



REVIEW

Incorporating Land Tenure Security into Conservation

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Abstract

Insecure land tenure plagues many developing and tropical regions, often where conservation concerns are highest. Conservation organizations have long focused on protected areas as tenure interventions, but are now thinking more comprehensively about whether and how to incorporate other land tenure strategies into their work, and how to more soundly ground such interventions on evidence of both conservation and human benefits. Through a review of the literature on land tenure security as it relates to conservation practice, predominantly in the tropics, we aim to help conservation practitioners consider and incorporate more appropriate land tenure security interventions into conservation strategies. We present a framework that identifies three common ways in which land tenure security can impact human and conservation outcomes, and suggest practical ways to distill tenure and tenure security issues for a given location. We conclude with steps for considering tenure security issues in the context of conservation projects and identify areas for future research.

Introduction

Ecosystems and the services they provide to people are powerfully influenced by land use patterns and land and resource tenure (Foley 2005). At the same time, strengthening land tenure for local people is linked to social and human development, and research and investments in

improving land tenure security have increased greatly in recent years (The World Bank 2011). Land tenure security is an important factor that underpins the potential for success of many multilateral policy initiatives including Reducing Emissions from Deforestation and Forest Degradation (REDD+), the UN's Sustainable Development Goals (SDGs), the Convention on Biological

Diversity's Aichi Biodiversity Targets, the International Platform for Biodiversity and Ecosystem Services (IPBES), certification schemes (e.g., the Forest Stewardship Council), and "new conservation" broadly (Kareiva 2014). Yet, little attention is given to the ways in which land and resource tenure security (hereafter *tenure security*) interact with conservation initiatives. Building on our own experience and that of others, the aim of this article is to review how the conservation community can better incorporate tenure security into their work. Drawing from the literature on property rights, institutionalism, environmental and development economics, political ecology, and land use science, we hope to provide actionable tools for practitioners who design and implement conservation programs.

Insecure tenure plagues many developing and tropical regions, often overlapping areas of great conservation concern (Bruce *et al.* 2010). Many of these countries have colonial legacies whereby states seized control over land and resources at the expense of local communities. Centuries-old property rights and land tenure systems, originally set up for taxation, extraction, and colonial governance, can persist and differentially affect development and conservation outcomes to this day (Banerjee & Iyer 2005; Kelly & Peluso 2015). Current tenure regularization programs often privilege and provide tenure security for some while marginalizing others, and processes to devolve rights "back" to communities are uneven across the developing world (Sunderlin 2011; Wily 2011). Land use pressures have increased dramatically in recent years owing to increasing market integration, a growing consumer class, urbanization, and tremendous growth in demands on natural systems (Meyfroidt *et al.* 2013). Additionally, global goals for protecting biodiversity have brought attention to protected areas as a major conservation tool, but for many protected areas (e.g., IUCN [International Union for Conservation of Nature] classes I–III) this can come at the expense of local communities' access to land. All these reasons have made securing land tenure challenging for many rural dwellers who must contend with post-colonial legacies and manifestations of globalization, but too often lack strong representation or political voice.

Within this context, a broad body of work shows that securing tenure for local people, generally by establishing rights and effectively enforcing and adjudicating those rights, commonly has positive impacts on human well-being by reducing landholders' uncertainty and supporting investment in development (Deininger & Feder 2009; Mullan *et al.* 2011; Holden *et al.* 2013; Lawry *et al.* 2016). But does securing land tenure mitigate deforestation, slow biodiversity loss, or otherwise improve environmental conditions? The evidence is mixed. Some research

documents positive relationships between tenure security and land investments that can benefit people and nature, like soil conservation or planting trees (Holden *et al.* 2009; Otsuka & Place 2015). In other cases, securing tenure seems to have little effect on conservation outcomes (Gavian & Fafchamps 1996; Buntaine *et al.* 2015), and in some examples the causality is reversed: investments like tree planting are made to denote property borders and thus secure land tenure itself (Besley 1995; Deininger & Jin 2006; Fenske 2011).

These mixed findings highlight how land rights empower landholders with choice, which may not necessarily align with positive conservation outcomes. But given tenure's role, it can be a major factor in the success or failure of conservation interventions (Larson *et al.* 2013; Sunderlin *et al.* 2014). This goes beyond just looking for the presence or absence of formalized rights, but understanding factors that affect risks and perceptions of risks to land rights. While there is a large academic literature on tenure security, the links to implementation are often obscured by jargon and disciplinary boundaries. Yet, for those designing payment for ecosystem services (PES) programs, working with communities nearby protected areas, or implementing projects with stakeholders in "working landscapes," understanding and addressing land tenure issues are critical for success. Through our review of the literature, we propose actionable tools and a simplified framework to show how tenure and tenure security interact with conservation initiatives.

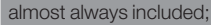
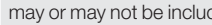

Land tenure form, land tenure security, and conservation

First, it is critical to define and distinguish between the *form* and the *security* of land tenure. While the literature defines land tenure form in various ways, we use a commonly referenced FAO (2002) definition that states that the form of tenure "determine[s] who can use what resources, for how long, and under what conditions." Land tenure *security*, in contrast, can be thought of as the assurance a landholder feels that those rights will be upheld by society (Sjaastad & Bromley 2000).

The land tenure forms discussed in the literature are often conveyed in simplified categories (Robinson *et al.* 2014): private, communal, public, state protected land, and customary. These general categories, however, can mask significant heterogeneity in the depth, breadth, and quality of the bundle of rights that can be held within any single category (RRI 2012). Commonly referenced rights include access, withdrawal, management, exclusion, alienation, transferability (Schlager & Ostrom 1992), and due process and compensation in the event

Table 1 Land tenure form and bundles of de jure rights^a

| Right bundle ^b | Tenure category | Community | | Government | |
|-----------------------------|--|--------------------|-------------|---------------------------|----------------------------------|
| | Individual or firm Private ^c | Communal | "Customary" | Protected | Public (unprotected) |
| | <i>Right holder</i> | Individual(s)/firm | Community | Self-identified community | Society Citizenry |
| | <i>Duty holder^d</i> | Individual(s)/firm | Community | Self-identified community | Governing body Governing body |
| Access | | | | | |
| Withdrawal (subsistence) | | | | | |
| Withdrawal (commercial) | | | | | |
| Management | | | | | |
| Exclusion | | | | | |
| Alienation | | | | | |
| Due Process | | | | | |

^aColor coding:  almost always included;  may or may not be included;  rarely included (no shading). These are "fuzzy" distinctions: in any given location, there may be overlap between some columns, signaling overlapping (and thus contested or unclarified) rights.

^bDefinition of rights (Schlager & Ostrom 1992; RRI 2012): *Access* allows entry into an area. *Withdrawal* is the right to benefit from land, for subsistence or commercial purposes. *Management* can be defined by the legal limits of other rights, and it can also be used to empower a community to articulate its rights to alienation or the exclusion of particular resources. *Exclusion* is the right to refuse others access to and use of a resource. *Alienation* is the right to subdivide or sell one's property. *Due process and compensation* allow for adjudication of grievances and fair (usually monetary) compensation in cases of eminent domain. Generally, local conditions dictate which of these bundles are relevant for conservation and biodiversity for a given location, but most often associated with environmental outcomes are: *Access*, *Withdrawal for commercial use*, and *Management* rights.

^cHowever, even in the most complete private land markets, the state always retains some "takings" rights and restricts prohibited uses.

^dThe state or governing body is almost always implicated as a *duty holder* as the entity that has the power to arrest and adjudicate.

of expropriation (RRI 2012). The tenure form categories that are often used as shorthand to denote a combination of these rights, or a "bundle of rights," and what parties hold rights or duties to a piece of land.

Table 1 summarizes broad associations between these bundles of rights and tenure form (see also, Barry & Meinzen-Dick 2008). The shading indicates how likely the tenure category is meant to denote a set of rights that is "almost always included," "may or may not be included," or "rarely included" following Schlager and Ostrom's (1992) framework in their classic review of common property. The literature generally uses private property to imply a so-called "well-defined" bundle of rights, which is the complete set of the bundle of rights. In Table 1, all rights bundles are noted as "almost always included." We use Schlager and Ostrom's (1992) own characterizations for shading community-based tenure. The customary tenure category is somewhat ambiguous

since "customary" can encompass many arrangements. Drawing from a range of literature (including but not limited to Agrawal 1994; Peluso & Vandergeest 2001; Fitzpatrick 2005), we shade these bundles similar to communal tenure, except for commercial withdrawal rights which can come at the expense of customary institutions (Zoomers 2010). Land under government control, i.e., most protected areas and other general nonprotected public land, can also take many forms (Barry & Meinzen-Dick 2008; Nolte *et al.* 2013), so most rights are labeled "may or may not be included." Finally, as public land is often the default category for undocumented land in many developing regions, we designate *exclusion*, *alienation*, and *due process* as being "rarely included."

While Table 1 summarizes common associations, in practice there can be significant heterogeneity within the table and empirical counter-examples to our shading. Thus, the table may be most useful given a specific

location with an intervention in mind, where practitioners can undertake their own shading exercise to map the tenure situation and better identify points of entry for an intervention. The online Supporting Information includes two examples from our own work. Table S1 shows the regional variance of rights around a nontimber forest product based on Robinson *et al.* (2013) and Robinson (2016), and Table S2 documents the rights held under private title when individual land overlaps with protected area designations, based on Holland *et al.* (2017). These examples highlight how regional rights vary under different tenure regimes, and can help identify issues that may arise or opportunities for ways an intervention could address tenure issues.

However, Table 1 only bears on the issue of tenure *security* indirectly. Tenure security reflects a landholder's confidence or belief (real or perceived) that agreed-upon rights, i.e., the form of tenure, will be enforced and upheld by society more broadly. A common but faulty assumption is that private land tenure is inherently more *secure* than customary tenure based on its more formal/legally codified bundle of rights. First, this ignores transaction costs in private systems, and assumes that communities have the capacity to efficiently monitor and enforce rights (Robinson *et al.* 2013). This also overlooks rules, rights, or norms, legally or locally enforced, which may exist within a customary framework that proves to be internally coherent and enforced, and thus secure, in practice (Baland & Platteau 1996; Knight 2010; Stickler & Huntington 2015; Lawry *et al.* 2016). Moreover, formal private land tenure may also be insecure, undermining the presumed "completeness" of the bundle (e.g., Barsimantov *et al.* 2010).

The form of land tenure can bound what land use decisions are possible, but tenure *security*, irrespective of form, is a major vehicle through which land management activities are realized. For example, a private landholder may have the right to cut down her forest, but whether she does (and how she cuts it down, whether she replants it, etc.) is, in large part, a function of how secure she feels that she will receive benefits from that forest in the future (Barbier & Tesfaw 2013). Similarly, a well-monitored and enforced (secure) formal protected area is less prone to deforestation than if it is weakly monitored and enforced (insecure), especially when land use pressure is high (le Polain de Waroux *et al.* 2016). Ambiguity in tenure, where there are overlapping claims or conflict over who has access and rights to a resource (Samadhi 2013; Holland *et al.* 2014), may also be a marker of insecurity.

Tenure form is an essential element to understanding governance context, and thus something all conservation strategies must consider. Yet, relying too much

on the form of tenure to understand outcomes is limiting; practitioners must also take into account tenure security. Without considering tenure security, most forms of tenure show mixed impacts on conservation outcomes (Robinson *et al.* 2014; Seymour *et al.* 2014). Thus, a better grasp on the conditions that underpin secure tenure is necessary to understand a conservation intervention's probability of achieving its goals.

Conservation interventions and land tenure security

Conservation interventions affect and are affected by tenure security. Figure 1 shows a conceptualization of the relationship between tenure security, conservation interventions, and outcomes. This framework summarizes how landholders, those who live and work on the landscape, make land management decisions. This section first describes the major components of Figure 1; later subsections detail the interactions between a conservation intervention and tenure security (blue components).

Landholders' perception of tenure security is influenced by a variety of factors including prevailing prices, social norms, economic development, socio-economic status, expectations, and other factors. In Figure 1, we cast these as three categories: political economy, formal, and informal institutions. These categories can overlap and interact, reinforce or contradict each other, and the relative importance of each can vary by location. But, all affect tenure security and, therefore, the expected monetary or nonmonetary returns on possible land uses. These factors impact landholders' management decisions, which have implications for outcomes that relate to conservation interests and human well-being.

The political economy box represents the macro-level forces that manifest themselves locally, such as governance struggles, macro-economic conditions, or political objectives. These conditions can influence micro-level conditions (e.g., returns to land use, local preferences, local population growth and density, within-community power dynamics, etc.) and tenure security. Although these larger political economy issues often rest outside the control of conservation practitioners, an awareness of how they might support or undermine a project's feasibility is necessary (Vaccaro *et al.* 2013).

The degree of security is also influenced by locally manifested formal and informal institutions. Formal institutions are legal and statutory systems, policies, and rules which ultimately legitimize a *de jure* tenure system, and are related to and reinforced through the political economy. Formal institutions determine how land rights are administered, enforced, and applied (Simbizi

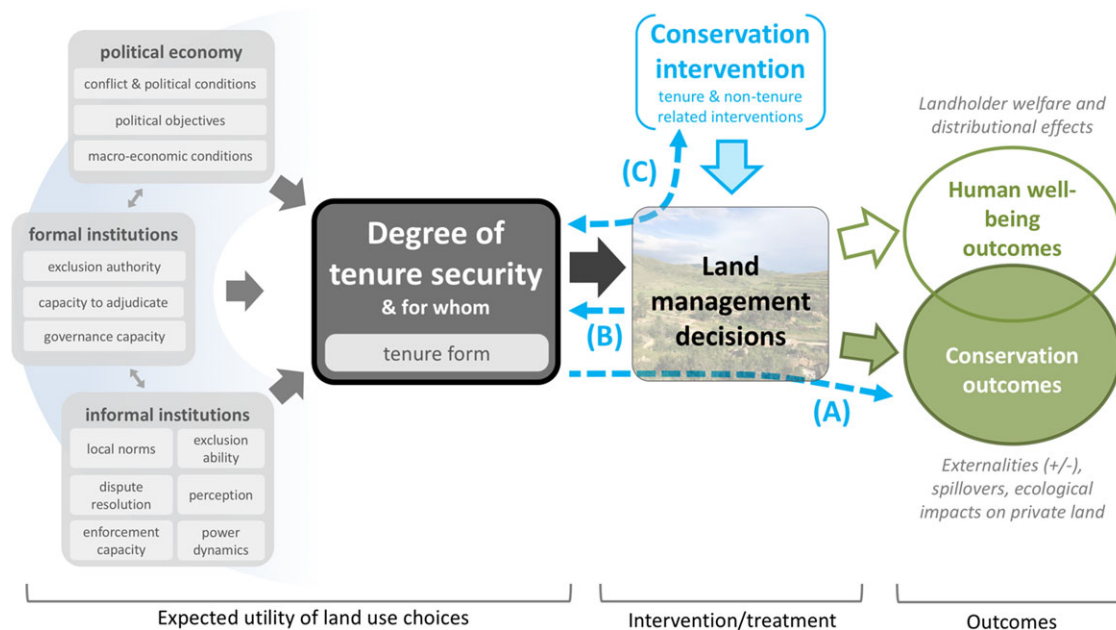


Figure 1 Land tenure security affects conservation interventions and outcomes through land management decisions.

Notes: 1. Solid arrows indicate dominant direction of impact; dashed blue arrows indicate issues of conservation concern.

2. Land management decisions include land use activities or actions that conservation organizations hope to affect.

3. Conservation interventions are activities an organization undertakes with communities to promote conservation (see Salafsky *et al.* (2008) for a unified classification, e.g., protection, management, incentive payments, etc.). This may include simply "getting out of the way" when communities activities already implicitly or explicitly support conservation goals.

4. Arrow (A) represents how tenure security affects the provision of public goods; arrow (B) is how land management activities affect tenure security; arrow (C) focuses on how a project directly interacts with tenure security.

et al. 2014). For the conservation community, two important questions should be asked and answered before taking action in this context: first, how the enforcement or implementation of *existing* tenure laws could impact conservation outcomes and, second, how *deficiencies* in laws and/or their implementation require reform that might interact with conservation.

Informal institutions can include customary land rights, rights enforced through recognition of community norms and values, or a mix of both informal and formal rules. These informal institutions may constitute a de facto tenure regime in which rights are upheld by a community of resource users themselves without formal statutory recognition (Simbizi *et al.* 2014). This may remain secure and coherent as long as outside parties do not lay claim to resources within the system, or the ability to enforce rules or exclude outsiders does not become overwhelmed. However, with increasing land pressures, population growth, and migration, outside claimants on resources under traditional or customary management can be common (Curry & Koczberski 2009; Jayne *et al.* 2014). Failure to recognize differences in de facto and de jure tenure, and potentially the role of landholder agency

which can override both formal and informal systems, can lead to incoherence and in many instances tenure insecurity. Addressing the "tenure gap" between de facto and de jure tenure has been one rationale underpinning efforts to formalize community land rights in much of the developing world (Naughton-Treves & Day 2012). One way to close this gap is by legally recognizing traditional customary rights (see, e.g., Knight 2010; Quizon 2015).

For the conservation community, understanding current land and resource use requires a focus on whether de facto and de jure tenure align, as de facto rights, are the current operating rules. But to affect land use changes into the future, working to ensure de jure recognition of tenure and transparent interaction between formal and informal systems can be just as crucial. A conservation intervention in land management implicitly aims to change the rights over who benefits from a land use, and implies new rights and duties. Conservation organizations must practice due diligence to ensure that these changes are congruent with local formal and informal institutions.

Taken together, the left half of Figure 1 shows how tenure security underpins landholders' decision-making, which then influences the value of different land use

options. This summarizes how tenure security impacts land use decisions which can affect, among other things, landholders' returns from agricultural production (Alix-Garcia *et al.* 2012), the value derived from social/cultural resources (Rodgers & Menon 2012), and how the political economy impacts landholder utility (Broegaard 2005).

Land management decisions are typically made to improve a landholder's own welfare, but can also entail externalities, positive or negative, which affect biodiversity and conservation. In this way, tenure security can have significant impacts on conservation outcomes. For example, increasing security for smallholders might improve agricultural productivity, but could entail investments in synthetic fertilizer inputs that in turn negatively impact downstream water quality (Zheng *et al.* 2016). Alternatively, tenure security can produce positive externalities, such as increased investment in soil conservation activities (Deininger & Jin 2006) or reforestation.

Conservation organizations often hope to improve ecological outcomes by promoting or discouraging certain land management strategies (solid blue arrow). Tenure security is an important but often overlooked aspect of these land management decisions. Below, we outline three broad considerations for how landholders' tenure security could interact with a conservation intervention. Issues A and B highlight the importance of understanding local tenure conditions prior to implementation. Issue C focuses more directly on how those tenure security conditions might affect a conservation intervention.

Issue A: How does tenure security impact the current provision of public goods?

Conservation practitioners must consider how tenure security affects land management decisions (and, in turn, the organization's target public goods—biodiversity, ecosystem services, forest health, etc.), prior to any conservation intervention (arrow A). This is necessary for understanding how a conservation intervention might impact land management decisions. For example, weak tenure security can play a role in a household's decision to convert forest to agriculture: very insecure tenure could prevent households from engaging in agriculture for fear of not being able to even reap a harvest, but in different situations insecure tenure may prompt households to clear forest for agriculture since near-term payoffs might be greater. In another example, the process of formalizing tenure through titling can generate positive conservation gains; in Ecuador, deforestation was reduced in protected areas after titling (Holland *et al.* 2017). Regardless, in all these situations, a conservation intervention should consider the strength or legitimacy of claimants, as some landholders may lack the ultimate

power or authority to carry out a medium- to long-term intervention strategy. These dynamics should be incorporated into conservation strategies that aim to influence land management decisions.

Issue B: Can land management activities affect tenure security?

Some landholders make land management decisions with the explicit *intent* of improving land rights (Besley 1995; Deininger & Jin 2006; Fenske 2011) (arrow B). This can be the case when policies encourage "productive use" of the land to stake claim to property, as was well known with land reform in Latin America, especially in the Amazon where homesteading rights can be earned in frontier areas by clearing forest for agriculture (Fearnside *et al.* 2005; Mena *et al.* 2006). In Africa, tree planting can also commonly demarcate and stake claim to land (Unruh 2008; Barbier & Tesfaw 2013), and "land to the tiller" (*mise en valeur*) policies similarly incentivize investment in order to claim rights (Toulmin 2009). Knowing the activities landholders can undertake to secure tenure can help organizations better identify opportunities for supporting or discouraging these actions.

Issue C: How do the above conditions affect a project or program?

Finally, a conservation intervention itself may have a direct and immediate relationship with tenure security (arrow C). On the one hand, a conservation program may require some degree of tenure security as a necessary or enabling condition for successful implementation. For example, PES programs may assume or require strong tenure security. In PES programs, ecosystem service beneficiaries compensate landholders for changing land management activities to maintain the provision of that service (Naem *et al.* 2015). Thus, to reliably enter into these contracts, landholders must have a requisite level of tenure security, usually formal "clear and uncontested" title, to meet the obligations of the contract. Without this, the conservation practitioner has little assurance that the conditionality of the payment will be met (Duchelle *et al.* 2014). Additionally, a key mechanism of PES programs is identifying who receives the reward for participation in the program. In areas where land tenure is uncertain or in conflict, choosing a group with which to work assumes that this group has at least the right to manage and exclude activities from the land. The level of tenure security of the landholders impacts an organization's capacity to change land management decisions.

On the other hand, in some cases, practitioners may be able to directly harness tenure reforms to meet con-

conservation goals. Tenure reforms are not usually designed to catalyze conservation behaviors. Yet, the establishment of Namibian conservancies provides an example of using tenure reforms to promote conservation outcomes. Here, the World Wildlife Fund worked with the government to help pass legislation in 1999 that grants ownership rights over local wildlife to legally constitute “community conservancies,” largely based on the argument that sustainable wildlife-based industries would generate livelihoods benefits of higher value than cattle ranching (Jones 2010). Some conservancies have leveraged their wildlife ownership rights to broker investments from commercial tourism enterprises. The result has been abandonment of livestock production in favor of conservation practices, which has increased wildlife in the conservancy areas. These partnerships generate considerable local employment and investments in local public services, although equitably managing the distribution of newfound benefits can prove challenging (Novelli & Gebhardt 2007).

Discussion

Tenure security in context

Which above issue A, B, or C is most salient? This will depend on local contextual conditions, largely based on the interactions between the three boxes on the left side of Figure 1. This part of Figure 1 highlights issues such as whether : macro-level political economy factors manifest in local returns to land uses, credit and economic constraints limit land use options, a “tenure gap” exists between informal and formal institutions, or conflicts in local land rights affect decision-making.

Of course, tenure form and security are not the only factors that affect conservation outcomes, but when they present a bottleneck to effective action, the framework above outlines several insights. First, it highlights how secure tenure can lay the groundwork for sustainable conservation programs by decreasing uncertainty in investment for landholders and conservation practitioners. Second, the framework outlines major pathways through which tenure security may interact with conservation interventions, allowing practitioners to more rapidly home in on the theory and evidence supporting a given intervention. Third, conservation practitioners must still be prepared to put in the effort to clarify which informal, formal, or political economy factors are critical levers for improving tenure security. For example, areas where formal institutions do not recognize local customary rights may seem like a natural place to help strengthen tenure. However, if local customary rights are relatively secure without formal recognition, as is documented in at least some African communities (Knight 2010; Stickler &

Huntington 2015), advocating for formal rights may have little near-term impact on human well-being or conservation outcomes (Jacoby & Minten 2007). In special cases like this, and given limited conservation financing, organizations may find it prudent to shift current conservation investments elsewhere while perhaps continuing to advocate for strengthened recognition of rights.

The conservation community must also pay attention to which *level* of security might be needed to secure conservation and human well-being objectives. Formal institutional changes can be long, contentious, and complex, and the payoff for conservation small relative to other options. For example, a protected area or PES program may require tight integration with formal institutions, but reinforcing informal institutions, like environmental stewardship, might be an effective conservation intervention toward more sustainable agricultural practices (e.g., Rudel *et al.* 2009). The menu of conservation interventions is large, and whether and how important tenure security is for any given intervention must be investigated as part of the process for selecting a wise conservation strategy.

Finally, we should be aware of inequalities that might result from interactions between a conservation intervention and tenure security. For example, engrained power dynamics and persistent social norms can make addressing current tenure problems for some populations difficult, e.g., female-headed households (Banerjee & Iyer 2005). Marginalized or vulnerable subpopulations may have distinct tenure security situations that should be factored into program planning (Carter & Olinto 2003). Conservation organizations cannot solve all these issues by themselves given limited funding, but they should be aware of the risks of maintaining or exacerbating existing inequalities, and be committed to social safeguards within their conservation programs that aim to “do no harm.”

The relationship between tenure security, land management, and outcomes related to human well-being and conservation is obviously complex. The devil is in the details, and those with conservation goals must work to understand local factors that determine opportunities and constraints for an intervention. The approach presented in Figure 1 provides a starting point for grappling with these issues.

Assessing tenure security

Tenure security is important, but how should conservation practitioners go about assessing it? Development agencies and researchers have generated a range of survey-based approaches to assess local land tenure security, which may offer some guidance for conservation audiences. Existing tools range in depth and scale

of assessment—some focus explicitly on tenure security, others only address tenure security tangentially. Table S3 presents survey-based approaches as a point of reference for existing ways tenure security is being addressed.

For conservation practitioners, there are few simple tools to help rapidly assess tenure security issues. Table 2 summarizes common sources of tenure insecurity based on a thorough (though nonexhaustive) review of the literature (Table S4). This table can help organizations assess local tenure security issues for each tenure form in a project region. Table 2 broadly categorizes sources of tenure insecurity as related to the *assurance* or *substance* of rights, following Arnot *et al.* (2011), and issues that relate to the “tenure gap” as we described above. Most tenure security issues relate to the assurance of rights, but the substance of rights (i.e., what bundles are present) may also present tenure security problems, depending on the right bundles implied in local tenure forms. The tenure gap could highlight issues with assurance, substance, or both, and is further distinct because it represents incoherence in de facto actions and the de jure governance system. The boxes could note the presence/absence of a condition or a more quantitative appraisal of the importance of an issue locally. As with Table 1, this tool is likely best applied by practitioners in a specific decision context.

Addressing tenure security

In what ways can conservation organizations address tenure security issues? When governments or development projects aim to directly address tenure security, the most common approach is through formal mechanisms to legally recognize land rights. These might include documenting rights through land titling programs (Deininger & Feder 2009; Larson *et al.* 2013; Holland *et al.* 2017), incorporating customary systems into a statutory framework (Knight 2010), or gaining rights from the state through a process of devolution of management (Jagger *et al.* 2014; Otsuka & Place 2015).

Some tenure security interventions focus on government capacity to implement and uphold land tenure reforms and make documentation systems affordable and accessible (Jagger *et al.* 2014; Meinzen-Dick 2014; Otsuka & Place 2015). Efforts may include creating a transparent public landholding registry, clarifying institutional responsibilities, simplifying overlapping and plural tenure systems, resolving disputes, or improving monitoring and evaluation of tenure governance systems (Deininger & Feder 2009; FAO 2012; Naughton-Treves & Day 2012; Larson *et al.* 2013; Bruyn & Veer 2014).

Finally, some tenure security projects focus on informal institutions. These often begin with an evaluation of the local tenure setting, including the policy and

governance environment and local norms with the goal of identifying sources of insecurity, conflict, and inequality (van Gelder 2010; Katz 2010; Larson *et al.* 2013; Bruyn & Veer 2014). Complementary education and outreach programs can also bolster the knowledge and skills needed to take advantage of formal institutions like land registration (Naughton-Treves & Day 2012).

Across these interventions that aim to improve tenure security, marginalized populations are often a focus. Conservation groups should also help ensure that tenure systems recognize basic human rights and safeguard against intracommunity discrimination toward women, pastoralists, indigenous groups, or other minorities. To aid in access to government recognition and protection of rights, low-cost land registration and legal assistance are often necessary (Katz 2010; Knight 2010). Additionally, spousal co-ownership is not the norm in many locations, so divorce and inheritance laws may limit women’s rights separate from a spouse (Mammen & Paxson 2000; Peterman 2011). Addressing such issues can ensure land passes to widows and children.

Conclusions

Summarizing the discussion above, four main “action items” emerge for organizations investing in place-based conservation programs.

First, assess the baseline social-economic-political situation and underlying tenure security issues. Land tenure security is a function of local conditions (political economy, informal, and formal institutions) and can hinder or help advance conservation goals. Applying Tables 1 and 2 to local settings can help form the foundation for this baseline.

Second, examine how varying degrees of tenure security might interact with conservation programs under consideration. This includes assessing how the program would interact with the legal system and informal institutions, subgroups of interest, and whether the intervention requires or assumes some level of tenure security that may not necessarily be currently present.

Third, if an intervention is deemed worth pursuing, organizations should consider the implications for marginalized or vulnerable groups. The stakeholders for whom tenure security is being assessed clearly matter: women, minorities, indigenous groups, and other marginalized subpopulations may face additional hurdles to securing land tenure compared to others. Securing tenure can sometimes be a zero-sum game in that one group’s gains in tenure security come at the expense of another’s. Organizations must realize when such trade-offs are present since they may create additional conflict or undermine overall social cohesion often necessary for

Table 2 Land tenure forms and sources of tenure insecurity^a

| Factor impacting tenure security | | Tenure category | Community | | Government | |
|----------------------------------|--|----------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| | | Individual/firm Private | Communal | “Customary” | Protected | Public (unprotected) |
| Assurance of rights | Conflict (violent, political instability) | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| | Social inequalities | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| | Political or power asymmetries | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| | Land governance issues | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| | Land use/ development pressures | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| | In-migration | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| | Land reallocations or expropriation | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| | Resource exploration/ exploitation | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| | Policy volatility/ unpredictability of state action | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Substance of rights | Missing components of the ‘bundle’ | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| | Lack land documents or formal title | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Tenure gap | Formal statutory rights held, but not locally recognized/ enforced | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| | Locally-recognized rights, but no statutory claim | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Other sources of insecurity | | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

^aExample checklist to help conservation practitioners map sources of tenure insecurity in a given location.

achieving conservation objectives. Further, tenure security applies to more than just land. Programs that define rights to carbon, water, or other ecosystem services are becoming more prevalent and assessing tradeoffs is increasingly important.

Finally, in light of these underlying tenure security issues, organizations should reassess the likelihood of an intervention achieving the desired outcomes. In some cases, the current situation, left alone, may have the greatest chance of achieving good conservation outcomes. In other cases, tenure security issues may be so

intractable that they severely limit the likelihood of positive conservation outcomes. Conservation organizations have limited staff, budgets, and capacity. It is critical that they consider how tenure-related strategies complement or detract from other goals.

In general, more research is needed that recognizes the dynamic nature and complex feedbacks inherent in tenure security issues. Experimental research through randomized controlled trials, taking advantage of natural experiments, or reanalyzing existing metadata on tenure interventions can all help identify the benefits of tenure

security on conservation outcomes. Much empirical research is mixed, and identifying the causal implications of tenure security on the environment, and how local conditions might mediate these causal effects, is critical (Baylis et al. 2016; Persha & Meshack 2016).

We see two research areas that deserve more immediate attention. First is the detailing of the gap between statutory and locally defined tenure, which occurs when there is incongruence between land rights as seen in the eyes of the state on the one hand, and the on-the-ground de facto rules and rights used to manage land, on the other hand. This “tenure gap” between de jure and de facto land management has implications for conservation outcomes since it highlights whether investments should be made in formal or informal institutions.

Second, determine the marginal benefit of engaging in a tenure security intervention relative to other types of conservation investment, which we refer to as the “tenure dividend.” The conservation community, like any other, has finite resources to allocate to policies and programs. Understanding the additional benefit of engaging in a tenure security intervention will help assess the tradeoffs between alternative interventions to meet conservation and development goals. Until, we develop this understanding, however, as a conservation community we must face land tenure and tenure security issues head-on, explicitly taking these into account in strategic plans and implementation.

Supporting Information

Additional Supporting Information may be found in the online version of this article at the publisher’s web site:

Table S1. Village-level de facto NTFP rights in north-west Yunnan, China (based on Robinson et al. 2013; Robinson 2016).

Table S2. Overlapping and conflicting de facto rights in Ecuador (based on Holland et al. 2017).

Table S3. Summary of easily accessible land tenure security measurement and assessment tools.

Table S4. Literature support for sources of tenure insecurity in Table 2.

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