Issue Brief: Natural Climate Solutions and Land and Resource Governance

The effectiveness of tenure interventions to reduce land-based greenhouse gas emissions

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KEY FINDINGS

Which tenure interventions are effective at reducing land-based greenhouse gas (GHG) emissions? No counterfactual studies were found for this brief on the impact of land and resource governance (LRG), or tenure, interventions and forest restoration outcomes. With respect to deforestation, a robust literature exists that separates causality from bias or noise. Although context is always important and no intervention type guarantees success, robust counterfactual evidence identifies clear priority actions to reduce deforestation. Although not an exhaustive list and other interventions may also be effective, the evidence base is particularly strong for the following types of interventions or approaches leading to positive outcomes for forests and the climate:

- **Protected area establishment** that is combined with interventions to improve human well-being for local communities, that includes mixed use and co-management, and where design and implementation is in partnership with local communities.
- **Formal recognition of customary tenure for Indigenous Peoples and local communities**, inclusive of community forest management. This approach may be particularly effective for communities with high existing levels of collective action. If collective action levels are low, these levels might be increased through a combination of inclusive community governance structures, participatory land use planning, and boundary harmonization. Finally, these interventions may be combined with local forest monitoring to further reduce deforestation.
- **Conversion of poorly designed public lands** into protected areas or full property rights for Indigenous Peoples and local communities consistent with the above.
- **Titling of de facto private land claims combined with rational and enforced forest set-asides.** This should include robust forest monitoring, positive incentives to induce compliance, and enforcement actions for violators.

INTRODUCTION

A central challenge facing USAID and other stakeholders committed to climate action is how to reduce land-based greenhouse gas (GHG) emissions given that land use, including agriculture and forestry, account for almost a quarter of annual emissions globally (Seddon et al. 2020, p. 2). There are a range of potential pathways available to achieve the 1.5-degree Celsius (1.5C) target that vary in their relative reliance on fossil fuel emissions reductions, bioenergy, and carbon capture and storage technologies (e.g., long-term geological storage of CO2) (Figure 1; IPCC, 2018). However, in all scenarios, a decrease in land-based GHG emissions and support for land-based carbon removal is essential, without which we will not achieve the 1.5C target.

Climate change mitigation solutions in the agriculture, forestry, and land use (AFOLU) sector have been termed Natural Climate Solutions (NCS). NCS are a suite of protection, restoration and improved land management pathways that reduce land-based GHG emissions and increase rates of CO_2 sequestration

(Griscom et al. 2020, p. 2).[1] NCS can provide up to 37 percent of the GHG mitigation needed by 2030 to stay on track for a 2-degree Celsius target (Griscom et al., 2017). This estimate does not fully account for implementation feasibility; it also estimated the potential area for natural regeneration that some criticize as too high (Seddon et al. 2020, p. 4). Because of these limitations, the 37 percent estimate is probably an upper limit for the potential contribution of NCS. Nevertheless, NCS such as avoiding deforestation and forest restoration are essential pathways for climate change mitigation.

This issue brief focuses on the two NCS pathways estimated to have the largest climate change mitigation potential globally – avoided deforestation and forest restoration[2] – and the land and resource governance[3] (LRG) or tenure interventions that can contribute to those two pathways. The counterfactual evidence for the impact of LRG interventions on native forest restoration is scant, although this gap is beginning to be recognized (Mansourian, 2016; McLain et al., 2021). No such counterfactual evidence was uncovered when preparing this brief and thus we focus on avoided deforestation impacts. There is a robust literature, including systematic reviews, on the biophysical determinants of native forest restoration. In particular, there are multiple reviews comparing the outcomes of more active versus more passive forms of forest restoration[4] (e.g. Meli et al., 2017; Crouzeilles et al., 2017). Yet, sustained native forest restoration is unlikely to occur unless the underlying human drivers of deforestation are changed. That in turn requires effective interventions, which are the event/program/package that independently brings about this desired change.

While this brief focuses on avoided deforestation and forest restoration, other NCS pathways are also effective and critically important, particularly for certain countries or within smaller landscapes. For example, avoiding peat conversions in Indonesia represents a larger total mitigation opportunity than any single pathway in any other individual country, with the exception of avoided deforestation in Brazil (Griscom et al., 2020). Peat in general is remarkably carbon dense;[5] peatlands in Indonesia often contain more than 1000 metric tons of carbon per hectare, and sometimes up to 7500 tons per hectare (Warren et al., 2017). In comparison, intact native lowland forest in Indonesia holds an estimated 171 tons of aboveground carbon per hectare on average (Ferraz et al., 2018). Indeed, our understanding of

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[1] NCS is a subset/type of Nature-based solutions (NbS) but NbS is broader and includes "climate adaptation, food security, water security, human health, and social and economic development derived from nature" (Griscom et al. 2020, 2; Chausson et al. 2020, p. 6135). NbS is simply working with and enhancing nature to help address societal challenges, including climate change (Seddon et al. 2020, p. 2)

[2] Forest restoration: Actively attempting to return an area to its previous naturally forested state. The priority is the recovery of a forest ecosystem, not just tree cover (Gaworecki, 2021)

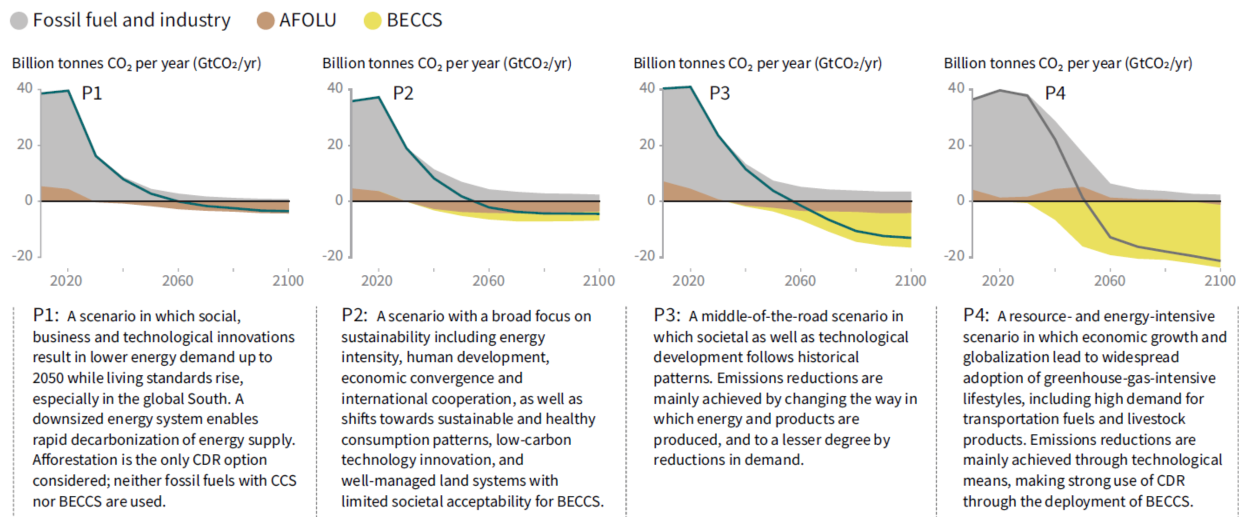
[3] As defined in the USAID LRG research agenda, "LRG refers to the bundle of rules, rights, policies, processes, institutions and structures created to manage the use, allocation of, access to, control, ownership, management, and transfer of land and . . . natural resources" (Stevens et al., 2020).

[4] More passive forms of forest restoration rely primarily on natural forest regeneration - the spontaneous recovery via colonization of native tree species - although this may be assisted through human interventions such as livestock exclusion or fire management. By contrast, active forest restoration involves direct planting of seeds or seedlings of native species or silvicultural management techniques such as thinning or burning (following Crouzeilles et al., 2017).

[5] It has been estimated that peat contains a quarter of the global soil carbon stock while covering less than 3 percent of global area (Loisel et al., 2021).

the extent of peatlands in Central Africa and peat's potential as a "carbon bomb" is relatively recent (Dargie et al., 2017).

Figure 1: Four illustrative pathways to limit increasing temperatures to 1.5 degrees C



Source: IPCC (2018), p. 14.

Because large carbon stocks can be lost very quickly during forest conversion, avoiding deforestation has far more mitigation potential per unit area on an annual basis than restoring a lost forest. Griscom et al. (2020) estimate that avoiding deforestation has 33 times more mitigation potential than forest restoration per unit area. However, forest restoration is a more effective pathway for sequestration, or carbon dioxide removal, and it plays a strategic role in restoring ecosystem connectivity by reconnecting forest fragments. As forest fragments are further reduced, pressure on those forests tends to intensify, generating a negative feedback loop as forest loss renders more forest loss (Hansen et al., 2020). Thus, maintaining or restoring intact forest landscapes and minimizing fragmentation has clear benefits for avoiding deforestation as well.

NCS mitigation pathways, such as avoiding deforestation and restoration, are in effect types of outcomes or impacts that can be observed between 1 and 8 years from when interventions are completed. As discussed below, changes in human behavioral responses, perceptions, incentives, and norms can be observed within one to two years of when an intervention is completed. Yet, context matters. All common tenure interventions are successful in improving environmental outcomes at least sometimes; however, they also all fail sometimes (Borner et al., 2016; Burivalova et al., 2019). Counterfactual evidence can increase the likelihood of a successful intervention by accounting for and controlling bias when designing and adapting programs as well as reducing risks and uncertainties.

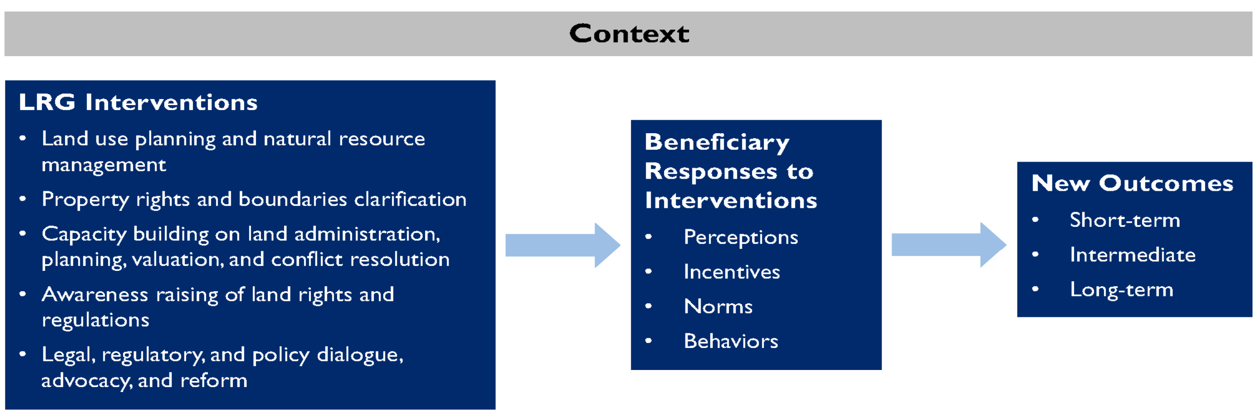
Counterfactual evidence (what would have happened without the program or policy change? Did the program work?) is generally lacking for environmental policy and programs (Ferraro, 2009). Although the field has advanced in recent years with many studies benefiting from counterfactual thinking, the evidence base is not balanced. Many standard interventions and critical landscapes suffer from little to no counterfactual evidence. This in turn raises questions about whether these standard interventions work, why, and for whom.

WHY FOCUS ON LAND AND RESOURCE GOVERNANCE?

Land and resource governance (LRG), and in particular tenure regimes and tenure security, influences people's and businesses' incentives, perceptions, norms, and behaviors with respect to land use.[6] By modifying incentives, perceptions, norms, and behaviors, LRG interventions can generate new positive outcomes and lasting impact. LRG interventions consist of five types following Lisher et al., 2019 (Figure 2). These interventions are not stand-alone but are generally more effective if integrated with conservation, health, NRM, and food security interventions, among others (Jones et al., 2020).

One critique of the NCS literature is too much of a focus on the biophysical potential of NCS pathways and not enough of a focus on LRG and other interventions that will determine whether NCS outcomes are achieved (Seddon et al., 2020). While NCS mitigation pathways have immense potential when viewed from the perspective of biophysical constraints, the on-the-ground potential in any particular country or landscape will largely depend on the success of LRG and conservation interventions, inclusive of tenure, environmental governance, and natural resource management.

Figure 2: Conceptual Model for Land and Resource Governance



Source: Adapted from Lisher et al. (2019).

Tenure is typically thought of in terms of a bundle of rights, such as management, exclusion, access, and use (Ostrom, 1990) as well as the security of those rights in the form of documentation (e.g., deeds) and how secure the rightsholder feels. Improving tenure security, or the security of one's land and resource rights, is sometimes a means to improve environmental outcomes. The reasoning is that if people feel more secure, they have more incentive for long-term investment and sustainable management and less incentive for short-term over exploitation (IPCC, 2020). In cases where landholders clear forest as a

[6] As defined in the USAID LRG research agenda (Stevens et al., 2020, p. 13) "LRG refers to the bundle of rules, rights, policies, processes, institutions and structures created to manage the use, allocation of, access to, control, ownership, management, and transfer of land and . . . natural resources."

means of demonstrating ownership, a land title can reduce deforestation by eliminating the need to clear to own.

Despite the benefits from improving tenure security, formalizing claims can cut both ways for climate change mitigation depending on the tenure or land type; that is, the rules associated with a given land area. As discussed below, increased tenure security for Indigenous Peoples and local communities generally results in positive forest outcomes. Yet, increased tenure security for private land (with limited or no restrictions on use) in many cases has resulted in negative environmental outcomes, such as increased forest clearing for farmland (Probst, 2020; Walker, 2021). Title can induce increased investment in intensive agricultural production at the expense of forest (Walker, 2021). The impact of private tenure security on rates of forest cover change are predicated on collective action levels, land use planning, natural resource management, government subsidies, and anti-corruption interventions, among other factors (Tseng et al., 2021; Seymour & Busch, 2016).

What is LRG?

Land and resource governance (LRG) has its roots in Ostrom's work on *Governing the Commons* (1990). Ostrom conceptualized property rights as a bundle, consisting of access, use, management, and exclusion. Recent high-quality evidence points to management and exclusion as the most important rights in the bundle for positive environmental outcomes (Hajjar et al. 2020). And management rights are important in part because they imply access and use.

In 2012, the UN Committee on World Food Security adopted the *Voluntary Guidelines on the Responsible Governance of Tenure of Land, Fisheries and Forests* that was prepared with USAID in a leading role. As with Ostrom's work on common property systems, the Voluntary Guidelines recognized that achieving long-term impact requires a broader governance lens. As the title suggests, the Guidelines take a broad view of governance as inclusive of land and resources, such as forests and fisheries.

Finally, recent work by the Rights and Resources Initiative and World Resources Institute highlights the common practice by governments of bifurcating rights to land and natural resources; hence the term '*land and resource* governance' as opposed to just 'land governance.' It is common for rights in the land to be recognized under formal law while rights to valuable surface or subsurface resources are retained by the government (or vice versa) for allocation to businesses or individuals. This allocation frequently occurs with limited transparency and accountability and resultant inequities as elites capture resources and income.

For instance, from 2004 to 2013, Brazil was one of a few sustainable intensification success stories as integrated national-level interventions and approaches were deployed to reduce deforestation *and* increase nationwide cattle and soy production on privately held land (the two largest commodity drivers of deforestation in the country) (Seymour & Busch, 2016). An expanded protected area and Indigenous Territories network reduced the supply of forest available for expansion, and jurisdictional coordination of incentive payments, commodity-based moratoriums, and zero-deforestation commitments reduced the demand for forests. Finally, the risks of deforestation were ratcheted up with near real time forest monitoring and enforcement actions (Seymour & Busch, 2016).

The rest of the brief is organized around three key LRG interventions or approaches, namely: formal recognition of community and indigenous lands; private land titling; and protected area establishment. Each of these approaches is consistent with one or more tenure interventions in Figure 2.

FORMAL RECOGNITION OF COMMUNITY AND INDIGENOUS LANDS

The exact area held or managed by Indigenous Peoples and local communities (IPLCs)[7] is difficult to establish. Yet, there is clearly a large gap between the area of land de facto held by IPLCs and the areas where IPLCs have secure, formally-recognized land and resource rights. Indigenous Peoples manage or have tenure rights over at least 38 million km2 of land in 87 countries. This represents over a quarter of the world's land surface and intersects with about 40 percent of all terrestrial protected areas and ecologically intact landscapes (Garnett et al., 2018). Further, of the ecosystems containing "irrecoverable carbon" (Goldstein et al., 2020), an estimated 33 percent fall within IPLC-governed lands (Noon et al., 2022). Irrecoverable carbon can guide spatial priorities and is defined as carbon that can be influenced through governance and local action, is vulnerable to land use conversion, and is not recoverable by 2050.

Designation of Indigenous lands is one of the most effective interventions for avoiding deforestation. Borner et al. (2020)'s systematic review identified only 3 studies on the impact of Indigenous community title. However, their review excluded several studies, including some post-dating their review period ending in May 2019. Some key omitted studies, particularly covering the Brazilian Amazon, are discussed below. Nevertheless, the general finding of Indigenous lands being roughly as effective as protected areas at limiting forest loss is consistent across many studies (Sze et al., 2021). For example, in Panama, a matching study that controlled for confounding variables found that areas under Indigenous communal tenure reduced deforestation by 7.3 percent relative to the national average (Walker, 2021). This was comparable to the impact of protected areas that reduced deforestation by 9.7 percent. In contrast, private land title in Panama *increased* deforestation by 15.3 percent (Walker, 2021). In Brazil, the impact of Indigenous lands was comparable to the experience in Panama but had an even stronger effect. Indigenous land reduced deforestation more than all other forms of tenure – including protected areas. Deforestation on Indigenous lands was 16.8 percent less than on private lands and 23.2 percent less than on undesignated public lands (Pacheco and Meyer, forthcoming).

Indeed, fully registering property rights for Indigenous Peoples is very likely to reduce deforestation (Pacheco & Meyer, forthcoming; Baragwanath & Bayi, 2020; IPCC, 2020). A study on the impact of Indigenous land registration in the Brazilian Amazon from 1982 to 2016 found that demarcating Indigenous Territories, an earlier step in the registration process, had only a minor impact on rates of deforestation; however, completed registration resulted in a 66 percent reduction in deforestation (Baragwanath & Bayi, 2020). Approximately 2 million hectares of Indigenous land await full registration in Brazil (Baragwanath & Bayi, 2020) as well as millions of hectares in other countries (RRI, 2020). The evidence clearly points to registration of these Indigenous lands as very likely to generate positive, significant forest and climate outcomes.

Baragwanath and Bayi's analysis is illustrated in Figure 3. The three plots each represent a different time period. Plot A is prior to Indigenous Territory demarcation (establishing the area de facto held and

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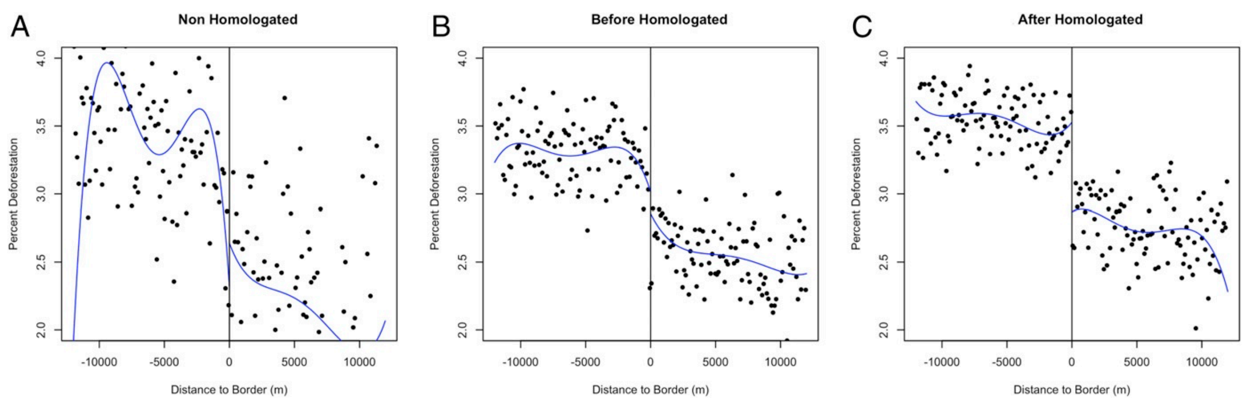
[7] The term Indigenous peoples and local communities (IPLCs) is generally used to refer to members of ethnic groups who are descended from and identify with the original inhabitants of a given region, in contrast to groups who have settled, occupied or colonized an area more recently (IPBES, 2018).

claimed by Indigenous Peoples); B is after demarcation but before full property rights registration (also called homologation under Brazilian law). C is after registration. Within each plot, deforestation rates are shown on the vertical y-axis and distance from the Indigenous Territory border on the horizontal x-axis. The area to the left of the vertical line is outside of the Indigenous Territory while the right side of the line is inside the Indigenous Territory. The plots demonstrate a clear break (a discontinuity) in deforestation rates at the border of the park – demonstrating the impact of the Indigenous Territory. After demarcation but prior to full registration, this effect is much less, and before demarcation there is no difference between the area that will eventually be within the Indigenous Territory and the area outside.

Figure 3: Discontinuity analysis by Baragwanath and Bayi (2020).[8]



Source: Baragwanath & Bayi (2020), p. 20498.

Community forest management (CFM) has been promoted over the last decades as a way to achieve environmental outcomes while also improving economic development and ensuring rights to resources of forest communities. Hajjar et al. (2020) completed a systematic review of 643 cases of CFM[9] across 51 countries and evaluated whether they reported improvements or declines across three areas: environment, income, and resource rights. The analysis found that the majority of studies showed CFM having a positive impact on income and environment. Consistent with other recent systematic reviews, 75 percent of cases where communities received increased resource rights resulted in positive environment and human well-being outcomes. However, there were trade-offs, especially with respect to equity (Hajjar et al., 2020). Despite generally positive impacts on the environment and income, a majority of CFM cases (54 percent) showed declines in resource access rights, such that elites tend to benefit from increased incomes while the more vulnerable experience reduced rights and incomes.

[8] The analysis by Baragwanath & Bayi (2020) uses a regression discontinuity design (RDD), which includes the timing of demarcation and registration to differentiate the effects of those events. The RDD approach provides an improved ability to establish causation by comparing deforestation before and after, inside and outside of the Indigenous Territory.

[9] Hajjar et al. (2020) and (2021) define CFM as a "range of community-based and collaborative management arrangements across forest types that can be under a range of land tenure categories (including communally and customarily owned forests and those on public or private lands) and administered by a range of government and community stakeholders."

Finally, triple outcome wins were rare (18 percent of 122 eligible studies) (Hajjar et al., 2020; Hajjar et al., 2021).

Approaches to CFM that included co-management – i.e., "both government and local actors actively engaged in CFM" – had higher levels of success than those that did not (Hajjar et al., 2021). Also, smaller communities and communities facing less migration tended to have more success with CFM (Hajjar et al., 2020). Strong de facto exclusion and management rights prior to CFM establishment was also a strong predictor of positive outcomes, although the "act of formalization of management and exclusion rights often represented a decrease in actual rights that had been practiced, making it less likely to have positive joint outcomes" (Hajjar et al., 2021).

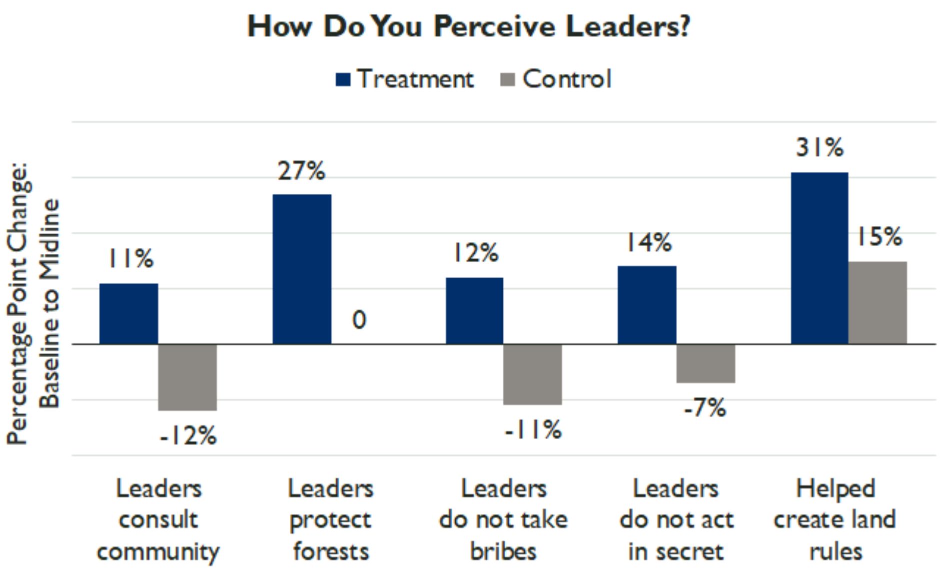
The Hajjar et al. (2020) findings regarding the predictors of CFM success are generally consistent with Ostrom's findings that more homogenous groups are better able to exclude outside actors from exploiting a common resource. Further, Hajjar et al.'s findings on the degree to which a community adheres to forest rules (i.e., collective action and trust) is consistent with Ostrom's theory and a substantial amount of high-quality evidence (Oldekop et al., 2019; Bluffstone et al., 2018; Blackman, 2015).

An open question is whether low levels of pre-existing collective action can be improved through inclusive community governance structures, participatory land use planning, and formal recognition of customary tenure. An ongoing USAID-funded impact evaluation in Liberia demonstrated dramatic improvements in collective action levels less than half-way through implementation of the Land Rights Act (Figure 4). Interventions included village land use plans, community bylaws, establishment of inclusive village committees, boundary harmonization, legal awareness, and a government certificate formally recognizing the community as a self-identified legal entity with ownership over their land and resources (although not yet with a full deed to their land).

The interventions were only partly completed, yet communities receiving the Land Rights Act interventions saw a significant increase in collective action levels. Treatment community households saw a 27-percentage point increase in perceptions that leaders protect the forest; control communities experienced no change. Further, households increased their perception that they help create land rules by 31 percentage points; control communities experienced a more modest improvement. As noted, increased collective action levels, social capital, trust, and social cohesion are associated with positive forest outcomes (Hajjar et al., 2020; Oldekop et al., 2019; Bluffstone et al., 2018; Blackman, 2015).

In addition, as mentioned, migration also has a significant impact on CFM success. An influx of new migrants reduces the likelihood of multiple win outcomes. This too is consistent with theory and empirical evidence, especially from the Maya Biosphere Reserve in Guatemala (Blackman, 2015). New migrants may not have developed self-governing common property systems and may exhibit individualistic tendencies with lower collective action and trust levels, as well as livelihood strategies (e.g., livestock grazing) generally at odds with forest conservation (Hajjar et al., 2020; Hajjar et al., 2021).

Figure 4: Impact of Land Rights Act Implementation on Collective Action Levels in Liberia[10]



Source: Marple-Cantrell et al. (2017).

One limitation to note regarding CFM is the degree to which the literature is concentrated in a few countries and does not generally benefit from counterfactual study designs. Hajjar et al. (2020) found that 54 percent of the 697 cases identified were from South Asia. Mexico and Guatemala are also well-represented in the literature. Because the literature covers a relatively narrow base, it may represent an incomplete picture of how CFM performs more broadly. For instance, Mexico's CFM is generally regarded as a success, yet a recent matching analysis covering more than 1000 community forest permits issued after 2001 could not reject the null hypothesis, concluding "that [CFM] permits do not have large systematic effects on tree cover loss." (Blackman et al., 2021).

Although formal recognition of IPLC land and resource rights can lead to improved forest outcomes, early evidence suggests additional positive impacts are possible when combined with local forest monitoring, which improve enforcement and accountability. Slough et al. 2021 demonstrate that training and incentivizing Indigenous community members in the use of monitoring tools can have significant, positive impacts on deforestation. They found a 52 percent reduction in deforestation during the first year, although that fell by more than half in the second year and the second year's findings have low confidence levels (p=0.26 or a 26 percent probability of no relationship between the interventions and outcomes observed such that the null hypothesis is in fact correct). Despite this, a large effect sizes in the first year and robust randomized-control trial (RCT) design strongly indicates positive impact.

[10] USAID supported a quasi-experimental difference-in-difference approach to assess the impact of the Land Rights Act interventions in Liberia that included a panel dataset (i.e., involving repeated measures with the same households in multiple time periods) with 818 households in 57 communities. For more information visit https://www.land-links.org/2018/06/evaluation-of-the-community-land-protection-program-in-liberia/

Finally, household land certification within a customary community combined with village land use planning and conflict resolution can significantly decrease deforestation while increasing agricultural investment. An RCT of 300 villages and 70,000 landholdings in Benin found an 18 percent reduction in deforestation over an eight-year period, with no evidence of leakage (Wren-Lewis et al., 2020). The program may also have promoted sustainable agricultural intensification. Deforestation decreased while agricultural investment increased; households with land certificates were 22 to 43 percent more likely to grow perennial cash crops and to invest in trees on their parcels (Goldstein et al., 2018).

PRIVATE LAND TITLING

Tseng et al. (2021) reviewed 117 counterfactual studies that evaluate the impact of land tenure related interventions on both human well-being and environmental outcomes. The study assessed a range of LRG interventions including increasing awareness of land rights, land use planning, and capacity building of land administration offices; however, the majority of studies (70/117) evaluated interventions relating to land titling and formalization. The great majority of studies related to individual tenure. The largest number of studies evaluated efforts to formalize de facto tenure without necessarily changing the tenure form. In cases where the tenure form changed, it was largely to increase the area under private tenure resulting from a transition from collective customary tenure to private, individualized ownership.

The Tseng et al. systematic review found that increasing land tenure security through formalization generally had positive outcomes for both environmental and human well-being. There were some negative impacts of the LRG interventions, but overall, the positive impacts outweighed the negative both in terms of environmental and human well-being outcomes. This pattern was consistent across the three most common intervention types: land formalization, land use planning, and policy reform.

Of the 23 studies that evaluated outcomes in both environment and human well-being categories, 10 represented win-win cases where multiple positive outcomes were observed. One case was a "lose-lose" outcome where both environment and human well-being were harmed; this lose-lose instance resulted from land reform and redistribution efforts in Zimbabwe (Zikhali, 2010). In the majority (12/23) of cases, there existed at least some trade-off in outcomes.

As mentioned, other studies clearly demonstrate that deforestation rates are higher on privately titled land. In Panama (Walker, 2021) and Brazil (Pacheco and Meyer, forthcoming), robust matching analyses found that deforestation was significantly higher on privately titled lands (by 15.3 percent in Panama). The effects of titling private land may change over time. Titling can at first reduce deforestation, but in the long term increase it as titling improves landholder access to credit, investment, and ability to use resources (Probst et al., 2020).

Titling regimes that include specific environmental commitments by landholders have seen greater effectiveness. Evidence suggests that Brazil's CAR (Cadastro Ambiental Rural or Rural Environmental Cadaster) has been effective in reducing deforestation. Under Brazil's Forest Code registration in the CAR is mandatory for rural properties, which improves the government's ability to enforce land use restrictions and forest set aside requirements. In an analysis that compared properties registered earlier in the CAR program against those registered later, Alix-Garcia et al. (2018) estimated that registration in the CAR reduced deforestation by 10 percent on registered property. Whereas corruption can create an environment in which forest set asides and other land use restrictions are routinely violated (Seymour and Busch 2016).

By contrast to private and other tenure types, the worst performing tenure is poorly designated public lands, which can become de facto Hardin's tragedy of the commons. Despite formal government ownership, recent migrants, loggers, agri-business and other actors may overexploit the natural resources because of weak government capacity and/or corruption, among other factors. And the lack of secure rights can hamper protection efforts by the de facto landholders (typically Indigenous Peoples and local communities, but not always).

PROTECTED AREAS

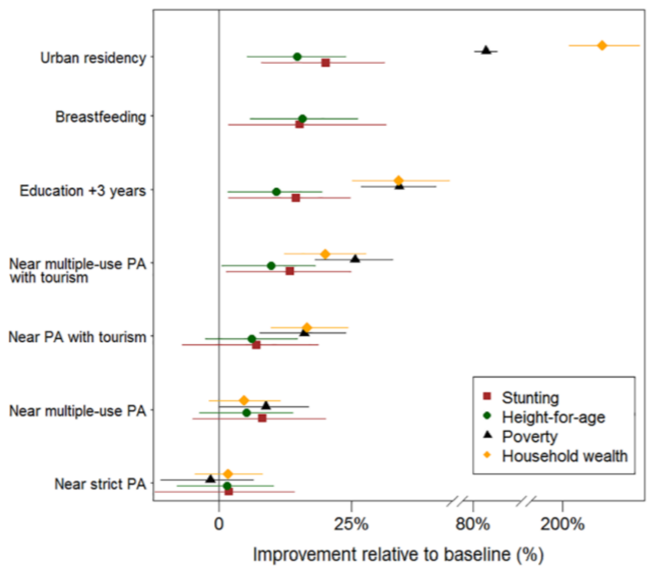
Ribas et al. (2020) evaluate counterfactual methods used to determine protected area (PA) effectiveness. They assess the difference between "naive" methods, which simply compare deforestation rates within protected areas against deforestation rates outside without controlling for confounding variables, with more robust counterfactual methods that rely on matching, among other techniques. Across almost all studies, protected areas have a measurable positive impact on deforestation rates; however, standard, naive methods significantly overstate the size of impact. This is at least partly due to the biased nature of protected area siting. Protected areas tend to be in relatively remote areas with lower deforestation pressure; as such a naive analysis that simply compares protected areas with non-protected areas will find that deforestation in protected areas is far lower and will therefore determine that protected areas have a strong effect.

Burivalova et al. (2020) generally support the Ribas et al. (2020) findings that protected areas are effective, but the most rigorous methods suggest more modest effectiveness than reported in earlier studies. In some cases, forest loss remained low within protected areas until buffer zones became highly deforested; at that point, rates within the protected areas increased to levels higher than in the buffer zone.

Evidence suggests that ensuring local buy-in and participation is a key factor for multiple environment and human well-being outcomes when establishing protected areas. Protected areas associated with positive human well-being outcomes are more likely to show positive conservation outcomes, and rights-based approaches to protected area establishment are more likely to generate both positive human well-being and conservation outcomes (Odelkop et al., 2016). It is not difficult to see why. For instance, once expelled from their forest, forest communities may remain adjacent to a newly established protected area. The only barrier to their continued use of the forest may be a single forest guard or other hallmarks of paper parks. Simultaneously, self-governing common property systems over the forest are diminished or eradicated, fostering conditions for a tragedy of the commons or overexploitation of the forest resource as individuals seek to maximize their short-term advantage.

Naidoo et al. (2019) found that the relationship between protected areas and human well-being is dependent on how a protected area is managed. Naidoo et al. used statistical models to simulate different scenarios for how proximity to a protected area affects human well-being relative to a baseline, defined as a rural household living greater than 10 km from a strict protected area with no tourism and with breast-feeding children. For strict protected areas, there was no or marginal improvement in household wealth and child health (Figure 5). By contrast, mixed use protected areas, particularly those that include economic activities such as tourism, can lead to significant increases in environmental and human well-being outcomes.

Figure 5: Simulated well-being impacts of protected area proximity



Source: Naidoo et al. (2019).

Sze et al. (2021) compared protected areas, Indigenous Lands (IL), and protected Indigenous areas (PIAs; i.e., Indigenous Lands that overlap protected areas) against non-protected areas globally and did a comparison among regions. They noted different drivers of deforestation in the three categories among the three regions of Asia-Pacific, the Americas, and Africa. In Asia-Pacific more than 60 percent of deforestation was attributable to commodities and forestry and in the Americas 40 to 50 percent was attributable to commodity production. However, that number was only 3 percent in Africa where most deforestation was from shifting agriculture.

The authors found that Indigenous Lands reduced deforestation at comparable levels to protected areas and PIAs with some regional differences. Indigenous Lands performed somewhat less well than protected areas and PIAs in Asia-Pacific, but somewhat better than protected areas and PIAs in Africa. In Africa, protected areas, PIAs, and Indigenous Lands all reduced deforestation by 1 - 1.5 percent annually, with Indigenous Lands performing the best. In the Americas, each of the three types of area reduced deforestation by 2 to 3 percent. In Asia and Pacific, PAs and PIAs reduced deforestation by about 3 percent, but Indigenous Lands had a negligible effect.

Sze et al. hypothesized that the relatively poorer performance of protected areas in Africa may be linked to the contentious colonial history and the fact that many protected areas remain contested landscapes. A key consideration is the nature of the protected areas established. Strictly protected areas that do not include community participation or engagement may be more likely to result in negative forest and human well-being outcomes, such as reduced income, than multi-use protected areas paired with livelihood support for forest peoples (Naidoo et al., 2019). This again reiterates the importance of local buy-in and meaningful community participation as essential for the effectiveness of protected areas.

CONCLUSIONS AND RECOMMENDATIONS FOR EFFECTIVE INTERVENTIONS

A 2010 USAID issue brief *Climate Change, Property Rights, & Resource Governance* concluded, "The interface between climate change and tenure is still *poorly understood* by policy makers and program planners alike . . . . the analytical frameworks for dissecting the complexities of the issues are still in their *infancy*" (emphasis added; Freudenberger & Miller, 2010, p. 6). Fortunately, 12 years later we have a much better understanding of which tenure interventions are effective for reducing land-based GHG emissions, at least with respect to avoided deforestation.

As mentioned, no counterfactual studies were found for this brief on the impact of LRG interventions and forest restoration outcomes. Thus, a recent increased focus on native forest restoration is an invaluable learning opportunity by generating counterfactual evidence and applying that evidence to program design and adaptive management (Ferraro & Pattanayak, 2006). Additionally, none of the counterfactual evidence regarding intervention effectiveness that was uncovered for this brief reported a causal link between women's empowerment and avoiding deforestation or restoring native forest, although equity and collective action outcomes have strong causal relationships with forest outcomes.

With respect to deforestation, a robust literature exists that separates causality from bias or noise. Although context is always important and no intervention type guarantees success, robust counterfactual evidence identifies clear priority actions to reduce deforestation. Although not an exhaustive list and other interventions may also be effective, the evidence base is particularly strong for the following types of interventions or approaches leading to positive outcomes for forests and the climate:

- **Protected area establishment** that is combined with interventions to improve human well-being for local communities, that includes mixed use and co-management, with design and implementation in partnership with local communities.
- **Formal recognition of customary tenure for Indigenous Peoples and local communities**, inclusive of community forest management. This approach may be particularly effective for communities with high existing levels of collective action. If collective action levels are low, these levels might be increased through a combination of inclusive community governance structures, participatory land use planning, and boundary harmonization. Finally, these interventions may be combined with local forest monitoring to further reduce deforestation.
- **Conversion of poorly designed public lands** into protected areas or full property rights for Indigenous Peoples and local communities consistent with the above.
- **Titling of de facto private land claims combined with rational and enforced forest set-asides.** This should include robust forest monitoring, positive incentives to induce compliance, and enforcement actions for violators.

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