

Policy Insights for Community Forestry: Lessons from a comparative analysis of forest management in Honduras, Nicaragua & Tanzania

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1. Introduction

Over the past several decades, common-pool resource scholars and others have consistently cautioned against the use of blueprints or single solutions to sustainably govern all human-environment interactions (Ostrom 1990; Ostrom, Janssen, Anderies 2007; see PNAS special addition Sept. 25, 2007). Studies of linked social-ecological systems (SESs) point to the variety of socioeconomic, institutional, and biophysical conditions that may impact resource use; factors that may not be fully addressed by “one size fits all” policy solutions (Agrawal 2001; Acheson 2007; Ostrom, Janssen, Anderies 2007). For example, in his survey of common-pool resource management scholarship, Agrawal (2001) found over 30 variables that might possibly influence common-pool resource management outcomes.

Despite such complexity, or perhaps as a consequence of it, there is an astounding uniformity to policy solutions for natural resource management in applied contexts. This is particularly true in forest conservation where scholars and practitioners frequently contest whether forests are best managed by public agencies or local communities (Terborgh 2000; Putz, Blate, Redford, Fimbel, & Robinson, 2001; Molnar, Scherr and Khare 2004; Sunderland et al. 2008), but often do not sufficiently consider the particular nature of the resources, managing institutions, or structure of policies and processes which shape forest outcomes in specific contexts. In fact, neither public, private, nor common-property arrangements have been shown

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to universally conserve forests in all situations where they are applied (Ostrom and Nagendra 2006; Acheson 2007; Barton Bray et al. 2008). In recent years, there has been a push for greater collaborative governance arrangements in which forest management is shared between communities, different levels of government, and at times, non-governmental organizations. Nonetheless, these arrangements have met with questionable success within the local institutional contexts in which they operate (Stevens 1997; Ribot et al. 2006; Agrawal 2007).

Designing and implementing sustainable forest management policies that address local contexts while providing a degree of programmatic uniformity is a daunting task for policymakers and program managers. Unfortunately, scholarship on resource management does not always address practical needs of policymakers. Basurto and Ostrom (2008) point out that too often scholars of natural resource management fall into two analytical traps in which they either oversimplify the complexities and offer management panaceas or contend that every resource management situation is unique, thus it is impossible to identify management patterns. Within these opposing poles, there is a need for common-pool resource scholars to provide analytical questions and insights that help practitioners sort out patterns that contribute to successful governance arrangements.

This paper uses a diagnostic approach proposed by Ostrom and colleagues (Ostrom 2005; 2007; Ostrom, Janssen & Anderies 2007) to compare forest management institutions and related conservation outcomes on forest commons². We compare forest management case studies of public, co-management, and community property rights systems in Honduras, Nicaragua and Tanzania. The objectives of the paper are to glean commonalities regarding (1) how different institutional arrangements contribute to forest conservation; (2) the role external governmental

² By forest commons we refer to forests in which forest use norms allow for shared access and use by multiple residents. This is distinct from forests that have a history of private property norms that prohibit non-property owners from accessing and using forest lands.

and non-governmental agencies in providing financial and institutional support; and, (3) the overall robustness of particular institutional configurations given varied biophysical, socio-economic and political contexts. In our comparative analysis, we are *not* seeking to develop forest management blue prints. Instead, we are attempting to begin to develop a set of shared lessons that practitioners might draw on when considering how to design and implement forest management on shared forest lands.

The case study findings suggest that institutional arrangements that give residents resource tenure security and autonomous collective choice rights (and the resources to defend those rights) are better able to conserve forests and maintain robust forest management systems, especially when high commercial value of the forest influences the dynamics of interaction between local managing institutions and broader government systems in which they are necessarily embedded (though to varying degrees depending on particular institutional arrangements). The findings also highlight some shared challenges in community forestry arrangements. Challenges include tension between resident desire for decision-making autonomy that is separate from the government authorities and the need for external institutional support to resolve conflicts over monitoring and enforcement.

2. Literature: Analytical Questions to Inform Forest Management

In her discussion of analytical approaches to understanding SESs, Ostrom encourages scholars to move beyond panaceas by developing a diagnostic approach that builds cumulative empirical knowledge on three broad questions (Ostrom 2007, pg 15182):

- 1. What patterns of interactions and outcomes, such as overuse, conflict, collapse, stability, and increasing returns, are likely to result from using a particular set of rules for the governance, ownership and use of a resource system and specific*

resource units in a specific technological, socioeconomic, and political environment?

2. *What is the likely endogenous development of different governance arrangements, use patterns, and out-comes with or without external financial inducements or imposed rules?*
3. *How robust and sustainable is a particular configuration of users, resource system, resource units, and governance system to external and internal disturbances?*

Elucidating answers to these research questions is particularly important for improving the understand and effective implementation of forest management policies in varied contexts. Over the past years, forest management policies have evolved beyond the traditional publicly managed protected area model to include more intricate arrangements that provide for a variety of rights and responsibilities. In light of demands from resource users for greater recognition of their livelihood needs and rights, funding limitations, and encouragement from donor agencies, many governments have introduced decentralized forest governance arrangements with a focus on collaborative or community management of forests (Molnar, Scherr and Khare 2004; Ribot et al. 2006; Agrawal 2007). For example, Molnar and colleagues find that 22% of forests in developing countries are now owned or managed by communities (2004, p. 27).

This movement toward increased community participation has been further supported by empirical research findings that secure tenure rights over forest resources, rulemaking rights, monitoring and enforcement of forest rules, organization amongst resource users, and expectation of benefits all contribute to effective forest management (Gibson et al. 2005; Bray et al. 2005; Pagdee et.al. 2006; Hayes 2006). Nonetheless, translating participatory institutional arrangements into a cohesive policy paradigm for governments remains a substantial challenge (Agrawal 2007; Ostrom 2007; Persha and Blomley in press).

Two particular concerns relate to how different decentralized governance arrangements impact local resource management and forest conservation outcomes, and the role that different external agencies may play in contributing to (or thwarting) robust forest governance regimes at local levels. Decentralized forest management is an umbrella term that encompasses a wide range of institutional arrangements. Decentralization processes may take on many different forms, and collaborative and community arrangements vary widely in the degree of decision-making rights and responsibilities shared with local resource users (Nygren 2005; Lemos and Agrawal 2006; Ribot et al. 2006; Agrawal 2007; Barton Bray et al. 2008).

In considering decentralized systems, it is particularly important to understand how the rights and roles assigned to the state and other external actors impact local resource decisions (Gibson, Williams & Ostrom 2005; Wright 2005; Andersson et al. 2006; Agrawal and Chhatre 2007). Work by Agrawal and Chhatre (2007) on co-governance in the Indian Himalayas finds a negative association between government involvement and sustainable forest management, and suggests that decentralized systems may be more effective given a more limited role of the state. Others, however, worry that local governance arrangements are not robust enough on their own to withstand changes in the resource system and resource users (Redford 1991; Terborgh 2000), and call for greater government oversight in forest and biodiversity management. Cash and colleagues (2006) emphasize the importance of identifying how the interaction between national and local policies may present significant opportunities and challenges in managing the environment.

If we are to improve our understanding of how different combinations of decentralized arrangements impact forest governance, we need to parse how the distribution of specific rights, rules and responsibilities between different actors operating across different scales, impacts

resource user incentives and actions (Agrawal 2007; Cash et al. 2006). Studies that use a consistent framework to assess how different institutional arrangements impact sustainable forest conservation are needed to provide empirical lessons about how rights, rules and resources in specific contexts might be more effectively distributed amongst governments, communities, and non-governmental agencies.

3. Conceptual Model: SES Framework to Assess Institutional Arrangements and Conservation Outcomes

We use the SES framework development by Ostrom (2007) to systematically compare and contrast institutional arrangements and outcomes regarding sustainable forest management in five case studies from Honduras, Nicaragua and Tanzania. The SES framework divides the investigation and subsequent analysis into tiers. In the first tier, the researcher identifies the broad characteristics of the unit of analysis, such as the resource system, the resource units, the social, economic, and political setting, the specific governance system and the resource users. In the second tier, the researcher identifies how specific characteristics of the resource system, resource units, the resource users and the broader socioeconomic and institutional setting interact to produce specific management outcomes.

In the cases presented here, our unit of analysis is forests that are governed under specific management systems. The independent variable of interest is the particular institutional configuration of the resource management system, defined by how decision-making rights are allocated. The dependent variables of interest are forest condition and the de facto forest management practices. We use the Institutional Analysis and Development (IAD) framework and work by Schlager and Ostrom (1991) to specify the particular institutional configuration for

forest governance in each case. We categorize the rights and responsibilities held by public agencies and by local forest users. In the study we categorize the right and responsibilities held by local forest users and by public agencies at the federal, regional and municipal levels. In our cases, we consider local forest users to be individuals that have historically lived in the forest regions (at least 100+ years) and who to date, live either in or adjacent to the study forests.

Schlager and Ostrom (1992) emphasize that different bundles of property rights, and whether they are de facto or de jure, affect the incentives individuals face, the types of actions they take, and the outcomes they achieve. Drawing from the IAD framework, decision-making rights can be split into three different levels: constitutional, collective choice and operational (Ostrom 1990, 2005). At the constitutional level, actors make decisions with respect to who can make and change the rule structure. Thus whether a state government or a local community holds constitutional decision-making rights will greatly impact local tenure security as these actors are able to determine who is eligible to craft rules and how these rules will be shaped.

The collective choice right holders, however, are the actors who are able to make management decisions about use and access to a particular forest system. In forest management, particularly important collective choice rights include management, exclusion and alienation (Schlager and Ostrom 1992). Those with collective-choice decision-making rights are entitled to make rules that *exclude* others and make *management* decisions that determine future access and withdrawal rights. *Alienation* is also a right decided at the collective-choice level and entitles one to sell or lease access and management rights. Finally, at the operational level are the decisions that regulate the day-to-day use of a specific good. In forest management, these are often include monitoring and enforcement activities as they are specified at the collective-choice level.

We compare the institutional structure and forest conservation and governance outcomes from cases drawn from two studies conducted in diverse regions of the world, yet affected by similar national processes of forest management and policy reform currently under momentum in most lesser-developed countries. The studies assessed institutional arrangements and associated governance outcomes for five forest reserves in Honduras, Nicaragua and Tanzania.

4.1 Case Studies

The forests in Honduras, Nicaragua and Tanzania include tropical humid, very humid and montane forests which differ in size, altitude, and accessibility. Appendix 1 shows the principal forest site characteristics, and draws attention to several biophysical and related differences between the cases in Mesoamerica compared to East Africa. The Mesoamerican forests were generally very large (10,000s of ha), contiguous, devoid of road access and inhabited by settlements with low population density per hectare of forest, while the East African forests were quite small (100s – 1,000 of hectares), highly discrete and fragmented, fairly accessible by nearby roads, uninhabited because forest settlements are prohibited, but with much higher population density per hectare of forest from settlements adjacent to the forests.

Despite the above-mentioned differences, the communities that use these forests share several key similarities in socioeconomic status and forest use customs, including: shared use rights; common degree of dependency on forest products; outside use pressures, and similar organizational histories. In Honduras and Nicaragua, the Miskito and Mayangna Indians have traditionally managed their forest lands based upon decisions made at the familial level and through a tacit set of shared forest-use norms that permits all community members access to forest lands and use of forest products. In Tanzania, native residents have historically shared

access and use rights, though these historic rights were gradually eroded over the past 100 years with the introduction of colonial followed by centralized state forestry activities in the area.

In addition to sharing similar customary use rights, the local residents share similar forest uses. In all forests, residents are primarily subsistence farmers (Herlihy 1997; Stocks 1998; Mascarenhas 2000) who depend upon the forests for a variety of products, including fuel wood, building poles, and medicinal plants. In Honduras and Nicaragua, the local residents also depend upon the forests for agricultural lands as they continue to practice traditional swidden agriculture. It is also important to note that although timber harvesting is technically prohibited in all countries, in each case study, trees are felled for subsistence uses, and to varying degrees, for commercial purposes.

In many cases, much of the timber harvesting for commercial purposes is done by, or in conjunction with, non-residents who live outside of the local forest communities. In all three of the case study forests, community outsiders threaten the sustainability of the forest reserves and local governance systems. In Honduras and Nicaragua, the forests are threatened primarily by farmers and ranchers expanding on to forest lands, although there is also evidence of timber harvests facilitated by outsiders for commercial purposes. In Tanzania, the case study forests are threatened by illegal timber harvesting that is facilitated by outsiders, fires burning into the forest from adjacent agricultural lands, and continued conversion of non-reserved forest cover to other land uses.

In terms of institutional characteristics, a principal difference between forests in this study is the degree to which decentralization reforms devolved collective choice decision-making rights over the forest resources. Appendix 2 shows the tenure and collective choice right holders in each forest. If we consider the spectrum of rights that run from left to right with the left side

being complete government control over collective choice rights and the right side being complete community control over collective choice rights, the two reserves on the far right side of the spectrum are the Honduran government reserve, and the Tanzanian government reserve under centralized government management. In Honduras, although the native residents were briefly consulted about forest reserve management rules, the Honduran Department of Forestry retains all collective choice rights and residents only have permission to access and use the forests so long as they are in accordance with the rules created by the Ministry of Forestry.

Likewise in the Tanzanian government reserve, the Tanzanian Department of Forestry retains all collective choice rights. In the Tanzanian Joint Forest Management forest, collective decision-making rights are split between the central Department of Forestry, the local district forestry department and local residents. In terms of collective choice rights, villagers have some input into management and exclusion rights, though subject to Forestry oversight and approval, while Forestry retains alienation rights. On the far right of the spectrum are the Nicaraguan communal forest and the Tanzanian communal forest. In the Nicaraguan case, indigenous residents hold all collective choice decision-making rights to their territories that are located within a larger forest reserve. In the Tanzanian communal forest, the forest is managed by a cooperative consisting of most village households, and management is carried out on their behalf by an elected board of directors. The cooperative holds all collective choice rights.

4.2 Research Methods

Data for each study was gathered during site visits to the respective reserves and interviews with corresponding management associations and households from 2002-2006 in Honduras and Nicaragua, and from 2005-2007 in Tanzania.

Each study assessed how different institutional arrangements, which were specified by forestry sector decentralization policies in the respective country (public, co-management, or community), impacted forest conservation and local forest governance. Forest conservation was defined in terms of the nature of primary threats to forest integrity at each site, which necessarily differed among Mesoamerica and East Africa. In Honduras and Nicaragua, the study compared agricultural expansion in a government managed reserve with a reserve owned and managed by indigenous residents. In Tanzania, the study compared the incidence of prohibited timber harvesting and subsistence forest use among neighboring centralized, co-managed and communally managed reserves.

In each case, the investigation was structured by the International Forestry, Resources and Institutions (IFRI) protocols; a validated set of research instruments specifically designed to understand how different institutional arrangements impact forest use and management outcomes. Data on formal and informal institutions and socioeconomic information was collected via focus groups, key informant interviews, and observation. In Honduras and Nicaragua a short household questionnaire was also administered to understand local forest use norms.

The broad outcome of interest in all cases was forest conservation, and was measured in each country by indicators specific to the nature of particular forest threats these. In Honduras and Nicaragua, forest conservation indicated by the ability of local communities or forest management institutions to control agricultural expansion into their forest frontier. The study forests in these two countries lie on the agricultural frontier, and agricultural expansion is the leading cause of deforestation in the region (Geist & Lambin 2001). Agricultural expansion was measured by Landsat images classified by the Honduran Ministry of Forestry (1995-2001), and

the Nicaraguan Ministry of Natural Resources and the Environment (2003) augmented by time-series land cover change conducted by Stocks et al. (2007).

In the Tanzanian sites, where forest patches are already highly fragmented and forest reserve boundaries have remained relatively stable over the past several decades, forest conservation was indicated by how well management institutions controlled illegal commercial timber harvesting and subsistence pole cutting in their forest. Incidence of these two primary sources of forest degradation was measured via stratified random vegetation sampling, in which all logged and pole-cut stems were censused within 20x20m plots and within 100m of plot boundaries.

5. Summary of Case Study Findings

The following summarizes the ecological and institutional outcomes for the study sites in Honduras, Nicaragua and Tanzania. The findings show that the communally owned and managed forests were more successful in controlling exploitative activities than their government and jointly managed counterparts.

5.1. Government Reserve, Honduras

In 1997, in the forest reserve in Honduras, the Honduran Ministry of Forestry crafted formal rules that specifically prohibited agricultural expansion and timber harvesting within the reserve. In practice, however, these rules have been minimally applied. The boundaries, however, were never physically demarcated and there was very limited monitoring and enforcement of the reserve rules. In 2001, there were four forest guards for the reserve and by 2005-2006, there were none.

In the Honduran reserve, agricultural expansion and timber harvesting continue to threaten the region. Remotely sensed images of land cover in 1995 and 2001 show that, over this six year time period, the western edge of the cultural zone (a region particularly threatened by outside agricultural expansion) lost 10% of its forest cover. In 1995, 88% of the western region was covered in forest, but by 2001, the forest area was reduced to 76% (Hayes 2007). Furthermore, accounts of illicit timber harvesting, and the Ministry's of Forestry's facilitation of said harvesting, threaten the sustainability of the forests and the government systems responsible for protecting them (del Gatto 2004; Wells, del Gatto, Richards 2007).

In the absence of external support for monitoring and controlling deforestation, the indigenous residents have devised their own vigilance organizations and rules to prohibit further colonization. Nonetheless, under increasing colonization pressures, these local governance systems have tended to breakdown as community members report that lack of enforcement support from the government makes it difficult to keep outsiders from entering the forests. In interviews, some community land vigilance committee members stated that when the Honduran Ministry of Forestry took over management responsibilities for the reserve, they stopped monitoring. Other residents stated that since the Ministry of Forestry technically owned the reserve lands, there was no reason for the local residents to comply with land-use rules as the lands were no longer their responsibility. The result at the local governance level, has been an overall deterioration of the traditional common-property system that historically served to conserve forest lands (Hayes, in press).

5.2. Communal Forest, Nicaragua

In 1997, indigenous communities in the Nicaraguan reserve worked with The Nature Conservancy and in conjunction with the Nicaraguan Ministry of the Environment to establish their common-property rights over their territories and craft a land management plan to conserve their forests and prohibit agricultural expansion³. The resultant properties rights arrangement left a reserve whose core area is communally owned and managed by the indigenous residents.

In each community, two residents were selected to work as forest guards to monitor community activities and participate in the territorial boundary patrols. As of 2005, the guards continued to maintain the boundary clearings and monitor for mestizo encroachment as well as resident compliance with the territorial land management plan. The guards are financially supported by external NGOs who also play critical roles in providing conflict resolution mechanisms to address infractions to the management rules by outsiders.

An analysis of the current status of agricultural expansion in the communal territories of the forest reserve shows that the common-property rights and their respective monitoring mechanisms established in 1997 are working to stop outside encroachment and promote forest conservation. Remotely sensed images of forest cover in and outside the territories show that outsiders are not expanding into the territories (Hayes 2007; Stocks et al. 2007). An analysis of land-cover change from 1987, 1995/1996, and 2001/2002 by Stocks and colleagues (2007) found that the territorial boundaries are restraining agricultural expansion and that forest connectivity is statistically greater in the portion owned and managed by the native residents under a common-property regime than in the portion owned and managed by the Nicaraguan government.

³ In 1997 the native residents crafted an informal document that established their common-property rights to their territories, demarcated their territorial boundaries and created a management plan. The residents in Bosawas consider the 1997 agreement to be the establishment of “the law”. The rights were not formally recognized by the Nicaraguan government, however, until 2001.

Likewise, the rate of deforestation between 1987 and 2002 was significantly less inside the territories than in the publicly managed portions of the reserve.

Furthermore, the sustainability of the indigenous governance system appears promising. Land-cover analyses suggest that residents are complying with the territorial management plan that delineates where agriculture, gather forest products, strict conservation will be practiced (Hayes and Murtinho 2008). Results from a simulation of possible land-use change indicate that, if the residents retain their current land-use practices and population growth rates, forest conservation is relatively secure. Furthermore, while increasing population pressures and cattle ranching may stress the land-use institutions, the indigenous residents have the advantage of having previously participated in establishing a set of rules to restrict land use and a governing body that has, thus far, effectively monitored and enforced those land use restrictions.

5.3 Centralized, co-managed and communal forests, Tanzania

In Tanzania, the co-managed governance system and local institutional arrangements were similar to centralized management in their formal conception and in practice. In both forests, stiff fines for logging and pole cutting were mandated on paper and determined by external Forestry authorities rather than local forest users or decision makers. In practice, loggers operated freely in both forests, but other villagers were commonly apprehended and sanctioned for their subsistence pole cutting. To many villagers, this disparity in rule enforcement indicated collusion between logging interests and the forestry department, and was viewed as unfairly penalizing the most disempowered and poorest members of the village. Despite the introduction of co-management, many villagers felt a select group of village elites would continue to benefit

from illicit forest activities just as they did under the previous centralized management, and saw little opportunity for a change in the status quo.

In contrast, communal forest managers, who chose to set similar forest-management goals and forest-use rules as that of the neighboring centralized and co-managed forests, and also implemented a logging ban in their forest before the government banned logging in all forests in the district, had very different rule enforcement and forest conservation outcomes. They set no formal fines for any forest offences, and in most cases, only verbally sanctioned rule-breakers. They did take stronger action when outsiders farmed or logged in the communal forest, though this required seeking help from government authorities to bring rule breakers to court. In their opinion, their nearly complete autonomy from forest department authority, who they viewed as facilitators of illegal logging in the district, enabled the communal forest managers to escape a set of complicated power dynamics that might otherwise leave them more vulnerable to corruption, and led to better conservation of their forest. Nevertheless, they had no source of revenue to manage their forest or pay forest guards, and saw their lack of financial sustainability as their greatest challenge to long-term good stewardship of their forest.

In all three forests, de facto enforcement notably differed by the nature of the infraction and who rule breakers were. In the centralized and co-managed forests, de facto enforcement mainly targeted poor villagers who undertook subsistence pole cutting, whereas in the communal forest it mainly targeted outsiders.

These institutional and enforcement patterns related to forest conservation outcomes. Recent logging or pole-cutting (within 12 months of sampling) was recorded in 84% of plots in the co-managed forest, compared with 40% in the centralized forest and 31% in the communal forest. Logging incidence in the co-managed forest was nearly double that of the centralized

forest, but virtually non-existent in the communal forest. Pole-cutting for subsistence was common in all three forests, but still significantly higher in the co-managed forest compared to either the centralized or communal forest. While the centralized forest was not as disturbed as the co-managed forest overall, it was also much larger than the other two forests in the study and peripheral areas of that reserve were much more disturbed than the forest interior. The incidence of logging and pole-cutting in the peripheral area of the centralized forest was relatively similar to that of the co-managed forest.

6. Discussion: Common Themes in Institutional Arrangements for Forest Management

The case study findings offer insights into the three questions posed by Ostrom regarding the governance of SESs and the contention over the degree of devolution of property rights, management rights, and responsibilities with respect to effective decentralized or collaborative forest management arrangements. Similar to other studies of decentralized forest management (Nygren 2005; Padgee, Kim & Dougherty 2006; Agrawal and Chhatre 2007), the findings illustrate the importance of local rulemaking autonomy in forest conservation. The case study findings also illustrate the tension that local communities face over their desire for autonomous management, while at the same time acknowledging that some level of external financial and institutional support seemed necessary, at least in certain circumstances, for them to meet challenges which threaten their forests but originate beyond or transcend their scope of management. The issue of institutional support is particularly challenging given the weak institutional support at all governance levels. In the following we highlight lessons from our findings regarding (1) rulemaking; (2) the need for external support for monitoring and

enforcement and (3) the robustness of local governance systems, particularly with respect to their ability to learn and adapt in sustainable forest management.

6.1 Local Rulemaking Rights

Our findings suggest that in decentralized management systems, local rulemaking autonomy is critical to constructing effective forest management regulations. In each case study forest, when local forest users were able to make access and management rules, the forests were better conserved than when the rule making rights were held by government agencies. Results from interviews with residents in the communal forests in Nicaragua and Tanzania found that rules were better monitored and complied with when they were made by local residents instead of the government. *Why?* Interviews in our cases suggested that perceived legitimacy played a key role. In forests where residents were able to make rules, the rules were perceived to be legitimate.

In Nicaragua, the indigenous natives and outside colonists both stated that they complied with the forest management rules created in 1997 because they each participated in the rulemaking process. Likewise in the communal forests in Tanzania, residents stated that the ban on logging in their forest was legitimate in their eyes and upheld by most members of the community, because they made the ban themselves.⁴

In contrast, in the government managed forest in Honduras and the Jointly Managed Forest in Tanzania where residents are subjected to rules, but can only provide token input, the rules are not perceived to be legitimate. In both of these forests, the rules are poorly monitored and forest degradation continues relatively unchecked. In interviews with residents in the government managed forest in Honduras, residents consistently commented that the Honduran Ministry of

⁴ The residents created a ban in timber harvesting prior to the government mandated ban.

Forestry had no right to tell them how to use what has traditionally been the homeland of the native residents. Furthermore, amidst accusations that the Honduran Ministry of Forestry was involved in the illicit timber trade, some residents stated that if the government now owns the forests, they have no reason to protect the forest because that is the responsibility of the government who will do with the forest whatever they wish. The forests are no longer perceived to be the responsibility of the native residents.

6.2 Role of External Agencies: Institutional and Financial Challenges

The ability of local residents to monitor and enforce their own forest regulations and the role of external enforcement is perhaps, one of the most challenging aspects of forest governance. It is challenging because of the problem of weak institutions at all governance levels and limited sources of funding for monitoring activities. In the cases in Honduras, Nicaragua and Tanzania, we found local monitoring and enforcement mechanisms to be relatively weak, particularly in the ability to regulate outsiders that wish to exploit the forest resources. We also found, however, governmental monitoring and enforcement mechanisms no more effective, and at times, more damaging to sustainable forest management.

The problem of monitoring and enforcement and the role of external agencies, specifically governmental agencies, are threefold. Local residents often do not have sufficient power or resources to effectively apply their forest rules to outsiders. When, however, the government is given monitoring and enforcement responsibilities, these are often abused. Government agencies are often accused of failing to apply the law equally to all and, in some cases, are implicated in illicit forest activities.

The difficulties in how to involve external governmental agencies in monitoring and enforcement is exemplified by activities in the forest reserves in Honduras and Tanzania. For example, in Honduras, when colonists first began moving into the forest, the native residents organized land vigilance groups to keep the colonists from settling on indigenous homelands. In the mid-1990's, however, faced with growing colonist pressures, the leaders of the land vigilance committees asked for greater government support to monitor the lands. In interviews, leaders of the land vigilance committees stated that they felt that they could no longer keep farmers and ranchers out of the forest and that they needed the Ministry of Forestry to help apply forest rules. Shortly thereafter, the Honduran Ministry of Forestry was given jurisdiction over the forest reserve with the right to make management rules. Unfortunately, the Ministry of Forestry most often failed to effectively monitor the reserve and the colonists pressures continue to date. Local residents accuse the Ministry of Forestry of failing to apply the rules to the more powerful ranchers and timber barons and Ministry of Forestry officials have been implicated in illegal timber harvests.

The residents of the communal forest in Tanzania share similar concerns regarding the need for external enforcement from a system that is perceived to be corrupt. It is important to note that within the communal reserve, the local forest guards do not apply fines for breaking the forest rules. The residents omitted fines as a form of sanctioning specifically because they were concerned about the temptation for corruption. By creating a system of rules that were perceived to be legitimate by the local residents, they were able to largely control local forest uses. When it came to sanctioning outsiders, however, the local forest guards were less effective. The communal management institution must rely on forest department staff and external courts because (1) they are afraid of outside timber harvesters who generally have powerful backers, so

they need people with more perceived authority to remove or catch them; and (2) their forest bylaws will not have legal backing until their forest is formally gazetted as a communal reserve, a process that realistically will not happen for several more years due to the number of legal steps required and the slow functioning of the necessary government bureaucracies, who have an overwhelming backlog of gazettelement and land registration cases to work through first.

The experience from the communal reserve in Nicaragua illustrates how an external non-governmental organization may play a critical role in supporting local governance systems and providing institutional backing to mediate conflicts and sanction transgressors. Like the Honduran and Tanzanian environmental agencies, the Nicaraguan Ministry of the Environment has also been accused of illicit forest activities in the region (Wells, Del Gatto, Richards 2007). And like the reserves in Honduras and Tanzania, local residents feel unable to effectively prevent transgressions from outsiders who wish to exploit the forests. Nonetheless, fieldwork findings in the communal forests in Nicaragua find that the residents, in conjunction with assistance from non-governmental agencies, have been able to mediate external conflicts while drawing on government help when necessary.

In Nicaragua, residents share legal common-property rights to their lands and hold legally recognized rulemaking rights with respect to management and exclusion. In order to monitor compliance, local forest guards monitor the reserve lands, particularly the reserve boundaries. If someone is found breaking a forest rule, the local governing body is informed. If the local governing body cannot stop the perpetrator, a national NGO (Centro Humboldt) is called on for assistance. The NGO plays two significant roles. First, the NGO pays a stipend to the local forest guards and organizes and financially supports training activities for the guards. Second, the NGO serves as a mediator to resolve conflicts with outsiders, and if the conflict cannot be

resolved, the NGO in conjunction with the local governing body calls on the Nicaraguan military and the environmental agency to enforce the law. According to local leaders, the environmental agency cannot sanction anyone without prior permission from the leaders to enter the communal reserve. In fact, in order to receive assistance from the agency and/or military, the communal reserve residents must pay the stipend for military personnel. In the communal reserve, the NGO has paid the stipend for military intervention in past conflicts. The NGO has also served to moderate the level of external government involvement in the reserve.

The need for external financial and institutional support generates concerns about the sustainability local governance arrangements. It is important to recognize that in addition to institutional support to enforce forest rules, local forest arrangements require some sort of financial support. In both the reserve in Honduras and Nicaragua, local forest guards emphasized the need for a stipend and appropriate gear to monitor the forest lands. Forest guards in the communal forest in Nicaragua stated that if they did not receive a stipend, they would not monitor. It is risky, however, to depend upon the largess of a national NGO to consistently pay the forest guards. The local residents, and the respective governing body, however, have few options to generate revenue when the only resource of commercial value is the forest that the residents are trying to protect.

The Tanzanian communal forest managers find themselves in a similar revenue bind. Commercial timber harvesting seems to present the only source of revenue for forest management, but their previous logging experience in the 1980s did not generate a sufficient revenue stream to each of the 103 families in their cooperative, given the small size of their forest, even while it depleted their forest of a substantial number of harvestable trees. They adamantly do not want to log their forest again, as their logging bans demonstrates, but also

could identify no other source of revenue. Their main interest was to earn enough funds to pay their forest guards a small wage, yet even that modest amount of income (on the order of \$25-50 per month) is out of their reach without external support.

6.3 Institutional Robustness

A common concern in recognizing local forest rulemaking rights is whether local residents will be able to adapt to changes in the ecological or social systems in order to sustainably manage a forest. The experience from Honduras and Nicaragua is that residents responsible for the communal forest management system in Nicaragua have been much more capable of adapting to (and thereby controlling) outside uses and planning for their own forest uses than has the government in the Honduran reserve. Furthermore, in the Honduran reserve, not only has the government failed to adapt to changing demographic pressures, the traditional forest management system of the local residents is in decline leaving a potential institutional vacuum in the region. The study from Tanzania shows similar results. There, communal forest managers have been able to make decisions, experience failure, and learn from their mistakes over time, as occurred with their short-lived logging venture in the 1980s which the cooperative now views as a mistake, and their subsequent longer-term outlook for retaining their valuable timber trees.

7. Conclusions: Insights for Policymakers

Our cases of shared forest management cross continents and differ across biophysical and the broader sociopolitical characteristics. The ostensible dissimilarities of our cases, however, serves to reinforce the commonality of institutional outcomes and patterns of interactions which results from the implementation of current decentralized forest management policies in the

impoverished tropics. Our results illustrate why the design of national policies to support various participatory forms of forest management at local level must give much greater thought into how such initiatives structure local level institutions for forest management, and how those institutions are embedded within and interact with broader state institutions. The similarities in our findings reinforce several policy insights for practitioners in designing and implementing decentralized forest management policies.

First, our cases suggest that rulemaking autonomy matters. In considering who should hold which property rights, our findings consistently show that when residents hold collective choice rulemaking rights, forests are in better condition. Furthermore, the findings from the communal forests in Nicaragua and Tanzania suggest that these rules are most effective when they are legally binding. The findings with respect to participation in rulemaking concur with other case and cross-national resource management studies that find natural resource systems are better sustained when resource users have rulemaking rights (Ostrom 1990; Agrawal 2001; Bray et al. 2005; Pagdee et al. 2006; Hayes 2006). Decentralization policies that do not recognize local resident rulemaking rights, or give residents only token rights, will not be perceived to be legitimate and therefore, will be more difficult to apply.

Second our case study findings illustrate the need to carefully consider how to structure government intervention in local forest management. The high commercial value of many tropical forests (e.g. an abundance of hardwood timber trees) has great potential to alter the dynamics between local community forest-managers, community outsiders, and government forest departments. Specifically, the commercial value of the timber offers opportunity for collusion between outside expropriators and forest departments. In the cases presented here, local communities are less powerful and less connected than outside forest users, and are

therefore challenged to effectively regulate outside forest use. In many cases however, the forest departments offer little assistance. Accusations (and the reality) of corruption within forest departments ultimately weakens both local institutional management robustness and forest conservation outcomes. This is an explicit reality throughout forested regions of the world, and empirically supported by our cases, thus necessitates more careful design of institutional linkages and incentives for accountability between local managers and broader authorities.

Institutional design must recognize this particular challenge outright and pay particular attention to structuring local institutional arrangements, and the structure of the linkages between local institutions and broader existing government institutions, in ways that strengthen accountability amongst the various sets of actors. In high commercial-value forests, institutional designs that minimize direct upward accountability of local managers to state forest institutions may have a greater likelihood for conservation success and sustainable management. Our case study findings suggest that that external support from the government should be limited and under the purview of the local communities. Another option is to build stronger mechanisms for accountability within the state institutions tasked with implementing decentralized management policies. The case from Nicaragua illustrates how an independent third party may be needed to mediate conflicts and curb corruption.

Third, our study findings suggest that local forest management arrangements are not necessarily self-sustaining and the design of local forest management policies needs to take into account the financial resources necessary for managing, monitoring and enforcing forest regulations. The communal reserve in Nicaragua is highly dependent upon outside donations from NGOs to cover operation costs, while it is unclear how long the communal forest in Tanzania can continue to be managed well without any financial inputs.

Finally, with respect to the overall robustness of local governance arrangements, particularly in their abilities to adapt to changing social and ecological conditions, our study findings are that local residents are able to learn, but that learning is a process. The communal forest in Nicaragua illustrates the ability of local residents to effectively address new outside threats when they are bolstered by NGO support and national policies that recognize their tenure rights. Likewise, the communal forest in Tanzania illustrates that local residents may also address their own unsustainable use practices. The overarching requisite, however, appears to return to tenure security and decision-making rights.

The practical application of decentralized forest policies is a challenging and a learning process for all. These three cases from across the world offer a few insights into how different institutional arrangements impact resource use and the overall robustness of local forest governance systems. Further research is needed, however, to identify successful decentralized arrangements in other contexts. In particular, more research is needed on how to build nested systems that provide external monitoring and enforcement support without squelching local resource management systems. In addition, more information is needed on how to construct experiences and financial mechanisms to sustain local forest governance systems. Translating participatory systems into a new forest paradigm that effectively includes conserves forest lands and respects local forest resource rights remains a challenge that can slowly be met by teasing out key commonalities from complex social-ecological systems.

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Appendix 1 Site Characteristics

	Government, Honduras	Communal, Nicaragua	TZ Govt	TZ JFM	TZ Communal
RESOURCE SYSTEM					
Resource Sector	Forest	Forest	Forest	Forest	Forest
Forest Area (ha)	389,500	123,497	3,049	365	256
Elevation	0-1326	0-1750	1550-2200	1650-1950	1475-1775
Accessibility	foot/river	foot/river	road/foot	road/foot	road/foot
RESOURCE UNITS					
Units	Trees (Mahogany) & Ag lands	Trees (Mahogany) & Ag	Trees	Trees	Trees
Subsistence Uses	Fences, Houses, Boats	Fences, Houses, Boats	Fuelwood, Construction	Fuelwood, Construction	Fuelwood, Construction
Commercial Use	Yes. Timber	Yes. Timber	Yes. Timber	Yes. Timber	Yes. Timber
USERS					
Total Pop. per Forest Area	21,320	3,912	20,262	5,023	1,826
Pop per Ha of Forest	0.05	0.03	6.7	13.8	16
Socioeconomic attributes	Subsistence Livelihoods	Subsistence Livelihoods	Subsistence Livelihoods	Subsistence Livelihoods	Subsistence Livelihoods
History of Use	Shared access and use	Shared access and use	Shared access and use	Shared access and use	Shared access and use
Location	Inside forest	Inside forest	Inside forest	Inside forest	Inside forest
Pressure from Non-local "external" Users	Yes	Yes	Yes	Yes	Yes
Technology	Limited. some chain saw use	Limited. some chain saw use	Limited. No chain saw use	Limited. No chain saw use	Limited. No chain saw use
GOVERNMENT SYSTEMS					
Tenure rights (land title)	Ministry of Forestry	Indigenous territories	State	State	Co-operative
Management Structure: Collective choice rules making authority	Ministry of Forestry oversees rulemaking and management. Community is supposed to support Ministry of Forestry in monitoring rules.	Indigenous territorial government makes and enforces forest management rules	Director of Forestry (national) oversees regional and district foresters. Decisions may be informed by district or regional foresters, but ultimately made by Director.	Elected Village Forest Management Committee has joint management authority with District. Community has joint decision-making rights in processes involving the village, otherwise decision by Director	Co-operative, represented by an elected Board of Directors and a Manager makes all collective choice management decisions (informed by cooperative members).
External government (NGO/intl org) intervention in management?	YES	YES	Not directly to this forest	Not directly to this forest	Limited NGO assistance

Appendix 2 Forest Rights

Property Rights Hierarchy

Forest Management Institutional Regime

	<i>Centralized</i>	<i>Collaborative</i>	<i>Communal</i>
<p>1. <i>Constitutional:</i> Decisions regarding who can make and monitor rule structure.</p>	Central government.	Typically central government.	Local forest users.
<p>2. <i>Collective choice:</i> Decisions regarding exclusion, future access and withdrawal, and sale or leasing of forest access or management rights.</p>		Some combination of government and local forest users; often more rights held by government.	
<p>3. <i>Operational:</i> Decisions over day-to-day use. Monitoring activities.</p>			
<p><i>Cases in this study:</i></p>	<ul style="list-style-type: none"> ▪ Tanzanian centralized reserve; ▪ Honduran reserve. 	<ul style="list-style-type: none"> ▪ Tanzanian reserve under Joint Forest Management. 	<ul style="list-style-type: none"> ▪ Tanzanian communal forest; ▪ Nicaraguan communal reserve.