Climate and Land Use Alliance

Cultivating solutions for people and the planet

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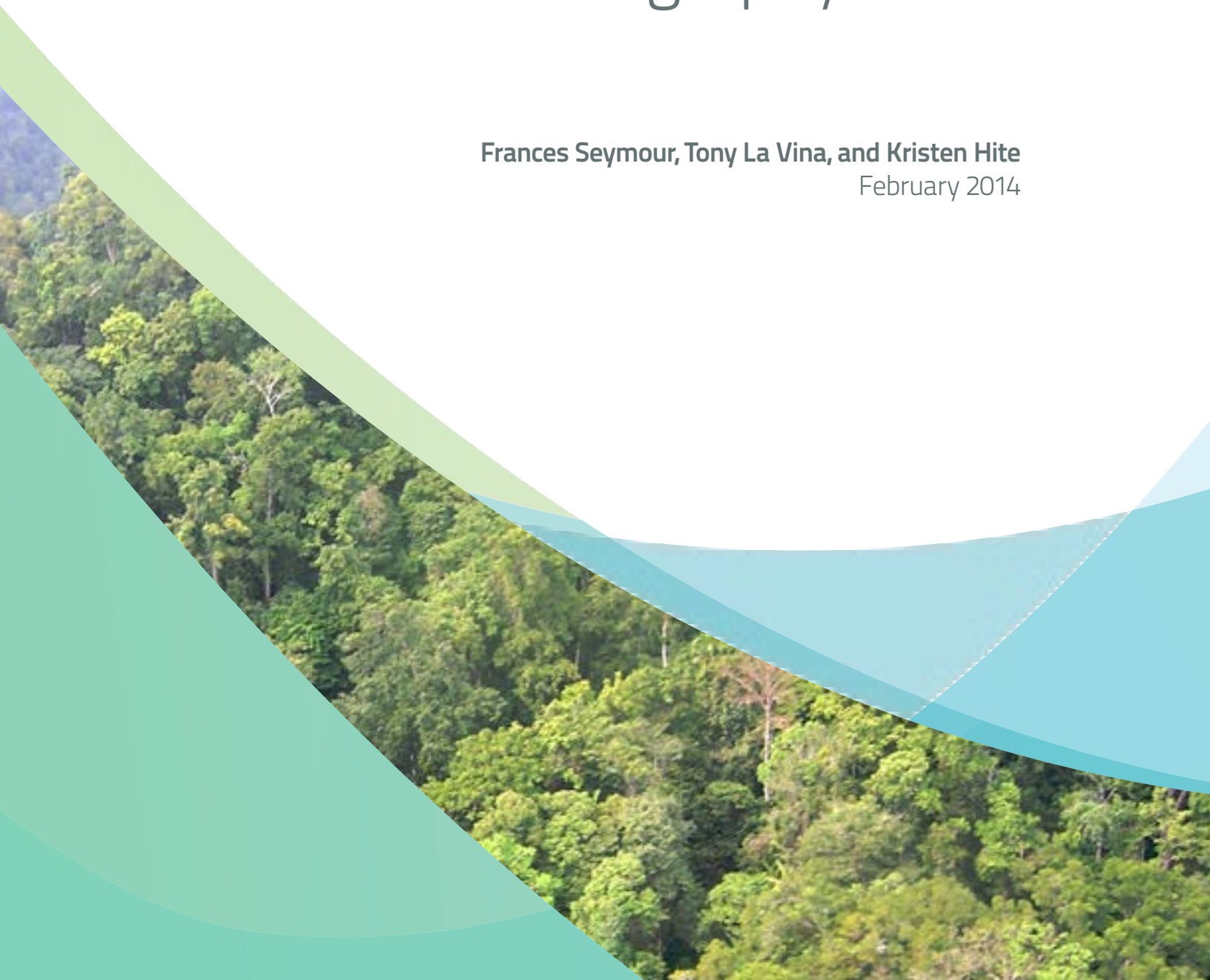
Frances Seymour, Tony La Vina, and Kristen Hite

February 2014



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Frances Seymour, Tony La Vina, and Kristen Hite[1]

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TABLE OF CONTENTS

FIGURES

FOREWORD

This annotated bibliography provides evidence that community tenure over forests can result in more forest cover and more species-rich forests, less deforestation and degradation, and fewer fires than some other approaches to protecting forests. These beneficial forest outcomes are more likely if communities are “traditional” or have a long term relationship with their natural resources, if the forest provides them with some livelihood options, and if community forest rights are secure and enforced (i.e. the risks of alienation low).

Why did we, the Climate and Land Use Alliance, commission an annotated bibliography of the evidence linking community tenure and forest condition?

We are a collaboration of philanthropic Foundations that seek, as our goal, to mitigate the forest and land use-related causes of climate change, benefit people and protect the environment.

A key part of our work is to increase the recognition of indigenous peoples’ and rural communities’ rights, based on the hypothesis that strengthened community tenure leads to better outcomes for forests. This assessment has helped us better understand the empirical basis for that hypothesis and we are pleased to share the assessment publicly, in the hope that others may find it useful as well.

While this review of 73 published and peer reviewed reports speaks for itself, we want to highlight four related issues that it has brought into focus for us.

First, no single approach will help us reach our goal. However, strengthening community tenure is one approach and the evidence is sufficiently strong to justify our emphasis on it. Second, less research has been carried out in Africa. Third, the gender impacts and benefits of different community forest tenure regimes are poorly covered in the scientific literature. Both of these are gaps that need to be filled by researchers in the future. Finally, that although it is difficult to establish causality between community tenure and forest condition due to a variety of confounding factors, this review certainly points to a broad consensus in the literature that tenure insecurity is a significant driver for deforestation.

Some may hold the default position (or null hypothesis), namely that strengthened community tenure does not lead to better outcomes for forests. From reading this review, we conclude that the evidence is more than sufficient to reject that default. We encourage policymakers, therefore, to recognize and act upon this evidence by working to strengthen community tenure and the enabling conditions that can help translate tenure into positive outcomes for forests and the people who depend on them.

Daniel J. Zarin, Director of Programs
Climate and Land Use Alliance

Penny Davies, Global Initiative Coordinator
Climate and Land Use Alliance, &
Program Manager, Sustainable Development and Climate Change, Ford Foundation

EXECUTIVE SUMMARY

In 2012, the Climate and Land Use Alliance (CLUA) commissioned a scoping study to assess the evidence that strengthened community-level tenure leads to improved forest condition. The resulting bibliography, analysis, and research priorities are presented as resources for others seeking insight into the potential contribution that strengthening the rights, tenure, and management roles of indigenous and local communities can offer in reducing emissions from deforestation and forest degradation.

The authors initiated the review by identifying relevant scholarly articles published since 2002 based on interviews with experts and keyword searches of databases. We gave priority to review of articles that had been recommended by an expert, were empirical studies linking tenure to forest outcomes, expanded the geographic coverage, and/or were frequently cited. We gave particular attention to articles describing previous attempts to assess the evidence that enhanced community management rights are associated with better forest outcomes.

The review confirmed the existence of a large and growing literature in support of the proposition that strong indigenous/local tenure is associated with forest management outcomes that are at least as good or better than outcomes for areas owned/managed by the State (such as protected areas). Taken as a whole, the literature would appear to provide broad support for more specific assertions that the following conditions are associated with better forest outcomes: security of tenure regardless of form; protected status (with better outcomes when combined with multiple use and/or indigenous territories); community-level management (local involvement/autonomy in rule-making); strong and established local institutions; positive economic incentives to justify the investment in forest management; support from NGOs; and supportive national policy. There is also significant "circumstantial" evidence for the linkage, including broad consensus that tenure *in*security is a significant driver of deforestation and degradation, the overlap of remaining forest with indigenous territories in some areas, and the relative scarcity of "contrary" cases. In addition, an emerging literature makes a strong normative case for investing in strengthening tenure as an essential component of REDD+.

The strength of the results linking tenure and forest condition depends on the standard of evidence and geographic focus of analysis. We were not able to identify any studies that used before/after and control/intervention methods. In a few cases, there is sufficient evidence to infer causality—i.e., where forest condition outcomes have improved following the strengthening of indigenous/local tenure—but they are limited to certain geographies and circumstances. For example, there is an emerging literature focused on the Amazon region providing evidence that indigenous and mixed/sustainable use areas have at least as favorable forest outcomes as protected areas. The strong positive results for protected indigenous areas—a hybrid form combining state environmental regulation with community or indigenous management rights—are particularly striking in the Americas, the geographic region where countries are most likely to statutorily recognize indigenous rights.

The literature presenting evidence for an association between community-level forest management rights and better forest condition is relatively abundant for South Asia (especially Nepal), East Africa (especially Tanzania), and much of Latin America (especially Mexico and indigenous reserves in the Amazon). Evidence from elsewhere in Africa and from Southeast Asia is particularly limited. Accordingly, extrapolating from current evidence requires the assumption that the effects of the tenure variable are transferrable across landscapes, countries, and regions—i.e., they are likely to have similar impacts in very different socio-cultural and political-economic circumstances.

While the literature overall suggests a consistent association between stronger local forest tenure and better forest condition, meta-studies attempting to rigorously establish the link have generated mixed and heavily qualified results. Factors affecting the feasibility of conducting such a rigorous analysis include, *inter alia*, a lack of formal recognition of community and indigenous rights and the relatively recent initiation of reforms in many countries, selection bias, inconsistent definitions or methodologies, confounding factors, and endogeneity considerations.

In sum, the substantial evidence of an association between community-level tenure and improved forest condition under many circumstances is tempered by limited research in several regions and methodological constraints that often preclude drawing definitive cause-and-effect linkages. In addition, the case for investment in strengthening community-level tenure as a strategy to reduce deforestation rests on assumptions regarding the feasibility of creating the necessary conditions in a relevant timeframe. Nevertheless, the evidence supporting this approach may well be stronger than the evidence supporting alternative strategies, but such an assessment was beyond the scope of this study.

Given the complexity of the findings, further research could prove helpful in generating additional insights into the relationship between community forest tenure rights and forest condition outcomes in the context of REDD+. Studies could assess the significance of particular tenure rights (e.g. alienation, regulation, and use) distinct from their aggregated “bundles” and could illuminate the relationship between customary and statutory rights and the impacts of government regulations on community-managed lands. Priorities for further research include filling in gaps in the geographic coverage of available studies, updating and increasing the precision of meta-studies attempting to link tenure to forest condition, and improving understanding of how external interventions can responsibly accelerate establishment of community forest tenure.

INTRODUCTION

In late 2012, the Climate and Land Use Alliance (CLUA) commissioned a scoping study to assess the evidence that strengthened community-level tenure leads to improved forest condition. The annotated bibliography presented here is a product of that assessment. CLUA is making the bibliography and associated analysis available as tool for others seeking insight into the potential contribution that strengthening the rights, tenure, and management roles of indigenous and local communities can offer in reducing emissions from deforestation and forest degradation, as well as a guide to priorities for further research.

APPROACH

The published and grey literature relevant to this topic is huge—one of the meta-studies reviewed initially identified more than 6,000 titles. We initiated this assessment by contacting a number of experts, either in person or via phone or email, requesting their suggestions of the most important articles and reports to review. We supplemented the many articles provided by the experts by undertaking keyword searches of databases of scholarly publications, with an emphasis on those published within the last ten years.

We then gave priority to review of articles that had been recommended by an expert, were empirical studies linking tenure to forest outcomes, expanded the geographic coverage, and/or were frequently cited. We did not attempt to undertake a thorough review of all articles identified as potentially relevant, but we gave particular attention to previous attempts to assess the evidence that enhanced community management rights are associated with better forest outcomes.

We present these bibliographic entries in the next section, followed by a discussion, including suggestions for further research, and conclusions.

LITERATURE

For each entry in the bibliography, we summarize key points—with a preference for direct quotes—relevant to linkages between tenure and forest condition. Sources and summaries are presented below with brief analysis, organized as follows: global and cross-regional studies, country-level studies grouped by region, and studies specifically assessing the relevance of tenure to reducing emissions from deforestation and forest degradation.

I. GLOBAL AND CROSS-REGIONAL STUDIES

A number of studies synthesize findings from multiple countries or include global analysis. We paid particular attention to findings from empirical meta-analyses because, given their larger sample sizes, robust associations between tenure status and forest outcome would be particularly compelling evidence of a linkage between the two. Among other global and cross-regional studies, the most significant are two global reviews: those based on the International Forestry Resources and Institutions (IFRI) data set and those that compare outcomes from protected areas (PAs) and indigenous-managed areas.

1. Meta-analyses

We reviewed several previous attempts to conduct meta-analyses on the relationship between tenure or related variables (e.g. community forest management) and forest condition outcomes.

While these studies found some positive correlations between forest protection and/or community forest management and forest outcomes, overall findings were mixed and inconclusive. For example, Bowler et al. (2010) found "some evidence" that community forest management could enhance carbon sequestration, but the authors could not further disaggregate community management attributes or rule out selection bias. Robinson et al. (2013) found protected areas tended to have positive forest outcomes, while community-managed land outcomes varied across regions.

The meta-analyses we identified that assessed linkages between tenure and forest outcomes include the following.

Bowler, D., Buyung-Ali, L., Healey, J. R., Jones, J. P. G., Knight, T., and Pullin, A. S. 2010. The Evidence Base for Community Forest Management as a Mechanism for Supplying Global Environmental Benefits and Improving Local Welfare: Systematic Review. ***Environmental Evidence CEE*** **08-011.** This methodologically rigorous meta-study includes an exhaustive literature review and focuses on 42 articles that met a standard of comparing cases of before-after and/or with-without "community forest management." Of these, 34 reported data on forest condition or cover, and 75% of the cases were from India, Nepal, or Central America.

- Although "the outcome of the review suggests that some evidence exists for global environmental benefit of CFM [(community forest management)] through increase in carbon sequestration," the authors describe in some detail the limitations of their analysis, including selection bias, difficulty in further disaggregating community forest management attributes, and lack of a BACI (before/after and control/intervention) site comparison.

- Most studies did not explicitly evaluate underlying tenure forms and focused instead on decision-making rights. “The three studies reporting land cover change [comparing CFM with other management] show a consistent trend: deforestation is lower under CFM.”

- “[I]n a majority of the studies, areas with CFM have higher forest cover, tree basal area and tree stem density. This may indicate that CFM has had a positive impact on forest condition during the lifetime of current CFM arrangements but the study designs do not eliminate the possibility that these differences were present at baseline (before CFM was implemented), i.e. due to bias in the selection of locations for implementation of CFM.”

Pagdee, A., Kim, Y.-s. and Daugherty, P. J. 2006. What Makes Community Forest Management Successful: A Meta-Study from Community Forests Throughout the World. ***Society & Natural Resources: An International Journal*** **19(1): 33–52.** This meta-study of 31 articles with 69 case studies (Asia, 67% of cases; Africa, 17%; Americas, 16%) identifies the following variables as significantly influencing the success of community forestry: tenure security, clear ownership, congruence of biophysical and socioeconomic boundaries, effective enforcement, monitoring, sanctioning, strong local leadership and authority, expectation of benefits, and shared community interests. The study concludes that “specific attributes of property rights regimes, institutional arrangements, incentives and interests of the community, and decentralization are significantly associated with CFM’s success.”

- “ Well-defined property rights may be more likely to occur with robust institutional arrangements. For example, forest tenure will presumably be secure with effective enforcement and strong leadership with effective organizations. However, the statistical test indicates that tenure security shows no association with these two factors together. Tenure security has a marginally significant association with effective enforcement and sanctions. This suggests that the presence of effective enforcement and sanctions improves tenure security and the likelihood of CFM’s success. Additionally… clear ownership is significantly associated with effective enforcement, monitoring, and strong leadership with effective organization.” (specific values omitted)

- “Clear ownership has a significant association with management responsibility and authority… [h]owever, the granting of local responsibility to the community does not guarantee tenure security. Only local authority has a significant relation with security of forest tenure . . . These results raise an important issue about decentralization: A local community may have gained responsibility and been recognized for its ability to manage the forest resources, but the future of CFM and the community can never be sure as long as the central government is still reluctant to transfer management authority to local institutions.”

- “Clearly specified property rights alone may not be sufficient to ensure the success of CFM if management programs establish property rights that are unenforced, inconsistent, and incongruent with community ecological, social, and economic

contexts." Within the suite of variables associated with property rights regimes (including tenure security, enforcement capacity, clear ownership, regulations, and sanctions), "clearly defined boundaries, and a congruency of that regime with its ecological and social context, congruence between the biophysical and socioeconomic boundaries of the resources has the strongest association with the success of CFM, whereas clearly defined boundaries shows the weakest association."

- "Decentralization, in which local communities are given management responsibility, authority, and recognition, can also facilitate development of clear ownership and tenure security.… Clear ownership is positively associated with both local responsibility and authority. However, tenure security shows an association only with local authority. If decentralization involves only local responsibility, user tenure can remain insecure."

Porter-Bolland, L., Ellis, E., Guariguata, M., Ruiz-Mallén, I., Negrete-Yankelevich, S., and Reyes-García, V. 2012. Community Managed Forests and Forest Protected Areas: An Assessment of Their Conservation Effectiveness across the Tropics. *Forest Ecology and Management* 268: 6–17. This is a meta-analysis of peer-reviewed case studies comparing 40 protected areas (using International Union for Conservation of Nature (IUCN) categories) and 33 community-managed forests (using the Pagdee et al. 2006 definition) in 16 countries, with most of the cases from Latin America. Quantitative data derived from spatial studies are used to test the hypothesis that "on a pantropical scale, rates of deforestation within or around community managed forests are either equal to or less than forests under strict protection." The study finds that "as a whole, community managed forests presented lower and less variable annual deforestation rates than protected forests." The "contradictory" cases—in which community-managed forests were associated with higher deforestation—were mostly from Colombia's area of conflict and coca cultivation.

- Protected areas with favorable conservation outcomes tended to occur in remote areas. Only 30% of community forests with favorable outcomes were remote, two of which still had deforestation pressures.

- "The most common underlying factors among CMFs with forest conservation outcomes were the presence of conservation policies and institutions, communal land use, government ownership of land, and natural resource management.… Indigenous populations were also present in 50% of the CMF case studies that presented the outcome of forest conservation."

- Both protected areas and community forests had some cases with high deforestation rates "although high deforestation rates were most prominent for protected areas." Honduras, Guatemala, and Mexico cases had instances of indigenous deforestation pressures on protected areas.

- "[D]eforestation pressures do not necessarily result in forest clearing as institutional arrangements may overcome those pressures."

- Methodological challenges included: globally inconsistent data, recognized sampling bias toward neotropics, and potential for other biases. Regarding drivers of deforestation, the study "purposefully excluded articles dealing with colonization in agricultural frontier regions."

- "Targeting community managed forests for the purposes of maximizing the success of implementation of REDD+ schemes may be a sensible approach to follow by further discerning under what biophysical, institutional, market and policy settings, community managed forests are more likely to persist in time and space in relation to other types of forest conservation strategies."

Robinson, B., Holland, M., and Naughton-Treves, L. In press. Does Secure Land Tenure Save Forests? A Review of the Relationship between Land Tenure and Tropical Deforestation. *Global Environmental Change*, available online 29 June 2013. The purpose of this paper is to identify relationships between tenure and forest cover and "outline the specific contexts in which land tenure interventions can help slow deforestation." An important feature of the study design is that it distinguishes between the *form* of land tenure (as defined by USAID 2008[2] to include a set of property rights and the institutions to uphold them) and the *security* of land tenure (defined as assurance that land-based property rights will be upheld by society).

The authors reviewed more than 100 empirical studies of forest outcomes under specific land tenure conditions and selected 36 publications that control for covariates, targeting studies that used remote sensing to measure forest cover change over time. The majority of the 118 distinct cases covered by the review are from Africa, Central and South America, and South Asia. Hypotheses regarding the factors that influence forest outcomes were tested using regression models that successfully predicted more than 70% of the variation.

- "[O]utcomes emphasize the importance of local factors. Overall, protected land is associated with positive outcomes in all regions, and public land seems to be particularly vulnerable to negative forest outcomes in South America. Communal land performs well in our Central American cases but worse in Africa, possibly due to the effects of regional conflict and/or weak governance."

- The authors caution against assuming tenure security is related to any particular form of land tenure, finding "little evidence that these two concepts are consistently correlated." They view that tenure studies sometimes oversimplify land tenure security analyses by utilizing private property rights or the possession of formal title as a proxy for security of tenure. Additionally, the authors found that "all forms of land tenure are susceptible to

[2] USAID 2008. Land Tenure and Property Rights: Tools for Transformational Development, in United States Agency for International Development (Ed.). Washington, DC.

tenure insecurity."

- The authors found "both positive and negative outcomes for forest cover across all the most common tenure forms. However, public land (unmanaged) is associated with negative forest outcomes and protected land has more positive than negative outcome." Private outcomes were mixed. "The negative result for public land reflects cases of illegally occupied land at the forest-farm interface and encroachment into the frontier," mostly in the Amazon region.

- "As a whole, the theoretical economic literature shows that the relationship between tenure insecurity and forests depends on local context," including how to frame investment decisions—e.g. timber vs. agriculture.

- Recommends future studies to clarify tenure form and security (What forms of tenure exist in the study area? What is the respective security of each land tenure form as perceived by landholders?); avoid using land title as proxy for security; and analyze land use change over time or account for "covarying land qualities across tenure types." Supports matching techniques as described by Joppa and Pfaff (2010).[3] Try to better understand role of drivers/macroeconomic and social conditions.

The study's categorization of tenure form into public, private, protected, communal, or customary raises a number of questions. For example, the authors note that cases where governments explicitly restricted the conversion of forests to other land uses were categorized as "protected," so it is possible that indigenous or community management of protected areas is responsible for some of the more positive outcomes for such areas, consistent with the Holland et al. (2014) and other findings related to "overlapping tenure" noted earlier. Additionally, the size of area and duration of the cases included varied considerably, and the authors could not rule out selection or publication bias due to a relatively small data set.

[3] Joppa, L.N., Pfaff, A. 2010. Reassessing the Forest IUmpacts of Protection: The Challenge of Nonrandom Location and Corrective Method. Annals of the New York Academy of Sciences 1185, 135-49.

2. Comprehensive reviews

Two significant global reviews provide qualitative assessments of national-level experience and attributes relevant to forest tenure and condition. One summarizes 16 country case studies of devolution of forest management rights, while the other analyzes the legislative frameworks relevant to community and indigenous rights in 27 countries.

Lawry, S., McLain, R., Swallow, B., and Biedenweg, K. 2012. *Devolution of Forest Rights and Sustainable Forest Management, Vol. 1: A Review of Policies and Programs in 16 Developing Countries and Vol. 2: Case Studies*. United States Agency for International Development (USAID). This two-volume publication offers a comprehensive review of forest tenure reform. Drawing on detailed case studies from 16 developing countries[4] where forest management rights have been devolved to local communities, the paper offers valuable characterizations of the state of play and lessons learned at country, regional, and global levels.

- While the study team did not undertake its own empirical analysis of the relationship between tenure status and forest condition outcomes, it did undertake a literature review similar to this one, which can be summarized as follows: The literature points to joint positive outcomes being associated with rights devolution approaches that provide user group members with an adequate share of benefits relative to the costs of forest management, encourage user groups to organize themselves in ways that are adapted to their circumstances, exist in conjunction with well-organized user groups with strong connections to national and international networks who can advocate on their behalf, and have government policies and forest departments at both local and national levels that are supportive of the changes.

- Summary observations include: “Forests under community ownership have better ecological outcomes, when measured by forest cover, than state-managed forests. Livelihoods outcomes are generally better under community ownership, though the relationship is weak or negative in some settings.”

- Findings are grouped according to regions. Latin America saw a comparatively rapid pace of forest rights devolution, and the paper suggests some explanations. For Africa, forest rights in the continent remain heavily concentrated with governments (barriers to tenure reform are discussed), although forest rights devolution is moving up the policy agenda in a number of countries. In Asia, devolution of rights over forests is moving slower than in Latin America but faster than in Africa; diverse approaches to tenure reforms are highlighted.

- Vol. 2 includes 16 country case studies that analyze experiences in devolving forest rights to communities and indigenous peoples in Latin America, Asia, the Pacific Islands, and Africa. Analysis is based on Ostrom-type “bundle of rights” framework, including

[4] Mexico, Brazil, Peru, Bolivia, Guatemala, Ghana, Kenya, Zambia, Democratic Republic of Congo, Tanzania, Ethiopia, India, Philippines, Nepal, Indonesia, and Vietnam.

withdrawal (regulated extraction rates), management (including user-defined extraction rates), exclusion (user controlled resource access), and alienation (sale/lease).

The study concludes with six specific recommendations to donors and governments for interventions to support the acceleration of forest rights devolution. It also frames its findings around the following comprehensive review by Rights and Resources:

Rights and Resources Initiative 2012. *WHAT RIGHTS? A Comparative Analysis of Developing Countries' National Legislation on Community and Indigenous Peoples' Forest Tenure Rights*. Washington, DC: Rights and Resources Group. This publication "assesses whether the legal systems of 27 of the world's most forested developing countries recognize the rights of Indigenous Peoples and communities to access, withdraw, manage, exclude, and alienate forest resources and land, the duration of those rights, and their extinguishability.… These regimes involve many different institutional arrangements used by governments to recognize the rights of Indigenous Peoples and communities to forest resources—such as land titles, management conventions, concessions, and written permission to inhabit and/or participate in the management of environmental conservation areas."

- "[C]ommunities with strong management authority and sense of security tend to conserve forest resources, carbon, and biodiversity, as well as enhance livelihoods."
- Development, climate, and legality efforts could be impeded by limitations in scope, duration, and completeness of formal local tenure. Even with formal recognition, implementation is impeded by "bureaucratic obstacles and weak or waning political will.… The lack of clarity in so much of the world's forest is cause for major concern."
- Fifty-six of 59 countries did not recognize at least one of the rights within the extended bundle ("Ostrom plus"). "The rights most commonly denied are the rights of exclusion and alienation: 36 percent (21 of 59) of the surveyed regimes do not recognize the rights of Indigenous Peoples and communities to exclude others from their forest lands, and 66 percent (39 of 59) forbid any right to alienate land or rights (through lease, use as collateral, or sale)." "Africa is particularly far behind, where approximately 97% of the forests remain claimed as state property."
- "A bare majority of the regimes in this study—54 percent (32 of 59)—guarantee the combined rights of access, commercial exploitation and forest resource management, provided there is compliance with management plans or licensing requirements. Thirty-six percent (21 of 59) do not recognize the right of Indigenous Peoples and communities to exclude others from their forest lands. In 58 percent (34 of 59) of the surveyed regimes, rights are granted to communities for an unlimited period, and in 68 percent (40 of 59) the law provides due process and compensation if the state extinguishes rights. Sixty-six percent (39 of 59) forbid the alienation (through lease, use as collateral, or sale) of community lands or the rights to them."

- Regional variances include the following:
    - “In Africa, the area under the community forest tenure regimes in this study totals 15.9 million hectares, which is about 5 percent of the forest area of the surveyed countries in that region. Community forest tenure regimes account for about one-third of the total forest area in the countries surveyed in Latin America (233 million hectares are under community forest regimes) and Asia (152 million hectares are under community forest tenure regimes).”
    - “Latin America has the highest percentage of regimes that guarantee the rights of access, commercial exploitation, and forest resource management. It is also the region in which more rights are constitutionally guaranteed for an unlimited period and where the greatest number of the regimes cannot be extinguished unless governments follow the due process of law and provide adequate compensation. Asia has a mixed record, and Africa lags behind.”
    - In Africa, 6 out of 17 countries’ laws recognizing community rights to forest resources ”cannot be implemented due to a lack of supplementing regulations.”

3. Studies based on the IFRI data set

Many cross-regional studies are analyses based on the International Forestry Resources and Institutions project data set. While compelling for the subset of cases included, the utility of the IFRI analyses for "making the case" globally is constrained by the limitations of the geographic representation of cases in the data set. For example, more than three-quarters of the "commons" included in the Chhatre and Agrawal 2009 study are from drier, more degraded, lower carbon forests and higher population density sites in South Asia and East Africa. More humid, less degraded, and carbon-rich forest frontier areas with lower population density (such as the Amazon Basin, the Congo Basin, and Southeast Asia) are not well represented in the data set.

Chhatre, A., and Agrawal, A. 2009. Trade-offs and Synergies between Carbon Storage and Livelihood Benefits from Forest Commons. *PNAS* 106(42): 17667–70. The authors use original data on 80 tropical forest "commons" across 10 countries in Latin America, East Africa, and South Asia, comparing "the simultaneous effect of forest size, local autonomy, and government vs. community ownership on the joint outcomes of carbon storage and livelihood benefits."

- The statistical analysis finds that local autonomy and community ownership are both positively associated with increased carbon storage. The authors conclude that "[t]ransfer of land ownership of forest commons likely advances carbon storage benefits because local communities have the incentive to defer present livelihood benefits."
- "We find that the area of the forest commons and the degree of rule-making autonomy are both positively associated with win–win outcomes—high carbon storage and livelihood benefits and negatively with lose–lose outcomes. On the other hand, ownership of forest commons has a trade-off relationship with carbon storage vs. livelihood benefits."
- "It remains unclear, however, whether forests that contribute more to livelihoods store more carbon or less, or if carbon storage and livelihood contributions of forests are unrelated.[5] . . . there is no association between carbon storage and livelihood benefits from these forests… both win–win and trade-off outcomes are possible in forest commons."
- Increasing the size of individual patches and enhanced participatory rule-setting can help "improve livelihoods and carbon storage benefits from decentralization of forest governance."

[5] Smith J, Scherr S.J. 2003. Capturing the Value of Forest Carbon for Local Livelihoods. World Dev 31:2143.

Hayes, T., and Persha, L. 2010. Nesting Local Forestry Initiatives: Revisiting Community Forest Management in a REDD+ World. *Forest Policy and Economics* 12: 545–53. Drawing on cases from Honduras, Nicaragua, and Tanzania, the authors show that local rulemaking autonomy is associated with better forest conservation outcomes.

- "[I]nstitutional arrangements that granted local forest users rulemaking autonomy were more effective in conserving forests. The communally managed reserves in both studies, where local residents held sole decision-making authority to make rules regarding the access, use and management of forest lands, showed more positive forest conservation outcomes than cases where residents held minimal or no forest rulemaking rights. This association between local rulemaking autonomy and better forest conservation outcomes may be explained, in part, by links between the perceived legitimacy of the rulemaking process, local monitoring activities and hence, compliance with the resultant rules."

- "Our cases suggest that rulemaking autonomy matters. Forest policies that do not recognize local resident rulemaking rights, or give residents only token rights, will not be perceived to be legitimate and will therefore be more difficult to apply… Our findings from the communal forests in Nicaragua and Tanzania additionally suggest that these rules are most effective when they are supported by broader legal frameworks."

- "Our cases, however, illustrate an important distinction between making rules and sustaining rules. A lesson here is that local forest management institutions can make new rules to address changing situations and try to improve their governance, but outside forces often strongly impact or constrain the effective application of these nascent institutions."

Persha, L., Agrawal, A., and Chhatre, A. 2011. Social and Ecological Synergy: Local Rulemaking, Forest Livelihoods, and Biodiversity Conservation. *Science* 331(6024): 1606–08. The study examines 84 sites from six countries in East Africa and South Asia to evaluate biodiversity and forest-based livelihood outcomes. Their key finding is that formal participation in rulemaking leads to better outcomes in terms of both biodiversity and livelihoods.

- Larger forest size and participation in rulemaking were positively correlated with better outcomes. Improved outcomes associated with increased participation were "particularly relevant for small forest patches in human-dominated landscapes (especially forests under 200 ha), which often present a particular challenge for achieving jointly positive results."

- Data focused primarily on India, Nepal, and Uganda (adding some sites in Kenya, Tanzania, and Bhutan), and the authors estimate tree species richness as an indicator of forest biodiversity. "Most of our 84 cases (60%) are characterized by trade-off relationships, although jointly positive outcomes across biodiversity and livelihoods are also well represented (27% of cases)."

- "We find both positive and negative relationships, leading to joint wins, losses, and trade-offs depending on specific contextual factors; participation in forest governance institutions by local forest users is strongly associated with jointly positive outcomes for forests." Also, "the distribution of outcomes across all possible categories suggests that there is no universally applicable positive or negative association between livelihoods and biodiversity to be found in the studied forests."

- "Forests are larger on average in East Africa, and a greater proportion of households rely on the forests for commercial income. We also find differences in the strength of association of some of these explanatory and broader contextual factors between the two regions, even as overall patterns of outcomes in the relationship between tree species diversity and subsistence livelihoods are similar. We suggest that this may point to the likelihood of multiple pathways for achieving these outcomes, differentiated, for instance, across varied regional contexts and key factors that also likely operate at broader scales."

Hayes, T. 2006. Parks, People, and Forest Protection: An Institutional Assessment of the Effectiveness of Protected Areas. *World Development* 34(12): 2064–75. This study uses data from 163 forests in 13 countries[6] to assess whether protected areas yield better conservation outcomes than other institutional arrangements.

- Beyond protected areas vs. not protected, the study does not measure the impact of tenure *per se* but rather focuses on the effect of local institutions. "Park" designation alone does not demonstrate enhanced forest outcomes. The existence of rules and the ability of forest users to make those rules were significantly correlated with forest condition, while user-group identity and user-defined sanctions were not strongly correlated with forest condition.

- "The results demonstrate a significant correlation between rules acknowledged and crafted by forest users and forest vegetation density and challenge the assumption that parks are the most appropriate management arrangement."

- Methodology: Relies on IFRI data set. Uses forest vegetation density as proxy for forest condition. Restricted dataset to 99 cases, with 50 forests with below-average vegetation density and 49 above-average. Uses IUCN categories and compares with areas that would not meet any IUCN classification (potential methodological challenges).[7] Also considers four other variables: organization of user group, existence of forest rules, user-defined rules, and user-defined sanctions.

[6] Uganda (26 forests), Nepal (47), India (40), Kenya (5), Tanzania (3), Madagascar (8), Bolivia (9), Brazil (3), Ecuador (1), Guatemala (7), Honduras (1), Mexico (6), and United States (7). Of the 163 forests, 76 were designated as parks.

[7] E.g. Nelson and Chomitz (2009) found differentiated results within IUCN categories between multi-use and strict protected areas.

4. Empirical studies comparing outcomes from indigenous and protected areas

There is an emerging literature providing evidence that indigenous and mixed/sustainable use areas have at least as favorable forest outcomes as protected areas. The evidence is particularly strong for the Amazon region. In these cases, the strong positive results for protected indigenous areas—a hybrid form combining state environmental regulation with community or indigenous management rights—are particularly striking in the Americas, the geographic region where countries are most likely to statutorily recognize indigenous rights.

Two of the most methodologically rigorous are the following.

Nelson, A., and Chomitz, K. 2011. Effectiveness of Strict vs. Multiple Use Protected Areas in Reducing Tropical Forest Fires: A Global Analysis Using Matching Methods. *PLoS ONE* 6(8): e22722. doi:10.1371/journal.pone.0022722. The authors use matching techniques to compare deforestation (measured using fire as a proxy) in strictly protected areas, protected areas with multiple use, and indigenous areas with non-protected areas. Their results show that the multiple use and indigenous areas (in Latin America) are as or more effective than strictly protected areas in controlling fire. Results differed somewhat across regions, and limited data points constrained the analysis for Africa.

- "These results suggest that forest protection can contribute both to biodiversity conservation and CO_2 mitigation goals, with particular relevance to the REDD agenda. Encouragingly, indigenous areas and multi-use protected areas can help to accomplish these goals, suggesting some compatibility between global environmental goals and support for local livelihoods."

- "In Latin America and Asia, strict PAs substantially reduced fire incidence, but multi-use PAs were even more effective. In Latin America, where there is data on indigenous areas, these areas reduce forest fire incidence by 16 percentage points, over two and a half times as much as naïve (unmatched) comparison with unprotected areas would suggest. In Africa, more recently established strict PAs appear to be effective, but multi-use tropical forest protected areas yield few sample points, and their impacts are not robustly estimated."

- Globally, evaluation is limited by data. "There is no globally consistent, high-spatial resolution time series data for the entire tropical forest biome."

- Matching criteria included distance to roads and major cities, elevation, slope, and rainfall.

Soares-Filho, B., Moutinho, P., Nepstad, D., Anderson, A., Rodrigues, H., Garcia, R., Dietzsch, L., Merry, F., Bowman, M., Hissa, L., Silvestrini, R., and Maretti, C. 2010. Role of Brazilian Amazon Protected Areas in Climate Change Mitigation. *PNAS* 107(24): 10821–26. This study employs an "odds ratio" method to compare the effectiveness of

different types of protected areas. The results show that strictly protected, sustainable use, and indigenous protected areas all inhibit deforestation, with the most significant effect being that of indigenous protected areas. In three-fifths of indigenous reserves (71 out of 125), the inhibitory effect increased after establishment, suggesting an effect from strengthened tenure.

- Spatial analysis (with pairing) on the effectiveness of 595 Brazilian Amazon protected areas[8] on deforestation found that the three major categories of PA (indigenous, strictly protected, and multi-use) showed an inhibitory effect on deforestation between 1997 and 2008. Of 206 PAs created after 1999, a total of 115 showed increased effectiveness after their designation as protected.
- As they were unable to employ propensity score matching (most robust), they adopted a "pairing" (Bayesian) method of "adjusted odds ratio of deforestation" to compensate for differences."

[8] "We broadly define PAs as all public areas under land-use restrictions that contribute to protecting native ecosystems, even if they were created for purposes other than environmental conservation." They compare forest outcomes based on classification as indigenous lands, strict protected areas, sustainable use, and military and unprotected areas.

5. Additional studies at the global level

Andersson, K. 2012. *CIFOR's Research on Forest Tenure and Rights*. Bogor, Indonesia: Center for International Forestry Research (CIFOR). This publication reviews the contributions, rigor, and gaps of CIFOR's research on tenure (53 publications). It elaborates a conceptual framework and defining property rights and summarizes key contributions, including the finding that "insecure property rights undermine sustainable forest use."

- Previous studies showed that tenure and policy reforms (e.g. agrarian and agricultural intensification programs) can increase deforestation, especially on the agricultural frontier, and may impact smallholders differently than industry/agribusiness.
- One priority for additional research was "Under what conditions does forest tenure lead to sustainability?"
- Land reform in Brazil (1990s) "increased the rights of landless farmers substantially, but the reform process also led to an increase in uncertainty associated with the governance of the reform… [T]his uncertainty carried a high price for society, with an increase in violent conflicts, accelerated deforestation, and overall less tenure security for both landless people and landowners."
- "Secure tenure may lead to increased forest resource degradation and deforestation if such land use decisions offer higher economic returns. As Alston et al. (2000)[9] point out, competition for property rights often involves clearing forest in the contested land area as a way to demonstrate active control and 'productive' use of the area. It is harder to prove stewardship to external agents based on landholder activities that avoid deforestation."
- "The subjective assessment shows that in the vast majority of CIFOR-sponsored research, the possibility of causal inference is weak or absent."

Charnley, S., and Poe, M. 2007. Community Forestry in Theory and In Practice: Where Are We Now? *Annual Review of Anthropology* 26: 301–36. This article assesses the state of the theory and practice of "community forestry," with a focus on local participation in the management of forests on state land. It assesses the evidence for a number of propositions, including "greater local control leads to healthier forests and more ecologically sustainable forest use."

- Based on a review of the literature, the article concludes that "evidence demonstrates that local control over forest management on state and communal lands can have positive ecological outcomes where effective local-level institutions for forest

[9] Alston, L.J., Libecap, G.D. and Muller, B. 2000. Land Reform Policies, the Sources of Violent Conflict, and Implications for Deforestation in the *Brazilian Amazon. Journal of Environmental Economics and Management* 39: 162– 88.

management exist, especially when local people play a meaningful role in developing those institutions."

- The article includes a brief history of the origins of community forestry and describes experience in Canada, the United States, Mexico, and Bolivia.

Elson, D. 2012. *Guide to Investing in Locally Controlled Forestry*. Growing Forest Partnerships in association with FAO, IIED, IUCN, The Forests Dialogue, and the World Bank. London: International Institute for Environment and Development.

- Growing out of 11 international dialogues, this guide summarizes literature and presents case studies to make the case and identify enabling conditions for successful investment (from a classical economic theory perspective) in locally controlled forest management, focusing on small and medium-size enterprises for forestry-related income. Provides potentially useful definition of "locally controlled forestry."

- Distributing tenure can yield good forest and community benefits; "some evidence" to support that "locally controlled forestry leads to responsible, long term sustainable forest management."

- Tenure security appears correlated with a willingness to make long-term investments, potentially helping to explain enhanced forest outcomes over the long term.

- "Tenure reform is a necessary, but not sufficient, condition for improving economic outcomes in either agricultural land or forestry. Other factors are also important, such as decent governance, an enabling environment for enterprise, access to finance and macroeconomic stability. Nevertheless, surveys of investors have made it clear that they will not invest (or lend) if tenure is uncertain, as the risks are not justified by the eventual returns from forestry."

- "[T]itles such as freehold may not always be appropriate in forestry. Customary forms of land ownership can be just as effective if they are accompanied by wider social and legal recognition. These rights are given form and meaning by the surrounding institutions."

Larson, A. 2012. *Tenure Rights and Access to Forests: A Training Manual for Research*. Bogor, Indonesia: CIFOR. Larson offers a "guide to key issues" related to tenure and forests and highlights definitions (e.g. tenure and tenure security), concepts (e.g. de jure vs. de facto tenure rights), and theoretical debates (e.g. economic vs. political economy approaches).

- "Tenure and access are extremely complex issues, and one of the greatest challenges for research is determining ways to simplify that complexity to facilitate data gathering and analysis but without moving too far from complex reality for the analysis to be valid."

- "The relevance of tenure to forests and livelihoods is quite apparent. Although there are no simple correlations between the substance or security of tenure rights and outcomes, tenure institutions clearly matter. For example, [g]reater local participation

in resource governance institutions, such as local rule-making autonomy, has been shown to lead to better outcomes for biodiversity and livelihoods. Insecure tenure has been associated with deforestation and forest degradation."

- "More substantial rights and/or tenure security, which may be good for forest based people, is not necessarily good for forests. Not all people with secure rights to forests will choose to conserve them, as landholders may clear forests for more profitable alternatives."
- Also includes a useful section describing "hazards and opportunities of formal recognition."

Larson, A., and Dahal, G. 2013. Forest Tenure Reform: New Resource Rights for Forest-based Communities? *Conservation and Society* 10(2): 77–90. This article describes various ways in which formal rights to forests are recognized and/or new rights are granted to communities.

- Examples include titling of territories (Nicaragua, Bolivia, Philippines), titling to individuals with a common forest area (Brazil colonist communities), community forests in perpetuity (Nepal), establishing agro-extractive reserve (Brazil), recognition of community lands or community forest concessions (Guatemala, Burkina Faso), renewable leases for common land management through village cooperatives (India), collaborative management agreements (Cameroon, Ghana, Burkina Faso, Philippines), and revenue sharing for tree planting (Ghana).
- Globally, communities formally own or administer a little more than 11% of forests,[10] much of which has been granted in the past 25 years.
    - There is a higher likelihood of obtaining land titles when responding to demands for ancestral rights.[11]
    - In many cases, even when communities are given formal forest management rights, "rights continue to be tied to obligations or limited by state rules and regulations." "[R]eforms and their implementation are constantly being challenged by competing interests. Hence the importance of social movements in the defence of rights."[12]
- In Latin America, 25% of land is owned and administered by indigenous peoples and local communities (IP-LC), while 7% is state-owned land designated for IP-LC use; 36%

[10] Note that this figure is substantially lower than the 25%+ estimate of Rights and Resources Initiative (2012).
[11] Note the evidence base for this is all in former Spanish colonies (including Philippines), and it is unclear whether or how much further this translates.
[12] Internal citations omitted; *see* Larson, A.M., Barry, D., Dahal, G.R. 2010. Tenure Change in the Global South. In: *Forests for People: Community Rights and Forest Tenure Reform* (Larson, A.M., Barry, D., Dahal, G.R., Colfer, C.J.P., eds.). Earthscan, London; *see also* Larson, 2011.

is owned and administered by the State. Devolution of forest rights in Latin America is tied to indigenous peoples fighting for their land rights, with many types of communities benefiting from the reforms.

  - "[A]lmost 110 million ha of forest are owned by indigenous people and communities in Brazil, 40 million ha in Mexico, 28 million ha in Colombia (RRI and ITTO 2009)."[13]

  - "Forest tenure reform differs from agrarian reform. Rather than redistributing land, it primarily involves the formal recognition of forest rights and benefits for people already living in and around forests; it is often driven by demands for ancestral or customary land rights. In addition to responding to livelihood interests, it also explicitly aims to conserve forests, in contrast to agrarian policies that often promoted forest clearing."

- In the Asia/Pacific region, 25% of forests are owned by communities and indigenous peoples and 3% is State-owned land designated for IP-LC use. 68% is owned/administered by the State.

  - Nepal's early community forest efforts involved plantations on bare lands under the control of local government, with success demonstrated in a few highly degraded districts (Gilmour 2003).[14]

  - India's 1988–2006 Forest Policy granted new usufruct rights to communities following many years of conflict based on failure to recognize forest communities' formal tenure. Future research could assess outcomes under this new policy.

- Almost 98% of African forests are formally owned by the State, although "customary institutions have de facto rights to, and sometimes control over, forest resources."

  - In Ghana, "weak community tenure rights, and the resulting tenure insecurity, and unaccountable authority leading to elite capture of benefits, are the two principle constraints of benefit distribution in Ghana. Without attention to overcome these problems, benefits will not reach local people, and such efforts are unlikely, then, to improve the management of forests."

  - On the challenge of defining community forest tenure: In Burkina Faso, "the land tenure system is still largely dominated by indigenous practices and customs, but prevailing land law maintains the principle that the state owns all lands, except where individuals have claimed exclusive property rights." Communities have the

[13] Rights and Resources Initiative and International Tropical Timber Organization. 2009. Tropical Forest Tenure Assessment: Trends, Challenges and Opportunities. Prepared for the *International Conference on Forest Tenure Governance and Enterprise: New Opportunities for Central and West Africa.* Hôtel Mont Fébé, Yaoundé, Cameroon. May 25-29, 2009.

[14] Gilmour, D. 2003. Retrospective and Prospective View of Community Forestry in Nepal. *Journal of Forest and Livelihoods* 2(2): 5-7.

right to help manage state-owned lands, and the Constitution "classifies natural resources as the common property of the people."

Larson, A., and Pulhin, J. 2012. Enhancing Forest Tenure Reforms Through More Responsive Regulations. *Conservation and Society* 10(2): 103–13. The authors consider the degree to which forest management rights granted to local communities under various forest tenure reforms are in fact significantly circumscribed in policy and practice.

- In Brazil's extractive reserves, "the government's environmental and conservation objectives tend to dominate the interests of the local population… leav[ing] local people little flexibility to use the resources to fulfill their material needs—at least not legally."
- The design of forest tenure reforms should follow the drivers of deforestation: the more external the drivers, the more reform should focus on strengthening community rights of exclusion and internal rule-making; the more internal the drivers, the greater the role of the State. It also highlights the importance of "second-level" grassroots organizations and "forward-thinking" forest agency officials in providing support to community forest management.

Nelson, A., and Chomitz, K. 2009. *Protected Area Effectiveness in Reducing Tropical Deforestation: A Global Analysis of the Impact of Protection Status*. Evaluation Brief 7. Washington, DC: World Bank Independent Evaluation Group.

- With fires as a proxy for deforestation, multi-use protected areas showed greater absolute reductions in deforestation than strict protected areas. "This protective effect may be obscured because the multi- use protected areas tend to be established in zones of higher deforestation pressure. Indigenous areas have an even higher protective impact. Estimates for Africa indicate modest impact of strict protected areas, but results are not robust for multi-use areas."
- Assesses data from some "3,000 protected areas covering 2 million square kilometers of the tropical forest biome," employing matching methodologies to control for factors including, *inter alia*, slope, rainfall, and road proximity.
- **"**Across the biome, the paper finds that protected areas generally have significantly lower fire rates than comparable nonprotected areas, but this differential declines as remoteness increases."
- Regional-level results: "In Latin America and the Caribbean, multi-use protected areas appear to be as effective or more effective than strict, but indigenous areas are almost twice as effective as any form of protection. In Asia, strictly protected areas perform better than in the crude estimates, but multi-use is twice as effective. In Africa, these recently established protected areas appear much more effective than the larger set considered in Table 7, with a robustly estimated impact of about 4.5 percentage points. There are too few points to estimate an impact for multi-use areas."

Robson, J., and Berkes, F. 2010. Sacred Nature and Community Conserved Areas, in *Nature and Culture: Rebuilding Lost Connections* (Pilgrim & Pretty, eds.), 197–216. London: Earthscan.

- Describes examples of indigenous and community-managed systems that contribute to conservation outcomes and offers anecdotal evidence of successes absent any formal protected area designation. It also highlights challenges associated with integrating agro-forestry and conservation.

- Notes presence of species richness can be correlated with sacred site, local agroforestry systems, and productive areas supporting traditional livelihoods, even absent any formally recognized protected area designation.

- Asserts that sacred sites are the best known form of conservation and are more widespread than most people realize: "[A] preliminary survey conducted in Ecuador identified 328 sacred sites (Oviedo, 2006)[15] and, in a pilot project in the Russian North, 263 sacred sites were identified, described and mapped from interviews with indigenous elders of just one district of the Yamal-Nenets Autonomous region. These sites were located on some of the best hunting grounds and contained high biodiversity or rare species, migration routes and unique landscapes (AHDR, 2004)."[16]

  "The vast majority of ICCAs [indigenous and community conserved areas] have yet to receive recognition from official agencies and the most successful in this regard will likely be communities that are politically perceptive and influential.… To help ICCAs fulfill their potential in meeting national and international goals, current government recognition mechanisms need to be backed by a set of supportive legal reforms that are transparent to target communities, and which clearly spell out the costs and benefits of participation."

[15] Oviedo, G. 2006. Community-Conserved Areas in South America. *Parks* 16:49–55.
[16] AHDR, 2004. Arctic Human Development Report, Stefansson Arctic Institute. Akureyri, Iceland.

II. COUNTRY-SPECIFIC STUDIES

Other compelling studies focus on results from individual countries that make a strong case for the relationship between community forest management and forest condition. While global and cross-regional studies presented above are informative, variation across regions is such that it also helps to review literature focused on one or several countries within a single region. Such studies are grouped in this section according to region.

1. Latin America

Studies from Latin America are most numerous, more likely to focus on indigenous management, and more likely to have compelling empirical analysis. Most studies focus on a specific country or region within Latin America. One exception is Pacheco et al. (2012).

Pacheco, P., Barry, D., Cronkleton, P., and Larson, A. 2012. The Recognition of Forest Rights in Latin America: Progress and Shortcomings of Forest Tenure Reforms. *Society & Natural Resources* 25: 556–71. "[T]his research examines cases comparatively across the region and in the context of land reform. The findings suggest that forest tenure reforms have increased the opportunity for forest dependent people to benefit from their forests, due to greater tenure security and capacity to exclude third parties; nevertheless, they have not always reached their potential for delivering either desired livelihood or forest conservation results."

- "[T]he nature of forest tenure reforms in Latin America has been defined by three factors: grass-roots social pressure [later identified as 'the single most important factor'], particularly ancestral claims for homelands; growing global conservation concerns that permeated national policy decision making; and shifting political views about forest governance linked to political decentralization."
- The article alludes to a literature focused on Latin America demonstrating that "local people can be good forest managers under the right conditions. Those conditions include aspects that should be enhanced by reforms, such as the ability to exclude third parties (enforcement of boundaries) and local rule-making, and fair market access for local producers."
- Tenure security is seen as necessary but insufficient, with "better outcomes for people and forests" through tenure reforms plus "policy incentives and measures to reverse market imperfections."
- "The outcomes of forest tenure reforms on forest condition are not conclusive, yet it is again possible to identify key factors affecting outcomes. Forest condition is maintained across the reformed forestlands when communities strongly depend on forest resources for a living (e.g., agro-extractive communities in Pando, or forestlands in indigenous territories), due to economic incentives to conserve the forest and/or a culture strongly linked to forest maintenance. Nevertheless, based on anecdotal evidence, since there

are not available empirical data, growing forest degradation trends tend to occur in cases in which more intensive harvesting is taking place, particularly of the main valuable timber species, which is linked to reduced rates of regeneration…. In short, the role of forest resources in local economies, external pressures, and local capacity to respond to these pressures all play a significant role in explaining forest condition."

a) Mexico

Barismantov, J., and Kendall, J. 2012. Community Forestry, Common Property and Deforestation in Eight Mexican States. *The Journal of Environment and Development* 21(4): 414–37. The authors use spatial analysis of common property regimes across eight states to support the hypothesis that "common property can lead to greater forest conservation when there is an economically valuable asset to protect (coniferous forests) and when there are management plans in place to formalize the extraction process and the revenue distribution."

- Spatial analysis demonstrated significant reductions in deforestation in common property forests, with greater reductions in deforestation associated with a higher percentage of common property forests with forestry permits.
- "[W]hen the standing forest has little value and/or when institutions do not exist, increased deforestation may occur."
- "A final weakness in our model is the potential for endogeneity of institutional choice. The percentage of forested land in any municipality is the result of past decisions made by communities. The choice to participate in community forestry is also based on the institutional strength of the community and forest quality. Both of these are related to deforestation rates, and thus present potential issues for interpreting results. We can conclude confidently that areas with high levels of common property and community forestry have performed well as compared to other areas. However, the issue described above prevents us from concluding that implementing common property regimes or community forestry in other areas will be as successful."

Barismantov, J., and Antezana, J. 2012. Forest Cover Change and Land Tenure Change in Mexico's Avocado Region: Is Community Forestry Related to Reduced Deforestation for High Value Crops? *Applied Geography* 32: 844–53. Case studies of four communities in Mexican state of Michoacan find that local governance is a greater predictor of forest outcomes than tenure type (private vs. common).

- Through a comparative case study of four communities, this study considers "how forest cover change was facilitated by policy changes that affected land tenure rules and existing community forestry programs" by considering conversion of highland pine-oak

forests to avocado orchards in Michoacan, Mexico. “Privately-owned avocado orchards are found on land that was common forest before the 1992 Reform of the Mexican Constitution.”

- Noting the small sample size, results nevertheless show the region lost 33.1% of forest cover in 16 years, with forestry communities losing much less forest cover (7.2–15.1%) than non-forestry communities (86.5–92.4%). The differences were explained by interview data, which showed “the Reform of Article 27 combined with the 1992 Forestry Law led to collapse of local governance, illegal division of common forests, and illegal logging in the two non-forestry communities.”

Bonilla-Moheno, M., Redo, D., Aide, T. M., Clark, M., and Grau, H. R. 2013. Vegetation Change and Land Tenure in Mexico: A Country-wide Analysis. *Land Use Policy* 30: 355–64. This study analyzes the relationship between land reform and land use outcomes at the municipality level across four biomes and finds that communal systems performed better across forest types.

- Communal (historic ancestral group rights) systems performed better in all forest types, while *ejidos* (community-managed lands granted alienation rights only in the 1990s, which was expected to increase agricultural use) saw more deforestation in moist forests; private tenure (i.e. owned by title with right of alienation) had modest gains in forest cover under each type.

- “These results suggest that group size and composition, which tend to be smaller and more homogeneous in communal versus ejidos, facilitates group decisions and enforcement of rules preventing the loss of woody vegetation. The role of social controls that regulate access to common-pool natural resources (including unwritten and traditional laws and practices), as well as the mechanisms that facilitate agriculture adjustment, emerge as potential explanations and research agendas for explaining forest recovery in communal and private lands.”

Bray, D. 2010. *Toward ‘Post-REDD+ Landscapes’: Mexico’s Community Forest Enterprises Provide a Proven Pathway to Reduce Emissions from Deforestation and Forest Degradation*. CIFOR Infobrief 30. Bogor, Indonesia. Bray provides a useful summary of the evidence published elsewhere and concludes that "[k]ey factors in Mexico’s relative success are clear rights over all forest products (especially timber), the establishment of formal community governance mechanisms, relatively large commercial forests, access to training or experience in industrial forestry and a supportive policy environment at multiple scales."

- This is a meta-study of Mexico’s *ejido*-based common property rights (full Ostrom bundle except alienation).

- Mexican *ejidos* demonstrate the ability to “overcome institutional roadblocks to the redesign of forest governance in an era of climate change."

- Noting community forestry in Mexico dates from the revolution more than a century ago, the 1986 forestry law and 1992 constitutional reforms were significant in recognizing community rights and governance over forests, evolving to 60–70% of all Mexican forests being managed by communities.
- Though "the number of local communities that can successfully manage their forests for timber is still quite small, these numbers show what is possible when the right conditions are in place."
- Success factors included "clear rights over all forest products (especially timber), the establishment of formal community governance mechanisms, relatively large commercial forests, access to training or experience in industrial forestry and a supportive policy environment at multiple scales."

Duran, E., Mas, J-F., and Velázquez, A. 2005. Land-use Cover Change in Community-based Forest Management Regions and Protected Areas in Mexico. In *The Community Forests of Mexico*, 215–40. D. Bray, L. Merino-Pérez, and D. Barry (eds). Austin, TX: University of Texas Press. This chapter evaluates forest outcomes of protected areas vs. community management (*ejidos* with productive timber management) in Guerrero and Quintana Roo, Mexico.

- There was no significant difference between protected areas and *ejido* management with respect to deforestation rates, but they did find *ejidos* had slightly improved outcomes in regeneration of degraded lands (secondary regrowth). Quintana Roo had stronger forest outcomes for *ejidos*.
- Well-organized *ejidos* (i.e. stronger governance) may have better forest outcomes.

Ellis, E., and Porter-Bolland, L. 2008. Is Community-based Forest Management More Effective than Protected Areas? A Comparison of Land Use/Land Cover Change in Two Neighboring Study Areas of the Central Yucatan Peninsula, Mexico. *Forest Ecology and Management* 256: 1971–83. Land use cover change and logistic regression analyses were employed to examine deforestation drivers to assess the role of local community forestry institutions for conservation in two areas within the Central Yucatan Peninsular Region of Mexico.

- In the higher deforestation area (Campeche), there was no significant difference attributable to protected area status and instead the study attributed forest loss to demographic and soil variables.
- In the lower deforestation area (Quintana Roo), conservation outcomes appeared influenced by local governance decisions, and reduced driver pressures could potentially be attributed to tourism revenue.

b) Central America

Bray, D. B., Duran, E., Ramos, V. H., Mas, J.-F., Velazquez, A., McNab, R. B., Barry, D., and Radachowsky, J. 2008. Tropical Deforestation, Community Forests, and Protected Areas in the Maya Forest. *Ecology and Society* 13(2): 56–74. This article compares deforestation in 19 community forests with commercial timber production against 11 strictly protected areas in Mayan forests of Mexico and Guatemala. The authors found no significant difference between inhabited protected areas and recently inhabited community forests or between uninhabited protected areas and long-inhabited community forests.

- "Long-inhabited community forest management for timber can be as effective as uninhabited parks at delivering long-term forest protection under certain circumstances and more effective at delivering local benefits."
- "Our findings suggest that community forests that are managed for timber and strict PAs can be considered complementary strategies for achieving both biodiversity conservation and local economic benefits. . . [and] neither protected areas nor community forests can perform well in active colonization fronts."

Finley-Brook, M. 2007. Indigenous Land Tenure Insecurity in Nicaragua. *International Forestry Review* 9(4): 850–64. This is a descriptive article on legal, sociopolitical, and economic considerations regarding indigenous lands and forest conservation efforts in Nicaragua. It finds that the "[t]itling of Indigenous common-property lands in eastern Nicaragua is a necessary base for forest management."

- Formal titling may help reduce illegal logging: "Analysis also suggests that ineffective implementation of Nicaragua's multiethnic autonomy fosters illegality and resource mismanagement. Fundamental structural changes to improve inclusion, accountability and transparency are necessary. Remediation also requires inclusive multiscale negotiations of land claims and participatory mapping to resolve tenure disputes."
- "The inability to exclude others can be a major constraint to sustainable resource use."
- "Titling alone will not be sufficient to assure sustainable practices, and the success of demarcation programmes rests on processes of negotiation leading up to tenure decisions. Nevertheless, a review of decades of history in Indigenous territories suggests that key problems in forest resource administration are inextricably linked to tenure insecurities."
- "New tenure policies aimed at enhancing tenure security may actually contribute to greater conflict if they lack implementation procedures, a major problem in eastern Nicaragua. Legislative shifts often falter for years before the state drafts the *reglamentos* (codes) that mandate how it will be enforced, leaving procedures open to interpretation."

- Incidentally includes discussion of Awas Tigni case and the challenges of securing formal title even when mandated by the Inter-American Court of Human Rights as well as certification standards and implications for communities.

Hayes, T. 2007. Controlling Agricultural Expansion in the Mosquitia: Does Tenure Matter? *Human Ecology* 35(6): 733–47. Hayes compares agricultural expansion into a state-controlled protected area in Honduras and a biosphere reserve managed by indigenous communities in Nicaragua and finds that "agricultural expansion is controlled by a set of property rights that include clearly demarcated boundaries, monitoring, and mechanisms for conflict resolution; all of these must be perceived as legitimate rights by both the indigenous and non-indigenous residents in the region."

- Hayes uses interviews and satellite data to evaluate linkages between different bundles of rights, perceived legitimacy, and compliance/enforcement of rules to control encroachment to test the hypothesis that management regulations will be complied with even under weak enforcement "if the property rights process produces a set of resource use rights that the users perceive to be legitimate."

- "Findings show that territorial demarcation and common-property rights are important components for frontier forest conservation. In areas with weak enforcement mechanisms and heavy reliance on social norms over official regulatory measures, the findings suggest that the perceived legitimacy of tenure arrangements and their respective land-use rules are fundamental to controlling the agricultural frontier."

- Indigenous territorial boundaries in Nicaragua effectively inhibited encroachment by mestizo farmers and ranchers despite population pressure. Conversely, mestizo migrants continue to have high conversion rates to agriculture and pasture areas in the "cultural" zone of the Rio Platano.

- Recognizing indigenous rights to territory is key, as are community-defined management rules, physical demarcation of boundaries to promote compliance, and supportive nongovernmental organizations (NGOs).

Nittler, J., and Tschinkel, H. 2005. *Community Forest Management in the Maya Biosphere Reserve of Guatemala: Protection Through Profits*. Submitted to USAID.

- "When compared to neighboring national parks and multiple use zones whose conservation is dependent on government institutions and conservation NGOs, [Mayan Biosphere Reserve multi-use zone communities'] forest concessions have great impact on reducing fires, deforestation and illegal extraction, thereby conserving this valuable ecosystem."

- Concession-based community forest management with productive timber "is a long-term, complex and costly undertaking that should not be attempted unless solid government structure and plenty of outside help to the communities are available. For many of the

communities the concessions have represented their first opportunity to undertake meaningful communal activities and are generating empowerment and interest in the development of other communal enterprises. Most importantly, however, for many the most valuable aspect of the concession is the recognition of the communities' rights to manage, conserve, and live from 'their' own forest. But they will only continue to do so as long as the forest provides a broad-based profit to them."

Radachowsky, J., Ramos, V. H., McNab, R., Baur, E. H., and Kazakov, N. 2012. Forest concessions in the Maya Biosphere Reserve, Guatemala: A Decade Later. *Forest Ecology and Management* 268: 18–28. The authors identify factors for sustainable outcomes (conservation and development) of community and timber companies concession agreements for use rights to forest products (timber + non-timber forest products [NTFP]) in multi-use zone of Guatemala's Maya Biosphere Reserve where annual NTFP values exceeded $20 million.

- There was limited/minimal deforestation in industrial and non-resident community-managed concessions as well as in traditional forest-based resident community concessions, but "devastating ecological impacts" in community concessions with recent immigrants, principally from illegal cattle.
- Findings validated the five "most frequently cited conditions for achieving conservation and development through multiple-use management include: Devolution of authority and local rights; technical and institutional capacity; economic viability and distribution of revenue; reconciliation between local and global interests; and resilience of ecological processes and social institutions."
- "External actors must be careful not to be overly optimistic and recognize that integrated conservation and development projects often require a long-term commitment on the order of decades, with flexibility for adaptive management. Spaces for inter-sector dialog and consensus building can help direct and ensure complementarity of investments, as well as promote social learning and help evaluate success from a variety of perspectives."
- "Forest connectivity was difficult to gauge and quantify, but the difference between indigenous settlements, with nucleated villages and intensively used nearby agricultural areas, and colonist areas, with forest disturbance spread all over the landscape, seems important. Indigenous communities, even with relatively high populations, maintain large areas of intact forest nearby, and these forests seem to have maintained faunal diversity for the most part."
- Continued success is dependent on further devolution to indigenous territories, sustainable economic development, and collaboration between government, indigenous organizations, and technical support to territorial authorities regarding management decisions.

Stocks, A., McMahan, B., and Taber, P. 2007. Indigenous, Colonist, and Government Impacts on Nicaragua's Bosawas Reserve. *Conservation Biology* 21(6): 1495–505. This study presents spatial analysis of deforestation in areas pertaining to colonists vs. indigenous communities in Bosawas biosphere reserve in Nicaragua.

- "Indigenous demarcations protected the forest successfully, whereas the Bosawas boundary itself did not inhibit colonization and consequent deforestation. Indigenous farmers deforested significantly less per capita than colonists." "Our results show that indigenous common property institutions and indigenous defense of homeland have been powerful factors in protecting the forests . . . and that the difficult evolution of a nested cross-scale governance system in Bosawas—under pressure from indigenous peoples—is probably the key to the forest's survival."
- Colonists depend more on individual parcels; indigenous communities are "more closely knit through kinship and multiple reciprocal obligations."

Taylor, P. 2009. Conservation, Community, and Culture? New Organizational Challenges of Community Forest Concessions in the Maya Biosphere Reserve. *Journal of Rural Studies* (2009): 1–12.

Taylor addresses the role of secondary-level grassroots associations in forest governance, discussing the Association of Forest Communities of Petén (ACOFOP) in Guatemala's Maya Biosphere Reserve.

- "ACOFOP's experience highlights problems faced by multipurpose agrarian federations which are claiming and receiving greater responsibilities for managing natural resources."
- "Over the last fifteen years, a diverse set of communities and community-based associations have won legal concessions to manage timber and non-timber forest resources in the MBR's Multiple Use Zone (MUZ). While it does not itself hold a forest concession, ACOFOP has played a key role in negotiating and managing the concessions with support from government agencies, Reserve administration, and international donors."

c) South America

Adeney, J., Christensen, N., and Pimm, S. 2009. Reserves Protect against Deforestation Fires in the Amazon. *PLoS ONE* 4(4): e5014. doi:10.1371/journal.pone.0005014. This study compares deforestation from forest fires in protected areas (indigenous, mixed-use, and strict protected) versus unprotected areas.

- After factoring in proximity to roads and El Niño effects (regression analysis), the study found that protected areas (regardless of type) effectively curbed destructive burning (and consequently deforestation) in the Amazon.
- Deforestation fires "declined exponentially with increasing distance from roads," with protected areas showing the most protection in areas near roads.
- "Even within reserves, at a given distance from roads, there were more deforestation fires in regions with high human impact than in those with low impact."

Armenteras, D., Rodriguez, N., and Retana, J. 2009. Are Conservation Strategies Effective in Avoiding the Deforestation of the Colombian Guyana Shield? *Biological Conservation* 142: 1411–19. The authors use satellite data to compare "the effectiveness of uninhabited (national parks) and inhabited (national indigenous reservations and indigenous reservations) protected territories to mitigate the expansion of the agricultural frontier" in the Colombian Guyana shield.

- While both kinds of protected areas tended to have lower deforestation than did their buffer zones, "national protected areas have slower deforestation rates and are better at slowing deforestation rates than indigenous reservations."
- The difference in outcomes is explained by proximity to colonization pressures and coca crops.

Brito, B., and Barreto, P. 2011. *Did Land Regularization Advance in the Amazon?* Belém, Brazil: Imazon (Amazon Institute of People and the Environment). Assessed results after one to two years of Brazil's 2009 land tenure reforms demonstrate the program "failed to meet its ambitious goal" of quickly issuing land property titles (in 60 days) for some 300,000 informal occupants in the Amazon.

- Only 611 titles were issued over two years, mostly in Pará.
- "Uncertainty on land property rights in the Amazon is a severe obstacle for the implementation and advance of sustainable development policies in the region."
- Recommendations include identifying indigenous and other community areas before further titling private land.

Holland, M., de Koning, F., Morales, M., Naughton-Treves, L., Robinson, B., and Suárez, L. 2014. Complex Tenure and Deforestation: Implications for Conservation Incentives in the Ecuadorian Amazon. *World Development* 55 (special issue): 21–36.

- "In cases of overlapping categories of tenure, where indigenous community areas overlapped with protected forests (BP) or forest patrimony areas (PF), the rate of deforestation was *less* than that which occurred in any of those tenure categories separately."

Killeen, T. J., Guerra, A., Calzada, M., Correa, L., Calderon, V., Soria, L., Quezada, B., and Steininger, M. K. 2008. Total Historical Land-use Change in Eastern Bolivia: Who, Where, When, and How Much? *Ecology and Society* 13(1): 36. This article analyzes land use change in eastern Bolivia over a 30-year period, quantifying the change for 10 different groups with distinct cultural traditions and production systems. While the analysis does not specifically analyze the impact of tenure on forest condition, it demonstrates the impacts of various market phenomena and policy initiatives on the rate of deforestation.

Messina, J., Walsh, S., Mena, C., and Delamater, P. 2006. Land Tenure and Deforestation Patterns in the Ecuadorian Amazon: Conflicts in Land Conservation in Frontier Settings. *Applied Geography* 26: 113–28. This spatial analysis in Cuyabeno (flooded/tropical forest) compares areas inside government protected area vs. private communal (colonist) reserves vs. no protection, with agriculture and oil/road development as primary drivers. It finds an unclear relationship between tenure and forest outcomes: although apparently a designation of communal title for colonists over a portion of a protected area led to a decrease in deforestation, the causal chain is not clear.

- Considers land tenure mosaic resulting from “patrimony forest” (mixed-use protected easement) and protected area designations in Ecuador’s Cuyabeno Reserve, noting colonist and oil interests impacting indigenous communities. Changing from strict protected area to "patrimony forest" comparing communal land (patrimony forest) with private ownership (outside of patrimony forest or protected area) shows differences in landscapes, spatial configuration, and rates of change.

- Changing to patrimony forest was associated with a “continuous process of deforestation and fragmentation,” but “the rate of change within the patrimony forests and the Reserve dramatically declined after the titling policy was implemented.”

- “Landscape metrics and neutral models show that in the patrimony forest, although the degree of official protection decreased, the spatially explicit response was constrained. As a policy, with the goal of minimizing impacts by controlling deforestation and fragmentation on the Cuyabeno Reserve, the Patrimony Forest, was successful as a barrier to land transformation by deforestation and agricultural extensification."

- Method: "This analysis uses composition and pattern metrics to summarize land fragmentation and patch dynamics as a consequence of deforestation and associated land management practices along a nested spatial hierarchy in which biophysical, social, and geographic factors are integrated." Spatial data from 1986, 1996, and 2002 were compared from areas within the reserve, within the "patrimony forest," and outside of both ("ISAs").

Nepstad, D., Schwartzman, S., Bamberger, B., Santilli, M., Ray, D., Schlesinger, P., Lefebvre, P., Alencar, A., Prinz, E., Fiske, G., and Rolla, A. 2006. Inhibition of Amazon Deforestation and Fire by Parks and Indigenous Lands. *Conservation Biology* 20(1): 65–73. This article reports on an analysis of satellite data to compare the performance

(deforestation and fires) on uninhabited parks (resource exploitation is prohibited) vs. inhabited reserves (residence and some resource use is allowed) in preventing deforestation and fire.

- The study finds an inhibitory effect on deforestation of up to 20-fold by parks, 8.2-fold by indigenous lands, and 1.7-fold by extractive reserves. A similar inhibitory effect was also found for fire, especially in indigenous reserves.
- The authors stress the remarkable performance of indigenous reserves adjacent to the agricultural frontier (where few parks are located). "Indigenous lands that successfully inhibited deforestation within the active agricultural frontier were often inhabited by tribes who actively enforce legal restrictions on natural resource exploitation by outsiders."

Oliveira, P., Asner, G., Knap, D., Almeyda, A., Galván-Gildemeister, R., Keene, S., Raybin, R., and Smith, R. 2007. Land-Use Allocation Protects the Peruvian Amazon. ***Science*** **317 (5842): 1233–36.**

- "From 1999-2005, disturbance and deforestation rates throughout the Peruvian Amazon averaged over 600 km2/year. However, only 1–2% occurred within natural protected areas, indigenous territories contained only 11% of the forest disturbances and 9% of the deforestation, and recent forest concessions effectively protected against clear-cutting. Although the region shows recent increases in disturbance and deforestation levels, and leakage into forests surrounding concession areas, land-use policy and remoteness are serving to protect the Peruvian Amazon."
- "[P]oorly monitored logging concessions, along with the challenges of uncontrolled road access, may hinder efforts to maintain ecological function and diversity in Peruvian rainforests in the future."

Pokorny, B., and Johnson, J. 2008. ***Community Forestry in the Amazon: The Unsolved Challenges of Forests and the Poor*****. ODI Natural Resources Perspectives 112. London: Overseas Development Institute.** This policy brief assesses the experience with community forestry as an alternative to commercial forestry in the Amazon and finds that the current model, with its heavy legal and technical requirements requiring significant external support, is not working.

- "When external support has come to an end, in extreme cases, communities have simply contracted and supervised commercial enterprises to log their forests."
- While security of tenure has been a benefit, "amended legal frameworks and improved enforcement mechanisms have pushed the communities, previously acting in the vast grey area of informality, into officially defined illegality, leaving little space for traditional ways of using their forests to improve their livelihoods."
- The article does not directly address the effect of more secure local tenure on forest condition but suggests that smallholder and community forest management systems

can be socially and environmentally sustainable if supported by appropriate policy and regulatory frameworks.

Ricketts, T. H., Soares-Filho, B., da Fonseca, G. A. B., Nepstad, D., Pfaff, A., Petsonk, A., Anderson, A., Boucher, D., Cattaneo, A., Conte, M., Creighton, K., Linden, L., Maretti, C., Moutinho, P., Ullman, R., Victurine, R. 2010. Indigenous Lands, Protected Areas, and Slowing Climate Change. *PLoS Biol* 8(3): e1000331. doi:10.1371/journal.pbio.1000331.
This study offers support for the role of indigenous-designated lands and protected areas in reducing deforestation. Even where deforestation continues, rates are higher in unprotected areas.

- "Indigenous lands and other protected areas ['ILPAs'] created to safeguard land rights, indigenous livelihoods, biodiversity, and other values contain more than 312 billion tons of carbon. Crucially, and paradoxically, this 'protected carbon' is not entirely protected. While ILPAs typically reduce rates of deforestation compared to surrounding areas, deforestation (with resulting greenhouse gas emissions) often continues within them."

- "Since 2002 in the Brazilian Amazon, deforestation probabilities have been 7–11 times lower inside ILPAs.. . . Simulation models suggest that ILPAs established between 2003 and 2007 could prevent 272,000 km2 of deforestation through 2050, equal to 3.3 +-1.1 GtC, more than 1/3 of the world's annual CO2e emissions. Bolivia's Noel Kempff Mercado National Park, which expanded by 8,317 km2 in 1997, is projected to prevent emission of up to 1.6 million tC over 30 years."

Stocks, A., Noss, A., Bryja, M., and Arce, S. 2012. Deforestation and Waodani Lands in Ecuador: Mapping and Demarcation Amidst Shaky Politics. In *Deforestation Around the World*, 187–202. P. Moutinho (ed). Rijeka, Croatia: InTech.

- "[I]t is estimated at present that 85% of the world's areas designated for biodiversity conservation are inhabited by indigenous peoples, whereas outside of the parks and nature preserves, the world's remaining pristine forested habitats are nearly all occupied by indigenous peoples."

- "Although recognition of ownership and/or control of large tracts of land by private individuals or groups is easy for conservationists in the developed world, it becomes much more problematic in remote forest frontiers where indigenous people may be less visible, forested areas are often not densely populated and conservationists may have closer relationships with governments than with indigenous peoples."

- Overlapping land rights and non-hierarchical governance structures complicate tenure clarification.

2. Asia

Studies from Asia are concentrated in South Asia and more likely to focus on community management of drier, degraded forests rather than humid, "frontier" forests.

a) Nepal

For Asia, the positive impact of Nepal's Community Forestry program is especially well documented. Note that the State retains ownership in Nepal, while communities have authority over forest use and management decisions. In addition to the Nepal chapter of the USAID study referenced earlier (Lawry et al. 2012), specific studies of note are listed below.

Ojha, H., Persha, L., and Chhatre, A. 2009. *Community Forestry in Nepal: A Policy Innovation for Local Livelihoods*. Discussion Paper 00913. Washington, DC: International Food Policy Research Institute (IFPRI). This IFPRI discussion paper explains Nepal's community forest outcomes over recent decades, synthesizes existing studies, and identifies successful cross-scale institutional governance, decision-making autonomy, and a culture of inclusive deliberation as factors contributing to successful social and environmental outcomes.

- Although comprehensive studies are lacking, case studies and observations suggest that the approximately 1,000,000 ha of Nepal's community-managed forests are associated with improved forest outcomes such as "lower incidence of fire and illegal harvesting of various forest products, better controlled grazing, higher tree density in formerly degraded forests, increased species diversity, and regeneration of important species."

- "Three decades of operational innovations, legislative developments, and evolving practice have clearly demonstrated success in terms of enhancing access to forest products, improving livelihood opportunities for forest-dependent people, strengthening local institutional capacity, and improving ecological conditions of forests."

- "From an ecological standpoint, anecdotal observations and quantitative studies support the premise that community forestry practices have improved forest condition. A recent study reported that 74 percent of the forest area managed by CFUGs [community forest user groups] was in 'good' condition, compared to 19 percent in 'degraded' condition. Others have reported that CFUGs compare favorably to government forests in terms of change in forest condition."

- "One of the keys to the establishment and successful outcome of Nepal's community forestry system was the creation of appropriate institutional structures at local, meso, and national levels that included downward accountability and relatively unrestricted decision making at the local level, and effective cross-scale interactions among these various institutions.… Other institutional factors in the successful evolution of community forestry included efforts to improve the inclusion of all social groups. . .,

concomitant democratic processes, and provision of adequate time and space for frequent discussion, exchange, adaptation, inclusion, and interaction among stakeholders."

- "The presence of products of high commercial value [hardwoods] in Terai forests creates greater conflict over forest resource access, benefits distribution, and overall Community Forestry Program implementation," presenting substantial risks of elite capture or state appropriation.

- "Management models, operational plans, and related implementation processes initially adhered to blueprint models provided by the Forest Department and focused on forest protection rather than livelihood improvement. Over time, management and operational plans gradually evolved to reflect individual CFUG goals and took on a much greater livelihood-oriented emphasis. This was also reflected in the design of forestry programs under a livelihoods framework, such as the [DFID's] Livelihoods and Forestry Program, which began in 2000."

Pandit, R., and Bevilacqua, E. 2011. Forest Users and Environmental Impacts of Community Forestry in the Hills of Nepal. *Forest Policy and Economics* 13: 345–52. This study surveys community perceptions of forest impacts, demonstrates perception of improved forest cover and forest restoration (reduced degradation), and shows consistency with findings from other studies in the area.

- In Nepal, "community forestry practice was endorsed as a means to engage local people in forest management and to improve the environmental conditions in the hills in 1978. The practice gained significant momentum through the new forest act in 1993 (HMG/N, 1993), which extended the scope of CF from the hills . . . to the entire country and defined forest user groups as the ultimate beneficiaries and managers of community forests. As of 2009 August, a total of 1,659,775 households organized into 14,440 forest user groups manage about 22% (1,229,669 ha) of total forest area of the country with the aim to fulfill forest product demands of the community vis-a-vis to improve local environment."

- "The scholarly focus of impact studies has largely been directed towards socio-economic and distributional impacts as compared to the environmental impacts. . . . Several field studies in Nepal have indicated that community forestry practices have brought positive change in the form of increased forest cover and improved environmental conditions. . . . In addition, environmental impact related evidence of community forestry from other regions and countries suggests that greater local control over forest management results [in] more ecologically sustainable forestry and better environmental outcomes."[17]

[17] "For example, increased canopy cover, density, and species diversity in the forests of India; regeneration of degraded forest lands and fragile ecosystems in South and Southeast Asia; enhanced forest cover, biodiversity and rural livelihoods in Southeast Asia; increased understory regeneration,

Varughese, G., and Ostrom, E. 2001. The Contested Role of Heterogeneity in Collective Action: Some Evidence from Community Forestry in Nepal. *World Development* 29(5): 747–65. Varughese and Ostrom study 18 forest user groups to assess the extent to which heterogeniety of community predicts success of collective action on forest management. They do not find strong correlation between heterogeneity and level of collective activity.

- Heterogeneity "can be overcome by good institutional design" when decision-makers' interests justify the effort and time associated with improved rules.

b) Other studies from Asia

Agrawal, A., and Chhatre, A. 2005. Explaining Success on the Commons: Community and Forest Governance in the Indian Himalaya. *World Development* 34(1): 149–66. This study uses the IFRI data set to analyze 95 case studies of community-based forest management (mostly degraded forests) in the Indian Himalaya and identifies a range of biophysical, demographic, economic, institutional, and socio-political variables influencing forest outcomes in diverse ecological and institutional settings. The only tenure-specific variable evaluated is landlessness, which positively correlates with forest condition.

- "[G]reater landlessness is positively related with forest condition, which may indicate that villagers attempt to protect forests better when landlessness is higher. This result reflects the situation in Himachal Pradesh: low levels of social and economic inequality at the village level."

- Coniferous forests with higher utility values (e.g. timber) generally showed worse conditions, with similar findings associated with the prevalence of fruit trees in village agriculture, noting that mixed and broad-leaved forests with higher utility were more likely to be in a better condition. "[C]ommunities are likely to try to protect and maintain forests when they rely on them for subsistence . . . it is subsistence rather than general benefits from forests that prompt villagers to express the need to conserve forests. . . . It is also possible that when villagers do not view a forest as important to them, its condition is better because villagers are not extracting too much."

- "Government officials' involvement in community decision making is negatively related with forest condition and prospects for conservation."

- There was less enforcement in forests in good condition. Forest size was not predictive of condition.

- "Higher levels of village conflict are related to forests in worse condition. More conflict-ridden social relationships in the village likely make decision making around forest protection difficult." However, gender conflicts and enhanced participation by women

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return of wildlife into the forests and improved forest conditions in Tanzania; and reduced deforestation rates in Brazil and Mexico."

were associated with improved conservation outcomes.

- Findings are based on an index of community perception of forest condition and institutional variables, including existence, user representation, enforcement, and relationship with external authorities.. The study seeks to provide a link between more geographically diverse datasets and smaller-scale case studies through relatively high sample numbers in a geographically confined area.

Baland, J., Bardhan, P., Sanghamitra, D., and Mookherjee, D. 2010. Forests to the People: Decentralization and Forest Degradation in the Indian Himalayas. *World Development* 38(11): 1642–56. This paper assesses degradation of community-managed forests compared with state-managed and open access forests in the state of Uttaranchal in India. Community-managed forests were found to be in 20–30% better condition, with duration of community correlated to improved outcomes.

Boissière, M., Sheil, D., Basuki, I., Wan, M., and Le, H. 2011. Can Engaging Local People's Interests Reduce Forest Degradation in Central Vietnam? In *Natural Resource Management and Local Development*. R. D. Taylor and E. Torquebiau, eds. Germany: Springer. This limited case study, based primarily on community perceptions, considers unrecognized customary rights in the context of protected area degradation and suggests that strengthened tenure would lead to better forest condition.

- "From the results of these surveys we obtained clear indication that conservation can be enhanced if local priorities, perspectives and wishes are better identified and taken into account. The local communities identified the need for, at least, limited extractive activities in the protected area. . . . They also frequently stressed their willingness to participate in the monitoring and control of the area, and in the selection of local species for reforestation programmes."

- "Although government policies have been introduced to prevent local communities from collecting forest products or from having other kinds of activities in the protected area (e.g. shifting cultivation), local people still consider the forests as playing an important role in their livelihoods, and still value them for the different resources they can provide. Therefore local people are concerned about degradation. Due to the official control they are unable to act or intervene to prevent the damage occurring to their traditional lands."

- "The Khe Tran people are clearly unhappy with the ongoing degradation of the forests and are concerned about keeping the integrity of the forest services. They believe that if the government provided them with land use rights, their access to the resources would help to better control the forest; for these reasons, they could be beneficial partners in conservation."

Clerc, J. 2012. *Unpacking Tenure Security: Development of a Conceptual Framework and Application to the Case of Oil Palm Expansion on Customary Land in Kapuas Hulu district, West Kalimantan, Indonesia*. CIFOR Working Paper 102. Bogor, Indonesia.

Through surveys conducted in five Iban Dayak villages affected by oil palm development, Clerc considers tenure security of local resource users during oil palm plantation establishment, land transfer and acquisition to answer how the transfer of rights to companies from communities affects communities' rights to land and forest resources, how tenure security affects resource users, and options to mitigate negative effects.

- Among the identified indicators were "the degree of conflict and cooperation among actors, the actual distribution of rights, the degree of enforcement of rules regulating land rights [and] the ability of the rights holder to defend his or her rights."
- The study noted a generally positive but highly unequal relationship between the oil palm company (state-allied) and community members. Despite negotiation, the community land use became more restricted, limiting benefit-sharing opportunities. Furthermore, while a decision on the company was reached by consensus of the members of the community, the process excluded certain categories of villagers (such as women) and ultimately resulted in a loss of rights.
- "That villagers had the authority to reject or accept the oil palm company's operations on their land and to designate which land (and how much of it) would be transferred to the company was a significant recognition of their customary claims" despite formal (statutory) State ownership.
- "While most villagers had a perception of high tenure security, their land rights could be threatened by the incomplete recognition of customary institutions by the government, unclear regulations and the concentration of information and key documents by the local elite."
- "The notion of tenure security should . . . be modulated and adapted according to the resource and the kind of right considered among the bundle of rights and the related property rights regime."
- "Most respondents do not consider their rights to forest resources threatened by the development of oil palm plantations," and by giving their consent to company operations, they have been complicit in forest conversion in the expectation of a significant new revenue stream (estimated to be $1000/month/household).
- "[V]illagers do not perceive their rights as insecure and believe that benefits anticipated from the company's operation will offset the costs of declining access to forest products, their marketization and the need to purchase inputs with intensification of agricultural production. Except for village A, where land claims are contested with Village E, no violation of rights has occurred in the current reassignment and transfer of land to the oil palm company and no contestation of the company's presence has been reported.

Majority of the villagers voluntarily handed over their land. The system of compensation, benefits sharing and the related working opportunities offered by the company persuaded them to release their land to the company."

Nagendra, H., and Gokhale, Y. 2008. Management Regimes, Property Rights, and Forest Biodiversity in Nepal and India. *Environmental Management* 41: 719–33.

- "[W]e find that there is a close association between the amount of flexibility granted to local users in adapting management approaches to fit local ecological and social conditions, and the outcome in terms of forest condition."
- "In South Asia, where local biophysical, social, economic, and cultural conditions vary so markedly from one region to the next, allowing communities the flexibility to adapt management policies to local conditions is a crucial factor that impacts their success."
- "Although these resource-hampered countries have invested so much in programs aimed at community empowerment and devolution of management, the rhetoric of decentralization seems to be louder than actual practice. Much controversy has been raised about the implementation and effectiveness of alternative scenarios of management in these countries, and few comparative empirical examinations of these issues exist."
- "Ownership of land is not a binary variable, and there are multiple kinds of property rights that an individual or a community possesses." For forests, these include "the right to withdraw specified forest products from a defined physical area; the right to manage a forested patch, regulate use patterns, and make improvements; the right to determine exclusion, that is, to determine who has the rights to withdraw forest products and how this right can be transferred; and the right to alienate, that is, to sell or lease withdrawal, management, and exclusion rights."

Poffenberger, M. 2006. People in the Forest: Community Forestry Experiences from Southeast Asia. *International Journal of Environment and Sustainable Development* 5(5): 57–69. Here, Poffenberger examines experiences of community forest management in Cambodia, Indonesia, the Philippines, Thailand, and Vietnam in the wake of increasing environmental policies emphasizing "devolution, decentralization and community rights."[18]

- The CFM projects were in their formative stages, with limited coherence between national forest sector policies and community-based forest management systems. Evaluating forest outcomes has proved difficult due to the lack of data from project monitoring.

[18] Policy strategies included decentralization policies to transfer administrative functions to local governments and policies that increase community rights and responsibilities on lands claimed by the State.

- In examining particular projects in various local contexts, the study found that "communities often play a critical role in preserving biodiversity and maintaining hydrological functions" despite limited rights and responsibilities delegated to communities over forest resources, which limits their effective management.

Pulhin, J., Dizon, J., and Cruz, R. 2008. Tenure Reform and Its Impacts in the Philippine Forest Lands. Paper for presentation in 12th Biennial Conference of the International Association for the Study of Commons. The article analyzes the effect of tenure reforms in the Philippines (national programs for community forestry, laws on protected areas, indigenous rights, etc.) based on livelihood, income, forest condition, and equity impacts, focusing on a shift in recent decades toward community-based forest management.

- In terms of livelihood and income, success depended on external support and community organization/capacities. Unstable policies, bureaucratic requirements, and unstable markets affected outcomes.

- Community forest management was found to prevent further forest deterioration and in some areas improved forest outcomes.

- The authors contend that the transfer of access and management of State forest lands to local communities advanced social justice and equity, although benefit sharing remained a concern.

Xu, J., White, A., and Lele, U. 2010. *China's Forest Tenure Reforms: Impacts and Implications for Choice, Conservation, and Climate Change*. Rights and Resources Initiative. Washington, DC: Rights and Resources Group. This descriptive paper with recent historical context considers China's recent land reform efforts and the history of China's efforts to control illegal logging, and it presents detailed data on tenure changes with limited correlation regarding forest cover.

- "According to the results from our survey, reforestation increased by an average of almost 10% across the provinces and tenure types between 2000 and 2006. Reforestation by individual households accounted for the vast majority of this increase."

- "Although heavy-handed and massive, these extraordinary environmental accomplishments could not have been achieved without the administrative structure provided by the collective structure of forest ownership."

- Regardless of tenure type, fewer than 50% of households had the right to deforest (convert to agriculture) in any circumstance. More than half were allowed to manage for non-timber forest products and harvest trees.

- "China's forest cover has increased by approximately 40 million hectares since the late 1970s—a feat largely due to the government's approach of administrative fiat and compulsory land-use zoning. While programs include payments and incentives to landowners for planting trees and maintaining forest cover, the programs are widely

criticized for lacking due process or adequate compensation—approaches that are inconsistent with respecting private property rights."

3. Africa

Studies from Africa are most scarce, a challenge noted in a number of the meta- and global studies that we reviewed. Nevertheless, there are some interesting studies and findings.

a) Tanzania

For Africa, the evidence from Tanzania's Joint Forest Management program stands out.

Blomley, T., Pfliegnger, K., Isango, J., and Zahabu, E. 2008. Seeing the Wood for the Trees: An Assignment of the Impact of Participatory Forest Management on Forest Condition in Tanzania. *Oryx* 42(3): 380–91. The authors survey 68 of Tanzania's forest areas managed using participatory versus state-controlled forest management, compare case studies (in part through a matching method), and describe the history and scope of decentralization efforts to assess whether participatory forest management could successfully reduce both deforestation and degradation.

- Initial findings show that "participatory forest management is showing signs of delivering impact in terms of improved forest condition in Tanzanian forests," with further assessments needed.

Pflienger, K. 2010. *The Impacts of Joint Forest Management on Forest Condition, Livelihoods, and Governance: Case Studies from Morogoro Region in Tanzania*. University of East Anglia. This recent dissertation confirms that compared with state-controlled forests, jointly managed areas showed fewer fires and greater tree biomass.

- In forested areas jointly managed by the State and communities, a comparative analysis of 659 forest plots indicated that forest quality improved compared with lands managed exclusively by the state *but livelihoods did not*, primarily due to inequitable benefit distribution and control over decision-making, leading to capture.
- Compared with state-controlled forests, jointly managed areas showed fewer fires and an "increased frequency of trees, poles and withies, as well as seedling coverage and canopy density."
- "The disjuncture between externally created village forest committees and established village governance bodies prevents accountability and transparency with regard to forestry matters, allowing those who benefit to reinforce a regime that keeps them in control."

- "Essential ingredients for decentralized forest governance are political accountability, democratization and responsiveness (Nygren 2005;[19] Ribot 2005[20]). However, with setting up forest committees in parallel to the existing elected local governance bodies at village level, the three JFM cases did not fulfill these conditions."

Ylhaisi, J. 2003. Forest Privatisation and the Role of Community in Forest and Nature Protection in Tanzania. *Environmental Science & Policy* 6: 279–90. Here, Ylhaisi describes the conservation relevance of different tenure models (state versus "private" lands) in Tanzania, with an extensive history and description of forest and tenure ownership.

- Tanzania's 2002 Forest Act requires consent of local communities in order to proceed with development/conservation plans. "The community-owned lands give a better guarantee against interventions to buy large properties by foreign companies and businessmen. The customary law has also been amended to avoid a small number of owners to accumulate land. This is important when the land markets are not yet developed and the average land market prices are clearly lower than international prices."

- In one region, 60% of the protected forests associated with a specific ethnic group (Zigua) remained intact or "slightly disturbed" and 40% were "severely or completely destroyed."

- "There are a growing number of critical articles about communities' capacity to manage their environment. Common to all of them has been the missing legal protection of their property."

b) Other countries in Africa

Barbier, E., and Tesfaw, A. 2011. *Overcoming Tenurial Constraints to Carbon Forestry Projects in Africa*. Working Paper No. 10. CGIAR Research Program on Climate Change, Agriculture and Food Security. Washington, DC: Consultative Group on International Agricultural Research. The authors explore how carbon forest schemes affect smallholder land allocation decisions between crop production and tree planting. Tenure insecurity can be a major constraint for payment for ecosystem services. Customary law and weak enforcement in Africa have been cited as barriers to tenure in the context of REDD, but it may be worthwhile to make a distinction between de jure and de facto land rights.

- Tree planting can help improve tenure security for customary rights holders in Africa. The focus for REDD should not be on securing formal title but rather in designing REDD

[19] Nygren, A. 2005. Community Based Forest Management Within the Context of Institutional Decentralization in Honduras. *World Development*, 33 (4): 639-55.
[20] Ribot, J.C. 2005. Choosing Representation: Institutions and Powers for Decentralized Natural Resources Management. In: *The Politics of Decentralization*, Colfer and Capistrano (eds.). London: Earthscan.

activities to incorporate customary systems. Also, under outside threats of eviction, "less land will be converted to carbon forestry compared to when land is under private property or customary tenure."

  - "Sub-Saharan Africa tenure security is contingent on the continuous use of land."
  - "[T]he prospect of increased tenure security encourage[s] African farmers with customary tenure to continue to commit resources" beyond expected convergence of marginal costs and benefits."
  - "Eviction is likely when land is scarce and when land is abandoned for extended time."
  - "[C]ase studies from Niger and Kenya indicate that carbon finance transactions can result in overall increased land tenure security for landholders and communities."

- Methodology: compares private ownership, insecure tenure (threat of eviction), customary tenure (eviction abated through converting/afforesting cropland) for a representative smallholder; estimates forest value and corresponding optimal payment.

Damnyag, L., Saastamonien, O., Appia, M., and Pappinen, A. 2012. Role of Tenure Insecurity in Deforestation in Ghana's High Forest Zone. *Forest Policy and Economics* 14: 90–98.

- "The findings of the present study suggest that leasehold and sharecrop land holding farming activities contribute to deforestation, which may be because of the insecurity of tenure, compared to the customary freehold land holdings. Possible reasons for this are Ghana's Concession Act . . . which forbids tree felling in the off-reserve and reserve forests for monetary gains and the marginal direct benefits that local communities derive from timber resources on their farmlands."
- "[I]nsecurity of tenure, involvement in the short-rotation farming system, and the inability to cultivate the desired crop, has a negative impact on forest conservation."
- "When analyzing the effect of the rules on holders of farmlands, insecurity of tenure is the most important effect, indicated by over 24% of respondents. Other effects are that farmers are forced to practice intensive cultivation, they are unable to cultivate the type of crops desired and they must pay high tenancy fees. As indicated, over 10%, 6% and 3% of the respondents, respectively, indicated these as disincentives for them to plant trees on their acquired farmlands. These disincentives may be translated into negative effects on the forest in the form of deforestation."

Hoare, A. L. 2010. *Community-based Forest Management in the Democratic Republic of Congo: A Fairytale or a Viable REDD Strategy?* Cambridge, U.K.: Forests Monitor.
This publication describes the ideal forest arrangements to benefit communities and yield

sustainable development in context of desirable forest outcomes based on Nepal (Ostrom and Nagendra 2006;[21] Pokharel and Byrne 2009[22]), Mexico (Bray et al 2005), and Tanzania (Lund and Treue 2008;[23] Blomley et al. 2008).

Jindal, R., Swallow, B., and Kerr, J. 2008. Forestry-based Carbon Sequestration Projects in Africa: Potential Benefits and Challenge. *Natural Resources Forum* 32: 116–30.

- Reviews 23 carbon sequestration projects in 14 countries across Africa based on field research, secondary sources, policy updates, and international donor websites.
- Found a lack of literature to assess potential, although deforestation rates in some countries are extremely high. Speculates that there may be significant opportunities for carbon-related initiatives to reduce deforestation trend.

[21] Ostrom, E. & Nagendra, H. 2006. Insights on Linking Forests, Trees, and People from the Air, on the Ground, and in the Laboratory. Proceedings of the Academy of Sciences of the United States of America 103(51): 19224-19231

[22] Pokharel, B. & Byrne, S. 2009. Climate change mitigation and adaptation strategies in Nepal's forest sector: how can rural communities benefit? NSCFP Discussion Paper No.7.

[23] Lund, J.F. & Treue, T. 2008. Are We Getting There? Evidence of Decentralized Forest Management from the Tanzanian Miombo Woodlands. World Development 36(12): 2780-2800.

III. STUDIES ASSESSING THE RELEVANCE OF TENURE TO REDD+

Not surprisingly, several studies have already analyzed the relevance of tenure to REDD+. All of these studies offer valuable insights, literature reviews, conceptual frameworks, and/or case studies. Overall, their main emphasis is on the necessity of tenure clarification and strengthening for REDD+ success, defined in terms of both forest outcomes and equity outcomes. For example, Duchelle et al. (2014) foresee the strengthening of local tenure as a potential outcome of REDD+ in Brazil, while Resosudarmo et al. (2014) caution that strengthened local tenure could lead to increased deforestation in places where the contribution of forests to livelihoods is limited and the potential income from alternative land use (i.e. oil palm) is high. Among the more recent studies are the following:

Bluffstone, R., Robinson, E., and Guthinga, P. 2012. REDD+ and Community-controlled Forests in Low-income Countries: Any Hope for a Linkage? *Ecological Economics* 87: 43–52. This paper Identifies opportunities and complications for community-controlled forests (about 25% of developing country forests) in the context of REDD+.

- "To our knowledge no specific rigorous empirical research on REDD+ has yet been conducted within the context of community-controlled forests and we are aware of no analysis of compensation mechanisms and forest governance complexities associated with REDD+."
- Cites "worries related to insecure and poorly defined community forest tenure, informed by often long histories of government unwillingness to meaningfully devolve to communities. Further, communities are complicated systems and it is therefore also of concern that REDD+ could destabilize existing well-functioning community forestry systems."
- "A large number of forest devolution efforts are underway throughout the world and several are showcased at and by the World Rainforest Movement."
    - "Few, if any, [countries] have the forest devolution experience of Nepal."
    - In Tanzania, limited empirical evidence on participatory community forestry shows natural regeneration in degraded areas, fewer fires, reduced encroachment, and more wildlife.
- "[U]nclear tenure rights and power asymmetries between the state and local communities can hamper implementation of incentive schemes like REDD+."
- "There are a number of important details associated with linking REDD+ to [community-managed forests], many of which are expected to be thorny mechanism design and contracting issues," including small forest size, benefit and cost sharing arrangements, additionality, and duration of contracts (communities likely to prefer shorter term than the assumed 20–30 years for REDD+).

Cronkleton, P., Bray, D., and Medina, G. 2011. Community Forest Management and the Emergence of Multi-Scale Governance Institutions: Lessons for REDD+ Development from Mexico, Brazil and Bolivia. *Forests* 2: 451–73. The authors review the evidence from three countries in Latin America that community forest management has been able to reduce deforestation and degradation, and they analyze the importance of local organization.

- Examines the institutional factors of successful community forest management in Mexico, Brazil, and Bolivia to assess "multi-scaled governance institutions and their development" to identify lessons learned for REDD+.
- "There is growing evidence that varying forms of CFM have reduced, or stopped, deforestation and even enhanced carbon stocks under specific circumstances, and has done so while achieving more equitable outcomes in the distribution of forest incomes and at a relatively low cost. The equitability and cost characteristics (and potential for joining development and conservation) makes CFM one REDD mechanism with great potential for adoption at the local level."
- "Throughout Latin America, due in part to grassroots movements that were required to assure full rights recognition, huge areas of forest lands have been devolved to local people in ways that create conditions for maintaining their forest livelihoods. Secure tenure is a key precondition for the successful implementation of REDD projects."
- "[S]imply providing titles is not enough to assure that forests will be well-managed. . . Besides land tenure, successful CFM must include strong local governance institutions to regulate resource use, with the presence of legal frameworks, government programs and civil society organizations to help local communities link up with other institutional scales and negotiate with other stakeholders."

Duchelle, A., Cromberg, M., Gebara, M. F., Guerra, R., Melo, T., Larson, A., Cronkleton, P., Börner, J., Sills, E., and Wunder, S. 2014. Linking Forest Tenure Reform, Environmental Compliance, and Incentives: Lessons from REDD+ Initiatives in the Brazilian Amazon. *World Development* 55 (special issue): 53–67. Uses household-level interviews and community meetings to examine four incipient sub-national REDD+ initiatives in the Brazilian Amazon to test the effect of linking national forest tenure reform and environmental compliance on REDD+ implementation.

- "In sites where local landholders are the main targets of REDD+ initiatives, clear and secure tenure rights are necessary for—but cannot guarantee—the effectiveness and equitability of REDD+." Despite challenges, "Brazil's progress in linking forest tenure reform with environmental compliance could bode well for successful REDD+, as local initiatives are bolstered by national processes."
- "Poorly defined land tenure is a major barrier to the implementation of REDD+, including the regulatory and incentive-based mechanisms that are currently being discussed at the national level." Subnational REDD+ projects "face tenure difficulties

typical of tropical forest regions, but with perhaps a unique opportunity to leverage national policy initiatives."

- "Clarifying and securing tenure rights—before REDD+ begins—is thus needed for the application of both regulatory and incentive-based REDD+ mechanisms." Incentive-based payments may face greater challenges than regulatory measures based on contract enforcement and the need to prevent third-party encroachment/conversion.
- "In our study sites, REDD+ is motivating land tenure reform as opposed to simply excluding those without clear land tenure from direct and conditional compensation schemes." Yet despite progress on forest tenure, all areas except Acre had challenges in clarifying forest carbon rights.
- "[T]here may be some trade-offs between the conservation and well-being outcomes associated with REDD-readiness tenure reforms. For instance, promises of access to land rights, and associated REDD+ benefits, may attract new waves of migration to project areas," increasing deforestation.

Karsenty, A., Vogel, A., and Castell, F. 2014. ''Carbon Rights,'' REDD+ and Payments for Environmental Services. *Environmental Science & Policy* 35: 20–29.

- "Proposals for linking 'carbon rights' to land tenure could jeopardize the objective of securing the tenure rights of communities and local people. Since, as we suggested above, it legitimizes rent-seeking approaches, it could encourage governments to refrain from transferring property rights."
- "[I]n spite of there having been an important shift in discourse and a clear rise in policies granting new rights to local communities in forests substantive changes in decision-making rights are often quite limited." "Exclusion rights are strong in the cases that have been effectively implemented, though in some cases these are not granted by law but are maintained by powerful local authorities (e.g. in Burkina Faso). Alienation rights have not been granted in any of the cases."

Larson, A. 2011. Forest Tenure Reform in the Age of Climate Change. *Global Environmental Change* 21: 540–49 Larson focuses on the risks of REDD+ to local tenure rights and summarizes the implications of CIFOR research on forest tenure reform (published as Larson et al. 2010[24] which covered 30 sites in 10 countries) for risks to community rights stemming from REDD+. Its focus is thus the possible impact of REDD+ on tenure rather than on the impact of tenure on forest condition outcomes, but it is relevant to the current scoping effort in describing the challenges of actually implementing and realizing the expected benefits of forest tenure reform.

[24] Larson, A.M., Barry, D., Dahal, G.R. 2010. Tenure Change in the Global South. In: Larson, A.M., Barry, D., Dahal, G.R., Colfer, C.J.P. (Eds.), *Forests for People: Community Rights and Forest Tenure Reform*. Earthscan, London.

- "[T]hese cases represent countries demonstrating a clear interest in supporting, at least to some degree, greater community tenure rights; notably, many other countries may not." "The studies represent countries, regions and villages where local people tended to be active in fighting for and defending their rights. In light of REDD+, then, they provide a wealth of examples—many of which may be best-case scenarios—of what could go wrong."

- Communities face many challenges even after rights are secured—especially in implementing statutory rights and accessing benefits: "The state may fail to implement reforms or move very slowly to do so. In Nicaragua, 15 years passed between the constitutional reform granting indigenous communities the right to their traditional lands and the passing of the law that set up the institutions for implementation. The law was written only after a legal battle in the Inter-American Court for Human Rights, which the government of Nicaragua lost, and it was only passed thanks to extensive grassroots organizing. It took six more years after that for the first titles to be granted."

Lawlor, K., and Huberman, D. 2009. Reduced Emissions from Deforestation and Forest Degradation (REDD) and Human Rights. In *Rights-based Approaches: Exploring Issues and Opportunities for Conservation,* 269–85. J. Campese, T. C. H. Sunderland, T. Greiber, and G. Oviedo, eds. Bogor, Indonesia: CIFOR and International Union for Conservation of Nature. This article highlights benefits and risks of REDD for communities, including in the context of tenure.

- Potential benefits include: governments could help secure and formalize land tenure for forest communities; new income streams for communities providing carbon-related services; enhanced forest outcomes may help buffer from climate-induced agriculture impacts.

- Risks include: violations of customary land rights and harsh enforcement measures (leading to loss of forest access, land use conflicts, displacement, and marginalization through zoning); recentralization of forest ownership/management; decoupling forest carbon rights from forest management or ownership rights; inability to access benefit payments due to lack of property rights (to forests or forest carbon); exploitative carbon contracts (communities unknowingly sign away land use rights); and elite capture due to inadequate forest governance systems.

Naughton-Treves, L., and Day, C., eds. 2012. *Lessons on Land Tenure, Forest Governance and REDD+. Case Studies from Africa, Asia and Latin America*. Washington, DC: U.S. Agency for International Development. This presents a compilation of nine case studies presented and associated discussions held at a workshop on the topic supported by USAID and hosted by the Land Tenure Center at the University of Wisconsin.

- "Tenure security, in turn, influences residents' forest use. Secure tenure appears to help prevent some deforestation, but hardly assures that landholders will preserve

forests. . . .The complexity of resolving tenure security calls for donor/investor backing of the training and legal conflict resolution that will facilitate better decision-making."[25]

- "[W]hether or not REDD+ is funded, clarifying land tenure and strengthening local governance will improve chances of equitable forest stewardship. Projects aimed at improving tenure security should proceed cautiously and recognize that tenure problems are not resolved in a one-shot intervention. Fair and enduring negotiations with local actors take time, as does the process of building local capacity to enforce land rights and forest access rules. Land ownership and forest governance problems often also require attention at the national level, particularly if there are contradictory laws regarding land and forest rights."

Resosudarmo, I., Atmadja, S., Ekaputri, A., Intarini, D., Indriatmoko, Y., and Pangestuti, A. 2014. Does Tenure Security Lead to REDD+ Project Effectiveness? Reflections from Five Emerging Sites in Indonesia. *World Development* 55 (special issue): 68–83. The authors consider the connection between tenure security[26] and REDD+ as a mitigation strategy based on data from five REDD+ sites in Indonesia, noting competing land use priorities and resulting policy conflicts in Indonesia.

- In all study sites, communities claimed customary or de facto land tenure despite Indonesian forestry law preventing acquisition of de jure rights over state-regulated forest zones. In those situations, locally issued documents or other certificates of title provided little protection against encroachment, especially when coupled with weak governance mechanisms.

- The lack of tenure security at these five REDD+ sites threatened the stability and sustainability of REDD-Plus projects. The study concludes that weak tenure security can impair REDD+ effectiveness, which is also affected by "the ability and interest of communities and REDD-Plus projects to manage their forests in ways that reduce deforestation and forest degradation or enhance carbon stocks."

Sunderlin, W., Larson, A., Duchelle, A., Resosudarmo, I., Huynh, T., Awono, A., and Dokken, T. 2014. How Are REDD+ Proponents Addressing Tenure Problems? Evidence from Brazil, Cameroon, Tanzania, Indonesia, and Vietnam. *World Development* 55 (special issue): 37–52. Based on interviews of villagers and project proponents at samples of 19 REDD project sites in five countries, this report's early findings are from household and village surveys at REDD+ pilot projects included in CIFOR's Global Comparative Study on REDD+, focusing (respectively) on all projects, projects in Indonesia, and projects in Brazil.

[25] Internal citations omitted.
[26] For purposes of the study, secure tenure was defined as resource rights recognized as legitimate de jure and respected de facto.

- REDD and tenure situation on the ground is a sufficient justification for investing in strengthening tenure. Donors and international organizations "do not spell out in detail why resolving tenure insecurity early is so important nor how to do it."

- "[A]ppropriate resolution of tenure insecurity is viewed as that which is sufficient to determine the holders of rights and responsibilities, to secure their rights, to avoid a resource rush, and to protect local livelihoods and rights against the effects of forest use restrictions."

- "External reasons for tenure insecurity (e.g. 'competition for land with outside company') outnumbered internal reasons (e.g. 'competition for land among villagers') by a ratio of five to one." "Across all countries, neighboring villagers were the most frequent type of external user."

- "There are already too many examples where well-intended attempts to enhance forest people's rights have gone awry because they failed to build in space for decision-making at local, national and global scales and to link decision processes with each other."[27]

Westholm, L., Biddulph, R., Hellmark, I., and Ekbom, A. 2011. REDD+ and Tenure: A Review of the Latest Developments in Research, Implementation and Debate. *Focali Report* 2011: 02. Swedish International Development Cooperation Agency (SIDA). This was commissioned by SIDA "with a view to assessing implications of current understandings of tenure reform and community-based forest management for REDD+ implementation." While the focus of the study is on the importance of addressing tenure in the context of REDD+ implementation, it also includes a section summarizing the experience of Community Based Forest Management (CBFM).

- "[M]ost researchers and others interested in REDD+ seem to agree that tenure reform is an important element of REDD+ preparations; mainly for two reasons: 1) clear and enforced forest tenure allows for greater control over forests and forest management, which is essential for combating deforestation and forest degradation; and 2) distribution of compensation for REDD+ management of forests. Irrespective of whether REDD+ is market-based or fund-based it will involve transfer of payments conditional on performance. This is a way of creating incentives for sustainable management of forests. Without clear tenure arrangement and adequate enforcement it will be difficult to define who should receive these payments."

- Recommended future work includes (inter alia): generating lessons about how effective CBFM can be rapidly and adequately scaled up; exploring and promoting evidence that REDD is catalysing reforms which open possibilities for communities to be delegated responsibility for higher value productive forests than has been common in the past; and

[27] Referencing Sikor, T., Stahl, J., Enters, T., Ribot, J. C., Singh, N., Sunderlin, W. D., & Wollenberg, L. 2010. Editorial: REDD-plus, forest people's rights and nested climate governance. *Global Environmental Change* 20(3), 423-425.

tracking "the evolution of attempts to link existing community forestry projects to carbon markets."

DISCUSSION

Taken as a whole, the literature would appear to provide broad support for more specific assertions that the following conditions are associated with better forest outcomes:

- ***Security of tenure, regardless of form.*** More secure tenure may enable better forest outcomes, although local context matters.[28]
- ***Protected status*****,** with better outcomes when combined with multiple use and/or indigenous territories. Although indigenous and multiple use areas may perform as well as protected areas, some level of regulation of users or inhabitants in not-strictly-protected areas may further enhance outcomes.[29]
- ***Community-level management—***specifically local involvement or autonomy in rule-making. Local autonomy and community ownership are both positively associated with increased carbon storage; enhanced participatory rule-setting is also concurrent with improved outcomes.[30]
- ***Strong local institutions*****,** and those that have been managing forests for a longer period of time. At least one study found more enduring communities to be correlated with improved outcomes, while another found weaker forest outcomes associated with higher conflict levels in communities.[31]
- ***Positive economic incentives to justify the investment in managing forests as forest*****.** Deforestation may increase when standing forest is not of high economic value.[32]
- ***Support from NGOs and NGO networks*****.** In a number of cases, communities depended upon outside expertise for technical or political assistance. NGOs and their networks may play an important role in legitimizing proposals or activities.[33]
- ***Supportive national policy*** such as one that recognizes customary rights or supports the principle that communities should benefit from activities in or near their territories.[34]

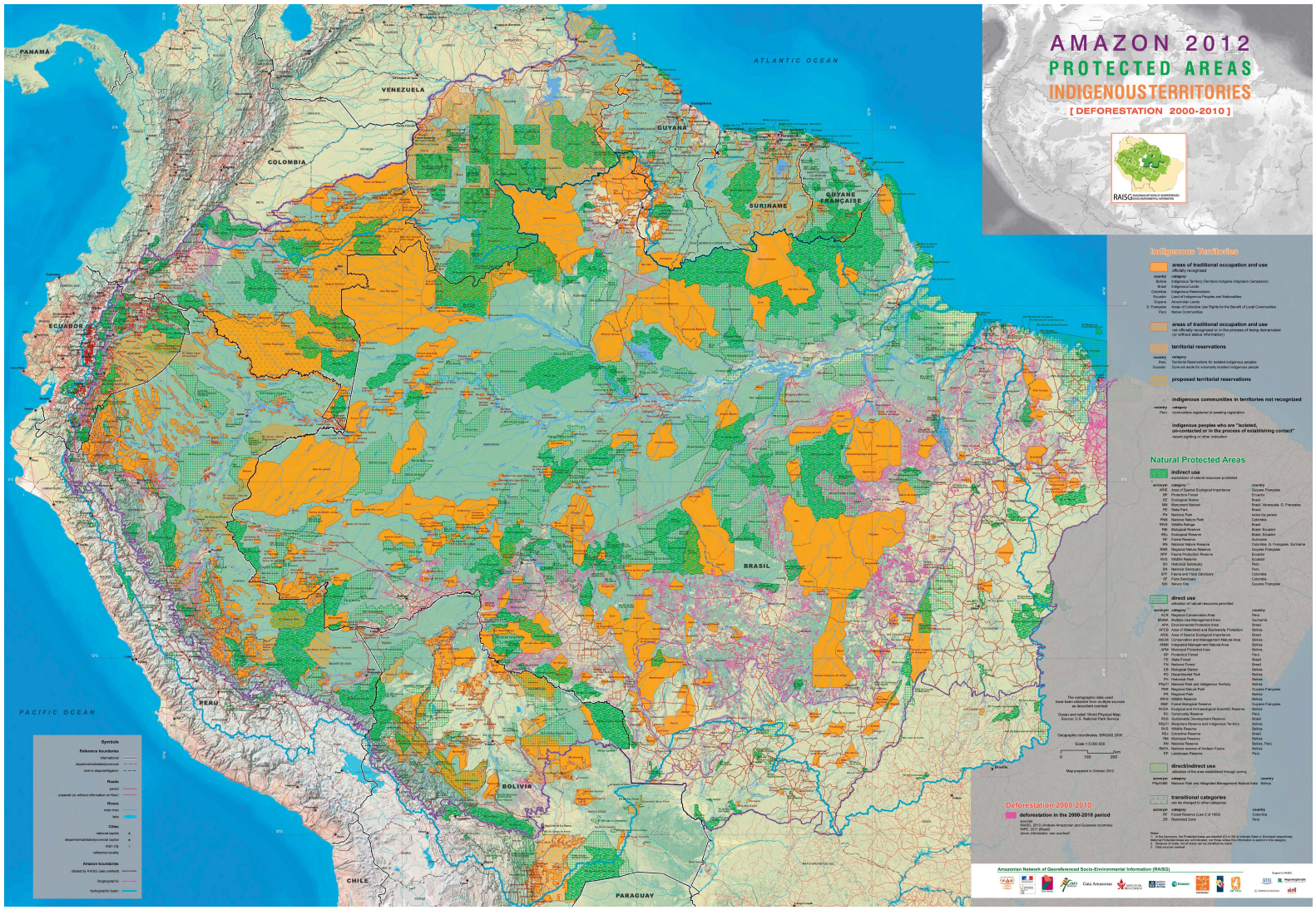
[28] See Robinson et al. (2013).
[29] See, e.g., Nelson and Chomitz (2011); Holland et al. (2014).
[30] See, e.g., Chhatre and Agrawal (2009).
[31] See Cronkleton et al. (2011) and Baland et al. (2010), respectively.
[32] See, e.g., Barsimantov and Kendall (2012); Agrawal and Chhatre (2005).
[33] As described in Hayes (2007) and Taylor (2009).
[34] See, e.g., Pacheco et al. (2012).

There is also significant "circumstantial" evidence for the linkage, including:

- Broad consensus on the obverse—i.e., that tenure *in*security is a significant driver of deforestation and degradation. For example, farmers with less secure tenure may practice more extensive cultivation, which could help explain deforestation rates in countries such as Ghana.[35]
- The overlap of remaining forest with indigenous territories in some areas. For example, a significant amount of the forest cover in the Amazon corresponds to areas traditionally inhabited by indigenous peoples.[36] (See Figure 1.) One meta-analysis found that half of the community forest areas with positive conservation outcomes corresponded to indigenous territories.[37]
- The relative scarcity of "contrary" cases, and the few that do exist appear to be associated with conflict—e.g., in Colombia.[38]

[35] See, e.g., Damnyag et al. (2012).
[36] http://raisg.socioambiental.org/system/files/mapaAmazonia2012-deforestation%5Bing%5D.pdf.
[37] See Porter-Bolland et al. (2012).
[38] *Id*.

Figure 1: *Amazon 2012 – Protected areas and indigenous territories*



Do the findings of the literature review outlined above constitute a sufficient basis to support the proposition that strengthened local tenure is associated with improved forest condition outcomes? The answer depends on the standard of evidence required and on the geographic scope of the assertion.

Efforts to establish a causal link between strengthened community-level tenure and improved forest condition outcomes more generally and rigorously (such as the meta-studies summarized above) have been inconclusive. To our knowledge, no global-scale study has been done linking strong local tenure to improved forest outcomes using methods that are sufficiently rigorous (e.g. BACI or propensity score matching, to control for selection bias and confounding variables) to meet currently accepted standards of impact evaluation.[39] The individual studies providing strong evidence listed above are limited to certain geographies and circumstances, and the meta-studies that have been conducted to date provide mixed and inconclusive results.[40]

There are many reasons for this. First of all, consensus on the need and appropriate methods for evidence-based policy-making and impact evaluation is relatively recent, so it is only in the last few years that researchers and proponents of various approaches have felt the pressure—and received the funding from donors—to analyze the linkage between forest tenure and condition in a rigorous way.[41]

Second, the feasibility of conducting the type of analysis necessary to "make the case" globally is limited by a number of factors:

- *The geographic distribution of where indigenous/community management rights and roles have been recognized on significant scale is limited* (e.g. not most of Africa other than Tanzania).[42] A useful global map—overlaying property rights security with living

[39] For example, "3ie supports impact evaluations that adhere to agreed-upon methodological standards for addressing the 'attribution challenge'—e.g. establishing cause and effect between programmatic activities and specified outcomes. In particular, evaluation designs must be capable of addressing: a) confounding factors; b) selection bias; c) spillover effects; d) contamination of control groups; and e) impact heterogeneity by intervention, beneficiary type and context." From "Principles for impact evaluation", available at http://www.3ieimpact.org/media/filer/2012/05/17/principles_for_impact_evaluation.pdf. See also The Campbell Collaboration definition of systematic reviews at http://www.campbellcollaboration.org/what_is_a_systematic_review/index.php.

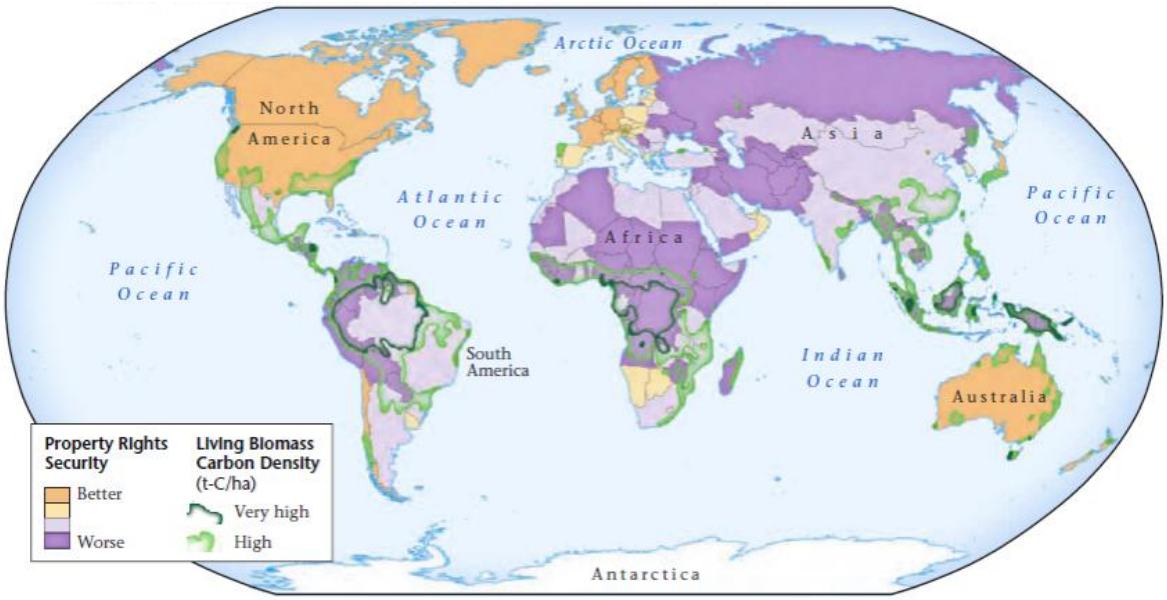
[40] See, e.g., Bonilla-Moneho et al. (2013): "Empirical studies over the last few decades have shown successes and failures in all types of tenure arrangements. It has become clear that one model is not necessarily superior as 'no single institution generates better outcomes for the resource and for the users under all conditions.' In addition, not much effort has gone into comparing the general consequences of one model versus the other using empirical research. Furthermore, few studies have compared the environmental impacts of land tenure systems using a robust experimental design (i.e., a large sample size and controlling for regional differences in the environment)."

[41] See, e.g., Andersson (2012), which assessed CIFOR's research on forest tenure and rights and concluded that "[t]he subjective assessment shows that in the vast majority of CIFOR-sponsored research, the possibility of causal inference is weak or absent."

[42] As stated by Westholm et al. (2011), reflecting on Odera's (2009) survey of community forest management in Africa, "[t]o the extent that the main business of REDD is avoided deforestation, this may imply that community management has not generally been implemented in the sort of landscapes where

biomass carbon density—presented in Day and Naughton-Treves (2012) illustrates the limited overlap between areas with more secure tenure and high or very high carbon density. (See Figure 2.)

Figure 2: *Property rights security versus living biomass carbon density*



Data Sources: Worldwide Governance Indicators and H. Gibbs http://cdiac.ornl.gov/epubs/ndp/global_carbon/carbon_documentation.html

- Accordingly, extrapolating from current evidence requires the assumption that the effects of the tenure variable are transferrable across landscapes, countries, and regions—i.e., they are likely to have similar impacts in very different socio-cultural and political-economic circumstances.[43]

lessons most relevant for REDD can be learned." See Odera, J. 2009. The Changing Forest Management Paradigm in Africa: A Case for Community Based Forest Management System. *Innovation and Change* 29(1): 27-35.

[43] The regional variation in results shown by the Robinson et al. (2013) study leads the authors to conclude that "the form of land tenure seems to matter in different ways in different regions of the world." Persha et al. (2011), comparing cases from East Africa and South Asia, "find differences in the strength of association of some of these explanatory and broader contextual factors between the two regions, even as overall patterns of outcomes…are similar. We suggest that this may point to the likelihood of multiple pathways for achieving these outcomes."

- *The relatively recent initiation of some of the reforms* reported in the literature also constrains robust conclusions regarding the long-term effects of changes in tenure.[44]

- *There is a significant likelihood of selection bias* in terms of where devolution of forest management rights has been attempted (e.g. more likely in areas where forests are less valuable, and local institutions are stronger) and in terms of those cases chosen for study and publication (i.e. those with more positive, more significant impact more likely to be selected). Thus one cannot assume that the body of cases available for review is a representative sample of either forest condition or local social organization.

- *Evidence presented in individual cases and meta-studies alike is often complicated by unclear or inconsistent definitions of the tenure variables*. The overall literature is composed of different strands that focus on particular land use designations (especially protected areas) or management arrangements related to tenure (especially community forest management), so meta-studies of necessity must find ways to compare apples, oranges, and hybrid fruits. Much "community forest management" takes place under government restrictions, complicating analysis of the role of the form or strength of tenure. Other than boundaries of indigenous territories in Brazil, it is difficult to access spatial data on tenure status.[45]

- *Confounding factors*. There is consensus in the literature that the effect of tenure on forest outcomes is moderated or masked by other variables, particularly economic incentives.[46] Thus, while strengthened community tenure may be necessary for improved forest outcomes, it may not be sufficient.

- *"The endogeneity problem."* One cannot rule out the possibility that successful examples are due to an underlying characteristic that influences outcomes, such that investment in tenure reform/strengthening might not be able to reproduce conditions that lead to desired outcomes.[47] For example, stronger tenure status could be the result of prior efforts to protect forests, leading to an overstatement of the effect of tenure *per se* on forest condition.[48]

Third, even if the evidence linking local tenure to forest condition were more comprehensively documented and rigorously analyzed, making the case that investment in strengthening local

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[44] Baland et al. (2010), in an analysis of "399 forest areas adjoining a stratified random sample of 83 villages covering the entire mid-Himalayan region in the state of Uttarancha" found that "village forests that had been established for over 25 years were three times more effective than those that had been established within the past 25 years" (reported in Westholm et al. 2011).

[45] See discussion in Robinson et al 2013. Moreover, even if spatial data on tenure status were available, it would be difficult to distinguish the actual forest management regime and perceived (in)security from formal legal status.

[46] For example, Resosudarmo et al. (2014) conclude that "[s]ecuring community tenure does not necessarily lead to REDD+ effectiveness unless it can compete with other economic interests that emit GHGs."

[47] See Barsimantov and Kendall (2012).

[48] See Holland et al. (2014).

tenure is a successful strategy for achieving REDD+ outcomes rests on a number of additional assumptions, including the following.

- *Effectiveness of investment.* The case for strengthening local tenure as a REDD+ strategy rests on evidence not only that stronger community-level tenure is associated with better forest condition outcomes but also that investment in strengthening tenure is likely to be effective in creating the circumstances that are favorable to improved forest condition outcomes in a REDD-relevant time horizon. A common view in the literature is that these circumstances include both favorable policy environments and strong local institutions.[49] Where any of these conditions do not exist (i.e. favorable policy environments, strong local institutions, supportive NGOs), the impact of interventions to strengthen local tenure would presumably be dependent on addressing those deficits as well.

- *Relevant time horizons*. Another consideration is the relevant time horizon for achieving improved forest condition outcomes, as tenure reforms could take decades despite the intention of REDD+ to reduce deforestation over a shorter term.[50]

- *Risk of unintended negative consequences*. Many of the articles we reviewed contained allusions to tenure reform efforts gone awry and/or "cautionary notes" about the difficulties and risks associated with attempts to clarify and secure tenure.[51]

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[49] For example, Hayes and Persha (2010) state, "[o]ur findings from the communal forests in Nicaragua and Tanzania [regarding the effectiveness of locally made rules] additionally suggest that these rules are most effective when they are supported by broader legal frameworks." Their findings also suggest "a role for external, independent nongovernmental organizations to help mediate demands on local forest governance systems in nested contexts." Taylor (2009) further asserts the importance of "secondary-level grassroots associations" in supporting local community management.

[50] See, e.g., Westholm et al. (2011) (building on Cronkleton et al. (2011) and stating that "[t]he sorts of political and institutional changes that would be required to achieve the quality of tenure reforms often perceived as fundamental to REDD+ success would therefore seem to require generations rather than the years or, at best, decades that are available if deforestation and degradation are to be halted by 2050"); Larson (2011) (describing how in Nicaragua, it took 15 years and a court case to pass the law necessary to grant indigenous communities the right to their traditional lands (following constitutional reform), and another six years for the first titles to be granted); Lawry et al. (2012) (discussing lessons from the mature *ejido* arrangements in Mexico, suggesting that "the lesson is that tenure change comes slowly and tenure arrangements cannot be easily or quickly reworked to accommodate new environmental programs" and further highlighting in their summary observations across the 16 case study countries how ambiguity of government commitments to reform and reluctant implementation by forestry agencies have constrained realization of the benefits of local rights recognition).

[51] See, e.g., Robinson et al. (2013) ("Tenure security can sometimes have negative consequences for environmental public goods since it promotes land use investments with private returns, such as agricultural intensification and development of built capital (Garnett et al. 2007). Pinel (2009) even discusses how efforts to bolster local communal tenure hastened deforestation by inducing competitive forest clearing;"); Naughton-Treves and Day (2012) ("In several cases, efforts to clarify tenure actually heightened conflicts (Wainwright and Bryan 2009, Peters and Kambewa 2007))"; Westholm et al. (2011)("Even tenure reforms intended to benefit the poor may in fact expose them to risk and lead to them losing their access to land and land-based resources.").

A final assumption integral to making the case for strengthening local tenure as a REDD+ strategy is that improved forest condition outcomes will lead to reduced emissions/increased carbon sequestration of sufficient magnitude to justify the investments in strengthened tenure. The assumption of a positive impact would appear to be reasonable, but its significance is likely to be much higher in carbon-rich, relatively undisturbed forests—where there is less evidence—than in carbon-poor, relatively degraded forests. The significance of these potential reductions compared with the investment necessary to achieve them is unknown (at least to us); presumably the cost of strengthening local tenure would vary considerably depending on starting conditions and the degree to which governments are supportive.

OPPORTUNITIES FOR ADDITIONAL RESEARCH

A number of articles reviewed contained suggestions for further research. Three are highlighted here:

Westholm et al. (2011) propose the following:

a) There is a need for field-based research that can provide context specific knowledge to inform national tenure reform processes; b) REDD+ countries are going to need extensive support in order to design equitable tenure reforms; c) Although tenure reform is important in a REDD+ context it should not be rushed in the name of REDD. This could lead to badly informed reforms that deepen inequalities rather than prevent them; d) The major challenge in order to make Community Based Forest Management (CBFM) successes REDD-relevant is to generate further lessons about how effective CBFM can be rapidly and adequately scaled up; e) In some cases there is evidence that REDD is catalysing reforms which open possibilities for communities to be delegated responsibility for higher value productive forests than has been common in the past; this should be explored and promoted; f) It will continue to be valuable for research efforts and strategic planning and decision making on potential future REDD+ interventions to track the evolution of attempts to link existing community forestry projects to carbon markets.

Andersson (2012) states:

At least six areas of research are currently underexplored by most researchers concerned with forest governance. These are (a) the politics of forest tenure reform, (b) when tenure reform increases tenure security, (c) what factors contribute to establishing more secure forest tenure, (d) what the role of government is in increasing forest tenure security, (e) under what conditions forest tenure leads to sustainability and (f) what methods provide the best analytical leverage for these areas of research.

Lawry et al. (2012) note that the utility of existing meta-analyses is compromised by a tendency to use a state vs. community management dichotomy, and that they "would provide greater insight if they assessed a wider range of management regimes that are better representative of what in reality is a continuum of forest tenure arrangements." Further, they suggest "there is a need to tease out how the different regimes perform with respect to maintaining forest quality (as opposed to just forest cover)."

CONCLUSION

The bibliographic references summarized above confirm the existence of a large and growing literature in support of the proposition that strong indigenous/local tenure (and/or proxies such as formal community involvement in forest management decision-making) is associated with forest management outcomes that are at least as good or better than outcomes for areas owned/managed by the State (such as protected areas). For a few cases, there is sufficient evidence to infer causality—i.e., where forest condition outcomes have improved following the strengthening of indigenous/local tenure.

There is ample literature presenting evidence for an association between community-level forest management rights and better forest condition in South Asia (especially Nepal), East Africa (especially Tanzania), and much of Latin America (especially Mexico and indigenous reserves in the Amazon). Evidence from elsewhere in Africa and from Southeast Asia is particularly limited. While the literature overall suggests a consistent association between stronger local forest tenure and better forest condition, meta-studies attempting to rigorously establish the link have generated mixed and heavily qualified results. An emerging literature makes a strong normative case for investing in strengthening tenure as an essential component of REDD+.

There is also an emerging literature providing evidence that indigenous and mixed/sustainable use areas have at least as favorable forest outcomes as protected areas, particularly in the Amazon. Strong positive results for protected indigenous areas—combining state regulation with community or indigenous management rights—are particularly striking in the Americas, the geographic region where countries are most likely to statutorily recognize indigenous rights.

The substantial evidence of an association between community-level tenure and improved forest condition under many circumstances is tempered by limited research in several regions and methodological constraints that often preclude drawing definitive cause-and-effect linkages. In addition, the case for investment in strengthening community-level tenure as a strategy to reduce deforestation rests on assumptions regarding the feasibility of creating the necessary conditions in a relevant timeframe. Nevertheless, the evidence supporting this approach may well be stronger than the evidence supporting alternative strategies, but such an assessment was beyond the scope of this study.

Further research could prove helpful in generating additional insights into the relationship between community forest tenure rights and forest condition outcomes in the context of REDD+. Studies could assess the significance of particular tenure rights (e.g. alienation, regulation, use, etc.) distinct from their aggregated “bundles” and illuminate the relationship between customary and statutory rights and the impacts of government regulations on community-managed lands. Priorities for further research include filling in gaps in the geographic coverage of available studies, updating and increasing the precision of meta-studies attempting to link tenure to forest condition, and improving understanding of how external interventions can responsibly accelerate the establishment of community forest tenure.