

# Is the formalization of collective tenure rights in the Peruvian Amazon supporting sustainable Indigenous livelihoods?

## Findings from comparative research in San Martín and Ucayali regions

Miguel Guerra, Juan Pablo Sarmiento Barletti and Blanca Begert

### Key findings

- The titling of *Comunidades Nativas* (Native Communities) alone is not enough to ensure Indigenous Peoples' access to sustainable livelihoods in the Peruvian Amazon.
- Lack of income options, combined with restrictive legal frameworks for resource use under the *Comunidad* model, led to unsustainable land and resource use.
- In seeking to access cash incomes, *Comunidades* often entered into exploitative relationships with smallholder migrant farmers and timber companies.
- Regulations for resource use and the *Comunidad's* governance framework do not reflect local livelihoods and leadership practices; interviewees highlighted that this created challenges related to livelihoods, conflicts, participation and representation in communal governance.
- A transition from a punitive to an enabling role for government agencies – including investing to develop both the institutional and technical capacities of *Comunidades* – is essential to support more sustainable livelihoods.

### Introduction

Forested areas under community management regimes are more effective at maintaining forest cover than other land management arrangements, including some protected areas (RRI 2017; Schleicher et al. 2017; Garnett et al. 2018). Studies show that secure collective land rights allow communities to better protect their forests, emphasizing the compatibility of Indigenous Peoples' environmental management practices with carbon sequestration (Yeh and Bryan 2015; Blackman et al. 2017; RRI 2018). Indigenous grassroots organizations advocate for formal recognition of their rights to land and resources as the most important mechanism by which to secure their livelihoods (Seymour et al. 2014).

However, even after communities have received legal titles to their lands, tenure reforms throughout Latin America continue to restrict the livelihoods options that Indigenous Peoples are able to pursue (see Monterroso et al. 2019). Laws governing access to land and forests often do not consider the priorities, institutions and resource use practices of Indigenous and local communities (Stocks 2005; Larson et al. 2015; Sarmiento Barletti 2017) and instead limit their ability

to access forest resources and develop sustainable livelihoods from forests. As a result, informal practices remain widespread, and local people are often unjustly penalized (Duffy 2010; Pacheco et al. 2012; Maryudi and Myers 2018).

In this infobrief we summarize findings from a recently published article (Sarmiento Barletti et al. 2021) to explore the extent to which the titling of *Comunidades Nativas* (Native Communities) – the collective lands of Indigenous Peoples in the Peruvian Amazon – is supporting Indigenous Peoples' abilities to effectively conserve forests and secure sustainable livelihoods. We analyse how the inhabitants of six *Comunidades*, in the Peruvian regions of San Martín and Ucayali, perceive their livelihood options and manage their resources and territories. We synthesize challenges faced by our informants into three key areas: (i) livelihoods, (ii) conflicts, and (iii) participation and representation in communal governance.

This infobrief starts by briefly contextualizing how the current *Comunidad Nativa* legal framework was developed in Peru. We then present our research methodology and study sites, before summarizing our results and synthesizing them into broader lessons. The conclusion then summarizes our findings.

## The *Comunidad Nativa*

Three key transition periods mark the history of legal recognition of Indigenous territories in Peru (Monterroso et al. 2017); these are helpful to understand the current legal framework for *Comunidades*.

- The first period (1969–1979) was marked by the emergence of Law No. 20653 (1974), the Law of Native Communities and Promotion of Agriculture in the Lower and Upper Rainforests. This law initiated recognition of *Comunidades Nativas*, granting their inhabitants inalienable collective rights over areas that included forests. These rights could not lapse nor could their lands be seized. However, the law was modified in 1978 to introduce a distinction between agricultural and forested land within a *Comunidad's* territory. This placed forests under government control.
- The second period (1980–2009) saw a move away from the formalization of collective rights to focus on individual property rights. Laws were passed to make it easier for community members to vote to divide their collective land into separate parcels. The titling process more generally was paused and policies allowed for 'unused' land to be appropriated by the state. The emergence of multiple government institutions with responsibilities related to titling and to the resources in *Comunidades Nativas* made it harder for Indigenous Peoples to comply with legal procedures (including those related to resource use) and to engage effectively with government offices.
- The third period (2009 onwards) returned to an emphasis on collective tenure rights and has been marked by the passing of the Law of Prior Consultation. International agreements related to Peru's climate change goals led to multiple ongoing large-scale titling efforts funded by multilateral institutions.

Despite progress in titling, Peru continues to pursue an extractive-led development agenda. By 2010, almost 50% of Peru's Amazon fell within one of 52 hydrocarbon concessions, compared with only 7.1% in 2003; 46 of those concessions overlapped *Comunidades* (Finer and Orta-Martínez 2010). Yet between 2006 and 2011, Indigenous territories in the Peruvian Amazon reduced deforestation twice as much as protected areas with similar ecological conditions and accessibility (FAO and FILAC 2021). Although more than 1,300 *Comunidades* have been titled since 1974, another 600 others (spanning around 5.5 million ha) are still pending (Notess et al. 2018). Progress has been underwhelming, primarily because titling remains legally, politically and technically cumbersome (Notess et al. 2020).

Against this background, we ask: is the *Comunidad Nativa* supporting Indigenous Peoples' access to sustainable livelihoods? To explore this, we present research findings from research with six *Comunidades*.

## Methods and case studies

Research was carried out between June and October 2019 in three Awajún *Comunidades* in San Martín and three Asháninka *Comunidades* in Ucayali (see Table 1). Across all sites, we implemented qualitative methods including semi-structured interviews, document analysis and participant observation (see Sarmiento Barletti et al. 2021 for the full methods). Research sought to understand how people in *Comunidades* perceive their livelihood options and manage their territories. Although socioenvironmental pressures and political priorities differ in San Martín and Ucayali – Peru's foremost coffee production and timber extraction areas, respectively – Indigenous Peoples face similar pressures due to the land and resource regimes governing *Comunidades*, local and national development agendas, and the interests of other actors in their territories.

**Table 1. Community profiles**

Region	San Martín (Awajún)			Ucayali (Asháninka)		
<i>Comunidad</i>	Alto Mayo	Alto Naranjillo	Cachiyacu	Inkare	Nueva Esperanza	Tzinquiato
Area and population	11,106 ha	3,625 ha	29,473 ha	3,783 ha	4,752 ha	6,717 ha
	622 people	128 people	105 people	71 people	470 people	200 people
Year established/ titled	1950s/1999	1974/1999	~1990/1996	1990/1991	1987/1992	1989/1994
Main conflicts	Land renting to migrants, overlaps with a protected area	Land renting to migrants	Land invasion, overlaps with a mining concession and a conservation area	Debt with a timber company	Debt with a timber company	Land invasion issues with Andean migrants
Current engagement with projects	Programa Bosques / Conservation International	Small reforestation programme with the regional government	None	Programa Bosques	None	Programa Bosques

Awajún *Comunidades* were selected in coordination with the Regional Indigenous Awajún Federation of the Alto Mayo (FERIAAM). In total, 16 in-depth semi-structured interviews were conducted in Awajún communities, as well as 7 focus groups. Asháninka *Comunidades* were selected in coordination with the Asháninka Federation for the Bajo Urubamba (FABU). In these areas, 47 in-depth interviews with community members were conducted, in addition to 6 focus groups.

Awajún and Asháninka Peoples are the two most numerous Indigenous Amazonian societies in Peru, with 65,828 and 112,492 people respectively (INEI 2017). Traditional Awajún and Asháninka communities formed small kin-based groups of around 30–50 inhabitants. Groups lived dispersed, around one-day walking distance from each other, in territories much larger and less populated than current *Comunidades* (Killick 2007; Greene 2009). Studies note that the distance between households would allow family groups to manage the natural resources around them – mostly fish and game, as agriculture was small-scale and subsistence oriented – without having to coordinate use with other family groups from day to day. Family groups still lived close enough to visit each other for activities including rituals and communal fishing trips (Gow 1991; Killick 2007).

Today, many different families live within the boundaries of one *Comunidad*, commonly living side by side in villages of varying sizes. The Law of Native Communities imposed an Andean community model, based around agriculture, on Amazonian peoples who had previously lived in more mobile and dispersed patterns (Greene 2009). The social organization of *Comunidades* now resembles a settled and nuclear community model, where parts of *Comunidades* are divided into parcels for individual families to farm and profit from, while other portions are managed collectively, as per *Comunidad* regulations. The most important resource that is managed collectively is standing forests; farms are owned and managed by individuals, with little rules about where they can be located.

In the early 1980s, Asháninka farm plots were recorded to include more than two dozen different foodstuffs, which supplemented diets of game and fish; conversely, farm plots in the 2000s had less than a quarter of those plants (Hvalkof and Veber 2005). Cacao and coffee – the most important cash crops in San Martín and Ucayali – were introduced in recent decades, although much later in Ucayali, where the local economy has historically been based on logging. In both regions, there is recent support from government and NGO actors for cacao and coffee planting to discourage deforestation from logging and farm plot expansion.

As with most Indigenous Amazonian societies, traditional Asháninka and Awajún social organization had virtually no coercive leadership roles (outside war and ritual practice) in a sociopolitical context where land was freely available and thus people were able to move away and start new settlements when they disagreed with the decisions made by a leader (Greene 2009) or to avoid conflicts (Weiss 1975). The Law of Native Communities determined that a

communal assembly, composed of all adult members in a *Comunidad*, should elect a president to serve as its legal representative. In the early years of *Comunidades*, young men that could read and write in Spanish were selected as presidents, but they had no real impact on community-wide decision making (Brown 1993; Renard-Cassevitz 1993). Arguably, this could be because *Comunidades* at the time had few formal external engagements.

Over time, the increase in economic negotiations with outsiders over resources in the *Comunidad* (e.g., timber, land) granted presidents certain advantages over their neighbours, as they had the legal power to make and profit from these deals while, at least officially, representing the *Comunidad* (Greene 2009; Sarmiento Barletti 2017). Today, the renting of *Comunidad* land to outsiders, or the signing of logging agreements with companies, is normally approved by its president or by the communal assembly, but all legal agreements must be signed by the president.

## Results

Research participants' perspectives can be grouped into the three main challenges they faced despite having titled lands (all *Comunidades* in our study were titled in the 1990s). First, participants highlighted that their income from selling cash crops in local markets was insufficient, so they had to supplement it with informal land and resource use activities that exposed them to exploitative relationships. Second, they reported conflicts with Indigenous and non-Indigenous actors over their *Comunidades'* land and resources. Third, they noted communal governance challenges – specifically, gendered decision-making disparities within *Comunidades* and the abuse of presidential authority.

## Livelihoods

Awajún informants expressed difficulties earning a living from agriculture, as well as affording healthcare, school supplies and food. Primary income came from selling coffee, complemented by renting land to Andean migrants. Starting in the 1990s, government loans and policies to integrate Awajún *Comunidades* into the national economy through agriculture, coupled with scant technical capacity support, an increased need for money, and shrinking forest resources, led Awajún *Comunidades* to rent land to migrant farmers (Greene 2009). By the late 1990s leasing was widespread, and during the early 2000s Awajún *Comunidades* in San Martín experienced some of the highest forest loss in all of Peru. Focus groups attributed forest loss primarily to land rentals and migrant neighbours. Informants had little desire to expand their agricultural plots, given their limited capacity to work larger areas. Timber was never discussed as a primary motivation for land clearing. In San Martín, most *Comunidades* had divided land for agriculture and renting by parcelling out parts of their territory to individual families. Heads of households could decide to rent land and receive the income, but leases were approved and signed by the *Comunidad's* president.

At the time of research, income in Asháninka *Comunidades* was primarily obtained from cacao sales, supplemented with informal timber extraction to cover household needs. Respondents described the formal logging process as complicated and expensive; following the regulations requires accounting and technical capacities that only timber companies have. This has forced *Comunidades* either to rely on unfair contracts with timber companies that had the know-how to get legal permits, or to opt for informal logging. While informal extraction by individuals is aimed at meeting immediate economic needs, logging can also be carried out with timber companies at the *Comunidad* level, and income is later divided among the families. Deals with loggers are common, as they offer loans or products to *Comunidades* against future timber; all three Asháninka *Comunidades* in this study were in debt to timber companies. *Comunidades* enrolled in *Programa Bosques* – Peru’s National Programme for Forest Conservation – explained that despite capacity development sessions, the project’s benefits never solved family or personal needs because the funds can only be used for communal conservation and livelihood development projects. Awajún informants also expressed a desire for more cash support, to complement the non-governmental conservation programmes in their territories that fund sustainable livelihood projects, trainings, and materials.

## Conflicts

Land conflicts with outsiders were reported across all sites. All 12 Awajún *Comunidades* represented by FERIAAM have conflicts with migrant farmers (IPE 2018) and all 14 *Comunidades* represented by FABU had resource extraction and agricultural expansion conflicts with outsiders. Awajún *Comunidades* intend to phase out rentals because they have led to economic dependence on migrants, deforestation, and land dispossession that occurs when migrants refuse to leave once leases expire. Conflicts with renters, as well as with migrants who invade Awajún territories (without paying rent), have resulted in violent clashes. Formal conflict resolution channels are costly, lengthy and tend to favour migrants; in some cases, the government encouraged rentals as a solution to land invasions, which only prolonged the conflict (Kowler et al. 2016). In Asháninka *Comunidades*, although outsiders cleared areas for cultivation within their territories, this was tolerated so long as these areas were not used for cash crops; logging by outsiders was also not tolerated. Hydrocarbon concessions were also reported as a threat, as all Asháninka *Comunidades* were overlapped by one.

## Representation and participation

Research revealed two types of power asymmetries in *Comunidades*: gender-based inequalities and concerns related to the president’s power. The Indigenous organizations in both study areas said that they would like at least 50% of their *Comunidad* leadership roles to be occupied by women, but they had no concrete plan to achieve this. Although Asháninka women occupied leadership positions in some *Comunidades*, respondents noted that fulfilling those roles on top of household work

is harder for women than for men. In focus groups, Awajún women said that their opinions do not reach authorities; Asháninka women were reluctant to express their opinions in assemblies, especially in meetings concerning timber deals. Domestic violence towards women was also mentioned across all study sites.

Awajún informants noted they were not always informed about presidents’ dealings regarding the forest or agreements with NGOs. Presidents’ shifting approaches to land invasions had also driven conflict, such as when prior leaders had allowed settlers to remain on the land, leading to increased tensions when new leadership wanted them to leave (see also Kowler et al. 2016). Most Asháninka respondents disapproved of logging in their *Comunidades* but accepted it because their presidents had signed contracts with companies. In the area, companies target *Comunidad* presidents to pressure them into signing contracts. Assuming leadership positions was perceived as a burden in Asháninka *Comunidades* because presidents must invest money and time without compensation, which tended to lead to poorly engaged leaders eager to drop responsibility once their mandates were over.

## Discussion

Findings align with discussions of how regulatory frameworks limit the scope of rights granted during title formalization processes (Stocks 2005; RRI 2012; Larson et al. 2015). Our six case studies show how lack of income options and restrictive legal frameworks led to unsustainable and inequitable land and resource use, including renting land to migrants and extracting timber informally. In Asháninka communities there was strong government support for cacao cultivation, but no support was provided for market engagement or for alternative crops.

We found that the *Comunidad Nativa* framework presents challenges, as does a lack of government support for Indigenous Peoples to thrive within that framework. Research led to four wider lessons.

1. First, there is a contradiction between the state’s roles as the driver of an extractive agenda and as the guarantor of Indigenous rights. Enabling Indigenous communities to access their rights requires the state to play an active and supportive role, but evidence shows that the Peruvian state has other priorities. The *Comunidad* model provides only a partial devolution of land and resource rights; informants were only able to freely use land that had been classified as agricultural, and found that the challenging process to extract timber legally was a barrier to improved livelihoods.
2. Second, official channels for both conflict resolution and formal logging are cumbersome and restrictive, favouring informality. Instead of supporting *Comunidades*’ land rights and resolving disputes, local governments encouraged Awajún people to rent out land, yield to economic agreements, or grant usufruct rights to migrants. Loggers are,

- on many occasions, the only actors that provide immediate income to Asháninka people to ensure health, education and other basic household needs; a significant absence of cash and social services forces *Comunidades* to accept loans at excessive costs that must be paid in timber.
3. Third, laws and external initiatives treat *Comunidades* as cohesive units of production, where all their members have similar livelihood goals, often emphasizing non-monetary, collective benefits. However, initiatives must consider the diversity of strategies that families within the same *Comunidad* opt for to fulfil their livelihood goals. Our interviewees prioritised their families' incomes; although *Comunidades* need communal benefits, insufficient support for individual livelihoods may foster informal resource use.
  4. Fourth, the *Comunidad* governance model may clash with some Indigenous forms of governance, and with the ways *Comunidades* view their presidents. The president's signature on a contract or loan establishes the *Comunidad's* legal responsibility, and they are not protected from the negative consequences of these deals; decisions made by presidents could be catalysts for debt and conflict (see also Larson et al. 2015). Although communal assemblies are meant to give one vote per community member, women were not adequately heard nor represented in community decision-making processes.

## Conclusion

Findings show that the *Comunidad* model and the laws and interests around it are not supportive of sustainable livelihoods for their inhabitants. Across all sites, challenges in earning sufficient income through formal mechanisms were reported, resulting in informal income-generating activities, placing community members in exploitative relationships and at risk of penalties. Logging regulations in Ucayali and commercial agriculture systems in San Martín require capacities and resources that Indigenous Peoples do not have, resulting in one-sided deals with timber companies or Andean migrants. The system also supports leadership without clear lines of accountability, and there are gendered inequalities in participation and decision making. Trying to resolve conflicts over Indigenous titled lands following official routes led to further challenges or to others benefiting.

Findings call for a transition from a punitive to an enabling role for government agencies. There is an urgent need to establish forestry and tenure regulations that reflect the local livelihoods, representation practices and needs of *Comunidades*. At the very least, investment in targeted capacity, institutional, and technical development in *Comunidades* must be fostered. This would allow Indigenous Peoples to navigate the legal aspects of resource use and land conflicts, strengthen their internal decision-making mechanisms (see Stocks 2005), and enable their organizations to participate more equitably in decisions that affect their territories and futures, including having more equitable and informed involvement in markets for their products.

## Acknowledgements

We would like to thank the six communities where research was carried out, as well as FABU and FERIAM, their representative organizations. We also thank Evan Killick, Giancarlo Rolando and Anne Larson for their comments on this infobrief, and the anonymous reviewers at the International Journal for the Commons for their help in improving our original manuscript. This work was funded by the CGIAR Research Program on Policies, Institutions and Markets (PIM) led by the International Food Policy Research Institute (IFPRI), and the Norwegian Agency for Development Cooperation.

## References

- Blackman A, Corral L, Santos Lima E and Asner G. 2017. Titling Indigenous communities protects forests in the Peruvian Amazon. *PNAS* 114(16).
- Brown M. 1993. Facing the state, facing the world: Amazonia's native leaders and the new politics of identity. *L'Homme* 126–128:307–326.
- Duffy R. 2010. *Nature crime: How we are getting conservation wrong*. New Haven: Yale University Press.
- FAO (Food and Agriculture Organization of the United Nations) and FILAC (Fund for the Development of the Indigenous Peoples of Latin America and the Caribbean). 2021. *Forest Governance by Indigenous and Tribal People*. Santiago: FAO.
- Finer M and Orta-Martínez M. 2010. A second hydrocarbon boom threatens the Peruvian Amazon. *Environmental Research Letters* 5.
- Garnett ST, Burgess ND, Fa JE, Fernandez-Llamazares A, Molnar Z, Robinson CJ, Watson JEM, Zander KK, Austin B, Brondizio ES, et al. 2018. A spatial overview of the global importance of Indigenous lands for conservation. *Nature Sustainability* 1(7): 369–374.
- Greene S. 2009. *Customizing indigeneity*. Stanford: Stanford University Press.
- Gow P. 1991. *Of mixed blood: Kinship and history in the Peruvian Amazon*. Oxford: Oxford University Press.
- Hvalkof S and Veber H. 2005. Los ashéninka del Gran Pajonal. In Santos-Granero F and Barclay F, eds. *Guía etnográfica de la alta amazonia*. Lima: IFEA, pp. 75–280.
- INEI (Instituto Nacional de Estadísticas e Informática). 2017. *Censo Nacional*. Peru: INEI.
- IPE (Instituto Paz y Esperanza). 2018. *Protierras Comunes*. Peru: GIZ.
- Killick E. 2007. Creating community: Land titling, education and settlement formation among the Ashéninka of Peruvian Amazonia. *Journal of Latin American and Caribbean Anthropology* 13:22–47.
- Kowler L, Ravikumar A, Larson A, Rodriguez-Ward D and Burga C. 2016. Analyzing multilevel governance in Peru. *CIFOR Working Paper* 203. Bogor, Indonesia: CIFOR.
- Larson AM, Cronkleton P and Puhlin JM. 2015. Formalizing Indigenous commons: The role of 'authority' in the formation of territories in Nicaragua, Bolivia and the Philippines. *World Development* 70:228–238.

- Maryudi A and Myers R. 2018. Renting legality: How FLEGT is reinforcing power relations in Indonesian furniture production networks. *Geoforum* 97:46–53.
- Monterroso I, Cronkleton P and Larson AM. 2019. Commons, indigenous rights, and governance. In Hudson B, Rosenbloom J and Cole D, eds. *Routledge Handbook of the Study of the Commons*. New York: Routledge, pp. 376–391.
- Monterroso I, Cronkleton P, Pinedo D and Larson AM. 2017. Reclaiming collective rights: Land and forest tenure reforms in Peru. *CIFOR Working Paper* 224. Bogor, Indonesia: CIFOR.
- Notess L, Veit PG, Monterroso I, Andiko, Sulle E, Larson AM, Gindroz A-S, Quaadvlieg J and Williams A. 2020. Community land formalization and company land acquisition procedures: A review of 33 procedures in 15 countries. *Land Use Policy* 110.
- Notess L, Veit PG, Monterroso I, Andiko, Sulle E, Larson AM, Gindroz A-S, Quaadvlieg J and Williams A. 2018. *The scramble for land rights*. Washington DC: World Resources Institute.
- Pacheco P, Barry D, Larson AM and Cronkleton P. 2012. The Recognition of Forest Rights in Latin America: Progress and Shortcomings of Forest Tenure Reforms. *Society & Natural Resources* 25:556–571.
- Renard-Cassevitz F-M. 1993. Guerriers du sel, sauniers de la paix. *L'Homme* 126–128:25–43.
- RRI (Rights and Resources Initiative). 2018. *A global baseline of carbon storage in collective lands*. Washington DC: RRI.
- RRI. 2017. *Securing community land rights*. Washington DC: RRI.
- RRI. 2012. *What rights? A comparative analysis of developing countries' national legislation on Community and Indigenous Peoples' forest tenure rights*. Washington DC: RRI.
- Sarmiento Barletti JP. 2017. The rise of the egalitarian in post-war Peruvian Amazonia. In Virtanen P and Veber H, eds. *Indigenous perceptions and forms of leadership in Amazonia*. Boulder: UCP, pp. 45–64.
- Sarmiento Barletti JP, Begert B and Guerra Loza MA. 2021. Is the formalization of collective tenure rights supporting sustainable Indigenous livelihoods? Insights from *Comunidades Nativas* in the Peruvian Amazon. *International Journal of the Commons* 15(1):381–394. <https://doi.org/10.5334/ijc.1126>
- Schleicher J, Peres C, Amano T, Llactayo W and Leader-Williams N. 2017. Conservation performance of different conservation governance regimes in the Peruvian Amazon. *Scientific Reports* 7:1–10.
- Seymour F, La Vina T and Hite K. 2014. *Evidence linking community level tenure and forest condition*. San Francisco: CLUA.
- Stocks A. 2005. Too much for too few: Problems of Indigenous land rights in Latin America. *Annual Review of Anthropology* 34:85–104.
- Weiss G. 1975. *Campa cosmology*. New York: AMNH.
- Yeh E and Bryan J. 2015. Indigeneity. In Bryant R, ed. *The International Handbook of Political Ecology*. London: Elgar.



The CGIAR Research Program on Policies, Institutions, and Markets (PIM) leads action-oriented research to equip decisionmakers with the evidence required to develop food and agricultural policies that better serve the interests of poor producers and consumers, both men and women. PIM combines the resources of CGIAR centers and numerous international, regional, and national partners. The program is led by the International Food Policy Research Institute (IFPRI). [www.pim.cgiar.org](http://www.pim.cgiar.org)



This research was carried out by CIFOR as part of the CGIAR Research Program on Forests, Trees and Agroforestry (FTA). FTA is the world's largest research for development program to enhance the role of forests, trees and agroforestry in sustainable development and food security and to address climate change. CIFOR leads FTA in partnership with Bioversity International, CATIE, CIRAD, INBAR, ICRAF and TBI.

FTA's work is supported by the CGIAR Trust Fund: [cgiar.org/funders/](http://cgiar.org/funders/)



[cifor-icraf.org](http://cifor-icraf.org)

[cifor.org](http://cifor.org) | [worldagroforestry.org](http://worldagroforestry.org)

#### CIFOR-ICRAF

The Center for International Forestry Research (CIFOR) and World Agroforestry (ICRAF) envision a more equitable world where trees in all landscapes, from drylands to the humid tropics, enhance the environment and well-being for all. CIFOR and ICRAF are CGIAR Research Centers.

