pest management, drainage), or externalities between private farmland and common pool resources (e.g. springs found within private farmland) or between public and private property regimes (e.g. people-park interactions). Still others involved inefficiencies of individualized action, or common interests in the management or allocation of state or private property. The challenge is therefore not just one of “individual decisions cumulating to a tragic overuse and the potential destruction of an open-access commons” (Ostrom et al. 1999, 278, in reference to Hardin 1968), but the absence of institutional solutions to induce individuals or households to account for the social costs of their natural resource management decisions, to reconcile competing interests in the benefit streams emanating from individual and communal landholdings, or for neighbors to cooperate in optimizing returns from their investments in private property. Difficulty of exclusion and subtractability are features found not just in common pool resources, but in different degrees across a range of resource forms and property regimes, and are joined or compounded by externalities or simple inefficiencies associated with individualized action. Thus, the hard-earned lessons surrounding common pool resources may have a wider relevance beyond the commons and discrete property regimes.

The paper also illustrates the utility of applying principles of long-enduring common property regimes to contemporary resource challenges for which motivations for action exist, but institutional arrangements to translate those motivations

into action are absent. This utility is not restricted to common pool resources, but applies also to complex and heterogeneous landscapes involving a diversity of natural resource forms, tenure regimes and collective action problems.

A look at the case studies presented in the article highlights a few fundamental lessons for catalyzing self-governance not just for common pool resources, but across a diversity of hybrid regimes and coupled collective action dilemmas. First, each case has its own unique dynamics, requiring that solutions be tailored to those dynamics. On the other hand, a set of generic facilitation strategies informed by the principles of long-enduring common property regimes (and collective action challenges more generally) provide a basic scaffolding for process-based solutions to many of these challenges. This illustrates that many of the same principles identified by Ostrom for long-enduring common property regimes are also essential in moving beyond the impasse between motivation and action in addressing collective action dilemmas across private property and hybrid tenure regimes. While for each case, certain of these principles stand out above the others, a few of them are recurring across a diverse suite of collective action dilemmas. The need for congruence between appropriation and provision rules for all interest groups, and for those interest groups to negotiate collective choice rules amongst themselves, are key. Crucially, collective action dilemmas seem to remain intractable without Coasean-type solutions to negotiation that help to bring the costs of collaboration and divergent interests to the surface, and to align appropriation and provisioning in the process of forging solutions agreeable to all interest groups. This is especially true for social dilemmas rooted in the (re-)distribution of benefits (and costs) (Heckathorn 1996). Here, appropriation must be conceived of broadly as any of a number of benefits (e.g. resource access, reduced labor or material losses, improved relations with neighbors), and provisioning as costs – whether in the form of labor inputs, land loss, reduced benefit streams, or ceding authority and control. The centrality of these two principles in particular, and of the processes through which they are operationalized in forging solutions, points to the micro-politics of resource management and to the crucial role of surfacing and enabling overt confrontation of competing interests in land in efforts to address “environmental” problems.

Self-governance is thus not just a feature of long-enduring common property regimes, but may be catalyzed in situations in which it is absent and to address diverse types of collective action problems. Yet what is the feasibility of doing so? The paper highlights that the design principles themselves – achieving congruence, using these negotiated agreements to formulate collective choices rules, and monitoring planning and actions – raise their own set of practical barriers to self-organized collective action. Here, the role of (external) facilitation was key to overcoming these barriers in two important respects. First, outside facilitation helped to bear the transaction and start-up costs of collective organizing for addressing identified collective action problems. It was also crucial in overcoming the tendency for latent conflict and entrenched interests in the status quo to stymie the face-to-face interaction so essential for building trust and negotiat-

ing solutions with acceptable re-distributive consequences (Ostrom and Walker 1997). Central to the latter was the design of facilitation strategies to identify and bring those both harmed and benefiting from the status quo to the negotiating table, and the emphasis on minimizing costs to both parties while identifying mutually acceptable solutions. Without such intentionality in the identification of diverse interest groups and facilitated deliberation over the handling of the redistributive effects of institutional and technological change, process may simply reinforce existing social hierarchies (Platteau 2000; Rydin and Pennington 2000) or fail to bring change due to the perceived stakes for those deriving benefit from inaction.

Yet what are the prospects for institutionalizing such an approach within local communities or organizations? While building such capacity *within* rural communities would be ideal, the need for neutrality in the face of local political dynamics may pose challenges to all but the most sociable, respected and local facilitators. The alternative would be to equip organizations with a widespread presence in rural landscapes, such as agricultural extension and resource management professionals, with new mandates (landscape, participation, equity), facilitation tools, and the perspectives and ideological alignments required to deploy them in ways that are sensitive to local social and political dynamics. Such a process would require nothing less than a re-theorization of resource challenges and their causes, to render visible their institutional and political dynamics and the promise of theoretically-informed facilitation processes in addressing them. While this is no easy task, our experience suggests it is achievable – provided the organizational leadership is on board. While the choice involves clear trade-offs, the relative promise of each is itself a question for further *action* research.

Literature cited

- Agrawal, A. 2005. Environmentalism: Community, Intimate Government, and the Making of Environmental Subjects in Kumaon, India. *Current Anthropology* 46(2):161–190.
- Avison, D. E., F. Lau, M. D. Myers, and P. A. Nielsen. 1999. Action Research. *Communications of the ACM* 42(1):94–97.
- Balta, A. 2016. Determinants of Rural Household Food Security in Wolaita Zone, South Ethiopia. *Journal of Poverty, Investment and Development* 29:1–9.
- Baskerville, R. and T. Wood-Harper. 1996. A Critical Perspective on Action Research as a Method for Information Systems Research. *Journal of Information Technology* 11(3):235–246.
- Bavington, D. 2010. *Managed Annihilation: An Unnatural History of the Newfoundland Cod Collapse*. Vancouver: UBC Press.
- Begashaw, L., W. Mazengia, and L. German. 2007. Mobilizing Collective Action for Vertebrate Pest Control: The Case of Porcupine in Areka. *AHI Brief* E3.
- Bell, S. 1994. Methods and Mindsets: Towards an Understanding of the Tyranny of Methodology. *Public Administration and Development* 14(4):323–338.

- Berkes, F., D. Feeny, B. McCay, and J. M. Acheson. 1989. The Benefits of the Commons. *Nature* 340:91–93.
- Biddle, W. W. and L. J. Biddle. 1965. *The Community Development Process: The Rediscovery of Local Initiative*. New York: Holt, Rinehart and Winston, Inc.
- Blaikie, P. 1985. *The Political Economy of Soil Erosion in Developing Countries*. London: Longman.
- Blewett, R. A. 1995. Property Rights as a Cause of the Tragedy of the Commons: Institutional change and the Pastoral Maasai of Kenya. *Eastern Economic Journal* 21(4):477–490.
- Borras, S. M. and J. C. Franco. 2012. Global Land Grabbing and Trajectories of Agrarian Change: A Preliminary Analysis. *Journal of Agrarian Change* 12(1):34–59.
- Bromley, D. W. 1991. *Environment and Economy: Property Rights and Public Policy*. Cambridge: Basil Blackwell, Inc.
- Bromley, D. and I. Hodge. 1990. Private Property Rights and Presumptive Policy Entitlements: Reconsidering the Premises of Rural Policy. *European Review of Agricultural Economics* 17(2):197–214.
- Brosius, J. P., A. L. Tsing, and C. Zerner. 1998. Representing Communities: Histories and Politics of Community-Based Natural Resource Management. *Society & Natural Resources* 11(2):157–168.
- Buck, L. E., C. C. Geisler, J. Schelhas, and E. Wollenberg, eds. 2001. *Biological Diversity: Balancing Interests through Adaptive Collaborative Management*. Boca Raton: CRC Press.
- Byerlee, D. and R. Tripp. 1988. Strengthening Linkages in Agricultural Research through a Farming Systems Perspective: The Role of Social Scientists. *Experimental Agriculture* 24:137–151.
- Campbell, L. M. and A. Vainio-Mattila. 2003. Participatory Development and Community Conservation: Opportunities Missed for Lessons Learned? *Human Ecology* 31:417–437.
- Chambers, R. 1983. *Rural Development: Putting the Last First*. London: Longman.
- Chambers, R. 1994a. The Origins and Practice of Participatory Rural Appraisal. *World Development* 22(7):953–969.
- Chambers, R. 1994b. Participatory Rural Appraisal (PRA): Analysis of Experience. *World Development* 22:1253–1268.
- Chambers, R. 1997. *Whose Reality Counts? Putting the First Last*. London: IT Publications.
- Checkland, P. 1991. From Framework through Experience to Learning: The Essential Nature of Action Research. In *Information Systems Research: Contemporary Approaches and Emergent Traditions*, eds. H. E. Nissen, H. K. Klein and R. Hirschheim, 397–403. North-Holland: Elsevier Science Publishers.
- Checkland, P. and S. Holwell. 1998. Action Research: Its Nature and Validity. *Systemic Practice and Action Research* 11(1):9–21.
- Coase, R. 1960. The Problem of Social Cost. *Journal of Law and Economics* 3:1–44.

- Colfer, C. J. P. 2005. *The Complex Forest*. Bogor, Indonesia: Center for International Forestry Research.
- Cooke, B. and U. Kothari, eds. 2001. *Participation: The New Tyranny?* London: Zed Books.
- Cornes, R. and T. Sandler. 1996. *The Theory of Externalities, Public Goods, and Club Goods*. Cambridge: Cambridge University Press.
- Cox, M., G. Arnold, and S. Villamayor Tomás. 2010. A Review of Design Principles for Community-Based Natural Resource Management. *Ecology and Society* 15(4):38.
- DeFilippis, J., R. Fisher, and E. Shragge. 2010. *Contesting Community: The Limits and Potential of Local Organizing*. New Brunswick: Rutgers University Press.
- Demsetz, H. 1967. Toward a Theory of Property Rights. *The American Economic Review* 57(2):347–359.
- Farrington, J. and N. Martin. 1987. Farmer Participatory Research: A Review of Concepts and Practices. *Agricultural Administration Network Paper* 19. London: ODI.
- Feeny, D., F. Berkes, B. McCay, and J. Acheson. 1990. The Tragedy of the Commons: Twenty-Two Years Later. *Human Ecology* 18(1):1–19.
- Ferguson, J. 1995. From African Socialism to Scientific Capitalism: Reflections on the Legitimation Crisis in IMF-Ruled Africa. In *Debating Development Discourse: Popular and Institutionalist Perspectives*, eds. D. Moore and G. Schmitz, 129–148. New York: St. Martins Press.
- Flam, H. 2000. *The Emotional Man and the Problem of Collective Action*. Frankfurt: Peter Lang.
- Freire, P. 1970. *Pedagogy of the Oppressed*. Translation: Myra Ramos.
- German, L. and A. Stroud. 2007. A Framework for the Integration of Diverse Learning Approaches: Operationalizing Agricultural Research and Development (R&D) Linkages in Eastern Africa. *World Development* 35(5):792–814.
- German, L., H. Mansoor, G. Alemu, W. Mazengia, T. Amede, and A. Stroud. 2007a. Participatory Integrated Watershed Management: Evolution of Concepts and Methods in an Ecoregional Program of the Eastern African highlands. *Agricultural Systems* 94(2):189–204.
- German, L., K. Mekonnen, J. Mowo, E. Geta, and T. Amede. 2007b. A Socially-Optimal Approach to Participatory Watershed Diagnosis. *AHI Methods Guide* B2.
- German, L., W. Mazengia, H. Taye, M. Tsegaye, S. Charamila, and J. Wickama. 2009. Minimizing the Livelihood Trade-offs of Natural Resource Management in the Eastern African Highlands: Policy Implications of a Project in “Creative Governance.” *Human Ecology* 38(1):31–47.
- German, L., A.-M. Tiani, A. Daoudi, T. Mutimukuru Maravanyika, E. Chuma, C. Jum, N. Nemarundwe, E. Ontita, and G. Yitamben. 2012. *The Application of Participatory Action Research to Climate Change Adaptation in Africa*. Ottawa, Canada and Bogor, Indonesia: International Development Research Centre and Center for International Forestry Research.

- Gibson, C. C. 1999. *Politicians and Poachers: The Political Economy of Wildlife Policy in Africa*. Cambridge: Cambridge University Press.
- Gibson, C. C. and S. A. Marks. 1995. Transforming Rural Hunters into Conservationists: An Assessment of Community-Based Wildlife Management Programs in Africa. *World Development* 23:941–957.
- Goldman, M. J. 2011. Strangers in their Own Land: Maasai and Wildlife Conservation in Northern Tanzania. *Conservation and Society* 9:65–79.
- Greiner, C. 2012. Unexpected Consequences: Wildlife Conservation and Territorial Conflict in Northern Kenya. *Human Ecology* 40(3):415–425.
- Hagmann, J. and E. Chuma. 2002. Enhancing the Adaptive Capacity of the Resource Users in Natural Resource Management. *Agricultural Systems* 73(2002):23–39.
- Hall, D., P. Hirsch, and T. M. Li. 2011. Intimate Exclusions: Everyday Accumulation and Dispossession. In *Powers of Exclusion: Land Dilemmas in Southeast Asia*, eds. D. Hall, P. Hirsch, and T. M. Li, 145–169. Honolulu: University of Hawai'i Press.
- Hand, J. L. 1986. Resolution of Social Conflicts: Dominance, Egalitarianism, Spheres of Dominance, and Game Theory. *The Quarterly Review of Biology* 61(2):201–220.
- Hardin, G. 1968. The Tragedy of the Commons. *Science* 162:1243–1248.
- Hardin, R. 2011. Concessionary Politics: Property, Patronage, and Political Rivalry in Central African Forest Management. *Current Anthropology* 52(S3):S113–S125.
- Haverkort, B., J. van der Kamp, and A. Waters-Bayer. 1991. *Joining Farmers' Experiments: Experiences in Participatory Technology Development*. London: IT Publications, 269.
- Heckathorn, D. D. 1996. The Dynamics and Dilemmas of Collective Action. *American Sociological Review* 61(2):250–277.
- Herr, K. and G. L. Anderson. 2015. *The Action Research Dissertation*. London: Sage Publications Inc.
- Hilgers, M. 2010. The Three Anthropological Approaches to Neoliberalism. *International Social Science Journal* 61(202):351–364.
- Horwich, R. H. and J. Lyon. 2007. Community Conservation: Practitioners' Answer to Critics. *Oryx* 41(3):376–385.
- Hult, M. and S.-A. Lennung. 1980. Towards a Definition of Action Research: A Note and Bibliography. *Journal of Management Studies* 17:241–250. <https://doi.org/10.1111/j.1467-6486.1980.tb00087.x>.
- Hume, D. 1740. *A Treatise of Human Nature*. 538 (Book 3, Part 2, § 7) (1740, Oxford, Clarendon Press, 1965).
- Igoe, J., S. Sullivan, and D. Brockington. 2009. Problematising Neoliberal Biodiversity Conservation: Displaced and Disobedient Knowledge. *Current Conservation* 3(3):24–26.
- Kemmis, S., R. McTaggart, and R. Nixon. 2014. *The Action Research Planner: Doing Critical Participatory Action Research*. Singapore: Springer.

- Knight, J. 1992. *Institutions and Social Conflict*. Cambridge: Cambridge University Press.
- Krier, J. E. 2009. Evolutionary Theory and the Origin of Property Rights. *Law & Economics Working Papers Archive: 2003-2009* Article 98.
- Lichbach, M. I. 1996. *The Cooperator's Dilemma*. Ann Arbor: The University of Michigan Press.
- McCutcheon, G. and B. Jung. 1990. Alternative Perspectives on Action Research. *Theory into Practice* 29(3):144–151.
- McGinnis, M. and E. Ostrom. 1992. Design Principles for Local and Global Commons. *Paper Presented at the Conference, 'Linking Local and Global Commons,'* Harvard Center for International Affairs, Cambridge, Massachusetts, April 23–25, 1992.
- Mosse, D. 2005. *Cultivating Development: An Ethnography of Aid Policy and Practice*. London: Pluto Press.
- Mosse, D., J. Farrington, and A. Rew. 1998. *Development as Process: Concepts and Methods for Working with Complexity*. London and New York: Routledge/ODI.
- Murphree, M. W. 1995. Optimal Principles and Pragmatic Strategies: Creating an Enabling Politico-Legal Environment for Community Based Natural Resource Management (CBNRM). *Keynote address at the Conference of the Natural Resources Management Programme, SADC Technical Coordination Unit Malawi, USAID-NRMP Regional, Chobe, Botswana, 3rd April 1995.*
- Olson, M. 1965. *The Logic of Collective Action*. Cambridge, MA: Harvard University Press.
- Ostrom, E. 1986. Issues of Definition and Theory: Some Conclusions and Hypotheses. *Proceedings of the Conference on Common Property Resource Management*, Washington, DC: National Academy Press, 599–615.
- Ostrom, E. 1990. *Governing the Commons: The Evolution of Institutions for Collective Action*. Cambridge: Cambridge University Press.
- Ostrom, E. 2000. Collective Action and the Evolution of Social Norms. *Journal of Economic Perspectives* 14(3):137–158.
- Ostrom, E. and C. Hess. 2008. Private and Common Property Rights. *Encyclopedia of Law & Economics*. Northampton, MA: Edward Elgar. http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1304699.
- Ostrom, E. and J. Walker. 1997. Neither Markets Nor States: Linking Transformation Processes in Collective Action Arenas. In *Perspectives on Public Choice: A Handbook*, ed. D. C. Mueller, 35–72. Cambridge: Cambridge University Press.
- Ostrom, E., J. Burger, C. B. Field, R. B. Norgaard, and D. Policansky. 1999. Revisiting the Commons: Local Lessons, Global Challenges. *Science* 284(5412):278–282. DOI: 10.1126/science.284.5412.278.
- Peluso, N. 1993. Coercing Conservation? The Politics of State Resource Control. *Global Environmental Change* 3(2):199–217.
- Pigou, A. 1932. *The Economics of Welfare*, 4th ed. London: Macmillan and Co.
- Platteau, J.-P. 2000. *Institutions, Social Norms, and Economic Development*. London: Routledge.

- Ribot, J. 2004. *Waiting for Democracy: The Politics of Choice in Natural Resource Decentralization*. Washington, DC: World Resources Institute.
- Ribot, J. C. and N. L. Peluso. 2003. A Theory of Access. *Rural Sociology* 68(2):153–181.
- Robbins, P., K. McSweeney, A. K. Chhangani, and J. L. Rice. 2009. Conservation as it is: Illicit Resource Use in a Wildlife Reserve in India. *Human Ecology* 37:559–575.
- Rydin, Y. and M. Pennington. 2000. Public Participation and Local Environmental Planning: the Collective Action Problem and the Potential of Social Capital. *Local Environment* 5(2):153–169.
- Schlager, E. 2004. Common-Pool Resource Theory. In *Environmental Governance Reconsidered: Challenges, Choices, and Opportunities*, eds. R. F. Durant, D. J. Fiorino, and R. O’Leary, 145–175. Cambridge, MA: MIT Press.
- Schlager, E. and E. Ostrom. 1992. Common Property and Natural Resources: A Conceptual Analysis. *Land Economics* 68(3):249–262.
- Sikor, T. and C. Lund. 2009. *The Politics of Possession: Property, Authority and Access to Natural Resources*. Hoboken, New Jersey: Wiley-Blackwell.
- Sikor, T., E. Varlosius, and W. Scheumann. 2008. Introduction: Public-Private Relations and Key Policy Issues in Natural Resource Governance. In *Public and Private in Natural Resource Governance: A False Dichotomy?* ed. T. Sikor, 1–20. London: Earthscan.
- Stirrat, R. L. and H. Henkel. 1997. The Development Gift: The Problem of Reciprocity in the NGO World. *The Annals of the American Academy of Political and Social Science* 554:66–80.
- Suchman, M. 1995. Managing Legitimacy: Strategic and Institutional Approaches. *The Academy of Management Review* 20(3):571–610.
- Thebaud, B. and S. Batterbury. 2001. Sahel Pastoralists: Opportunism, Struggle, Conflict and Negotiation: a Case Study from Eastern Niger. *Global Environmental Change* 11:69–78.
- Thompson, M. and K. Homewood. 2002. Entrepreneurs, Elites, and Exclusion in Maasailand: Trends in Wildlife Conservation and Pastoralist Development. *Human Ecology* 30(1):107–138.
- Tiffen, M., M. Mortimore, and F. Gichuki. 1994. *More People, Less Erosion: Environmental Recovery in Kenya*. Chichester: Wiley.
- van den Bergh, J. C. J. M. 2010. Externality or Sustainability Economics? *Ecological Economics* 69(2010):2047–2052.
- Walters-Bayer, A. 1989. *Participatory Technology Development in Ecologically-Oriented Agriculture: Some Approaches and Tools*. Agricultural Administration Network Paper 7. London: ODI.
- World Bank. 2000. *World Development Report 1999/2000: Entering the 21st Century*. Washington, DC: World Bank.
- Young, O. R. 2003. Environmental Governance: The Role of Institutions in Causing and Confronting Environmental Problems. *International Environmental Agreements* 3(4):377–393.

Appendix

Table A1: Ostrom's design principles of long-enduring common property regimes, as modified by Cox et al. (2010).

Principle	Description
1A	User boundaries: Clear boundaries between legitimate users and nonusers must be clearly defined.
1B	Resource boundaries: Clear boundaries are present that define a resource system and separate it from the larger biophysical environment.
2A	Congruence with local conditions: Appropriation and provision rules are congruent with local social and environmental conditions.
2B	Appropriation and provision: The benefits obtained by users from a common-pool resource (CPR), as determined by appropriation rules, are proportional to the amount of inputs required in the form of labor, material, or money, as determined by provision rules.
3	Collective-choice arrangements: Most individuals affected by the operational rules can participate in modifying the operational rules.
4A	Monitoring users: Monitors who are accountable to the users monitor the appropriation and provision levels of the users.
4B	Monitoring the resource: Monitors who are accountable to the users monitor the condition of the resource.
5	Graduated sanctions: Appropriators who violate operational rules are likely to be assessed graduated sanctions (depending on the seriousness and the context of the offense) by other appropriators, by officials accountable to the appropriators, or by both.
6	Conflict-resolution mechanisms: Appropriators and their officials have rapid access to low-cost local arenas to resolve conflicts among appropriators or between appropriators and officials.
7	Minimal recognition of rights to organize: The rights of appropriators to devise their own institutions are not challenged by external governmental authorities.
8	Nested enterprises: Appropriation, provision, monitoring, enforcement, conflict resolution, and governance activities are organized in multiple layers of nested enterprises.