

WORLD RESOURCES INSTITUTE

REPORT

Enhancing climate finance access for Indigenous peoples and local communities

Insights from payments for ecosystem services

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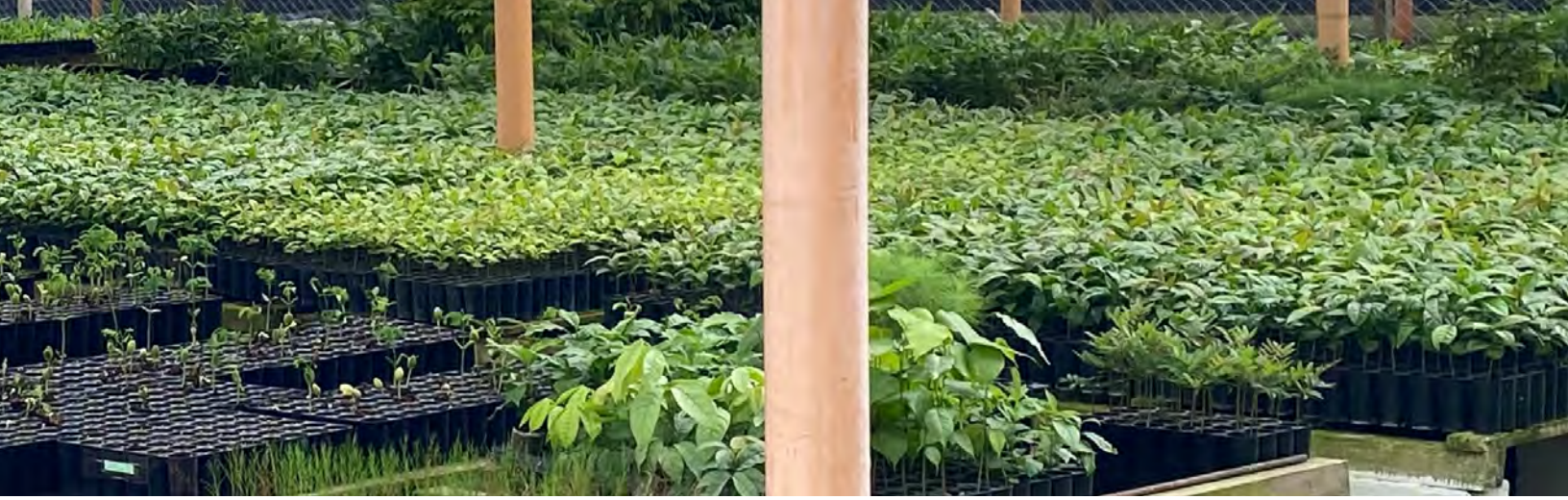
Finally, we dedicate this report to one of our coauthors, Manuel Cervera, who sadly passed away in September 2024, before the completion of this report. Manu had a keen intellect and warm spirit, and he was dedicated to helping ensure that the men and women of forest communities are always front and center in decision-making and the management of their lands and resources. He valiantly soldiered on with the research while undergoing intensive treatments. We are forever grateful to Manu for his contributions and will forever treasure the brief time we shared with him.

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Foreword

Nature plays a crucial role in sustaining over half of the global economy and is vital to addressing the climate crisis. Yet, those who protect nature—Indigenous peoples, Afro-descendants, and local communities—are rarely financially rewarded for their contributions. Their collectively held lands and resources provide more than US$1 trillion in ecosystem services. Yet, much of their land rights are not recognized or secure.

Despite their critical role in protecting forests and biodiversity, these communities are not given meaningful participation in decisions impacting them or benefits from climate solutions tied to their territories. Less than 1 percent of development assistance directed to forests, biodiversity, and climate between 2011 and 2020 went to supporting their role in forest management or securing their land tenure. In fact, they can bear disproportionate harm for certain climate solutions. Over a third of carbon offset projects have led to forcible removal, displacement, loss of livelihoods, and other negative impacts.

Payments for ecosystem services (PES) is an innovative financing mechanism to incentivize landowners to protect nature and, especially, to support those who are already doing it. This report uses PES as a lens to investigate how to make climate solutions more equitable for these communities—and therefore, more effective. Through a review of 129 PES programs across 36 countries, along with a deeper look at Guatemala's national PES program for smallholders and communities, this report identifies barriers that prevent these groups from participating effectively and accessing finance for their efforts.

This report outlines multi-tiered actions — from short and medium-term to systemic — to ensure communities gain rights, participation, and benefits. Poor recognition of customary land tenure systems persists as a structural barrier to equitable climate finance for communities, worsened by land encroachment from mining, logging, and commercial agriculture. Additionally, communities have historically lacked representation in national and international climate decision-making bodies that set climate goals and financing. PES processes often exclude communities through top-down, non-participatory approaches and exclusionary eligibility criteria.

However, there are some emerging practices we can learn from to promote more equitable outcomes. Guatemala's PES program for smallholders recognizes forms of customary land rights other than formal title. Guatemala also institutionalizes community representation in PES governance through membership in the executive board and lowers minimum land size requirements to allow smallholders to access PES.

Globally, there are also signs of progress. At the climate conference COP29, nations approved the greater inclusion of Indigenous representatives and experts in shaping carbon market processes under Article 6 of the Paris Agreement. At COP16 on biodiversity, Afro-descendant Peoples were formally recognized as a distinct group, ensuring they—along with Indigenous peoples and local communities—will have a seat at the table in future negotiations.

While all these developments are encouraging, much more needs to be done. We are still on an uphill journey to ensure that communities directly benefit from the climate solutions that depend on their lands and resources.



ANI DASGUPTA
President & CEO
World Resources Institute





Executive summary

This report examines how payments for ecosystem services (PES) programs have impacted Indigenous peoples and local communities (IPs and LCs), highlighting both their potential to deliver environmental and social benefits and the persistent barriers to equitable access and participation. Drawing on evidence from 129 PES programs and a case study of Guatemala's PINPEP program, this report examines how PES can be better designed and implemented to ensure more equitable finance flows to IPs and LCs, making climate solutions more just and effective.

HIGHLIGHTS

- Participation in payments for ecosystem services (PES) programs provides Indigenous peoples and local communities (IPs and LCs) with opportunities—as beneficiaries and in decision-making roles—to protect native ecosystems, strengthen their land tenure security, enhance territorial governance, build institutional capacity, enhance livelihood resilience, and invest in community development.
- However, direct payments to IPs and LCs are often insufficient to fairly compensate efforts or to improve well-being; some payments are as low as US$0.33 per household annually, and others cover less than 25 percent of opportunity costs.
- IPs and LCs also face manifold barriers to equitable access to PES finance, spanning macro-level structural and institutional issues (e.g., insecure tenure, power imbalances); community-level disparities; and challenges in PES design, implementation, and management that hinder meaningful participation and reinforce inequities.
- This report offers critical insights from the design and implementation of PES programs worldwide that can help enhance IPs' and LCs' access to climate and nature finance, particularly the increasing focus on carbon credits as a finance mechanism. It outlines a multitiered strategy that aligns cross-sectoral collaboration across scales, encompassing short-, medium-, and long-term actions to fundamentally transform the financing landscape while empowering community institutions and ensuring sufficient and equitable resource allocation.

Context

Each year, at least $1.16 trillion of value in ecosystem services (ES) is derived from lands that are managed by IPs and LCs, defined as groups that identify as Indigenous or members of a distinct local community with connections to land and natural resources through culture, access and use, governance and institutions, ecological knowledge, and so forth (Sangha 2020) (see Box 1 for a more detailed definition of IPs and LCs).

IPs and LCs play pivotal roles in safeguarding the provision of ES that underpin approximately 50 percent of the global gross domestic product (WEF 2020), such as regulating critical climate and water cycles and weather patterns as well as mitigating natural catastrophes such as severe storms, cyclones, and droughts (Ding et al. 2016). Despite their essential contributions, IPs and LCs have not been adequately included in, nor have they benefited from, international finance pledges that are developed for nature conservation and climate action. For example, a study of the state of donor funding for IPs and LCs found that between 2011 and 2020, less than 1 percent of the overseas development assistance (ODA) directed to forests, biodiversity, and climate went to support land tenure and forest management by IPs and LCs (RFN 2021). Of this already limited funding, only a small fraction was directly disbursed to Indigenous organizations. Instead, the majority was funneled through multilateral institutions, large international agencies, and nongovernmental organizations (NGOs), many of which allocate only minimal resources to IP and LC organizations.

IPs and LCs face several barriers to accessing international finance for nature and climate initiatives, including finance channeled through ODA and more direct mechanisms, such as PES and global donor funds (e.g., Green Climate Fund, Climate Investment Fund). These barriers range from structural and institutional challenges at national and global levels to local socioeconomic disparities and misalignment between program design and community realities. Additionally, IPs and LCs face hurdles to direct funding, including complex grant requirements and the perception that they lack the capacity to handle financial resources (Gabay 2023; Koop 2023).

Barriers must be removed so that IPs and LCs can meaningfully engage in climate actions as stewards of much of the world's remaining forests and biodiversity. It is particularly crucial that IPs and LCs have direct access to climate

finance related to forest conservation and natural resources management because such funding will become increasingly significant in achieving the goals of the Paris Agreement. Funding includes the already pledged $1.7 billion (2021–25) dedicated to advancing the forest tenure rights of IPs and LCs and recognizing their role as guardians of forests and nature and the $19.2 billion (2021–25) in public and private pledges for forest-related climate finance (COP26 Presidency 2021; Prime Minister's Office 2021).

This report aims to enhance direct access to climate and nature finance mechanisms by IPs and LCs and ensure they can participate effectively in their design and implementation. It focuses on leveraging the lessons from PES, a financing mechanism that involves compensating ES providers for sustainable land-use and management practices to ensure the provision of specified ES and functions, such as carbon sequestration, flood prevention, and biodiversity conservation (Wunder 2005).

Over the past two decades, PES has gained significant traction as an approach to directly incentivize IPs and LCs and other land managers for ecosystem conservation or restoration practices. By leveraging these insights, this report aims to enhance the effectiveness of global financing mechanisms like the proposed Tropical Forest Forever Facility, which seeks to channel hundreds of billions in results-based funding to protect standing forests on the territories of IPs and LCs.

This report seeks to answer three key questions:

- How and to what extent have IPs and LCs engaged in and benefited from existing PES programs, both in terms of monetary benefits via direct payments for ES provision and as nonmonetary benefits (e.g., improved tenure security, training opportunities, technology transfer, local capacity, infrastructure, etc.)?
- What barriers do IPs and LCs face in accessing PES programs and benefiting equitably in these programs?
- How may the barriers that prevent IPs and LCs from equitably participating in and benefiting from PES be addressed to increase their access to international finance—what are the pathways and actions, and which social actors and levels of governance are involved?

By addressing these questions, this report can shed light on practical actions—from local to international levels—to remove key barriers that prevent IPs and LCs from equitable and adequate access to PES funding opportunities. More broadly, the identified solutions could also benefit the rapidly changing climate finance landscape, including new pledges or mechanisms at the upcoming COP30 (the 30th Conference of the Parties to the United Nations Framework Convention on Climate Change [UNFCCC]) and beyond. They could also help emerging Indigenous-led territorial funds, such as the Mesoamerican Territorial Fund, the Nusantara Fund, and the Pawanka Fund, as well as other mechanisms and principles IPs and LCs have developed themselves to better attract, capture, direct, and govern funding for their objectives. Regardless of the form and sources of finance, these solutions require that different stakeholders work together to transform the international and national finance landscape and provide enabling conditions that allow IPs and LCs to gain increased access to growing climate finance.

About this report

This report builds on an extensive literature review of PES schemes to outline the key benefit pathways for IPs and LCs and highlight key barriers that prevent them from being involved and effectively engaged during the design and implementation of these programs. This in turn hinders their equitable finance access and benefit-sharing opportunity. The literature review covers 129 PES programs across a wide geography—44 programs from Central and South America, 38 from Asia, 33 from Africa, 8 from North America (7 from Mexico), and 6 from Oceania—over more than 25 years. These programs also encompass a broad and diverse range of IPs and LCs, representing various ethnic groups, cultures, and traditional land-use systems.

A conceptual framework was developed to systemically examine the programmatic and contextual barriers that hinder IPs' and LCs' equitable access to PES, followed by recommendations of specific actions from various international and national stakeholders to address these barriers. This is complemented by a case study of the national PES scheme in Guatemala, which illustrates both innovative PES design features that expand opportunities for IPs and LCs to access benefits and certain program features that can impede full benefits. While this report offers valuable insights, it acknowledges limitations, including the reliance on widely accessible literature, potential language and perspective biases, and the variability in the availability of systematic evaluations across PES programs.

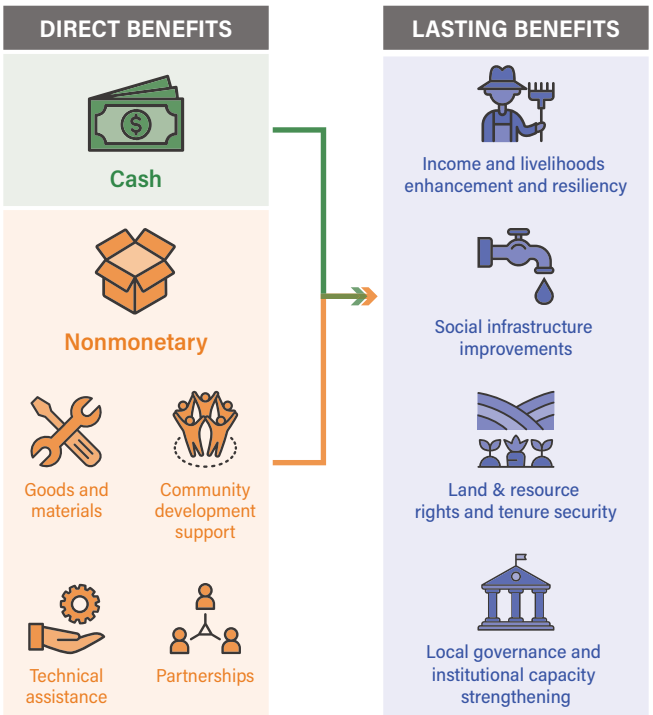
Key findings

Benefit pathways through PES

ES providers, including IPs and LCs, engage in PES transactions through individual, group, or communal contracts. Buyers of these services include government agencies, private companies, NGOs, and development organizations. Intermediaries, such as community-based organizations, play a vital role in facilitating these transactions and reducing associated costs.

PES programs provide IPs and LCs with two key types of benefits: direct cash payments and nonmonetary benefits, such as technical assistance, community development support, goods and materials, and strengthened partnerships (Figure ES-1). These benefits contribute to lasting benefits for IPs and LCs, including enhanced incomes and livelihoods, improved social infrastructure, strengthened land and resource tenure security, and improved local governance and institutional capacity.

FIGURE ES-1 | Overview of benefit pathways for IPs and LCs through PES based on a review of 129 programs across 36 countries



Source: WRI authors.

Many IPs and LCs participating in PES programs have reported that the payments they receive are insufficient to fairly compensate their efforts or improve their well-being. Some households received as little as $0.33 annually (Cavanagh et al. 2021), and many payments covered less than 25 percent of the opportunity costs (e.g., Hendrickson and Corbera 2015; McBurney et al. 2023; Tran et al. 2016). PES payment structures vary but are rarely based on opportunity costs or negotiated prices between ES providers and ES buyers. They are typically set in two main ways: either as a fixed proportion of the sale of the ES, such as carbon credits or water levies, or through assigned prices, often simplified to per hectare (ha) payments.

Despite being generally insufficient, PES cash payments can be critical sources of funding for Indigenous governance institutions, particularly in instances where other revenue streams are lacking, impermanent, or inflexible to pursue their own objectives. These payments support institutional capacity by financing governance activities, legal services, and organizational investments; strengthening leadership, negotiation, and management capabilities; and enabling communities to secure additional resources and protect their territories (e.g., Ingram et al. 2014; Molina-Murillo et al. 2014). PES payments also ease pressures for households within communities, reducing motivations to sell or decollectivize land (Davis and Goldman 2019; Liu et al. 2018).

PES can formalize communities' authority over territories by clarifying land rights, strengthening governance, and recognizing traditional land-use systems (e.g., Jones et al. 2020b; Liu et al. 2018; Upton 2020). PES programs enhance tenure security by codifying the role of IPs and LCs as landowners and stewards; incentivize capacity-building through land-use rule enforcement, monitoring, and financial management systems (Hayes et al. 2015; 2017; Ingram et al. 2014; Nieratka et al. 2015); and provide technical assistance to enhance these capacities (e.g., Biryahwaho et al. 2012; Denham 2023; Pasha et al. 2012). PES can also foster cooperation among neighboring communities by aligning territorial goals and incentivizing conflict resolution, enhancing their collective bargaining power with external stakeholders (Denham 2023; Nieratka et al. 2015). Furthermore, several PES programs have collaborated with communities to support land titling and the formal recognition of customary



rights to strengthen the authority of IPs and LCs, enhance enforcement capabilities, and ensure long-term sustainability and participation (e.g., Brown et al. 2011; Rambert and Sardonis 2023).

Participation in PES creates direct livelihood impacts through cash payments that diversify and stabilize funding sources and indirectly affects incomes through increased access to resources, technical assistance, and benefits stemming from improved agricultural productivity and alternative livelihood opportunities (Blundo-Canto et al. 2018). Ecosystem improvements leading to increased agricultural and livestock yield, productivity, and profitability are often found to surpass the value of PES payments over time (Davis and Goldman 2019; Grima et al. 2016; Kwayu et al. 2017; Shames et al. 2016). Technical assistance and extension services on sustainable practices increase the likelihood of successful adoption and positive impacts (e.g., Aganyira et al. 2020; Jack and Cardona Santos 2017; Waruingi et al. 2021), and goods and materials reduce the risk borne by IPs and LCs in shifting livelihood activities (e.g., Montoya-Zumaeta et al. 2021). However, continued payments are essential to support communities until the full benefits of sustainable practices, like reduced input costs, are realized (He 2020).

PES payments can also enable communities to invest in income diversification and sustainable livelihoods—such as agroforestry, nontimber forest products extraction, and traditional practices—or expand opportunities previously unavailable to specific social groups, such as women (e.g., Wylie et al. 2016; Zwick 2019). Both cash and nonmonetary benefits have supported social infrastructure improvements in education, health, and physical infrastructure (e.g., Izquierdo-Tort 2020; Kairo et al. 2018; Molina-Murillo et al. 2014).

Barriers to equitable participation, benefit-sharing, and finance access for IPs and LCs

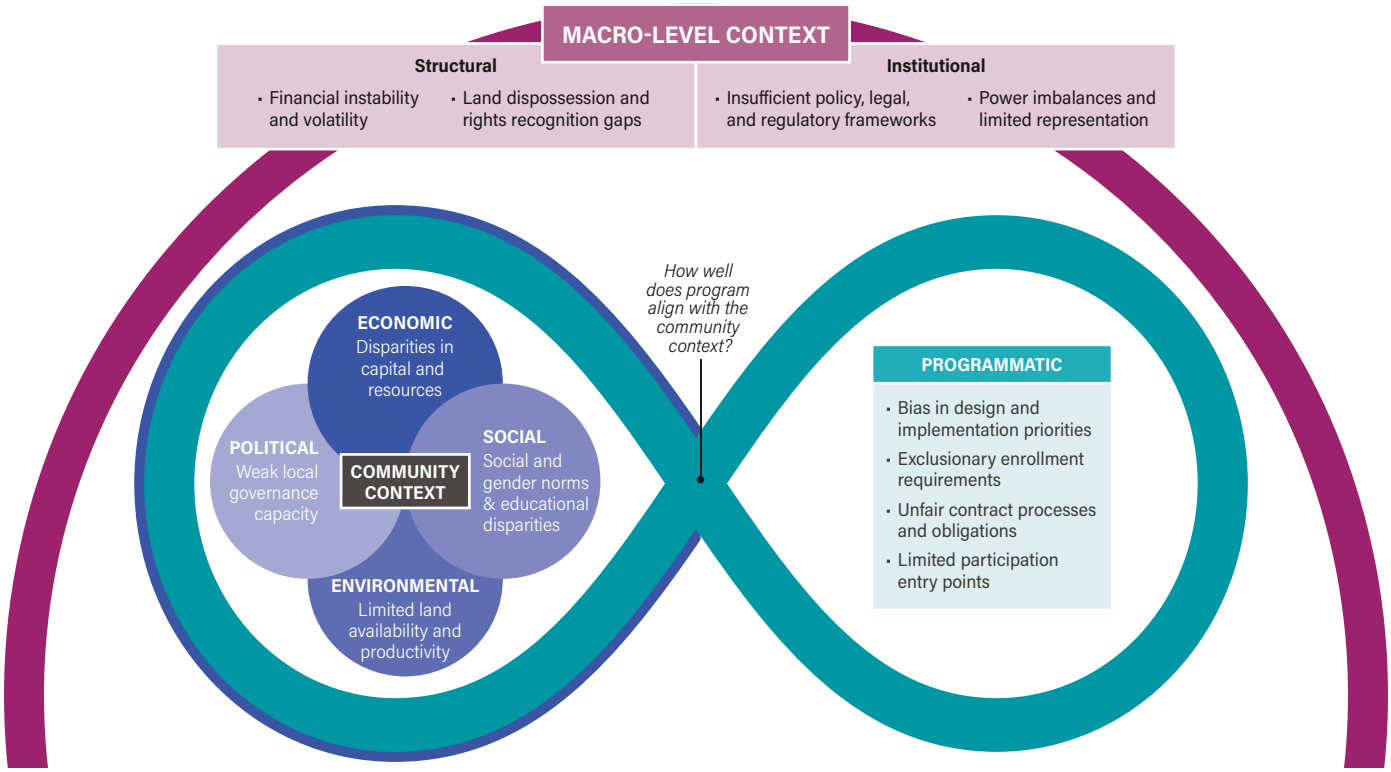
IPs and LCs face interlinked and reinforcing barriers stemming from broader structural and institutional constraints at the macro level, local community-level conditions, and programmatic challenges in PES program design and execution (Figure ES-2). These barriers are multifaceted, influencing one another and collectively hindering IPs and LCs from fully engaging in and benefiting from PES programs.

Macro-level contextual barriers

PES programs often rely on external funding from governments, donors, and international markets, creating mismatches between service providers and buyers and reinforcing power imbalances. These programs are vulnerable to financial instability as shifting priorities from governments, donors, and markets disrupt funding, leading to delays in payments and undermining program objectives (e.g., McBurney et al. 2023; Miles 2021; Perevochtchikova et al. 2021). This instability limits cash and nonmonetary benefits, erodes trust, and threatens the long-term sustainability of PES programs (Etchart et al. 2020; Guerra 2016; Trench et al. 2018).

Historical land dispossession and division continue to shape the recognition and formalization of land and resource rights, affecting PES access and benefit distribution. This is further exacerbated by the lack of recognition for customary tenure systems and resource rights, such as those for water and carbon sequestration (e.g., Karpowicz et al. 2024; Rakotomahazo et al. 2023; Ramírez-Cover 2017; Wylie et al. 2016). Insecure land tenure, compounded by ongoing encroachment, exacerbates mistrust of external

FIGURE ES-2 | Overview of contextual and programmatic barriers to equitable participation and benefit-sharing for IPs and LCs in PES, based on a review of 129 programs across 36 countries



Source: WRI authors.

actors and PES schemes, deterring participation and benefit-sharing (e.g., Aganyira et al. 2020; Bauchet et al. 2020; Etchart et al. 2020).

Power imbalances and limited representation of IPs and LCs in influential national and international decision-making levels, combined with significant disparities in bargaining power and access to information, hinder their ability to assert their interests and shape financing and PES priorities (Aguilar-Støen 2015; Rodríguez de Francisco and Boelens 2014; vonHedemann 2020). Additionally, restricted civic space in some regions further curtails opportunities for meaningful participation and undermines the inclusion of local knowledge (KimDung et al. 2016).

Regulatory complexity, including inconsistencies, overlapping laws, poor institutional coordination, and unclear legal frameworks, increases transaction costs and risks, hindering access to resources through PES (e.g., Fauzi and Anna 2013; Kim et al. 2016, 2018). Lack of political will and clear policies on property rights and benefit-sharing also prevent IPs and LCs from accessing markets, as seen in Canada, Madagascar, and Vietnam (Nguyen et al. 2023; Rakotomahazo et al. 2023; Smith et al. 2019).

Community-level contextual barriers

At the community level, IPs and LCs face barriers to effective PES participation due to economic, social, environmental, and governance disparities:

- Economic inequalities, such as limited capital or land resources, can hinder enrollment and benefit-sharing because those with diversified livelihoods and greater capital assets perceive less risk and are better able to handle the costs in shifting livelihoods (e.g., Beauchamp et al. 2018; Jones et al. 2020a; Resosudarmo et al. 2014).
- Social norms, including gender biases regarding land use and decision-making, and educational gaps can restrict equitable participation within communities and perpetuate power imbalances (e.g., Haas et al. 2019; Izquierdo-Tort et al. 2021; Kariuki et al. 2018; Martin et al. 2014b).

- Environmental challenges, like resource scarcity, can hinder participation (e.g., Kwayu et al. 2017; Pham et al. 2023; Shames et al. 2016).
- Weak community governance and risks of elite capture can erode trust, limit inclusivity, and exacerbate internal inequalities or conflicts, resulting in outcomes less likely to be perceived as fair or equitable (e.g., Costedoat et al. 2016; Hayes and Murtinho 2018; Jones et al. 2018).

Programmatic barriers

The equitable involvement of IPs and LCs is hindered by limited entry points for participation in PES program decision-making. Most programs follow top-down structures and communities are rarely engaged in shaping program design, making them poorly suited to succeed in community contexts and lacking genuine free, prior, and informed consent (FPIC) throughout the project lifespan (Bremer et al. 2023; Montero-de-Oliveira et al. 2023; Smith et al. 2019). Relying on community institutions and local leaders for PES decisions, especially when community structures are not inclusive or well understood, creates challenges related to information gaps, governance dynamics, and fair representation of all community members' interests, which can exacerbate power imbalances, enable elite capture, and undermine transparency and equitable participation (e.g., Hayes et al. 2017; Lapeyre et al. 2015; Milne and Adams 2012).

Exclusionary enrollment requirements, such as formal land tenure or land size thresholds, disproportionately benefit wealthier landowners and marginalize women, youth, and those relying on customary tenure systems (e.g., Kariuki et al. 2018; Shames et al. 2016; Tran et al. 2016). By prioritizing formal landownership, some PES programs risk facilitating land privatization, displacing customary communities, and undermining traditional systems of collective land management (Corbera et al. 2020; Kaiser et al. 2023; Nuñez Godoy and Pienaar 2023).

PES contracts often place disproportionate risks on IPs and LCs as ES providers, reflecting power imbalances that disadvantage them relative to ES buyers. Contract terms are frequently nonnegotiable, with payment structures favoring buyers' willingness to pay rather than addressing the opportunity costs or needs of providers and may fail to guarantee payments or ensure buyer compliance (e.g., Mangubhai and Lumelume 2019; Thompson 2019). Complex application processes and technical requirements increase costs and dependency on intermediaries, while non-Indigenous languages and technical jargon in contracts hinder transparency, informed consent, and equitable participation for communities with limited literacy or PES experience (e.g., Garcia et al. 2021; Lee 2017; Lee et al. 2016).

Biases in the design and implementation priorities of PES programs can lead to inequitable outcomes by prioritizing short-term success, administrative simplicity, and low-cost solutions over long-term sustainability and local context. The pressure to demonstrate quick results to secure funding often skews project selection toward areas with low conservation threats, which can exclude high-risk areas or communities in need of additional support (e.g., Giudice et al. 2019; Hanna et al. 2018; Thompson et al. 2023). This focus on administrative ease can also result in lack of baseline analyses, simplified land classifications, and generalized payment schemes that overlook local land-use practices and the varying needs of different community groups, exacerbating inequalities (e.g., Chu et al. 2019; Lliso et al. 2021; Milne and Adams 2012). Program designs that emphasize land-use restrictions without offering viable alternative livelihoods can increase income insecurity, deepen community conflicts, and erode trust (e.g., Corbera et al. 2020; Kaiser et al. 2023). Other times, top-down approaches that prioritize economic growth and short-term results risk undermining Indigenous knowledge systems, conservation practices, and community resilience (Ravikumar et al. 2023).

Program designs that emphasize land-use restrictions without offering viable alternative livelihoods can increase income insecurity, deepen community conflicts, and erode trust.

IPs and LCs seeking PES funds through voluntary carbon markets face heightened barriers driven by legal uncertainties, high technical requirements, and volatile demand and prices (e.g., Alvarez et al. 2016; Balmford et al. 2023; Yu et al. 2022). These challenges are compounded by administrative complexities that can result in prioritizing efficiency over local needs, undermining community involvement and decision-making (e.g., Aganyira et al. 2020; Osborne and Shapiro-Garza 2018).



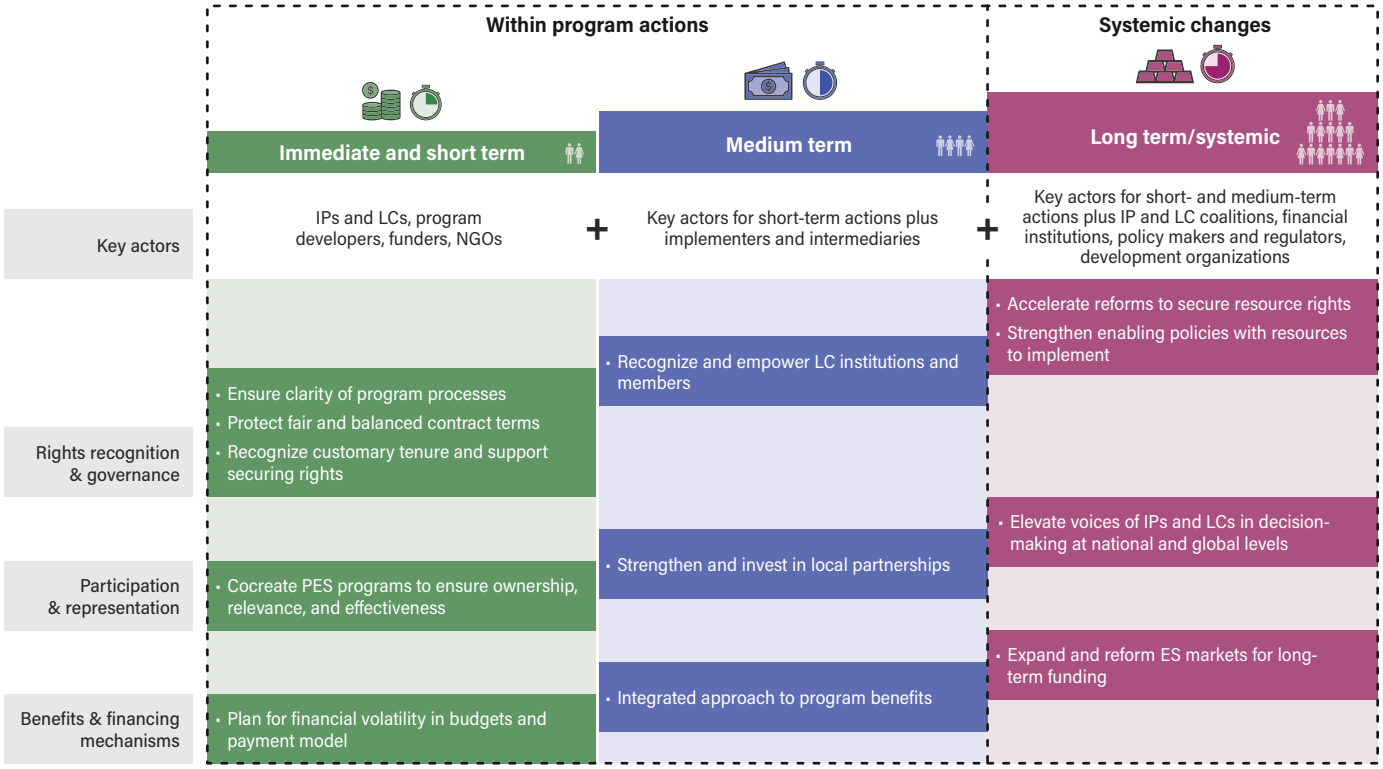
Case study

Guatemala's Forestry Incentive Program for Owners of Small Landholdings Used for Forestry or Agroforestry (Programa de Incentivos Forestales para Poseedores de Pequeñas Extensiones de Tierra de Vocación Forestal o Agroforestal; PINPEP) demonstrates how social mobilization by IPs and LCs and smallholders, with key support from intermediaries, can create a PES program that addresses common barriers regarding land tenure and participation in program decision-making. Targeting IPs and smallholders who were excluded from the country's inaugural PES program that had restrictive landownership and land size requirements, PINPEP facilitated access to PES by replacing formal land title requirements (typical in most PES programs) with certified proof of customary possession issued free of charge by the municipal government and by stipulating a reduced land size requirement of 0.1 ha for enrollment. PINPEP also created a mechanism for IPs and LCs to have a voice in PES implementation. It established a national network of PINPEP beneficiary communities through which an elected representative of the network serves as one of three members of the steering committee charged with managing PINPEP implementation. Additionally, PINPEP promoted gender equity as an explicit objective and prioritized women's groups in training and extension services. However, PINPEP has limitations that impede full benefits for IPs and LCs, including low government budget allocations and funding and capacity gaps in the National Forest Institute, the agency administering the program.

Call to action: A multitiered approach to enhancing equitable participation and benefit-sharing of IPs and LCs and supporting program impact

In general, actions should focus on improving three interlinked areas: rights recognition and governance, participation and representation, and benefits and financing mechanisms. Figure ES-3 provides an overview of different actions across stakeholders to address programmatic, community, and macro-level barriers. Transforming the financing landscape requires different actions in the short, medium, and long terms to tackle these barriers, from immediate improvements to lasting change.

FIGURE ES-3 | Overview of actions and stakeholders to address barriers and enhance PES program impact at all levels



Notes: IP = Indigenous people; LC = local community; NGO = nongovernmental organization; PES = payments for ecosystem services.
Source: WRI authors.

Improve rights recognition and governance

In the short term, IPs and LCs, funders, and program developers can undertake several actions to mitigate programmatic barriers. These include the following:

- Make PES program processes transparent and accessible to all community members by ensuring that all community members have access to PES information in an understandable format, with clear communication of rules and processes to support informed decision-making and active participation.
- Ensure and protect fair and balanced contract terms for IPs and LCs in PES by including clear and enforceable provisions on all actors' obligations in the contracts to promote equitable rights and responsibilities. These provisions should define payment schedules, establish penalties for delayed or nonpayment, outline dispute resolution mechanisms, specify conditions for termination or withdrawal, and ensure the FPIC of IPs and LCs.
- Recognize customary land tenure in program design to ensure IPs and LCs are not excluded due to lack of formal titles, as demonstrated by the successful integration of customary tenure in programs such as PINPEP in Guatemala, the Kenya Agricultural Carbon Project (KACP) in Kenya, and the Rewarding Upland Poor for Environmental Services in Southeast Asia.
- Support communities in securing their tenure rights, where feasible, as seen in Kenya's Mikoko Pamoja and Tanzania's Simanjiro Grazing and Conservation Easement PES programs.

In the medium term, efforts can focus on addressing barriers in the local context, such as recognizing and empowering local community institutions and members:

- When community institutions have strong governance and organizational capacity, PES design can leverage existing structures to enhance participation, self-

monitoring, adaptability, and local decision-making that promotes greater local satisfaction and improves program success (e.g., Costedoat et al. 2016; Hayes and Murtinho 2018; Murugan and Israel 2017).

- In communities with weak governance, PES programs can focus on strengthening local institutions and building capacity while also implementing safeguards to prevent elite capture and to ensure inclusive decision-making (Clements et al. 2010; Lliso et al. 2020; Martin et al. 2014b).

To promote systemic change, efforts should address structural barriers beyond PES programs, requiring a systems approach with time, resources, and coordination across all stakeholder levels, including governments, regulators, market developers, and IP and LC coalitions. While a significant investment, systemic reforms are critical to fully address the root causes perpetuating all barrier levels in PES. Some of the long-term efforts may include the following:

- Accelerate legal reforms to recognize, secure, and enforce the land rights of IPs and LCs, focusing on both formal and customary land rights. This includes strengthening and enforcing legal frameworks to ensure the recognition of customary land tenure systems, investing in mapping and titling efforts, and fostering political will and allocating resources for effective implementation.
- Strengthen regulatory, legal, and policy frameworks at all levels to enhance direct access to PES by IPs and LCs and ensure equitable benefit-sharing. These frameworks should reduce power imbalances between IPs, LCs, and ES buyers; clarify the resource rights of IPs and LCs; and promote coherent coordination across sectors (water, forests, carbon) to reduce conflicts. Governments should lead efforts to create inclusive frameworks, align sectoral regulations, and define clear roles and responsibilities to ensure effective implementation and enforcement, considering the perspectives and needs of IPs and LCs.

Increase participation and representation

In the short term, efforts should prioritize cocreation with IPs and LCs from the design phase to ensure program ownership, relevance, and effectiveness. This can be done by engaging IPs and LCs in the design phase to foster local legitimacy, build trust, and align PES activities with the capacities and needs of the community and embed local knowledge that supports program success (Bremer et al. 2023; Ezzine-de-Blas et al. 2019; Rakotomahazo et al. 2019; Wylie et al. 2016). Additionally, PES program developers should assess how program design and community institutions may unintentionally create barriers to participation and, by adopting intersectional approaches, address how factors such as gender, age, race, and migratory status affect marginalized groups' engagement and benefits. Ensuring the meaningful inclusion of these groups early in the design and decision-making process is critical to identify the types and levels of benefits that not only ensure more direct access to funding but also elevate program outcomes by rewarding those delivering ES. Incorporating community knowledge and values through cocreation can unlock more cost-effective solutions by aligning with locally relevant resource management practices and landscape-specific solutions; this can promote greater participation and lead to both better outcomes for IPs and LCs and toward the achievement of environmental objectives (Ren et al. 2020; Silva-Muller 2022; Weaver and Roughan 2024).

In the medium term, project implementers and intermediaries need to invest in and strengthen local partnerships. This requires shifting the perspective of PES from a short-term transaction to a long-term investment that prioritizes trust and relationship building among actors while reflecting the needs and capacities of IPs and LCs. Additionally, it calls for leveraging and strengthening support from intermediaries with established long-term relationships of trust with IPs and LCs and possess a deep understanding of the local context.

To promote systemic change, efforts must focus on elevating the voices of IPs and LCs in decision-making at subnational, national, and global levels. This includes advancing their role in high-level agenda setting and climate finance decisions beyond specific PES programs, ensuring their voices are integral to international environmental agreements (e.g., UNFCCC, Convention on Biological Diversity). Crucially, support should not only elevate IPs and LCs—by empowering existing coalitions and supporting new ones—but also strengthen their coordination with other stakeholders, including governments, development organizations, and private sector actors. This collaborative approach ensures that IPs and LCs can contribute effectively within a broader, concerted effort to address barriers and drive transformative, long-term solutions.



Improve benefit-sharing and financing mechanisms

In the short term, actions should focus on developing a plan for financial volatility in budgets and payment models. For instance, program developers can improve payments by addressing financial volatility, such as negotiating long-term agreements for guaranteed carbon credit purchases, as seen in the KACP; expanding PES to multiple services to hedge against market fluctuations; or mixed-funding approaches that position PES efforts within complementary priorities. Additionally, benefits can be enhanced through nonmonetary benefits, such as technical assistance, seeds, and small livestock, to improve livelihoods and mitigate risks from payment delays and financial volatility.

In the medium term, program developers can apply an integrated approach to improve PES implementation and benefit-sharing. This can involve building local capacities through a package approach of monetary and nonmonetary benefits—especially in areas where communities and community members lack capital or alternative livelihoods—to reduce barriers to participation and enhance program effectiveness. Such benefits should be integrated as part of the overall program costs as components for program success. In some cases, blended finance approaches can enhance funding opportunities to fund these benefits.

To promote systemic change, governments, market regulators, and financial institutions can support efforts to expand and reform ES markets to ensure long-term financial resources, diversify financial flows, enhance stability, and improve direct access to markets for IPs and LCs. While ES markets offer appealing opportunities to unlock additional funding opportunities for IPs and LCs (Pollination 2023), they are still emerging and require further research on the following areas:

- Growing and emerging ES markets such as the biodiversity credit market that unlock additional funding opportunities for IPs and LCs
- Leveraging technology to increase IPs' and LCs' direct access to funds
- Greater incorporation of the voices of IPs and LCs in research





Introduction

IPs and LCs manage lands that generate over US$1 trillion of value in ecosystem services, yet are rarely financially rewarded for their stewardship. This section highlights the critical finance gap they face, positioning payments for ecosystem services (PES) as a key mechanism to address this gap. But while PES has gained traction as a climate finance tool, IPs and LCs continue to encounter significant barriers to access and benefit. This section details the key questions asked in this report to unpack PES benefit pathways for IPs and LCs, the barriers they continue to face, and the actions and actors involved to address the barriers.



Indigenous peoples and local communities (IPs and LCs) (see Box 1 for definitions) own or manage at least 50 percent of the world's land that harbors much of the world's forests and biodiversity, including about 40 percent of protected areas (RRI 2021). Each year, it is estimated that at least US$1.16 trillion of value in ecosystem services (ES) is derived from IP lands (Sangha 2020).[1] This estimate covers four types of economically valued ES services in terrestrial landscapes (tropical forests, woodlands, grassland): carbon sequestration, air and water regulation, and biocontrol. This estimate is conservative because it does not cover other landscapes, such as coastal and marine, nor lands managed by LCs. It also does not account for other ES, such as the underlying processes and services that enable other ES to exist (e.g., nutrient cycling, soil formation) or nonmaterial ES (e.g., cultural and spiritual services, recreational value) (Sangha 2020).

Despite the pivotal roles they play in ensuring ES provision, as well as forest conservation and climate action, IPs and LCs have not participated in nor benefited meaningfully from international nature and climate finance pledges. For example, a study of the state of donor funding for IPs and LCs found that between 2011 and 2020, less than 1 percent of official development assistance (ODA) directed to forests, biodiversity, and climate went to support land tenure and forest management by IPs and LCs (RFN 2021). Moreover, of this total donor funding disbursed for land tenure and forest management, only a small fraction was disbursed directly to IP and LC organizations. Most of the funds were channeled through multilateral institutions or part of large programs managed by large international nongovernmental organizations (NGOs), UN agencies, and consulting companies, some of which disburse limited funding to IP and LC organizations.

In practice, IPs and LCs face several barriers to accessing international finance for nature and climate initiatives, whether the finance is channeled through ODA or more direct mechanisms such as payments for ecosystem services (PES) and global donor funds (e.g., Green Climate Fund, Climate Investment Fund). Some of the hurdles include complex grant requirements set up by donors or intermediary organizations, lack of legal identity by IP and LC groups, national restrictions against the movement of funds, and a perception that IPs and LCs are unable to handle the funds (Gabay 2023; Koop 2023).[2] Without effectively addressing these and other barriers detailed in this report, it is doubtful

BOX 1 | Who are Indigenous peoples and local communities?

Indigenous peoples (IPs) are culturally distinct groups who self-identify as Indigenous, asserting their rights and self-determination as stewards of their resources, environments, and territories. They possess deep ancestral ties to collectively owned lands, along with unique languages, knowledge systems, beliefs, and livelihood practices rooted in precolonial and presettler histories. As asserted by the United Nations Permanent Forum on Indigenous Issues (UNPFII), various terms can describe these groups, which collectively number 370–470 million people and speak over 4,000 languages worldwide. Their governance structures often contrast with those of nation-states, reflecting their historical marginalization and the importance of their cultural identity. IPs have distinct and differentiated rights embodied in international instruments, including the International Labour Organization's Indigenous and Tribal Peoples Convention, 1989 (No. 169), the United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP), and mechanisms such as the UNPFII, the Expert Mechanism on the Rights of Indigenous Peoples, and the Special Rapporteur on the Rights of Indigenous Peoples.

Local communities (LCs) are groups that manage and utilize lands and resources collectively, without necessarily identifying as Indigenous. These communities reside in particular geographic regions and possess a shared identity along with common interests in local resources or livelihood strategies (e.g., riverine communities, artisanal fishers or fisherfolk, pastoralists, seasonal nontimber forest product collectors, small-scale or family farmers, and others). Their legitimacy and rights to these resources are based on traditional usage, territorial connections, and established common property agreements or negotiated rules. Their customary rights primarily arise from their practical role as resource managers, often in the absence of recognized state institutions. While social movements for LCs tend to be diverse and tailored to the specific cultural, geographic, and social contexts of the communities they represent, their rights are recognized under international instruments, including the United Nations Declaration on the Rights of Peasants and Other People Working in Rural Areas; the Voluntary Guidelines on the Responsible Governance of Tenure of Land, Fisheries and Forests in the Context of National Food Security; and the Voluntary Guidelines for Securing Sustainable Small-Scale Fisheries in the Context of Food Security and Poverty Eradication.

Acknowledging the distinctions between IPs and LCs is essential for recognizing their unique rights, identities, and relationships with their environments. These differences also have implications for their engagement in payments for ecosystem services (PES) programs. Although IPs often have specific legal rights to land and self-determination, governments and institutions often fail to enforce these rights, creating additional barriers to securing tenure rights and participating effectively in decision-making processes. LCs, though similarly managing land and resources, may have different governance structures and relationships with state institutions because their social movements are diverse and specific to the context, which can affect their ability to access PES benefits. To reflect this understanding, this report uses the phrase *IPs and LCs*, but it is not intended to conflate IPs with LCs, denote homogeneity across the groups, or deny diversity or IPs' specific rights to self-determination.

Additionally, the term *LCs* is sometimes used to include Afro-descendant peoples, or peoples of African descent in the Americas representing diverse histories and experiences and who self-identify as such. Afro-descendants live in collective communities embodying traditional lifestyles with shared knowledge and connection with their lands. They should be recognized as a distinct category or differentiated local communities with special rights to their lands, cultural traditions, languages, and lifeways.[a] However, for purposes of this report, the authors are unable to make a distinction given that the current literature on PES generally does not distinguish between Afro-descendants and LCs. That said, the findings and recommendations are applicable to all groups.

Sources: Larson et al. 2022; UN 2007; UN Office of the High Commissioner on Human Rights n.d.; a. Athayde et al. 2021; CBD COP16 2024.

that IPs and LCs will see improved access to finance, even with the growing number of initiatives aimed at providing direct funding to them.

Global financial flows toward nature and climate that are strategically significant for IPs and LCs are expected to ramp up in the coming years as the international community pushes to meet the goals of the Paris Agreement. For instance, at COP26 (the 26th Conference of the Parties to the United Nations Framework Convention on Climate Change [UNFCCC]) 22 governments and private funders pledged $1.7 billion (for the period 2021–25) to advance the forest tenure rights of IPs and LCs and provide greater recognition and reward for their role as guardians of forests and nature (Prime Minister's Office 2021). A further $19.2 billion (for the same period) in public and private funding was pledged for forest-related climate finance, the biggest step forward in a generation in protecting the world's forests (Prime Minister's Office 2021).

Funding consortiums have also been established, such as Forest, People, Climate in 2022, a collaborative of philanthropy, civil society, and community-based organizations (CBOs) aimed at mobilizing funding to support IPs and LCs, halt tropical deforestation, and protect forests (FPC n.d.). At COP29 (2024), although no specific forest-related financial pledges were made by countries, climate finance to developing countries was increased overall (from $100 billion to $300 billion annually). Countries also enacted rules for the operationalization of international carbon markets under Article 6 of the Paris Agreement, including mandatory safeguards such as requiring the explicit informed consent of IPs and LCs before any carbon PES projects in their lands can proceed (UN Climate Change 2024).

Against this backdrop, this report aims to help IPs and LCs gain better access to direct finance and effectively engage in newly pledged nature and climate finance. The focus will be on PES, which is a climate finance mechanism that has gained significant traction during the past two decades as an approach to directly incentivize IPs, LCs, and other land managers for ecosystem conservation or restoration practices. Since the launch of the first national PES program in Costa Rica in 1997, PES programs have been scaled up globally with over 550 active PES programs in both developed and developing countries, and $36–$42 billion in annual transactions (Salzman et al. 2018). PES involves compensating ES providers for practicing sustainable land use and management that ensures the provision of specified ES and functions, such as carbon sequestration, flood mitigation, watershed protection, and biodiversity conservation, among others (Wunder 2005).

Building on a global literature review and a case study of PES implementation in Guatemala, this report contributes to address three key questions:

- How and to what extent have IPs and LCs engaged in and benefited from existing PES programs, both in terms of monetary benefits via direct PES provision as well as nonmonetary benefits (such as improved tenure security, training opportunity, technology transfer, local capacity, infrastructure, etc.)?
- What barriers do IPs and LCs face in accessing PES programs and benefiting equitably from these programs?
- How may the barriers that prevent IPs and LCs from equitably participating in and benefiting from PES be addressed to increase their access to international finance—what are the pathways and actions, and which social actors and levels of governance are involved?

The focus will be on PES, which is a climate finance mechanism that has gained significant traction during the past two decades as an approach to directly incentivize IPs, LCs, and other land managers for ecosystem conservation or restoration practices.



Lessons learned from existing PES programs worldwide—on program design, funding disbursement processes, incentive design, and IP and LC engagement—can inform the design of incentives-based financing mechanisms in the future and improve equitable finance access and benefit-sharing for IPs and LCs. These lessons may also benefit existing climate finance mechanisms tailored to IPs and LCs, such as the Dedicated Grant Mechanism for Indigenous Peoples and Local Communities and the Amazon Fund, both of which support the large-scale, global PES initiative led by the UNFCCC for reducing emissions from deforestation and forest degradation (REDD+) (Sauls 2020).

Importantly, the findings and lessons from this research can support IPs and LCs in their advocacy for greater access, representation, participation, and equitable outcomes in PES, REDD+, and similar incentives or results-based climate finance mechanisms. Given their role as stewards and primary managers of much of the world's forests and biodiversity, as well as their cultural connection and dependence on forests for livelihoods and well-being, IPs and LCs deserve direct access to climate finance to help them continue their efforts and increase the effectiveness of climate action (Sauls 2020). This report provides a detailed analysis of the challenges and opportunities for IPs and LCs within PES programs. It begins by exploring the evolution of PES and its engagement with IPs and LCs, followed by an overview of the benefits received by IPs and LCs, including income enhancement, land tenure security, and strengthened governance. The report then presents a conceptual framework for analyzing benefit-sharing pathways, using it to identify key barriers to equitable participation and benefit distribution. Finally, the report offers a call to action to the key stakeholders in PES: the international donor community, governments, and civil society. It provides actionable recommendations for short-, medium-, and long-term actions to address systemic barriers at different levels faced by IPs and LCs. It also highlights areas for future research to enhance the involvement of IPs and LCs in climate and nature finance.





Research methods

This section outlines the qualitative research methods, including a narrative literature review and a case study, used to examine PES implementation and identify key barriers limiting benefits to IPs and LCs, along with interventions to address these barriers. The review draws on over two decades of PES research, to develop a conceptual framework to analyze programs and draw on lessons from 129 programs across 36 countries. A case study of Guatemala's PINPEP program provide additional insights.



Literature review and analysis

The report uses qualitative research methods of literature review and highlights specific examples that illustrate the key barriers and enablers for IPs and LCs to benefit from PES. This literature review draws on an expansive body of research from over two decades of PES implementation. It examines the evolution of PES implementation and leverages existing analyses to identify the key barriers limiting benefits to IPs and LCs as well as targeted interventions to address the barriers.

This report adopts a global focus to reflect the shared challenges faced by IPs and LCs, incorporating literature on PES programs from both the Global South and Global North. Given that the majority of PES programs that reach IPs and LCs are in the Global South, the reviewed literature predominantly pertains to programs in this region, where the most substantial body of research and implementation exists. As a result, the sample of reviewed literature and relevant PES programs from the Global North is smaller, reflecting the more limited number of such programs reaching IPs and LCs in those contexts. However, the inclusion of relevant programs from the Global North, though limited, provides valuable lessons, particularly around Indigenous rights and governance practices.

This report examines PES as a financing mechanism to channel resources to IPs and LCs. PES is often integrated into other programs, such as REDD+ initiatives, to provide financial incentives for conservation and sustainable land management. While REDD+ has distinct institutional structures and policy objectives, this report does not address those aspects. Instead, it focuses specifically on PES, drawing lessons from REDD+ projects only when directly relevant to PES implementation for IPs and LCs.

A narrative literature review was chosen for this report because it provides a flexible and comprehensive approach to synthesizing insights from a large and diverse body of literature, making it well suited to capture the complexity and evolving nature of IPs' and LCs' participation and benefit-sharing across various PES programs. This section summarizes the research methods used for this report. A full description of the extended literature review methodology is provided in Appendix A.

Search strategy

The literature search primarily utilized Google Scholar and Google Search, prioritizing peer-reviewed journal articles that provide in-depth insights into PES programs and gray literature from NGOs, PES developers, and research institutions to provide additional context and program information.

The search was conducted primarily in English, with supplementary searches in Spanish to capture the extensive implementation of PES in Latin America. A diverse set of terms for both PES and IPs and LCs was used to reflect the evolving terminology for PES initiatives and the diversity of IPs and LCs involved over the years. The resulting set of search terms, detailed in Table A-1 in Appendix A, spans diverse contexts and time periods.

The search focused primarily on documents published between 2014 and 2024 to capture the most recent information and analyses of the participation and benefit-sharing of IPs and LCs in PES programs. However, older literature was included if deemed relevant; several key references from before 2014 were included, as reflected in the citations. The snowball method was used to identify further references and key article citations, including influential studies from earlier periods, broadening the search coverage. This approach ensured a comprehensive review while maintaining an emphasis on the most recent research, particularly as recent literature has increasingly focused on community inclusion in PES programs. This approach resulted in an extensive pool of over 650 peer-reviewed articles and gray literature.

Literature coding and selection

Titles and abstracts of the compiled documents were rapidly screened to narrow down the literature for in-depth review. The selection criteria for the literature coding and selection process included the following:

- Focus on barriers and enabling conditions for IPs and LCs to participate in and benefit from PES
- Varied representation of PES program attributes and geographies

Documents were methodically analyzed and coded by their bibliographic information, PES program attributes, and the study's specific methodology and findings as available, which were recorded in an Excel spreadsheet. Table A-2 in Appendix A details the coding and categorization of the PES programs reviewed.

In total, over 200 documents covering 129 PES programs were reviewed to provide comprehensive coverage of different PES program characteristics and ensure varied geographic coverage to yield practical and scalable findings and recommendations. PES program attributes and study findings were recorded wherever possible, noting that many studies do not cover all characteristics. An overview of the reviewed PES literature, including ES covered, payment types, payment scale, and contract types, is summarized in Appendix B.

A narrative literature review was chosen for this report because it provides a flexible and comprehensive approach to synthesizing insights from a large and diverse body of literature, making it well suited to capture the complexity and evolving nature of IPs' and LCs' participation and benefit-sharing across various PES programs.

Analysis of literature

Building on this initial analysis, a conceptual framework was developed to assess the context-specific pathways for IPs and LCs to benefit from PES and identify barriers to equitable participation and benefit-sharing. This framework consists of four key components—context, program design and implementation, equity, and enrollment—to enable examination of PES program characteristics and outcomes in relation to social, economic, political, and environmental contexts to understand the dynamic relationships that influence participation and outcomes.

The framework draws from and extends existing frameworks by incorporating insights on the dynamic relationships between context, actions, and outcomes (McGinnis and Ostrom 2014); the influence of PES on conservation motivations (Ezzine-de-Blas et al. 2019); factors shaping enrollment and participation (Pagiola et al. 2005); the feedback loops between community participation and program impacts (Brownson et al. 2019); and the role of multidimensional equity (McDermott et al. 2013; Pascual et al. 2014) (see Box 2).

Thematic coding aligned with the framework's key elements was used to assess varying program characteristics, positive and negative design features, enabling conditions and barriers, and context-specific factors; data were organized in Excel spreadsheets to enable tracking and analysis.

Case study analysis

The case study highlights Guatemala's PES program for small landholders, the Forestry Incentive Program for Owners of Small Landholdings Used for Forestry or Agroforestry (Programa de Incentivos Forestales para Poseedores de Pequeñas Extensiones de Tierra de Vocación Forestal o Agroforestal; PINPEP). PINPEP was selected after a desk review of PES programs across the developing world based mainly on innovative features relating to program access (i.e., accepting alternatives to formal land title) and program governance (i.e., representation in the executive board) that can potentially be replicated in other places. The case study employed qualitative methods: a literature review and key informant interviews and focus group discussions conducted during field visits in Guatemala on August 21–25, 2023. The analytical framework drew mainly from Angelsen and Wertz-Kanounnikoff's (2008) triple E (3E) framework (referring to effectiveness, efficiency, and equity) for assessing global PES programs under the UNFCCC's REDD+ program and from the multidimensional framework by McDermott et al. (2013) for assessing equity in PES (see Appendix C for a more detailed description of the case study method).

BOX 2 | Multidimensional equity in payments for ecosystem services

The framework for multidimensional equity in payments for ecosystem services (PES) was introduced by McDermott et al. (2013) with three core dimensions. It was later expanded by Pascual et al. (2014) to include a fourth, focusing on recognitional equity:

- **Contextual equity** considers how social, economic, environmental, and political conditions shape the ability of Indigenous peoples and local communities (IPs and LCs) to participate in decision-making and benefit from PES.
- **Procedural equity** focuses on the inclusivity of decision-making processes, ensuring that all relevant stakeholders are engaged.
- **Distributive equity** assesses how the costs, benefits, and risks of PES programs are distributed among stakeholders.
- **Recognitional equity** acknowledges and validates the rights, identities, knowledge, and contributions of individuals and groups, such as IPs and LCs, and stresses the importance of integrating these perspectives into decision-making.

Sources: McDermott et al. 2013; Pascual et al. 2014.



Limitations and caveats

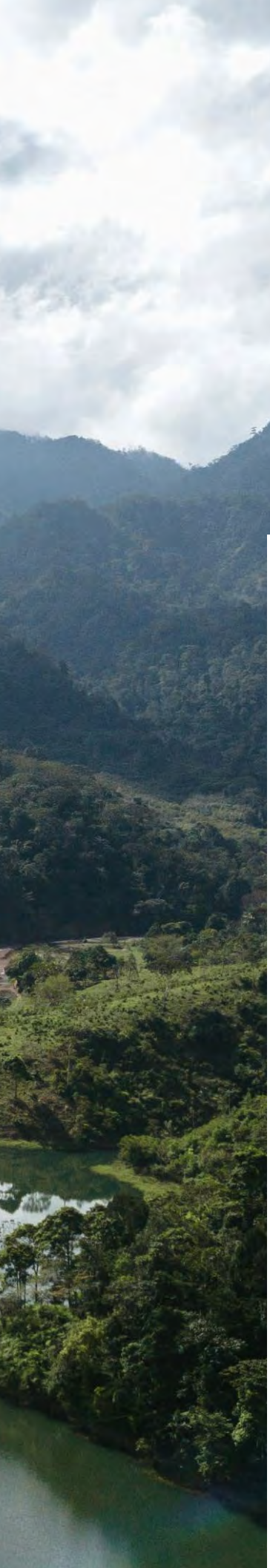
Despite efforts to ensure inclusive and comprehensive analysis, this report has several limitations:

Search tool and terminology bias. Reliance on Google Scholar and Google Search favors widely cited articles, limiting diversity in sources and perspectives. Although efforts were made to capture relevant terms, the keyword search did not fully represent LCs (e.g., mestizos, non-Indigenous riverine communities). The evolving terminology around IPs and LCs posed challenges; older studies often inadequately recognize these groups, and specific self-designations may complicate identification, which may result in some relevant literature being overlooked.

Underrepresentation of IPs' and LCs' direct perspectives and language bias. This report primarily draws on literature in English and Spanish, potentially skewing toward Latin American studies. Although some language bias is mitigated by the predominance of English publications (Kolinjivadi et al. 2023; Perevochtchikova et al. 2021), this dominance highlights broader limitations in the literature, including generalized expertise that often reflects Western perspectives rather than the views of IPs and LCs (Kolinjivadi et al. 2023). Consequently, as the review focuses primarily on published research, it does not directly incorporate the voices of IPs and LCs, limiting the depth of understanding regarding their experiences and perspectives. The exception is the limited interviews made during the field visit for the Guatemala case study.

Limitations of evaluations. There is a lack of systematic, high-quality evaluations of PES programs, which limits comparisons across programs (Salzman et al. 2018). Peer-reviewed articles typically focus on specific case studies, which provide important in-depth insights that are community-specific but limit generalizations to subnational and national contexts. This results in inconsistency in data availability across the 129 PES programs and complicates the overall understanding of equitable outcomes of PES for IPs and LCs. Additionally, gender is an under-studied aspect in the PES literature, although there has been increasing research on the topic during the last five years. Most studies approach gender as a secondary or tertiary aspect of the research rather than the primary focus, whereas studies that focus on gender typically involve case studies with small samples rather than broader program-wide evaluations. Hence, while this report includes gender in the analysis, it lacks a comprehensive and in-depth treatment of the topic due to the current limitations in the literature.





Evolution of PES and inclusion of IPs and LCs

PES started as a market-based mechanism to incentivize ecosystem service provision, initially focusing on environmental goals and formal land tenure, which often excluded IPs and LCs. Over time, PES has grown and evolved, involving more actors and complex financial arrangements and incorporating communal land enrollment, with increasing recognition of IPs' and LCs' roles in ecosystem stewardship. Despite this evolution, barriers to equitable participation and benefit-sharing persist.

Emergence of the concept of PES

PES emerged as a market-based mechanism to incentivize the conservation, restoration, and sustainable management of ecosystems. Because most ES are used without cost, they are often undervalued in conventional markets, leading to their degradation and underprovision (Costanza et al. 1997). PES was introduced to address this market failure by establishing a structured financial exchange in which those who benefit from ES (ES buyers) compensate those who maintain or restore them (ES providers).[3]

While PES was originally conceived as a direct transaction between buyers and providers, it has evolved into more complex arrangements, with many programs now engaging entire communities. Figure 1 illustrates this transition, comparing the original PES model with communal PES structures.

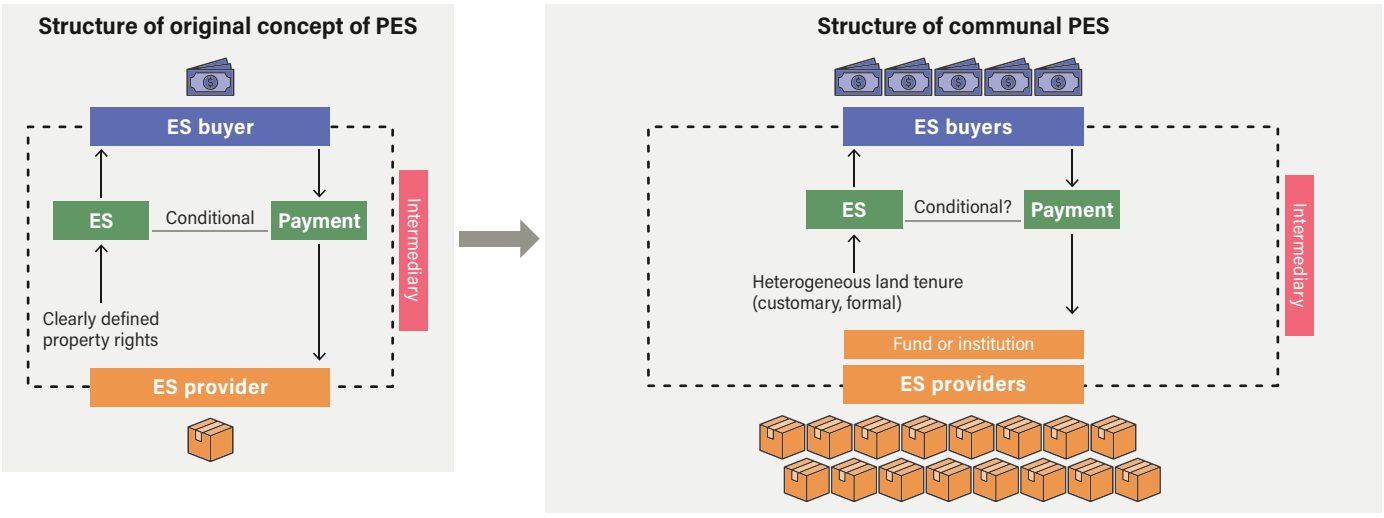
Financial flows in PES programs are often complex, involving many levels of actors. These can distance IPs and LCs from direct access to resources available at national and international levels.

The pathways through which financial flows reach IPs and LCs via PES are more complex than initially conceived, often involving buyers at international and national levels. These financial flows typically pass through multiple channels and actors, which can limit IPs' and LCs' direct access to PES funding and decision-making. Figure 2 provides a simplified overview of the common pathways for PES finance to reach households:

Publicly-financed PES programs, often backed by taxpayer revenues or ODA, typically channel funds from different levels of government to intermediary actors (which can be public, private, or NGOs) before reaching IPs and LCs.

User-financed PES programs vary in structure. Some are driven by direct users, typically at local and subnational levels; such users include water utilities paying for watershed protection or tourism operators investing in landscape and biodiversity conservation. Others are driven by indirect users, including entities at national and international levels purchasing carbon or biodiversity credits in private national and international ES markets.

FIGURE 1 | A comparison of the original PES concept and communal PES programs



Notes: ES = ecosystem services; PES = payments for ecosystem services.
Source: WRI authors.

Donor-financed PES programs are funded by development agencies, philanthropic foundations, and research institutions. They focus on conservation and capacity-building and often provide seed funding to establish PES implementation where market-based or government funding is limited.

Since a single funding source is often insufficient, PES programs are increasingly financed through hybrid models that combine funding from the private sector, donors, and governments. Such arrangements can include connecting water companies with municipalities or national governments or supplementing carbon market revenues with public or donor funding.

FIGURE 2 | Pathways for financial flows to IPs and LCs through PES

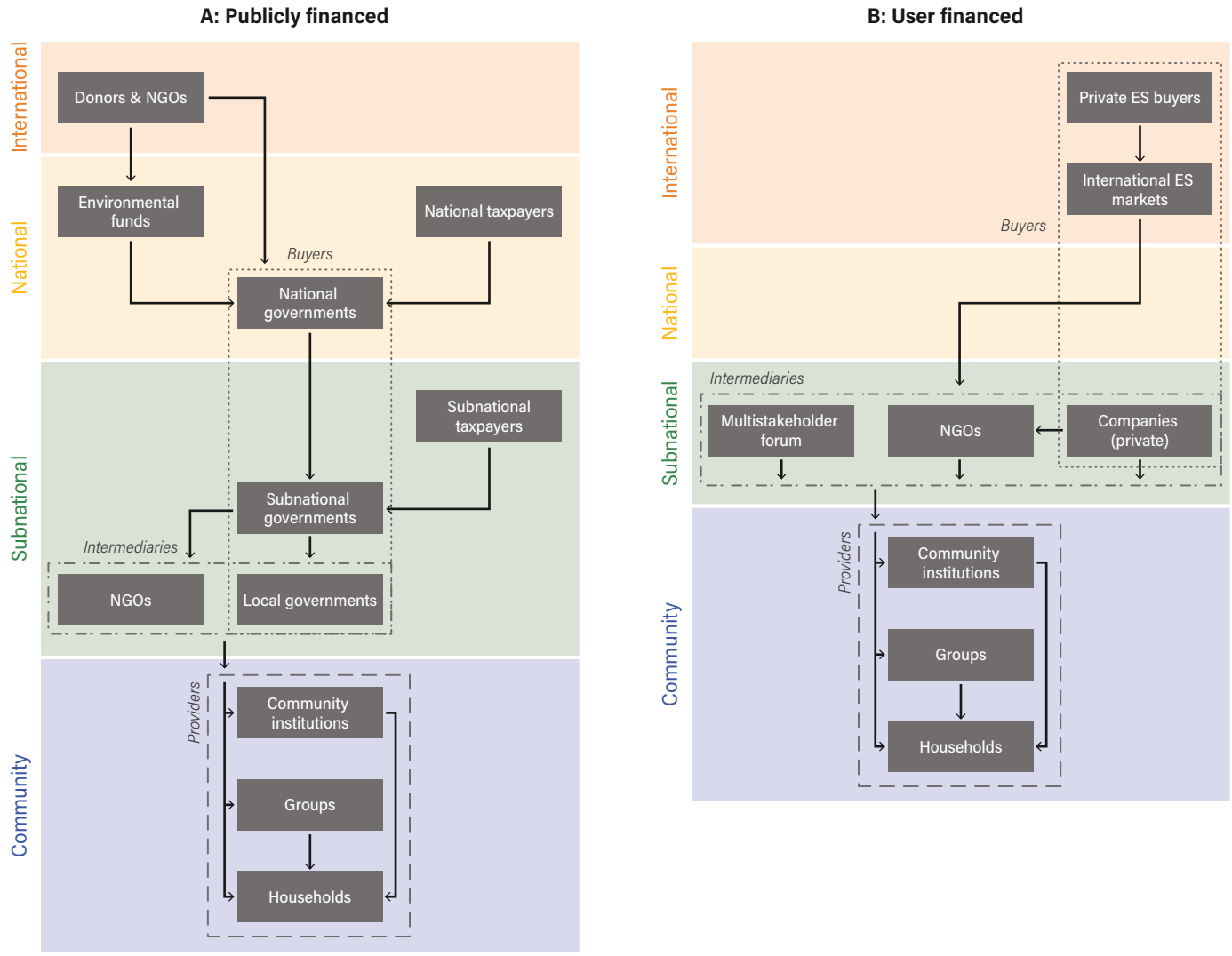
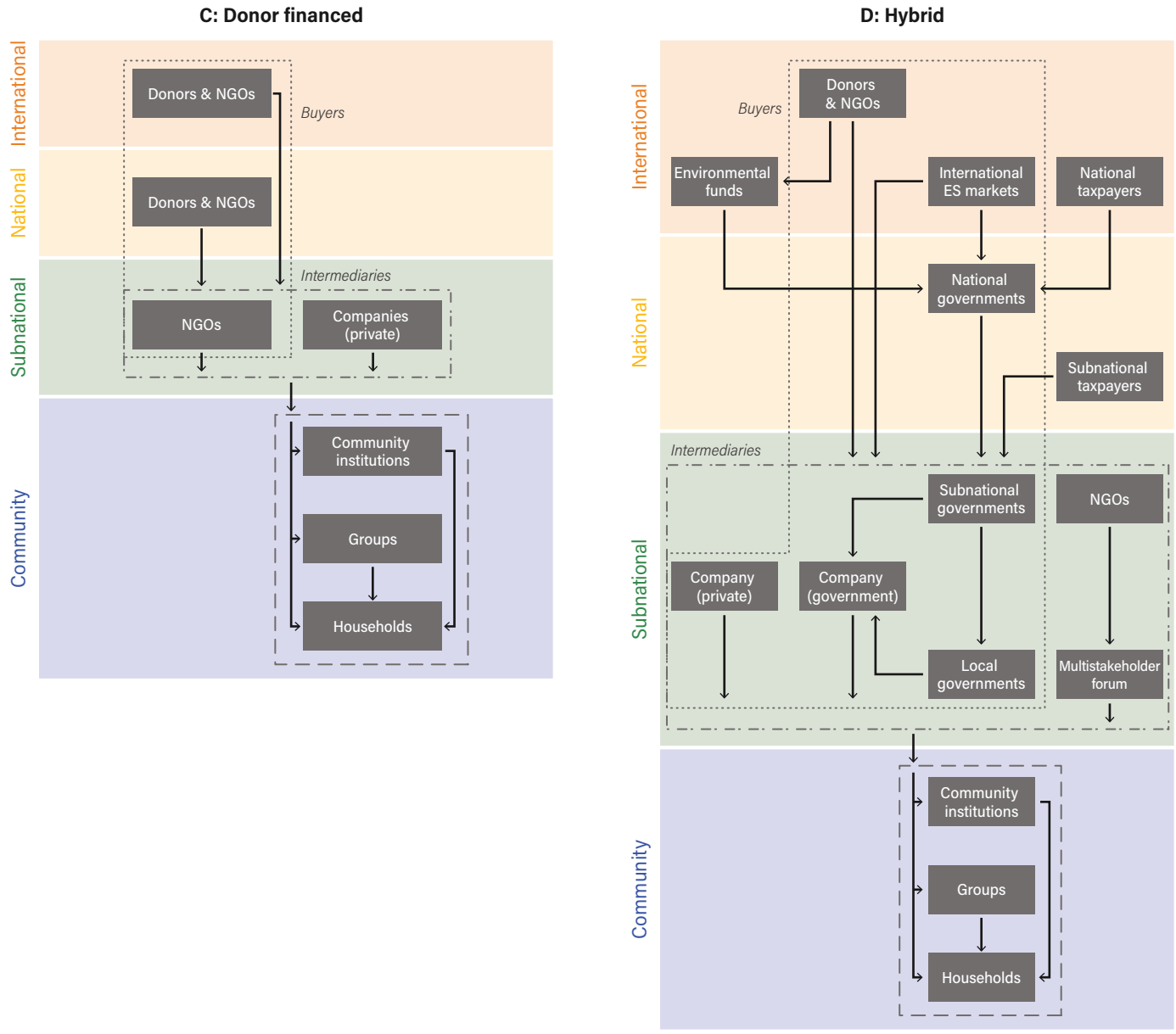


FIGURE 2 | Pathways for financial flows to IPs and LCs through PES (cont.)



Notes: ES = ecosystem services; NGO = nongovernmental organization.
Source: WRI authors.

Evolution of PES and inclusion of IPs and LCs

Since its emergence in the Global South during the late 1990s, PES has expanded significantly, with over 500 active programs and annual transfers of $30–$50 billion (Salzman et al. 2018). As Figure 3 illustrates, the past two decades have seen four key periods marking shifts in the inclusion of IPs and LCs, shaped by the development of new programs and the evolution of existing ones.

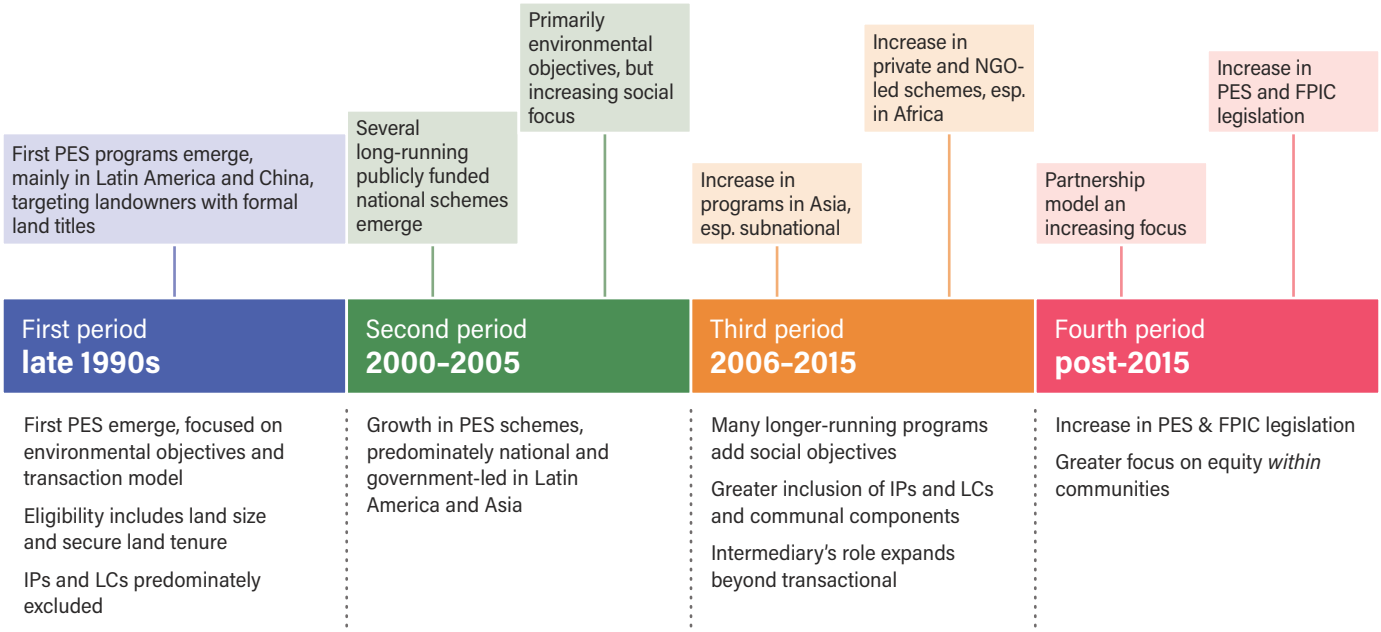
First period: Late 1990s, emergence of PES

Early PES programs in the Global South were primarily designed to achieve environmental objectives (Arriagada et al. 2015; vonHedemann 2020). These programs focused on transaction efficiency, assuming that ES could be accurately valued, land tenure was clearly defined, participation was voluntary, and market incentives alone would drive engagement. Social equity was not a priority (Wunder 2007) because it was seen as potentially reducing program efficiency (Pagiola et al. 2005; Shapiro-Garza et al. 2020). As a result, PES programs during this period tended to take a top-down approach (see Box 3), often excluding IPs and LCs with communal, informal, or small-scale land rights from benefiting due to eligibility requirements favoring individual land titles and formal property rights.

Second period: Early to mid-2000s (2000–2005), growth in PES programs

Between the onset of PES and the early 2000s, programs expanded rapidly, reaching 287 globally by 2001 (Landell-Mills and Porras 2002). Payment models also diversified, with some programs providing nonmonetary benefits such as infrastructure, training, and resources to support alternative livelihoods like agroforestry, beekeeping, handicrafts, and community-led tourism.[4] Many programs began combining cash payments with these benefits. Examples include teacher salaries and agricultural equipment in Cambodia's Cardamom Mountains PES (Chervier et al. 2019), subsidies for raising pigs and terracing in China's Changting County PES (Wang et al. 2017), long-term land-use plans in Brazil's Proam-

FIGURE 3 | Evolution of PES and inclusion of IPs and LCs



Notes: FPIC = free, prior, and informed consent; IP = Indigenous people; LC = local community; NGO = nongovernmental organization; PES = payments for ecosystem services.
Source: WRI authors.

BOX 3 | The domination of top-down payments for ecosystem services programs during the 1990s

The late 1990s saw the emergence of national payments for ecosystem services (PES) programs, such as Costa Rica's Payment for Environmental Services (Pago por Servicios Ambientales; PSA) and Guatemala's Forestry Incentive Program (Programa de Incentivos Forestales; PINFOR), as well as the subnational Noel Kempff Mercado Climate Action Project in Bolivia. These programs were primarily funded through earmarked government resources and international development organizations, particularly in their inception phases.

While the Noel Kempff Mercado project aimed to support community development, its top-down approach excluded communities from program design, leaving community members unequally informed about the expansion of the national park as part of the project.[a] Similarly, the PSA and PINFOR initially failed to engage Indigenous peoples and local communities. PINFOR required land titles registered in the National Property Register, forcing Indigenous peoples to enroll through municipalities that held forest titles within their jurisdictions.[b] The PSA required official cadastral and cartographic maps, as well as proof of landownership, neither of which recognized Indigenous lands.[c] As a result, both programs primarily channeled funds to large landowners—between 1998 and 2016, 75 percent of PINFOR funds went to private landowners and companies.[d]

During this period, the pilot for Scolel Té in Mexico—the world's first voluntary carbon offset project—was launched. However, it initially required secure land title, limiting enrollment to private farmers.[e]

In 1999, China piloted what would become the world's largest PES program: the Sloping Lands Conversion Program.[f] Its primary goal was reforestation and afforestation of highly degraded, sloping cultivated lands, with a secondary objective of food security and poverty alleviation in high-poverty areas. However, its top-down implementation prioritized ecological targeting and cost-effectiveness, primarily focusing on areas with private land-use rights.[g]

Notes and Sources: a. Montero-de-Oliveira et al. 2023; b. vonHedemann 2020; c. Arriagada et al. 2015; d. vonHedemann 2020; e. Hendrickson and Corbera 2015; f. Also referred to as the Grain-to-Green Program or the Conversion of Cropland to Forest Program; g. Liu et al. 2018; Ren et al. 2020.

biente (Blundo-Canto et al. 2018), and microhydropower turbines in Indonesia's Sumberjaya Watershed PES (Fauzi and Anna 2013).

While environment goals remain primary, there is increasing recognition that the lands of IPs and LCs are critical for ES provision; likewise, there is an increasing focus on social objectives, particularly poverty alleviation. Eligibility has expanded, creating more opportunities for IPs and LCs through collective land enrollment and greater access for smaller landholders. The expansion of PES was led primarily by national and subnational programs in Latin America (Southgate and Wunder 2009), including government and NGO-led initiatives in Bolivia, Colombia, Costa Rica, Mexico, Nicaragua, and Peru. Meanwhile, a few local and subnational programs emerged in Africa, mainly in Kenya, Tanzania, and Uganda, with a primary focus on carbon offsets.

In Southeast Asia, the Rewarding Upland Poor for Environmental Services (RUPES) initiative, led by the World Agroforestry Centre, launched several watershed-based PES programs across Indonesia, Nepal, and the Philippines. These programs aimed to improve both environmental and social outcomes, working with local communities characterized by strong cultural traditions, tenure insecurity, and diverse de facto land management practices (Leimona et al. 2015b; McGrath et al. 2017). Many of these programs partnered with local hydropower companies, which participated to secure reliable water supplies, reduce sedimentation risks, and strengthen relations with local communities (Leimona et al. 2015a, 2015b).

Third period: Mid-2000s to mid-2010s (2006–2015), expanded focus

During this period, PES programs broadened their scope, with greater recognition of the environmental and sociopolitical importance of including IPs and LCs. This led to increased inclusion of IPs and LCs, use of communal contracts, and a stronger role for intermediaries in capacity-building and relationship facilitation.

Long-running programs adjusted eligibility criteria to increase participation. In Mexico, the Payments for Ecosystem Services–Hydrological program expanded application

criteria from 9 to 25, prioritizing Indigenous applicants and *ejidos* (a type of communal land tenure regime) over individuals or groups (Ezzine-de-Blas et al. 2016a).

The 2007 United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP) heightened global attention to free, prior, and informed consent (FPIC). More PES programs began incorporating FPIC, particularly when engaging Indigenous ES providers. However, widespread adoption remained limited (Smith et al. 2019).

Carbon credit–funded PES programs expanded, driven by growing demand in the voluntary carbon market—particularly in Africa—creating new opportunities for smallholders and LCs. Examples include the Kenya Agricultural Carbon Project (KACP; sustainable agricultural land management), Mikoko Pamoja in Kenya (mangrove conservation), and Emiti Nibwo Bulora in Tanzania (agroforestry). In Asia, watershed-based PES programs emerged, especially in Indonesia, linking upstream communities with private and public water users.

Despite these shifts, most PES programs remained structured around frameworks that did not fully align with the knowledge, capacities, or needs of IPs and LCs. Most expanded eligibility remained tied to formal land tenure, excluding those with customary or communal rights. Costa Rica's PSA program introduced communal enrollment in 2004 but still required formal land titles, posing a major barrier for many Indigenous groups (Ramírez-Cover 2017). Furthermore, most programs did not significantly alter program design or decision-making processes. As a result, key barriers—particularly around land tenure—continued to limit equitable participation and benefit-sharing for IPs and LCs.

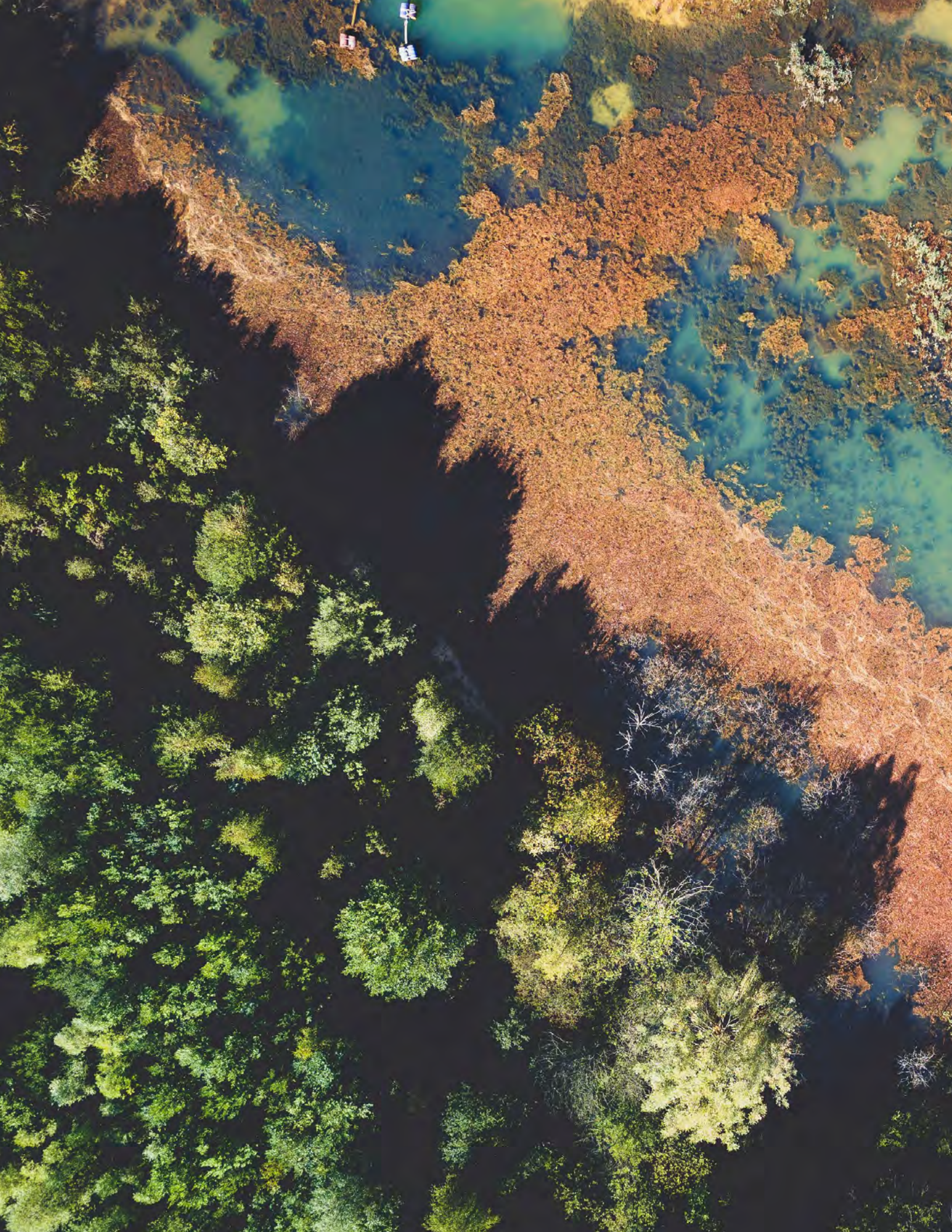
Fourth period: Post-2015, inclusion and safeguards are a greater focus, but barriers remain

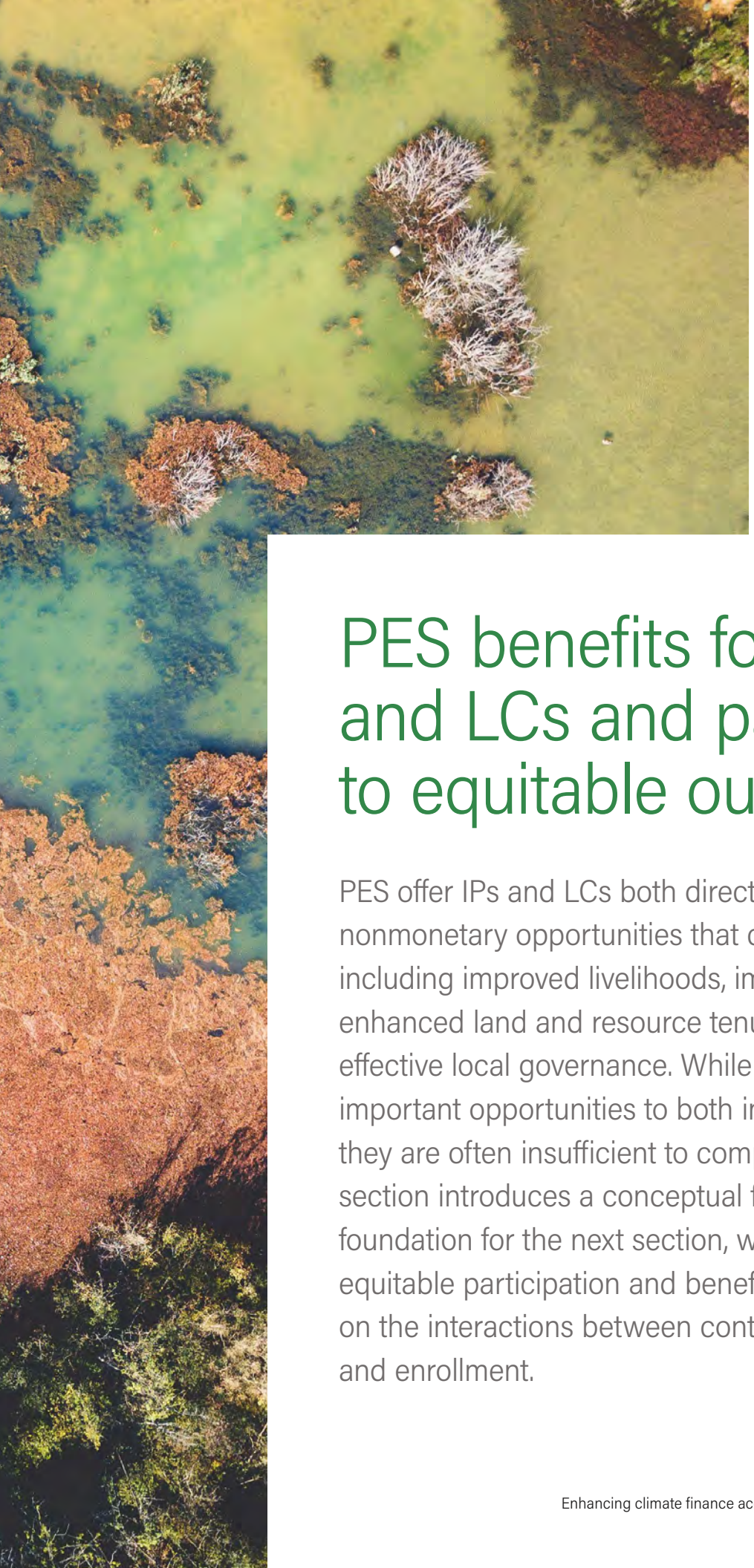
Since 2015, PES implementation has increasingly emphasized partnerships with IPs and LCs, with increasing instances of programs aligning with their sociocultural and territorial objectives. Many PES initiatives now incorporate technical assistance and community development support, though most still target private landowners (Ezzine-de-Blas et al. 2016a; Kaiser et al. 2023; McElwee 2012; Narloch et al. 2017).

This period sees the expansion of legal frameworks recognizing the rights of IPs and LCs, enhancing social safeguards, supporting FPIC, and improving benefit-sharing mechanisms. In 2016, Kenya's Forest Conservation and Management Act designated certain forest areas for comanagement with communities, strengthening their legal basis to participate as ES providers in PES programs such as Mikoko Pamoja (Kairo et al. 2018). In 2017, Colombia introduced national PES legislation prioritizing Indigenous participation and requiring programs to align with their customs (DNP 2017; Lliso et al. 2020; Moros et al. 2020). Brazil followed in 2021 with a national PES law[5] defining implementation standards after years of fragmented approaches (Mamedes et al. 2023; Presidência da República 2021).

Despite growing attention to local contexts and a handful of community-led initiatives and programs designed through bottom-up approaches (Plan Vivo 2020; Upton 2020; Weaver and Roughan 2024), most programs remain top-down, limiting the ability of IPs and LCs to cocreate PES models and ensure equitable outcomes. For example, China's Sloping Lands Conversion Program (SLCP) introduced a hybrid top-down and bottom-up approach in its New Stage reforms, but local governments retain more decision-making power than landholders. Although the program aims to be pro-poor, households with fewer resources often receive fewer benefits because governments prioritize environmental goals and cost-effectiveness—favoring lands with high ecological value that pose higher opportunity costs for poorer households (Ren et al. 2020).

Persistent power imbalances, political and economic exclusion, and inconsistent recognition of the territorial rights of IPs and LCs continue to limit progress. While recent policy advancements have expanded enrollment opportunities and introduced nonmonetary benefits, structural barriers—ranging from sociocultural and political-economic dynamics to local governance constraints—still hinder full and equitable participation. Gains in land rights recognition have facilitated access for some, yet these have not fundamentally shifted program design and decision-making toward truly inclusive, cocreated models. PES structures continue to fall short in fully integrating the knowledge, governance systems, and priorities of IPs and LCs, reinforcing inequitable participation and benefit-sharing. Without addressing these foundational issues, PES risks maintaining—rather than transforming—existing disparities.





PES benefits for IPs and LCs and pathways to equitable outcomes

PES offer IPs and LCs both direct financial benefits and nonmonetary opportunities that can lead to lasting benefits, including improved livelihoods, improved social infrastructure, enhanced land and resource tenure security, and more effective local governance. While cash payments provide important opportunities to both individual and communities, they are often insufficient to compensate their efforts. This section introduces a conceptual framework that serves as the foundation for the next section, which analyzes the barriers to equitable participation and benefit-sharing in PES, focusing on the interactions between context, program design, equity, and enrollment.

Benefits from enrollment in PES programs

In principle, IPs and LCs directly benefit from PES payments, which are conditional on the delivery of ES or activities that provide or enhance ES. They also benefit from wider opportunities that arise through their participation in PES programs, as will be detailed in this section.

Calculation of payments

PES payments are theoretically designed to compensate ES providers based on the opportunity costs they incur and the quantity and quality of ES they deliver. However, in practice, this ideal is rarely fully realized, and payment structures often vary depending on the program design and available funding sources as outlined in Table 1.

Due to the complexity and scale of determining opportunity costs and monitoring the exact level of ES provision, many PES programs lack payment differentiation in practice (Wunder 2007). Particularly for publicly funded subnational and national PES programs, instead of basing payments on opportunity costs or improvements in ecosystem quality—which is complex and difficult to assess, especially in heterogeneous ecological and socioeconomic contexts—many programs calculate payments based on proxies (Ezzine-de-Blas et al. 2016b). Most commonly, this is through a rate per hectare conserved, restored, sustainably managed, and so forth, which may be differentiated by type of ES, deforestation risk, or state of ES (e.g., degraded land, mature secondary forest, primary forest, etc.) (Alix-Garcia et al. 2019; McBurney et al. 2023; Rodríguez-de-Francisco and Boelens 2016; Tran et al. 2016). Clear methodologies for determining the payment rate per hectare are often lacking (McBurney et al. 2023; Pham et al. 2023). Likewise, donor-financed programs vary in how payments are calculated depending on the financial and technical resources available to them.

For user-financed PES programs, payments may be determined by market prices whereby a set proportion of the market price for the ES determines the price received by ES providers. For programs generating income through carbon markets, this typically involves ES providers receiving a percentage of the income from credit sales, in relation to

TABLE 1 | Overview of PES payment structures and calculation methods

TOPIC	DETAILS
Funding sources	▪ **Public funding:** Government budgets for environmental conservation and social objectives ▪ **User financed:** Contributions from individuals and businesses indirectly or directly benefiting from ecosystem services (ES) (e.g., water users, ecotourism operators, carbon-emitting corporations) ▪ **Donor funding:** Contributions from nongovernmental organizations, development agencies, international organizations ▪ **Hybrid model**s: A combination of the above sources
Payment structure	▪ **Results-based payments:** Linked to outcomes like verified reductions in carbon emissions (e.g., carbon credits), improvements in ecosystem health (e.g., reduced sedimentation, enhanced biodiversity), or land-use changes (e.g., hectares of forest conserved) ▪ **Activity-based payments:** Linked to specific activities aimed at enhancing ES (e.g., number of trees planted, sustainable land management practices, forest monitoring)
Basis for payment	▪ **Improvement in ES quality:** Payments linked to improvements in ecosystem quality (e.g., reduced soil erosion, enhanced water quality, increased biodiversity, verified carbon sequestrated) ▪ **Proxies for ES:** Payments based on measurable indicators that act as proxies for ecosystem services rather than directly quantifying the ES themselves (e.g., per hectare of forest restored/conserved, etc.)
Payment level	▪ **Opportunity costs:** Payments align with the opportunity costs incurred by providers (compensation for forgone benefits of alternative land uses) ▪ **Market prices:** Payments based on the market value of the ecosystem service provided (e.g., carbon credits sold on the market, water quality services priced by market demand, premiums for sustainably produced products) ▪ **Negotiated or assigned prices:** Payments based on a pre-agreed price, such as per unit of ES (e.g., per hectare of forest, per unit of water quality improvement) or per unit of labor or activity

Source: WRI authors.

their contribution, accounting for deductions for operational expenses and buffers for nondelivery risks (Balmford et al. 2023; Hendrickson and Corbera 2015; Masiga et al. 2012). Such payments are typically variable with market prices, but they can be negotiated with prepurchase agreements (Lee et al. 2016). In other user-financed PES programs, such as those with water companies or ecotourism operators, prices may be assigned by ES buyers, negotiated, or reflect market value. Some PES projects offer up-front payments or nonmonetary benefits to incentivize participation, often made possible through additional donor funding. Other programs pay only after carbon verification has occurred, which can take several years, and some provide payments as soon as a buyer is found, even without verification (Lee et al. 2016).

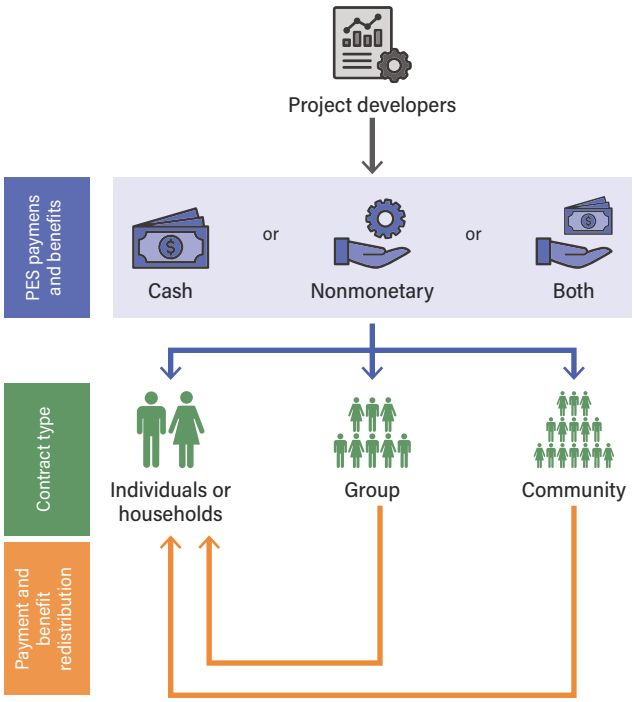
Distribution and redistribution of payments

Although the initial conceptualization of PES focused on direct cash transfer, in practice, these payments can be made in cash, in nonmonetary benefits, or in combination (see Appendix B for a full description of PES payments).

PES payments are disbursed to IPs and LCs either through direct contracts with individual households for the provision of ES or through collective contracts, which may involve a group of individuals or households or an entire community willing to participate in the PES program. Figure 4 shows a stylized structure of PES payment distribution across different contract types. These contract types can be summarized as follows:

- **Individual contracts.** In the case of individual contracts (39 percent of reviewed programs), community members receive their payments individually from the implementing institution irrespective of the actions of other enrolled individuals. The payments can be made in cash, such as in the Trees for Global Benefit (TGB) program in Uganda (ECOTRUST 2023), or through nonmonetary benefits, such as in the Reciprocal Watershed Agreements in Bolivia (Bottazzi et al. 2018).
- **Group contracts.** In the case of group contracts (9 percent of reviewed programs), cash payments are often channeled to the group leader (Haas et al. 2019; Lapeyre et al. 2015) and then redistributed between group members or maintained at the group level in cases where payment benefits are shared at the group level. These groups may consist of self-selected individuals (Leimona et al. 2015a) or traditional units such as clans, which can be smaller, kinship-based subgroups within a community (Mangubhai and Lumelume 2019; Shah and Race 2024).

FIGURE 4 | How PES payments are distributed to reach individual IPs and LCs



Note: PES = payments for ecosystem services.
Source: WRI authors.

- **Communal contracts.** Communal contracts typically involve payments being channeled into community funds or governing institutions (34 percent of reviewed programs) (Ingram et al. 2014; Izquierdo-Tort et al. 2022; Kairo et al. 2018; Molina-Murillo et al. 2014). These payments are then redistributed among community members. Communal payments tend to be partially or fully allocated to communal benefits, either through nonmonetary benefits, such as infrastructure or equipment and/or cash maintained within a designated community fund (Molina-Murillo et al. 2014; Nguyen et al. 2022; Tegegne et al. 2021). Payments can also be announced in terms of their cash value but distributed to the community nonmonetarily and purchased by each enrolled community. This was the case in the Menabe Community-Based Payment Scheme in Madagascar, where each participating village decided how to allocate payments (Sommerville et al. 2010a, 2010b).

Communities decide how communal cash payments will be distributed between the community and individual levels and whether these payments will be distributed as cash or nonmonetarily or through a combination. In communal contracts, distributing payments to individuals most often occurs through payments made to those performing specific ES activities, such as forest monitoring, or by distributing payments, in cash or nonmonetarily, to households in the community (Kairo et al. 2018; Martin et al. 2014a; Zwick 2019). Intracommunity benefit-sharing arrangements are typically set at the level of the community's governing institutions through assemblies, community meetings, or local community leaders (Hayes et al. 2017; Izquierdo-Tort et al. 2021; Martin et al. 2014a; Nieratka et al. 2015).

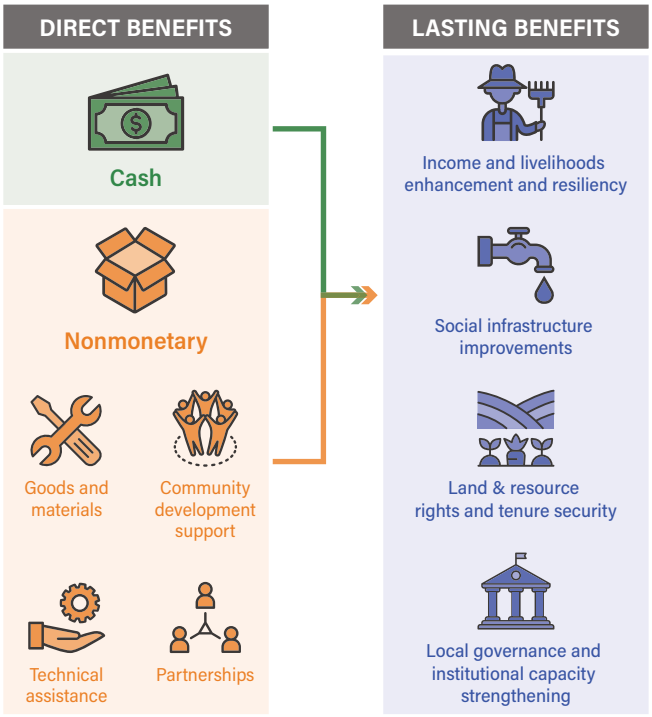
Classification of benefits

In many cases, the nonmonetary benefits of PES programs—such as enhanced land rights recognition, technical assistance, integration into new institutional partnerships, and broader capacity-building and community development—are more significant to IPs and LCs in achieving their objectives, such as advancing territorial rights and autonomy in managing their territories. This is especially true because direct cash payments are often too low to meet their needs (Pham et al. 2023; Tran et al. 2016). Figure 5 provides an overview of PES payment types and opportunities from PES enrollment and the broader benefits they support. An illustrative case study of Guatemala's PINPEP, which highlights key PES design features and benefit pathways for IPs and LCs, follows the general discussion on benefit pathways.

Income and livelihoods enhancement and resiliency

Participation in PES programs directly affects livelihood through the payments and indirectly affects incomes through increased access to resources, technical assistance, and benefits stemming from improved agricultural productivity and alternative livelihood opportunities (Blundo-Canto et al. 2018). First, direct cash payments, while generally small, diversify and stabilize household income throughout the year, helping to address basic needs, particularly in impoverished areas with limited alternative sources of income, as seen in Colombia, Ecuador, Kenya, Mexico, and Vietnam (Bremer et al. 2014b; Davis and Goldman 2019; Moros et al. 2020; Nieratka et al. 2015; Tran et al. 2016).

FIGURE 5 | Overview of benefit pathways for IPs and LCs through PES



Source: WRI authors.

In Vietnam's Central Highlands, home to 47 ethnic minority groups reliant on forests for their livelihoods, most participants in the national Payments for Forest Environmental Services (PFES) program are Indigenous minorities (Pham et al. 2021, 2023). Studies conducted in nine communes within Đắk Lắk and Kon Tum provinces show that income from PFES helps support income diversification and provides stability for these groups, who primarily rely on highly seasonal agricultural activities (Pham et al. 2021, 2023). Similarly, in China's SLCP, livelihood diversification effects were found to be driven by benefits accrued in the lowest income group (Liu and Lan 2015). In contexts where IPs and LCs lack access to alternative livelihood opportunities, payments often provide an injection of funds or resources to facilitate investment in additional income-generating activities (see the subsection on land tenure in "Barriers to equitable participation, benefit-sharing, and finance access for IPs and LCs" for more information on why lack of access to alternative livelihoods is particularly relevant in the case of IPs and LCs).

In community-level PES contracts, PES implementation frequently results in the creation of new livelihood opportunities as community members are hired to carry out support-

ing activities necessary to fulfill the community's contract obligations. Communities in national programs, including Mexico's Indigenous Chinantec communities and Vietnam's Hieu commune, have hired local members for PES implementation, monitoring, and patrolling (Nguyen et al. 2022; Nieratka et al. 2015). In other cases, the demand for seedlings to implement PES activities leads to new businesses, such as commercial tree nurseries (ECOTRUST 2023). However, ex post studies of Bolivia's subnational Noel Kempff Mercado project caution that while PES provides new employment opportunities, it may not fully compensate for the reduced access to prior livelihood activities (Asquith et al. 2002; Hausknost et al. 2017; Rambert and Sardonis 2023).

In many cases, nonmonetary benefits provided by PES programs may have long-lasting impacts on local communities. For instance, seedlings, beekeeping equipment, livestock, and harvesting equipment facilitate new livelihood opportunities while also reducing the risk borne by IPs and LCs in shifting livelihood activities (Lee et al. 2016; McWherter et al. 2022; Montoya-Zumaeta et al. 2021). At the household level, PES contracts have supported investments in practices that boost agricultural productivity, as observed in a study of 404 Indigenous households in Vietnam's Đắk Lắk and Kon Tum provinces (Pham et al. 2023). PES payments can enhance income-generating activities, as seen in a watershed program in Indonesia's Lombok Watershed PES in West Nusa Tenggara province, where a coffee farmer increased bean grinding from once to three times a week, boosting revenues (Fauzi and Anna 2013).

At the community level, payments have facilitated communal investments in community-level income diversification (Farley et al. 2011), including agroforestry projects (Montero-de-Oliveira et al. 2023; Tegegne et al. 2021). In the Suruí Forest Carbon Project (SFCP) in Brazil, revenue from the sale of carbon offsets enabled the Paiter-Suruí IPs of the Brazilian Amazon to fund six initiatives aimed at creating sustainable livelihood opportunities through traditional practices, including online communications and archiving, medicinal plant harvesting, coffee production, and the development and sale of various nontimber forest products such as handicrafts (Zwick 2019). Likewise, the Mikoko Pamoja expanded livelihood opportunities previously unavailable to women (Wylie et al. 2016).

Additionally, other nonmonetary support, such as technical assistance and access to supplementary opportunities as part of a package approach to PES benefits, facilitates access to livelihood opportunities. Several studies of PES programs in Kenya, Tanzania, and Uganda found access to village savings and loan associations through PES as a significant benefit of enrollment—sometimes more beneficial than the payments themselves because such associations enable access to affordable loans to invest in alternative livelihoods, including beekeeping and livestock rearing (Aganyira et al. 2020; Lee et al. 2016; Nyberg et al. 2020; Shames et al. 2016). Such investments are found to have a 30–60 percent return on investment for program participants in the Emiti Nibwo Bulora PES program in Tanzania and the KACP (Lee et al. 2016); meanwhile, in Uganda the TGB program supports 30 village savings and loan associations as of 2023 (ECOTRUST 2023).

Technical assistance and extension services on alternative livelihoods and sustainable resource practices improve technical knowledge of relevant practices. In doing so, they also increase the likelihood of successful adoption of intended activities and generate positive impacts in the community (Aganyira et al. 2020; Jack and Cardona Santos 2017; Lee et al. 2016; Tamba et al. 2021; Waruingi et al. 2021). In Mexico, technical assistance was found to positively increase the perceived benefits and social equity of the national PES programs (Jones et al. 2018). In Costa Rica's Talamanca–Cabécar Indigenous territory, training programs targeting Indigenous people of all ages and genders—covering areas such as rural tourism, food safety for restaurants, English language skills, computer science, leadership, business management, community organizing, health care, and agricultural practices—contributed to enhancing inclusive participation and providing long-term skill development for marginalized groups (Molina-Murillo et al. 2014).

Finally, in the long run, benefits stemming from improvements to ES, such as higher agricultural productivity, outweigh the benefits of the payments themselves (Grima et al. 2016). For example, across several PES programs in East Africa, program participants benefited from increased agricultural productivity and yields resulting from sustainable agriculture land management activities (Shames et al. 2016; Tamba et al. 2021) and other improved agricultural practices (Kwayu et al. 2017), they avoided fertilizer and firewood costs (Lee et al. 2016). In other cases, PES has increased profitability of livestock sales resulting from improved grazing lands for the Maasai pastoralists (Davis and Goldman 2019) or decreased the need to purchase fodder by the program participants in Ethiopia (Biryahwaho et al. 2012). However, in these cases, it is critical to ensure that payments continue to

be paid to communities until the benefits from trees planted or from newly implemented or adapted agricultural practices materialize (He 2020).

It is important to recognize that numerous studies across different geographies have found that the scale of PES payments are widely considered too low to improve material well-being or to fairly compensate participants—individually, in groups or communally—whether funded publicly, privately or by donors and irrespective of ES (e.g., Aganyira et al. 2020; Arriagada et al. 2015; Börner et al. 2017; Clements and Milner-Gulland 2015; Davis and Goldman 2019; Denham 2023; Jones et al. 2018; Lee et al. 2016; Lliso et al. 2021; McBurney et al. 2023; Montero-de-Oliveira et al. 2023; Moros et al. 2020; Silva-Muller 2022; Tamba et al. 2021). In one study of the KACP, PES payments were found to average as low as $0.33 per household per year, which is not sufficient to purchase even basic necessities like maize flour (costing $0.48 per kilogram) (Cavanagh et al. 2021). A study of five communities in Ecuador's Programa Socio Bosque found that the one-off payment of $340 per household (or $122 per person) is far below the annual regional poverty line of $1,020. Additionally, the per hectare rate of $20 per year is just one-fifth of what community members deemed fair. One respondent explained, "What is a fair price [for the paramo]? About $100 per hectare would be fair. That's what we make cultivating, even more. In good times, we harvest and make a profit. . . . The land is productive here, and the price we receive from Socio Bosque is unfair" (McBurney et al. 2023, 396).

In many cases, PES payments are not designed to fully cover opportunity costs and often fall short in providing sufficient economic benefits for IPs and LCs, risking heavily disadvantaging participating communities unless supplemented by additional benefits. One study in Mexico found that average payments for a one-hectare plot enrolled in the Scolel Té program would cover only 20–25 percent of the forgone income from alternative livelihoods, such as planting maize (Hendrickson and Corbera 2015). Another assessment of a program in Bolivia found that previous agricultural gross output (without deducting inputs) was 10 times that of the value of PES payments (Bottazzi et al. 2018). In Vietnam's Son La province, farmers could earn as much as $622 per hectare per year from cultivating corn, far surpassing the PES payments of $4.80 per hectare (Tran et al. 2016).

Such effects can be magnified when compounded with the effects of inflation and/or currency devaluation that reduce the real value of payments (Silva-Muller 2022), as seen in Mexico's national publicly funded PES programs, where 2016 cohorts received payments with a 15–20 percent lower real value compared to earlier cohorts (Alix-Garcia et al. 2019).

In several PES programs in Africa, payments were so low that the programs had framed them as a token of appreciation rather than payment (Lee et al. 2016). Communal payments on a per-beneficiary basis often remain particularly low (Saito-Jensen et al. 2014; Sommerville et al. 2010b). For example, in Costa Rica and Ecuador, payments under communal contracts are considerably less than those made under individual contracts on a per-beneficiary basis (McBurney et al. 2023; Ramírez-Cover 2017). Delays and instability of payment delivery are also widespread in government-funded programs (Etchart et al. 2020; Izquierdo-Tort 2020; Montero-de-Oliveira et al. 2023; vonHedemann 2020) as well as in user-funded programs that trade carbon credits in the voluntary carbon market (Garcia et al. 2021; Shames et al. 2016; Tegegne et al. 2021).

Notable exceptions include the BancO2 program in Colombia, which provides households with payments of $100–$250 per hectare monthly, which can reach up to one minimum monthly wage salary (Moros et al. 2020), and China's Grassland Ecological Compensation Policy, in which payments account for 28 percent of the annual household income for herders in the Qinghai and Gansu provinces (Hou et al. 2021). In the Mikoko Pamoja program in Kenya, the community directly received $26,446 in 2023, after operating costs. Over 10 years, the community has been paid a total of $170,422 from the sale of verified carbon credits in the voluntary carbon market (VCM) generated through the community's mangrove conservation and restoration (Juma et al. 2024).

Despite the typically low monetary value, many IPs and LCs continue to participate in these programs for several reasons:

- The nonfinancial benefits they receive, as detailed in the next subsections
- Payment amounts may have initially been sufficient but have not kept up with inflation
- Situations where payments aligned with market prices have underperformed expectations, particularly in PES programs reliant on carbon prices (Aganyira et al. 2020; Salzman et al. 2018; Shames et al. 2016; Silva-Muller 2022)

Social infrastructure improvements

Community-level income from cash payments enables IPs and LCs to supplement governmental support in social services underfunded through existing channels. In Gazi Bay, Kenya, payments support investments in clean water infrastructure and education (Kairo et al. 2018). In Costa Rica's Talamanca–Cabécar Indigenous territory, they support health initiatives (Molina-Murillo et al. 2014). In Tanzania's Simanjiro Grazing and Conservation Easement and Mexico's national PES programs, payments support education (Ingram et al. 2014; Izquierdo-Tort 2020). And in Ecuador, PES funds also help support community-level assistance, as seen in the Kichwa-speaking Indigenous communities of Chimborazo, where they maintain funds for members in need (McBurney et al. 2023). Outside of payments, some programs provide additional nonconditional support for community development projects such as schools and energy infrastructure, as in two pilot programs in Cameroon (Tegegne et al. 2021).

Land tenure security and resource rights

PES programs are found to provide important opportunities for IPs and LCs to secure their land tenure rights. In some cases, these rights could be considered a form of nonmonetary payment in a PES program, where the program facilitates formalized tenure or land-use rights conditional on fulfilling PES requirements. For example, in Lampung, Indonesia, the Sumberjaya Watershed PES program secured temporary user land rights (with the possibility of extension up to 25 years) in state-owned forestlands for enrolled groups in Sumberjaya. These communities are multiethnic, primarily consisting of the Indigenous Semendo ethnic group as well as Sundanese and Javanese migrants from Java, navigating a context of complex and overlapping property rights (Fauzi and Anna 2013). While this approach provides a practical solution in the absence of secure property rights, the temporary nature of these rights and the diversity of groups involved have led to occasional conflicts over access and land use, highlighting that it is not a substitute for permanent land rights (Fauzi and Anna 2013; Leimona et al. 2015a).

PES programs taking place on public lands have been found to extend land-use opportunities for those without customary or formal land rights. In Uganda, PES programs in state forests provide land-use opportunities for younger generations who are less likely to own land and therefore would be unable to participate in PES programs requiring private land (Aganyira et al. 2020). In Kenya's Plantation Establishment Livelihood Improvement Scheme, individuals lacking land are allocated degraded forestland plots where they can cultivate crops in exchange for restoring the forest canopy (Waruingi et al. 2021). However, despite these opportunities, conditional tenure and use rights cannot serve as substitutes for permanent recognition of customary tenure rights.

Additionally, enrollment in PES programs also promotes tenure security indirectly by codifying the role of IPs and LCs, whether at the individual, group or community level, as landowners and stewards of natural resources. A recent study of two PES programs in China found that enrollment in the SLCP likely improved land tenure security by making it more difficult to reallocate lands enrolled in the program (Liu et al. 2018). In Ecuador, a study of 49 Indigenous and Afro-Ecuadorian communities in the Amazon and Northern regions found that those enrolled in communal contracts in the Programa Socio Bosque experienced fewer land conflicts, both internally and with external actors such as industries and governments (Jones et al. 2020b). In Mongolia, the Pastures, Conservation and Climate Action project integrated the governance and pastoral practices of Mongolian herding communities into a carbon credit plan, allowing herders to participate without private land titles. This approach strengthened land tenure security by formalizing pastoral practices within the PES framework while respecting traditional governance structures (Upton 2020).

Maps and the demarcation of boundaries to facilitate PES implementation, whether formal or customary tenure, strengthen internal and external recognition of tenure claims (Robertson and Wunder 2005; Silva-Muller 2022). In one study in Vietnam, 13 percent of respondents (households living in eligible villages in the Da Bac district) reported joining PFES to establish control over forestland as their property, with two-thirds of them stating that this allowed them to have autonomy over the land, choose which trees to plant, and exclude invaders (Tran et al. 2016).

Moreover, land tenure security can also be improved by cash payments paid out of PES programs; these payments reduce competing financial pressures for households within communities, thereby reducing motivations to decollectivize and sell land. This was the case in Kenya's Kitengela Conservation Lease Agreement PES program and in China's national Ecological Public-Benefit Forest Compensation Programme (Davis and Goldman 2019; Liu et al. 2018). Similarly, pay-

ments provide crucial resources for IPs and LCs to assert their territorial sovereignty (see the following subsection, "Local governance and institutional capacity strengthening").

Other times, nonmonetary benefits or items purchased through cash payments have allowed participants to assert tenure. In Bolivia, property rights in communities are often informal and lacking in registered titles (Asquith et al. 2008), but in the Río Grande catchment of the Bolivian Andes, nearly 80 percent of households selected barbed wire as one of their nonmonetary payments through the PES program. This choice was primarily motivated by the need to fence their property boundaries, with 50 percent of households using the barbed wire to assert and protect their property from encroaching settlers, who often perceive unfenced or uncleared land as unused and available (Asquith et al. 2008; Bottazzi et al. 2018).

Land tenure security is considered in many PES programs as part of capacity-building and community development support (Davis and Goldman 2019; Rambert and Sardonis 2023; Tamba et al. 2021), as well as a critical element to facilitate the successful implementation and long-term sustainability of PES programs (Brown et al. 2011; Nguyen et al. 2022). When land tenure is secure, communities and their members are assured that their rights to access, control, compensation, and resource use are fully safeguarded (Karpowicz et al. 2024; Song et al. 2021). Several PES programs, particularly at the local or subnational scale, have integrated land-titling initiatives to formally recognize customary land rights, ensuring communities' full and effective participation in PES and their contributions toward achieving program goals. The Noel Kempff Mercado project in Bolivia facilitated land-titling projects that resulted in the Indigenous communities living in the area obtaining legal recognition and the titles to their ancestral lands (Rambert and Sardonis 2023).

In Tanzania's Simanjiro program, a local NGO collaborated with the community to secure Certificates of Customary Rights of Occupancy through formalized land-use planning. This enhanced trust with PES actors, increased community satisfaction and commitment, and empowered the community to enforce land-use restrictions (preventing settlement and farming) (Davis and Goldman 2019). Similarly, in Kenya's Mikoko Pamoja PES program, the Kenya Marine and Fisheries Research Institute facilitated community tenure for the local fisher communities of the Gazi and Makongeni villages of Gazi Bay over mangrove and seagrass resources (Kairo et al. 2018; Tamba et al. 2021; UNDP 2020).

Local governance and institutional capacity strengthening

According to the literature reviewed, PES can promote the strengthening of community-level institutional capacity both through cash payments made in communal contracts as well as through capacity-building and community development support offered through PES programs, which in turn help strengthen communities' capacity to facilitate enrollment in PES. Monetary payments made at the community level can provide both immediate and long-term support to strengthen local institutions.

Cash payments can be critical sources of funds for the local governance institutions of IPs and LCs, particularly in instances where other revenue streams are lacking or inflexible. Payments through the local Simanjiro PES program in Tanzania are modest compared to other funding sources, but the payments provide flexible funding and are considered critical resources to promote self-determination at the community-level (Ingram et al. 2014). Because discretionary revenues require the community to decide how to allocate the funds, the payments have bolstered internal governance processes for resource allocation and benefit-sharing more broadly (Ingram et al. 2014).

Over time, cash payments can enable communities to improve revenue management and resource allocation by creating the need to strengthen these processes and by providing the necessary resources to strengthen the capacity and agency of local institutions in driving community development (Denham 2023; Nieratka et al. 2015).

In Costa Rica, Indigenous territories rely heavily on payments from the PSA program to finance their governance institutions and the strengthening of their institutional capacity. Each Indigenous territory in Costa Rica is governed by an Integral Development Association (Asociación de Desarrollo Integral; ADI), which is legally recognized as the local government body (Molina-Murillo et al. 2014). However, ADIs lack permanent revenue sources to finance local government activities, so payments from the national PSA program serve as critical funding for the Indigenous territories (Ramírez-Cover 2017). For instance, in Costa Rica's Talamanca–Cabécar Indigenous territory, Molina-Murillo et al. (2014) found that PSA payments accounted for 80 percent of all resources received during the 2007–11 study period. The majority of resources were dedicated to enhancing the territory's institutional capacity, with 40 percent allocated to governance and 16 percent to legal services. During this



time, PSA payments financed all of the territory's development plans and 26 percent of organizational investments. These investments strengthened leadership, negotiation, and management capacities, enhancing the community's ability to leverage funds from other sources (Molina-Murillo et al. 2014). In a different territory, the Talamanca–Bribri Indigenous territory, over half (55 percent) of PSA payments are allocated to governance and administration, allowing for investment in administrative and legal capacity, including the hiring of a permanent lawyer and accountant. This arrangement has strengthened the Bribri Indigenous group's capacity to safeguard against territorial and environmental encroachment (Ramírez-Cover 2017).

Participating in PES also incentivizes the strengthening of governance capacity necessary for program success and, in some cases, capacity-building support to local governance institutions. Where communities have existing modalities for community organization or decision-making processes regarding land use, PES programs can motivate the introduction, clarification, and/or enforcement of land-use rules and sanctions at the community level (Hayes et al. 2015, 2017; Ingram et al. 2014). Additionally, technical support through PES can enhance institutional capacity in communities to manage and monitor PES activities and the use of financial management systems (Biryahwaho et al. 2012; Denham 2023; Pasha et al. 2012; Tamba et al. 2021).

In other instances, PES has strengthened intercommunity governance institutions and facilitated the development of conflict resolution mechanisms, leading to the effective consolidation of institutional power and enhanced collective bargaining capacity. For six Indigenous Chinantec communities in Oaxaca, Mexico, the national PES program has strengthened the governance of its regional coalition, the Natural Resources Committee of the Upper Chinantla (Comité de Recursos Naturales de la Chinantla Alta; CORENCHI). Although social capital and norms for collective action within each member community were strong, cooperation and trust between communities were undermined by territorial disputes (Nieratka et al. 2015). Following initial PES payments, the six communities, with support from a local NGO, jointly established a voluntary, nationally certified Indigenous and Community Conserved Area (ICCA) equivalent to three-quarters of their total territory (Denham 2023). In establishing a stronger framework for intercommunity cooperation, the PES and ICCA mechanisms not only reduced territorial disputes but also strengthened the CORENCHI communities' position to advance collective interests with relevant government actors (Denham 2023; Nieratka et al. 2015). As a result, the CORENCHI communities successfully negotiated for two additional provisions in the national PES program that would recognize their traditional land-use practices and structures for community organization (Denham 2023).

OPPORTUNITY TO STRENGTHEN SOCIAL CAPITAL

Social capital, at both the community and individual levels, is an important determining factor in PES outcomes (Bremer et al. 2014a; Hayes et al. 2019; Kaiser et al. 2023; Moros et al. 2019; Narloch et al. 2017; Pfaff et al. 2019). It is also a key benefit arising from participation in PES (Alix-Garcia et al. 2018, 2019; Bartels et al. 2010; Brownson et al. 2019; Pfaff et al. 2019). Social capital is considered a crucial factor in supporting broader economic development (Keefer and Knack 2008; Mansuri and Rao 2012).

PES programs that incentivize collective action at the community level can reinforce prosocial behaviors and strengthen social capital. A study of 862 Mexican communities showed that PES participation increased social capital over time (Alix-Garcia et al. 2019). In Oaxaca, Indigenous communities found that communal PES contracts supported traditional values and collective practices (Denham 2023; Rodríguez-Robayo et al. 2016).

Enrollment in PES has been found to build and expand both internal and external networks, bringing communities and individuals into new institutional networks. For instance, a review of six PES programs across Bolivia, Brazil, Ecuador, and Peru found that a sense of ownership and dialogue within communities resulted in increased network ties when capacity-building and inclusive participation in PES programs were strengthened (Montero-de-Oliveira et al. 2023). In Tanzania, enrollment in the Equitable Payments for Watershed Services program was found to increase membership in community organizations and groups to collaborate and exchange ideas, leading to increased trust between community members in the upper catchment of the Ruvu River in the Uluguru Mountains compared to those not enrolled (Kwayu et al. 2017). Additionally, this may facilitate formalized connections to governmental actors, as in the subnational PES in Changting County in China, where PES created a close connection with the county government agencies responsible for forestry, agriculture, soil, and water; 13 percent of participants developed frequent communication with these actors, opening access to additional livelihood opportunities (Wang et al. 2017). In other cases, PES programs enable new linkages through connections to NGOs or academic actors, which build or strengthen the trust of external actors (Kwayu et al. 2017; Silva-Muller 2022).

At the individual level, PES programs have been found to promote social learning, whereby enrolled households share their knowledge of new farming techniques gained through participation in a PES scheme (Hayes 2012). Social capital improved through PES networks helps strengthen individual willingness and ability to adopt new farming activities and livelihood opportunities (Lee 2017).

Illustrative case study of PES benefit pathways: Guatemala's PINPEP

Context

Guatemala's PINPEP, formally established in 2010, illustrates key enabling features in PES program design that foster equitable participation of and benefits for IPs and LCs. It is the second PES program to be introduced in the country and is a result of the social mobilization and advocacy of Indigenous communities and rural smallholders, with key support from intermediaries. The first PES program (1997–2016), the Forestry Incentive Program (Programa de Incentivos Forestales; PINFOR), was aimed at developing Guatemala's forestry industry and prioritized large landowners with formal land titles and commercially productive forests, leaving the vast majority of Indigenous communities and rural smallholders unable to access the program (Aguilar-Støen 2018; vonHedemann 2020; World Bank 1998). PINPEP began in 2005 as a pilot program on conservation development funded by the Netherlands Development Cooperation. The pilot was implemented in municipalities with very high levels of poverty and climate vulnerability that were excluded from PINFOR. Midway through the pilot program, in 2008, momentum for making PINPEP a countrywide program was spurred when the country office of the International Union for the Conservation of Nature (IUCN), together with the Food and Agriculture Organization of the United Nations and the World Bank, implemented a program to facilitate dialogue and boost networking among Indigenous and smallholder community forestry organizations. The IUCN program culminated in the establishment of the Alliance of Community Forest Organizations (ACFO), composed of 11 federations and umbrella organizations representing Indigenous and smallholder forestry organizations nationwide. The ACFO drafted the PINPEP bill and successfully lobbied for the creation of the national PINPEP program (Aguilar-Støen 2018; vonHedemann 2020). PINPEP is funded through the state's general budget and aims to give access to PES to IPs, LCs, and smallholders who were not eligible for PINFOR due to lack of formal land titles and/or because they did not meet the minimum land size requirement. PINPEP illustrates how Indigenous communities and smallholders, with the help of intermediaries supporting them, can catalyze political opportunities to enable them to access PES and be recognized as forest managers. PINPEP has directly and indirectly benefited 345,000 people, equivalent to 69,012 families, over 16 years of program implementation (2007–22)

(INAB 2023). The program prioritizes areas that have high food and nutritional insecurity, are considered extremely poor, and face high climate vulnerability—areas where most Indigenous communities and smallholders are located (de León 2010; INAB 2022).

Program design and outcomes

PINPEP fostered a more equitable national forestry incentive system in Guatemala through several innovative features. First, as regards program access and eligibility, PINPEP promotes IP, LC, and smallholder land tenure in several ways:

- It recognizes customary land rights and accepts other forms of proof of landownership beyond formal titles issued by the national property registry, such as a certificate of possession issued free of charge by the municipal office or a notarized copy of an ancestral title or deed issued by the Spanish colonial government.
- The program supports small landholders by stipulating a minimum land size of 0.1 ha for program enrollment.
- Its explicit objectives include promoting gender equity and the participation of women's groups (Arts. 2, 3, and 7, PINPEP law; Arts. 2, 3, 8, 20, and 23, PINPEP regulations).

Through these three features, generally marginalized segments of society can participate in the national PES program. These marginalized groups include Indigenous communities and their members, who often lack formal land titles; Indigenous individuals and peasant farmers, who typically hold small forest parcels; and women, who often face more barriers to access to public programs such as PES.

Second, PINPEP advances local institutional strengthening and participation in PES program governance by creating an inclusive steering committee to oversee PINPEP implementation. The steering committee is composed of three members and includes a representative of an organization of PINPEP participants called the National Network of Organized Beneficiary Communities of PINPEP (Red Nacional de Comunidades Organizadas Beneficiarias del PINPEP; RED-PINPEP). The other two members consist of representatives of the National Forestry Institute (Instituto Nacional de Bosques; INAB) and the National Association of Municipalities (Art. 5, PINPEP law). PINPEP stands out as a PES program that integrates program participants in an organized way through elected representatives in its formal governance structure. RED-PINPEP's membership in the steering committee facilitates regular input from IPs and smallholders into program management and space for voicing their perspectives and concerns. Beyond the program itself, RED-PINPEP's position enabled it to advocate for more inclusive provisions in the country's third PES program, succeeding PINFOR, the Incentive Program for the Establishment, Recovery, Restoration, Management, Production, and Protection of Forests (Incentivos para el Establecimiento, Recuperación, Restauración, Manejo, Producción y Protección de Bosques; PROBOSQUE), such as the acceptance of ancestral land titles as proof of landownership and greater allocation of the program budget to participants with smaller parcels (vonHedemann 2019).

Third, 35 percent of PINPEP projects from 2007 to 2022 were registered to female landowners (compared to 12 percent for the previous PES program). Gender equity is promoted in the program's training and extension services, and women are active members and leaders in RED-PINPEP.

PINPEP also has a significant impact on livelihoods enhancement and resilience as well as community development. For Indigenous communities and smallholders, the PES payments provide important benefits not just to PINPEP participants themselves but also to other members of the community. For program participants directly receiving PES payments, the payments provide the funds to fulfill the required forest management activities, provide access to much-needed resources to protect and improve their forests, commit them to work in forestry, and facilitate the learning of new land management practices to supplement existing practices—for example, protecting against wildfires (Pers. Comm. 2023a, b, c; vonHedemann and Osborne 2016). PINPEP also contributes to livelihoods and income diversification. PES payments are often reinvested in the household, such as to purchase food and clothing, pay for schooling or medical bills, or invest in a mill or other enterprise (vonHedemann and Osborne 2016; Pers. Comm. 2023b, c, d). The payments have also allowed some program participants who needed to migrate seasonally to other departments or cities for work to earn income by staying at home and working on PINPEP activities. The hiring of labor to help complete project activities facilitates the spillover of benefits to others in the community, which can be especially helpful to those who do not have enough land to enroll in the program.

PES payments to community or group projects tend to have a greater impact because more households benefit. Some communities or groups divide the payments directly among all participating households, whereas others first pay those members who provide labor for the required activities before distributing the remainder to participating households. In many cases, communities utilize PES payments to fund community development projects or infrastructure, such as road construction or repair or building community centers or meeting rooms (Pers. Comm. 2023b, c, d). In one instance, the community invested in a business enterprise, setting up an ecotourism project that makes profit distributions to all member households (vonHedemann and Osborne 2016). Communities also use PES payments to strengthen local institutions and enable them to advocate for the community with INAB and participate in forest policy debates (vonHedemann 2020; vonHedemann and Osborne 2016). INAB has instituted monitoring mechanisms to help ensure that incentive payments for communal or group projects are properly distributed within the community or among group members (Elías 2015).

PINPEP participants interviewed during a field visit to three municipalities shared that they generally view the program favorably and perceive the benefits to be worth the obligations. However, they believe that PES payments need to be higher to more fully compensate for opportunity and transaction costs as well as the amount of work that they put into the program—a finding also expressed in the literature (Pers. Comm. 2023a, b, c; vonHedemann 2020). They also report that PES payments have at times arrived late and only after protests and repeated meetings with government officials by RED-PINPEP and program participants, which required them to travel to Guatemala City (Pers. Comm. 2023a, b; vonHedemann 2020. Payment delays and other program challenges in PINPEP are further discussed in "Barriers to equitable benefit-sharing and finance access for IPs and LCs"). Importantly, beyond the economic and social benefits, the PES incentives help conserve land that is foundational to Indigenous communities' cultural identity, social cohesion, and independence in the face of historical marginalization (Elías 2015; Elías et al. 2009; vonHedemann 2020, 133). (See Appendix C for information on the case study methodology. An unpublished version of the full case study is available upon request.)

Conceptual framework to analyze benefit-sharing pathways

Framework overview

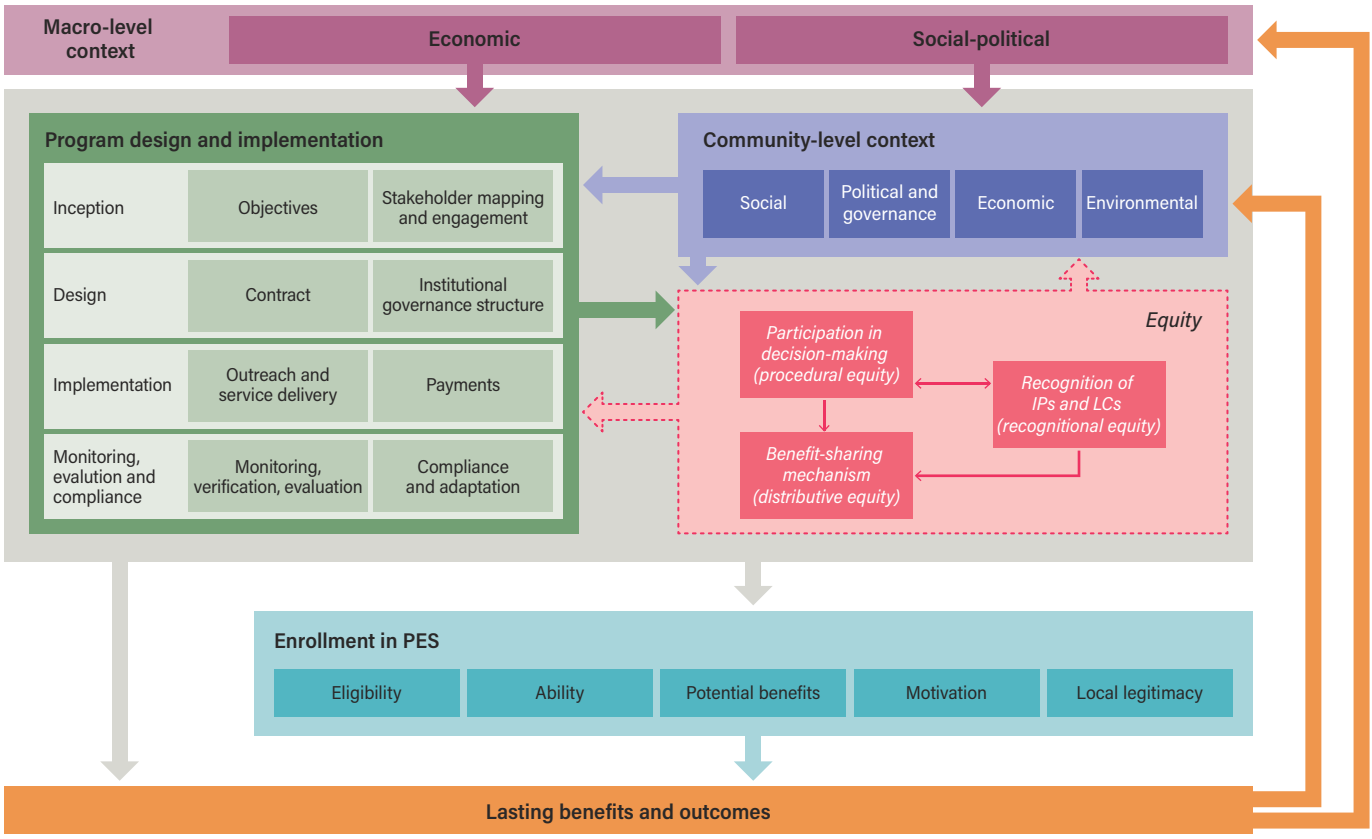
A conceptual framework was developed based on key insights from the literature review. The framework enables systematic and comparative analysis of the programmatic and contextual barriers to equitable participation and benefit-sharing for IPs and LCs in PES and similar financing mechanisms.

The conceptual framework, as shown in Figure 6, consists of four components identified through the literature as being critical for PES outcomes for IPs, LCs, and community members within them: context, program design and implementation, equity, and enrollment. The dynamic relationships between these components determines the outcomes of PES programs and benefit pathways for IPs and LCs.

- **Context** includes the broader sociopolitical and economic factors (macro-level context) and the specific local conditions (community-level context) that shape the opportunities and challenges for PES program design and implementation.
- **Program design and implementation** refers to the operational structure, decision-making processes, and strategies that guide the PES program from inception to monitoring.
- **Equity** arises from the dynamic interaction between the community-level context, including social, economic, environmental, and local political factors, and program design and implementation. This interaction shapes the inclusivity of rules and decision-making processes (procedural equity); the consideration of whose rights, knowledge, and values are included (recognitional equity); and how costs and benefits are allocated (distributive equity).
- **Enrollment** is the process by which IPs and LCs engage with the PES program; it is shaped by the interplay of eligibility, capacity, and motivations, which are influenced by context, design, and equity factors.

At its core, the framework focuses on the interaction between a PES program and IPs and LCs at the community level (in grey in Figure 6). The framework accounts for how elements in the broader sociopolitical and economic context of international and national systems (in purple) may influence

FIGURE 6 | Conceptual framework for IPs and LCs to benefit from PES



Notes: IP = Indigenous people; LC = local community; PES = payments for ecosystem services.
Source: WRI authors.

(both positively and negatively) the community-level context, in which the PES is implemented (in blue) as well as on the design and characteristics of a specific PES program (in green). PES program design and implementation set out the parameters for a program from start to finish. The extent to which PES program design and implementation accounts for the local context (including barriers and enabling conditions) and facilitates equitable participation and benefit-sharing (in pink), determines the extent to which IPs, LCs, and community members within them will be eligible, able, and motivated to enroll and succeed in PES (in light blue). Together, these factors and their interactions determine to what extent social and environmental objectives will be achieved and the benefits reaching IPs and LCs (in orange) and how these may impact the community and macro-level context.

The framework enables comparisons of diverse PES programs set in diverse contexts to provide relevant recommendations. It enables an understanding of how the same program implemented in different contexts will produce different barriers and how different design elements will be more appropriate in some contexts over others.

The relationship between the framework components is dynamic and may be reinforcing or conflicting. For example, constrained financial resources and limited prioritization of the needs of IPs and LCs likely mean that the local IP and LC context lacks sufficient recognition and may be distrustful of external actors, while on the other hand, PES programs will be less likely to prioritize strengthening the capacities of IPs and LCs in their programmatic activities. Similarly, program design that is not informed by the local context and does not support the participation of IPs and LCs is unlikely to produce benefit-sharing mechanisms in line with the communities' preferences. In contrast, programs that occur in well-capacitated local contexts and programs that facilitate equitable participation in decision-making can benefit from local knowledge and integration of locally preferred PES

activities and benefits, which in turn can best incentivize conservation actions and positive socioeconomic and environmental outcomes.

Framework components

Macro-level context

Context stretches across environmental, biophysical, ecological, socioeconomic, cultural, political, and institutional factors (Rodríguez-Robayo and Merino-Perez 2017), which sets the conditions for every stage of a PES program and the extent to which it might succeed in its intended aims. The framework separates context into two broad levels to distinguish between the broader *macro-level context,* which sets out the overarching conditions for PES design, implementation, and benefit-sharing, and the specific *community-level context* in which PES is implemented. This distinction helps to recognize and account for the heterogeneity and diversity of conditions IPs and LCs face, not only between countries and subnational regions but also between those within close proximity.

The macro-level context accounts for the broader socioeconomic and political contexts, including socioeconomic trends (historical and prevailing) regarding land tenure, rural development, strength of markets, national and subnational governmental capacities, national and international strategies, and institutional structures that can affect the capacity of ES providers to effectively participate and benefit from PES (Wegner 2016). These factors set the conditions for PES program design and implementation and influence the conditions at the local community level.

Community-level context

Community-level contextual factors encompass the economic, sociocultural, political governance, and natural environment in which PES operates, which provides enabling conditions for how IPs and LCs can participate in decision-making and benefit from PES (McGinnis and Ostrom 2014). This enables the integration of varying characteristics and capacities at the community level to understand why one program may succeed better in one specific context than it does in another. Such characteristics include the customary tenure regime; strength of local governance; trust in civil society, government partners, and each other; wealth and status inequality; land quality and availability; distance from markets; literacy; community priorities; and so forth (Rodríguez-Robayo and Merino-Perez 2017; Rodríguez-Robayo et al. 2020)

PES program design and implementation

PES program design and implementation is the vehicle of action for PES developers and implementers across all stages of the program, from inception to monitoring and evaluation. It sets out the program's objective, scope, and scale (Brownson et al. 2019; Sattler et al. 2013). This is where operational decisions are made that have a direct impact on how IPs and LCs can benefit. It establishes the institutional arrangement, including the key actors and their roles in the PES, the eligibility criteria for providers and the targeted ES, and how the different actors are engaged throughout the program (Grima et al. 2016; Tamba et al. 2021).

The project plan or contract between the ES buyers and providers sets out the details and conditionality for the exchange. It stipulates the payment structure of the PES by type (cash and/or nonmonetary), level, frequency, and payment method—whether payments will be to individuals, groups, communities, or a combination (Börner et al. 2017). It can also set out how these payments are distributed to and within communities or devolve this authority to groups and communities. Finally, this component sets out how a scheme is monitored and evaluated and the actions taken in response, such as sanctions for noncompliance.

Equity

The extent to which both PES program design and implementation, alongside the community context, support or hinder multidimensional equity—contextual, procedural, recognitional, and distributive—can significantly impact program outcomes. These outcomes encompass how PES benefits IPs and LCs and how the recognition of their rights and their involvement in decision-making processes, through the integration of local knowledge, customs, and alignment with customary tenure regimes, strengthens PES design and implementation.

This framework builds on existing research to emphasize the interplay between procedural equity, which refers to the inclusivity of decision-making processes; recognitional equity, which acknowledges and validates the rights, identities, knowledge, and contributions of groups like IPs and LCs and stresses the importance of integrating these perspectives into decision-making; and distributive equity, which addresses how the costs, benefits, and risks of PES programs are distributed among stakeholders (Haas et al. 2019; Lliso et al. 2021; McDermott et al. 2013; Pascual et al. 2014). While contextual equity—the influence of broader social, economic,



environmental, and political conditions on the ability of IPs and LCs to participate in and benefit from PES—is a critical factor, this framework addresses it separately, as described earlier. This approach aligns with existing research that considers the role of macro-level conditions distinctly (Börner et al. 2017; Haas et al. 2019; Rodríguez-Robayo and Merino-Perez 2017). It emphasizes the role of contextual factors while providing focused attention on procedural, recognitional, and distributive dimensions that are more directly affected by program design and implementation.

Understanding the differences across and within groups is important for analyzing why equal treatment is unlikely to result in equitable distribution of costs and benefits. In turn, the perpetuation of inequality influences how people perceive and respond to incentives. Therefore, an approach blind to this complexity risks both exacerbating existing inequalities and undermining desirable environmental outcomes (McDermott et al. 2013; Pascual et al. 2014). Conversely, equity enhances the environmental effectiveness and economic efficiency of PES mechanisms through community support and engagement (Brownson et al. 2019) as well as through the integration of local knowledge and practices (Denham 2023; Ingram et al. 2014). For instance, a study of 45 PES programs across 12 Latin American countries revealed that programs perceived as more equitable were more likely to achieve both social and environmental objectives (Lliso et al. 2021).

Enrollment

Enrollment of IPs and LCs in PES programs is influenced by the interplay between program design, contextual factors, and the equity dimensions discussed earlier. These elements not only establish the formal eligibility criteria but also create the enabling conditions at both community and macro levels that affect participation. These conditions shape three key aspects of participation: eligibility, which determines whether the household, group, or community meets the formal requirements set by the program; capacity, which refers to the ability of IPs and LCs to effectively engage based on their available resources, skills, and knowledge; and motivations, which encompass the personal, community, and socioeconomic factors that drive individuals and communities to participate in PES, including the perceived benefits and its legitimacy within the local context (Bottazzi et al. 2018; Jones et al. 2020b; Pagiola et al. 2005).

These reinforcing relationships then determine to what extent IPs' and LCs' capacities strengthen outcomes, how they will benefit, and whether such outcomes will be equitable. In the next section, key barriers to equitable participation and benefits will be discussed in more detail.





Barriers to equitable participation, benefit-sharing, and finance access for IPs and LCs

IPs and LCs face a multitude of multifaceted and interlinked barriers to their equitable participation and access to benefits in PES. These stem from structural and institutional constraints, community-level conditions, and programmatic challenges. At the macro level, power imbalances, financial instability, and historical land dispossession create significant obstacles. Community-level barriers, including economic inequalities, social norms, and weak governance, further impede effective participation. Programmatic challenges, such as exclusionary enrollment criteria and a lack of community input, exacerbate these issues. Together, these barriers prevent IPs and LCs from fully engaging in PES and realizing its benefits.

This section identifies and elaborates on key barriers to equitable participation, benefit-sharing, and finance access for IPs and LCs in PES programs. These barriers are categorized into two main groups: contextual barriers and programmatic barriers.

- **Contextual barriers** stem from broader sociopolitical, economic, and environmental factors, operating at both the macro level (national and international conditions) and the community level (local factors). The macro-level context shapes PES program design and implementation, including issues like funding volatility, land distribution, and policy misalignment. The community-level context—such as local governance, economic disparities, and social dynamics—affects how IPs, LCs, and their community members can engage with PES programs and access benefits.
- **Programmatic barriers** are related to the design and execution of PES programs, including exclusionary processes, biased priorities, and limited local participation.

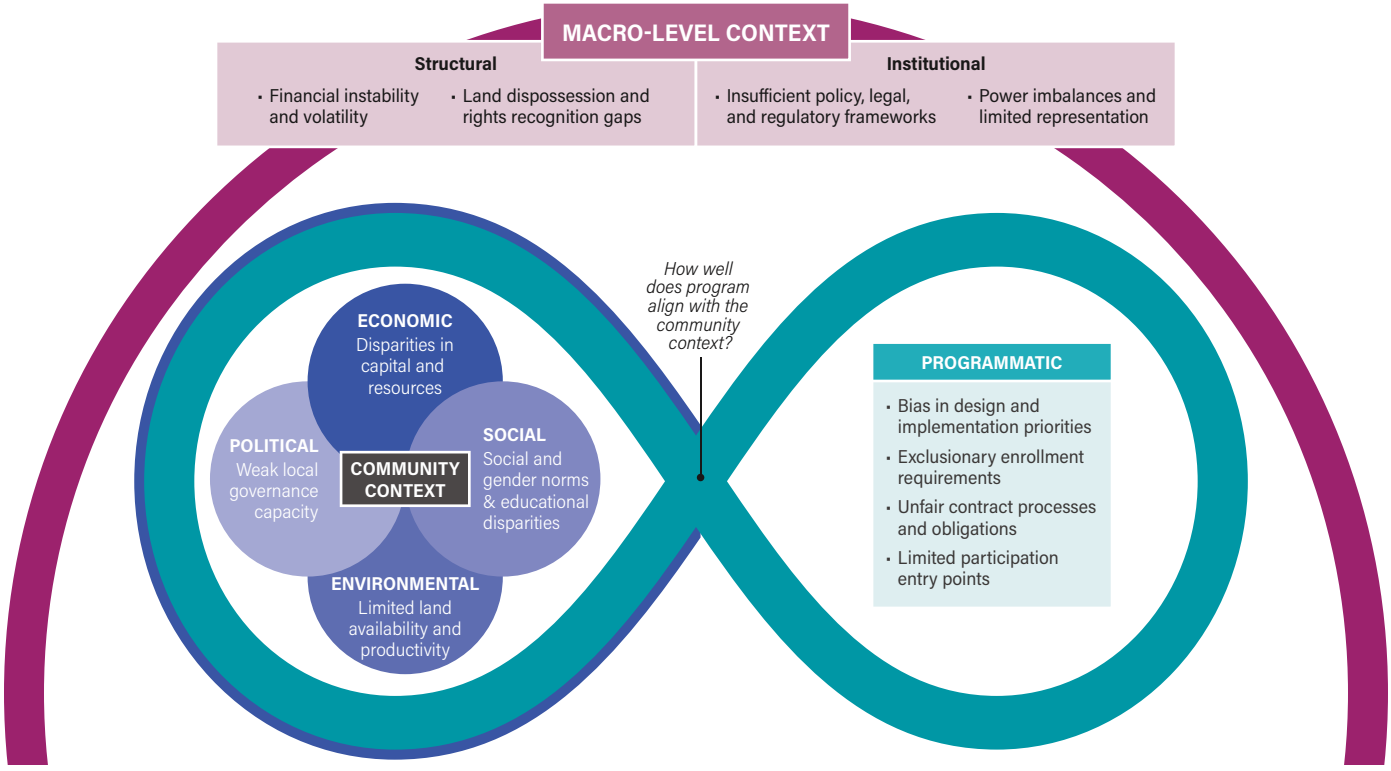
When PES programs fail to align with local realities, these barriers amplify existing contextual challenges and deepen inequities.

Many of these barriers are interlinked. Structural barriers, such as sociopolitical, economic, and governance-related factors, shape how operational structures function, often enabling or hindering the design and implementation of PES programs at the community level and affecting the extent to which these programs succeed within the community.

Figure 7 summarizes these barriers, illustrating how macro-level contextual factors (in purple) shape community-level conditions (in blue) and influence program design. The green section shows how programmatic barriers, when misaligned with local contexts, reinforce these challenges and deepen inequalities.

The following subsections provide a detailed breakdown of these barriers, with examples showing how they impact IP and LC participation and benefit-sharing in PES programs.

FIGURE 7 | Overview of contextual and programmatic barriers to equitable participation and benefit-sharing for IPs and LCs in PES



Source: WRI authors.

The discussion on barriers is followed by an example of how structural, institutional, and programmatic barriers intersect in a generally positive PES program, Guatemala's PINPEP.

Contextual barriers

The following section examines macro- and community-level contextual barriers in detail, highlighting their impact on IP and LC participation and benefit-sharing in PES programs.

Macro-level contextual barriers

These barriers refer to structural and institutional barriers from both the current national and international systems, and the enduring effects of past sociocultural, economic, environmental, and political structures (McDermott et al. 2013; Rakotomahazo et al. 2023; Wunder 2005; Zanella et al. 2014). Barriers at this level constrain the level and sustainability of resources accessible to IPs and LCs through PES programs as well as constrain the capacities of IPs and LCs at the community level to equitably participate and benefit from PES.

Structural barriers

Structural barriers refer to obstacles within the broader sociocultural, political, and economic frameworks that shape PES programs and the communities where they are implemented (McDermott et al. 2013; Wunder 2005). These barriers are often systemic, hindering IPs and LCs from participating effectively in PES programs and fully benefiting from their contributions.

Dependence on external funding and financial volatility in PES programs

PES programs often rely heavily on external funding, which can create misalignments between the interests of ES providers and buyers, perpetuating power imbalances and making these programs vulnerable to financial instability. While PES was originally envisioned as a direct exchange between ES providers and buyers, most programs are funded indirectly through government taxation, environmental funds, or international offset markets. Watershed programs are an exception because demand tends to be more localized and programs are often funded directly through companies or upstream water users. However, even in watershed programs, funding is often driven by corporate interests, such as improving public-private relations (Santos de Lima et al. 2019), rather than ensuring adequate payments to IPs and LCs for their services.

As PES programs are not a purely market-based mechanism, donor funding is critical for initiating PES programs, especially in the early stages, when technical assistance and capacity-building are essential for supporting IPs and LCs (Lee 2017). However, shifts in donor governments' geopolitical priorities can disrupt the flow of public funds and ODA, leading to interruptions or reductions in support. For instance, changes in Australian aid priorities led to the 2014 closure of the Kalimantan Forests and Climate Partnership in Indonesia, highlighting how such shifts can destabilize PES programs and undermine long-term support for local communities (Miles 2021).

Insufficient political will to prioritize IP and LC needs risks diverting funds and limiting the resources needed to implement supportive policies and sustain PES programs. Publicly funded PES programs are often vulnerable to interruptions or reductions as shifting geopolitical and economic conditions drive governments to prioritize competing agendas (McBurney et al. 2023; Perevochtchikova et al. 2021). Faced with competing priorities, governments frequently prioritize economic growth agendas over the long-term allocation of resources for IPs and LCs (Forest Peoples Programme et al. 2020; Shames et al. 2016).

Budgetary constraints are common for government-funded PES programs, with implementing agencies often facing limited time frames for funding (Rosa da Conceição et al. 2018). Inflation often exacerbates these constraints, reducing the real value of funding allocations over time (Silva-Muller 2022).

In Ecuador, the collapse of global oil prices in 2014 and a 2016 earthquake pushed the country into a deep recession, disrupting Programa Socio Bosque for nearly two years. These disruptions, compounded by halted bilateral conservation funds and the closure of the institution managing international conservation funds, increased opportunity costs for participants and eroded trust in the program and the government as brokers of PES (Etchart et al. 2020).

Similarly, cuts to federal environmental budgets have impacted PES programs in Mexico and Brazil. In 2017, Mexico's federal budget reductions decreased resources for the National Forestry Commission (Comisión Nacional Forestal; CONAFOR), which oversees PES programs, by over 60 per-

cent (Trench et al. 2018). In Brazil, the Bolsa Verde program was terminated in 2018 following a 12 percent reduction in the Ministry of the Environment's budget (Guerra 2018).

Global finance mobilization is heavily influenced by international and national policy agendas, which shape the strategic priorities of governments and institutions, including donors (Swiss 2021). Programs that align with these agendas, such as Brazil's SFCP (Zwick 2019) and Guatemala's PINPEP (see the PINPEP case study above for more information), often benefit from substantial international support. However, this selective allocation of resources disadvantages programs that fall outside these priorities, perpetuating unequal access to funding and resources.

The increasing global focus on carbon emissions mitigation has heightened interest in PES programs prioritizing carbon sequestration. While this focus attracts funding, it risks narrowing the scope of PES programs to carbon credit production, which may come at the expense of local community needs and decision-making (Osborne and Shapiro-Garza 2018). This funding also contributes to expanding the VCM, increasing demand for nature-based credits. However, carbon-focused PES programs remain vulnerable to the volatility of the VCM, where fluctuating prices and inconsistent demand undermine financial reliability for IPs and LCs (World Bank 2023) (see Box 5 for details).

Insufficient and unstable resource flows for PES programs create financial volatility (Perevochtchikova 2016), hindering IPs' and LCs' access to adequate and continuous finance. This results in low, delayed, or suspended payments and insufficient resources to fund activities such as technical assistance and capacity-building, which strengthen local capacities to successfully implement PES and provide additional benefits to IPs and LCs.

Historical dispossession and incomplete recognition of the land and resource rights of IPs and LCs

Unequal land distribution and historical dispossession continue to limit equitable access to PES benefits for IPs and LCs. How land has been historically divided and recognized has had important implications for both the recognition and formalization of land tenure in the present and the corresponding distribution of benefits from PES. These historical inequities have left many IPs and LCs with fragmented, small parcels of land, often neither formally recognized nor secure. The legacy of colonial-era land dispossession and subsequent land reforms has resulted in the reallocation of poorly endowed lands, such as those with limited agricultural potential, inadequate infrastructure, or poor market access.

In Ecuador, land reforms after colonial dispossession redistributed land to IPs, but these parcels were often small, with poor soil, limited irrigation, and little market access, contributing to high poverty, with over 40 percent of households in extreme poverty (McBurney et al. 2023). Similarly, in Costa Rica, even in cases with legal recognition, Indigenous territories face ongoing land invasions and remain among the poorest in the country (Molina-Murillo et al. 2014). In the United States, Indigenous communities often face challenges in securing the capital needed to participate in PES because their federal trust land status prevents Indigenous farmers and ranchers from using their land as collateral to access loans to cover these costs (Johnson et al. 2018).

Nonrecognition of customary tenure regimes hinders IPs and LCs from enrolling in PES programs. Despite customarily holding about 50 percent of the world's land, IPs, Afro-descendant peoples, and LCs have legal recognition for only 18 percent of it (11 percent ownership, 7 percent control).[6] Regionally, 25 percent of customarily held land is recognized in Asia (mostly China), 21 percent in Latin America, and 19 percent in sub-Saharan Africa (RRI 2023).[7] In cases where programs require formal land rights, this lack of recognition creates an additional administrative burden for IPs and LCs looking to participate, or it may prevent IPs and LCs from eligibility altogether.

IPs and LCs not only struggle with formal land titles but also with the unclear allocation of resource rights, such as rights over water and carbon sequestration. This lack of clarity can lead to disputes over resource use and limit access to PES programs, which are often conditional on clearly defined resource rights. This challenge is particularly pronounced with emerging opportunities, such as regarding rights to carbon sequestration from coastal and marine ecosystems like mangroves (Karpowicz et al. 2024; Rakotomahazo et al. 2023; Wylie et al. 2016).

In many cases, IPs and LCs lack formal titles, have unrecognized customary tenure rights, or cannot meet land size requirements, making them ineligible for PES programs, which often require formal land rights for participation (Dawson et al. 2021; Tamba et al. 2021; Tran et al. 2016). For instance, in Costa Rica, many Indigenous communities lack the formal documentation required for enrollment

in the national PES program, with non-Indigenous actors sometimes holding overlapping land rights (Ramírez-Cover 2017). In other cases, the uncertainty surrounding land tenure increases risks for ES providers, discouraging them from enrolling in PES programs because they lack assurance that their investments in land will be protected long term, as observed in Uganda (Aganyira et al. 2020).

Historical dispossession, inequitable land redistribution, and unfair formalization processes have long-lasting effects on IPs' and LCs' access to PES. These historical legacies shape current land tenure recognition, limiting participation and benefit-sharing, because those with more formally recognized land are better positioned to enroll in and benefit from PES programs.

In Vietnam, governance shifted to state control in 1954 with a decree declaring forests as a national asset managed by the state. Starting in 1988, governance began to decentralize through land allocation programs, which included issuance of Red Books (sổ đỏ)—certificates that conferred tenure and use rights to forests, either individually or as a group (McElwee et al. 2020). Eligibility for PFES payments requires a Red Book or a contract with a state forest owner (Loft et al. 2017; McElwee et al. 2020). However, the distribution of Red Books often favors well-connected individuals, and ethnic minorities and poorer groups are allocated less or lower-quality land or no land, limiting their eligibility for PES payments (Haas et al. 2019; Loft et al. 2017). Because PES payments are based on land under management, these disparities reduce payments to marginalized groups, while villages with larger, more productive forests tend to be more satisfied with PFES payments (Loft et al. 2017).

Additionally, colonial era landownership systems continue to perpetuate barriers to equitable benefit-sharing within communities. For example, in Kenya, historical land policies that recognized only male household heads as landowners perpetuate gender inequality in decision-making and benefit-sharing in local PES programs, despite legal reforms (Kariuki et al. 2018).

Historical dispossession and persistent land encroachment can create an environment of high distrust toward external actors, including PES schemes, and reinforce the perception that PES may threaten tenure security (Arias-Arévalo and Pacheco-Valdés 2022; Etchart et al. 2020; Ingram et al. 2014; Johnson et al. 2018; Kwayu et al. 2017; Lliso et al. 2020; Martin et al. 2014b; Silva-Muller 2022; Tran et al. 2016; Vergara-Asenjo et al. 2017). Mistrust has been found to deter



enrollment and consequently bar access to benefits from PES across Ecuador (McBurney et al. 2023; Murtinho and Hayes 2017), the Tropical Andes (Bauchet et al. 2020), and Uganda (Aganyira et al. 2020).

For instance, in Ecuador, the legacy of land grabs by the state, combined with recent government actions—such as taxation on PES revenues and the issuance of extractive industry licenses—has exacerbated mistrust among Indigenous communities toward political and state actors (Etchart et al. 2020; McBurney et al. 2023). Misinformation surrounding the Programa Socio Bosque, including rumors that participation could lead to land confiscation, created significant challenges for community leaders in communicating the PES program; at times, these leaders faced hostility from community members (Etchart et al. 2020; McBurney et al. 2023). One study found that 59 percent of participating communities were hesitant to enroll due to concerns about land loss, whereas nonenrolling communities cited mistrust and concern about community conflict (Murtinho and Hayes 2017).

Tenure systems across different regions or communities can vary substantially between different IPs and LCs within a given country or even subnational region of a country, as seen across Indonesia (Leimona et al. 2015a), Mexico (Costedoat et al. 2016), and Vietnam (Tran et al. 2016). This variation can be due to a mix of factors, including historical dispossession, incomplete recognition of land rights, and cultural differences in land management practices. For national and subnational PES programs, this poses challenges to appropriately reflect the local context. For example, Mexican *ejidos* can have both communal and individually owned parcels within territories formally recognized as communal. Similarly, the case of the Hopi reservation in the United States demonstrates how multilayered land tenure systems—where

clan and village landownership regimes coexist and individual heirship can involve up to 100 members per acre—complicate PES participation due to unclear ownership and jurisdictional issues; this prevents Indigenous communities from accessing financial support through programs like the Environmental Quality Incentives Program (Johnson et al. 2018).

In Vietnam, land tenure is marked by two layers of complexity: formal rights through the allocation of Red Books and traditional and de facto tenure regimes. Traditional land tenure varies across Vietnam's different ethnic communities, encompassing differing combinations of common property, individual rights, and family or clan forest rights, with many enduring throughout the changes in formal land rights (Nguyen et al. 2022). This creates a challenge for PES intermediaries to identify the true landowner because those occupying and managing a plot of land may often differ from those in possession of a Red Book (Tran et al. 2016). As a result, PES programs often fall short of fully aligning with local conditions, as observed in the implementation of PFES in the Da Bac district in Hoa Binh province. Because landowners were not easily identifiable, payments were distributed across households evenly. Many participants considered the lack of differentiation unfair and ineffective, expressing that if benefits were more directly channeled, forest protection would be more effective (Tran et al. 2016).

Institutional barriers

Interlinked with structural barriers are institutional barriers, detailed below, which include deficiencies in procedures and policies that shape agenda setting, decision-making processes, funding, and regulatory frameworks.

Insufficient enabling policy, legal, and regulatory frameworks and safeguards

Regulatory complexity, stemming from inconsistencies between jurisdictional levels or between preexisting laws and PES frameworks, can increase both real and perceived uncertainty and risk for potential enrollees as well as amplify bureaucratic challenges and risks for investors and donors. Additionally, frameworks regulating natural resources, such as water, forests, and carbon sequestration, often lack clear guidelines for coordination and fail to define the institutions responsible for overseeing, implementing, and regulating PES programs. Unclear mandates and poor institutional coordination across sectors further exacerbate these issues, preventing a cohesive approach to PES implementation.

In certain instances, the lack of national regulations for PES programs, particularly those implemented at local scales or by NGOs, limits their ability to access ES markets (Mangubhai and Lumelume 2019; Rakotomahazo et al. 2023). In Madagascar, for instance, the absence of clear legal frameworks governing mangroves and carbon rights has hindered the ability of projects such as Tahiry Honko to participate in carbon markets and has been further exacerbated by political instability and changes in institutions responsible for mangroves and PES (Rakotomahazo et al. 2023).

However, sufficient political will is required to establish the enabling regulatory environment to support PES scaling. In two PES programs in Kenya and Uganda, despite efforts by the implementing NGOs to advocate for policies to promote sustainable agriculture land management activities and carbon projects, no such policies were put in place because of insufficient interest by government institutions (Shames et al. 2016).

The absence of enabling policy and regulatory frameworks, outlining clear property rights, responsibilities, and benefit-sharing mechanisms among stakeholders, alongside effective dispute resolution, diminishes the regulatory certainty necessary for IPs and LCs to benefit from both public and private programs. For example, Brazil's government suspended the allocation of federal funds to Proambiente, one of the few programs in Brazil where IPs and LCs are eligible in addition to private farms, mainly due to the absence of specific legislation (Montero-de-Oliveira et al. 2023; Rodrigues de Oliveira and Guimaraes Altafin 2008).

The absence of clear frameworks has been shown to block IPs and LCs from directly accessing private markets. In Alberta, Canada, provincial regulations prevented the Red River Cree Nation from entering a carbon sequestration agreement that would have unlocked opportunities through PES (Smith et al. 2019). Likewise, in Vietnam, although communities receive funds through PES programs, unclear legal frameworks surrounding communal tenure create uncertainty about whether they are recognized as legal property holders with rights to sell carbon credits and engage in civil transactions; this has delayed their participation in carbon markets (Nguyen et al. 2022).

Overlapping laws and regulations create regulatory complexity, increasing transaction costs and hindering program effectiveness. In Indonesia, such overlaps regarding land tenure and fiscal arrangements have caused inconsistencies and limiting coordination across jurisdictional levels (Fauzi

and Anna 2013; Kim et al. 2016, 2018; Resosudarmo et al. 2014). This creates regulatory complexity and ambiguities that significantly increase transaction costs, hampering the effectiveness of intermediary actors (Kim et al. 2016). In one case, the suspension of a program was attributed to complicated fiscal arrangements (Fauzi and Anna 2013).

Power imbalances and limited representation in high-level decision-making

In theory, ES providers and buyers are assumed to have equal bargaining power; in reality, however, IPs and LCs often have limited leverage and bargaining power in PES negotiations, let alone program design. Power and information asymmetries are common because transactions occur between companies, governments, or intermediaries at subnational, national, or international levels and IPs and LCs at the community level (Rodríguez de Francisco and Boelens 2014). This disparity results in powerful buyers dominating the process and many small-scale providers struggling to assert their interests.

The limited representation of IPs and LCs in influential decision-making arenas constrains their equitable participation in decisions regarding PES and resource access. Such decision-making spaces are influenced by existing power dynamics (Aguilar-Støen 2015). Consequently, this lack of direct representation limits the extent to which IPs and LCs may influence the priorities determined in the initial development of a PES program, negatively affecting how IPs and LCs will be considered in funding allocations (vonHedemann 2020) (see the PINPEP case study).

In contexts with limited civic space, hierarchical institutions limit opportunities to meaningfully participate in PES decision-making. In state-dominated contexts such as in China, Laos, and Vietnam, civil society organizations, including both NGOs and IP and LC organizations, face restrictions on the types of activities they may conduct, often being prohibited from those perceived as political activities (KimDung et al. 2016). These restrictions undermine the capacity of NGOs to support and empower communities and the ability of IPs and LCs to mobilize themselves and directly engage in PES programs. These restrictions diminish the inclusion of Indigenous knowledge and collaboration in PES programs, as seen in Vietnam's PFES program (KimDung et al. 2016).

Community-level contextual barriers

These barriers reflect the challenges IPs and LCs face due to local conditions that limit their capacity to participate effectively in PES. The barriers are multidimensional, stemming from economic, political, sociocultural, and environmental disparities often reinforced by broader factors like inadequate representation in decision-making, economic marginalization, and insufficient recognition of land and resource rights.

Economic barriers

Income and wealth disparities limit community participation and exacerbate inequities between groups

Contextual disparities among communities impede the effective and equitable participation of IPs and LCs in PES processes, hindering the accumulation of PES benefits. Socioeconomic factors that influence the economic standing of communities, including proximity to regional capitals (Beauchamp et al. 2018) and the economic significance of the region (Mamedes et al. 2023), have been found to influence the economic standing of communities, potentially favoring certain communities over others in PES.

Household-level income, wealth, and capital influence the extent to which community members can enroll in and carry out PES activities. Those with diversified livelihood activities and more capital assets are more likely to enroll in PES because they perceive less risks in altering livelihood strategies and are better able to bear the costs of changing activities (Beauchamp et al. 2018; Resosudarmo et al. 2014; Jones et al. 2020a). Studies have consistently found that individuals enrolled in PES tend to be wealthier than their nonenrolled counterparts (Bremer et al. 2014a; Grillos 2017; Ren et al. 2020; Waruingi et al. 2021). Similarly, PES programs requiring up-front investments in materials and labor deter individuals and communities with lower capital assets from enrolling (Aganyira et al. 2020; Hayes 2012; Izquierdo-Tort et al. 2021; Johnson et al. 2018). As Indigenous households and communities are consistently found to have higher rates of poverty, this is a particular barrier (McBurney et al. 2023; Molina-Murillo et al. 2014). Such barriers are further exacerbated by the pressures on land held by IPs and LCs, such as land encroachment and degradation, which limit available land and resources for communities and community members to engage in PES programs.

Communal benefits that require complementary capital assets hinder the equitable use of benefits at both the individual and community levels. In Cameroon, where substantial income disparities exist between the locally dominant Bantu-Fang peoples and the Baka Indigenous ethnic groups, benefits such as solar panels, generators, and water supply infrastructure were found to be inaccessible to the Baka community members because they lacked the resources to utilize and maintain them (Tegegne et al. 2021).

Environmental barriers

Limited natural resource endowment and land availability

Initial natural resource endowment, including land availability, may prevent community members from enrolling in and benefiting from PES, particularly for low-income members. For example, in the Kon Tum and Dak Lak provinces of Vietnam's central highlands, Indigenous households with more productive land are more likely to be enrolled in PFES (Pham et al. 2023). Meanwhile, smaller landowners in Ecuador (Bremer et al. 2014a), Tanzania (Kwayu et al. 2014), and Uganda (Aganyira et al. 2020; Shames et al. 2016) face obstacles in enrolling in PES and investing in land due to limited land availability, which hampers their ability to allocate land to multiple uses (i.e., consumption and PES activities). Consequently, smaller landowners face lower margins for error and tend to be more risk averse than larger plot owners.

Social barriers

Social norms, gender dynamics, and educational disparities

Project design that overlooks community values and norms may unintentionally favor certain social groups over others, reinforcing intracommunity inequalities in payment allocation and benefit-sharing, even when procedural equity is prioritized. Social and cultural norms, such as those rooted in entrenched gender roles, can significantly impede women and other disadvantaged social groups from participation in PES programs, even when legal frameworks support gender and social equality.

Informal landownership practices that predominantly recognize male household heads often prevent women from enrolling in PES programs, irrespective of their legal entitlement to land rights as seen in Kenya (Kariuki et al. 2018). Similarly, in Fiji's Drawa Forest Conservation Project, despite the ability to inherit land, social status and cultural norms restrict women's participation in land-use decision-making, and limited access to bank accounts prevents them from receiving direct PES payments (Shah and Race 2024). Likewise, in Vanuatu, because chief titles are handed down patrilineal lines, women cannot be chiefs and are excluded from ownership and resource rights (Shah and Race 2024). These gendered barriers are deeply embedded in societal structures, reflecting long-standing power dynamics within communities, and are difficult to dismantle. For examples that offer a more detailed exploration of these dynamics, see Box 4.

Limited available labor acts as a barrier to IPs and LCs enrolling in PES programs. PES activities are generally labor-intensive, which necessitates labor being reallocated from other livelihood activities. Studies have found lack of labor to be a deterrent, with enrolled households tending to have more family members (Jones et al. 2020a; Lee 2017; Pham et al. 2023).[8]

Discrepancies in education and literacy levels can also reinforce power imbalances between program developers and communities/individuals as well as between individuals within communities, creating barriers to equitable participation, negotiation, and access to benefits in PES (Engel et al. 2008). Households enrolled in PES programs tend to be more educated than their nonenrolled counterparts (Beauchamp et al. 2018; Jones et al. 2020a). Information asymmetries and other discrepancies may limit the capacities of disadvantaged groups within a given community to advocate for their own interests and reinforce dependencies on those more advantaged (McGrath et al. 2017; Tegegne et al. 2021); this then opens the scope for elites to control information to further their interests (Lapeyre et al. 2015). Additionally, reliance on verbal communication creates barriers for disadvantaged community members to access unbiased and consistent information regarding PES contract terms, rights, responsibilities, and benefit-sharing. For instance, in Vietnam's Dien Bien province, high illiteracy has resulted in varying levels of understanding of the PFES program, which influenced the type of contracts signed (Loft et al. 2017).

BOX 4 | Social and cultural norms as barriers to participating in payments for ecosystem services: A gendered perspective

The following examples underscore the persistent impact of social and cultural norms, particularly those around gender, in shaping who can access the benefits and decision-making processes of payments for ecosystem services (PES) programs.

In Kenya, although women legally have the right to own land, gender norms inherited from colonial land tenure systems favor male household heads as the recognized landowners.[a] The resulting unbalanced landownership has limited women's ability to engage in PES; in the Mara North Conservancy PES program, for example, landowners are the only participants eligible for PES enrollment and decision-making roles.[b] In Rwanda, the Reconciling Biodiversity and Development through Direct Payments for Conservation (ReDirect) pilot project in rural settlements surrounding the Nyungwe National Park found that women reported feeling less empowered than their male counterparts to contribute to decision-making processes, highlighting gender imbalances in leadership roles and influence over PES outcomes.[c]

Likewise, in the Nomedjoh–Nkolenyeng and Ngoyla–Mintom PES projects in Cameroon, women's participation in project meetings was limited; they were often excluded from discussions and not consulted on meeting agendas. Additionally, decisions about meeting times were typically made by village chiefs without community consultation, which disproportionately affected women's ability to engage.[d]

Although legal and programmatic frameworks may strive for inclusivity, the effectiveness of such initiatives is contingent on addressing the deeper social and cultural factors that perpetuate exclusion. In Uganda's Trees for Global Benefits program, policies requiring wives' signatures on agreements have not significantly increased women's enrollment, highlighting the ongoing impact of gendered social structures that limit their full participation.[e]

Similarly, in Vietnam's Nam Đông district, despite targeting marginalized groups, enrollment in PES programs is still skewed in favor of more privileged groups, with gender, ethnicity, and local political affiliation playing decisive roles in determining who can participate.[f]

A study of 10 communities in the Selva Lacandona region of Chiapas, Mexico, found that efforts to promote gender and youth inclusion in the Selva Lacandona Special Program were undermined after the introduction of new criteria in 2014. Communities bypassed these requirements by modifying PES committee structures, such as appointing family members to meet the criteria. One local leader explained, "CONAFOR (the government agency responsible for implementing the PES) asked for a committee in 2015 with a woman and a young person. . . . They have their own committees where [they] gather and make the rules. I do not know why they came up with the idea of a committee with women and youth. But we did it to get extra points because we compete with many applications. That is why I remained as president of the committee with my wife and nephew."[g] This example underscores that when efforts to promote diverse and equitable participation are not well understood or embraced, they risk being viewed as procedural formalities rather than meaningful steps toward equitable participation and benefit-sharing in PES.

Sources: a, b. Kariuki et al. 2018; c. Martin et al. 2014b; d. Tegegne et al. 2021; e. Shames et al. 2016; f. Haas et al. 2019; g. Izquierdo-Tort et al. 2021, 7.

Political and governance barriers

Weak local governance, institutional capacity, and elite capture risks

Weak governance capacities in community-level institutions may prevent effective payment and equitable benefit-sharing within the community, especially in the case of collective contracts. Several studies of PES in Ecuador and Mexico have found that when communities are more organized and are perceived to have greater institutional capacity, households are more likely to be satisfied with PES outcomes and perceive the distribution of benefits as fair (Costedoat et al. 2016; Hayes and Murtinho 2018; Hayes et al. 2015; Jones et al. 2018; Nieratka et al. 2015). Poor institutional capacity often leads to information asymmetry; this enables elite capture, where individuals with greater social, economic, or political influence disproportionately benefit, perpetuating intracommunity inequities (Post 2008).

PES programs may bring positive outcomes, such as increased financial resources and community empowerment; yet at the same time, they may inadvertently promote negative effects, such as reinforcing existing inequalities between groups at the ground level. Local institutions may not represent all social groups, such as women and youth, and may be especially challenging in cases of communities with heterogeneous ethnic groups, as seen between the locally dominant Bantu–Fang peoples and the Baka Indigenous peoples in PES pilot programs in Cameroon (Tegegne et al. 2021). Furthermore, when community members perceive corruption or weak institutional capacity at the community level, this mistrust erodes the credibility and legitimacy of local institutions to promote and protect the interests of all community members and fuels concern among community members regarding the transparency of communal funds and how they are spent (Gross-Camp et al. 2012).

In many customary systems globally, including Amazonian Indigenous communities, governance structures are pluralistic rather than centralized, with multiple local leaders and groups (West 2016). In such systems, PES projects run the risk of strengthening the relative power of one group over others, giving rise to internal conflicts or reinforcing historical conflicts; this can, in turn, pose a particular threat to the long-term sustainability of PES projects.

Creating parallel structures to facilitate PES implementation—without carefully aligning with existing governance systems—can exacerbate elite capture or distort power dynamics. This risk is heightened in contexts where historical and prevailing marginalization and inadequate recognition of IPs' and LCs' rights and practices breed distrust of external actors, specifically when benefits are perceived as being unreliable, insufficient, and unfair. In Colombia, for example, the creation of Acuacali, a local community organization tasked with executing the PES for the Cali River Basin led to conflicts between leaders who supported Acuacali's creation and others who argued it threatened traditional leadership and practices (Arias-Arévalo and Pacheco-Valdés 2022).



Programmatic barriers

Programmatic barriers occur when PES program design and implementation fail to account for external or local contexts, limiting equitable participation and benefit-sharing opportunities for IPs and LCs.

Bias in program design and implementation priorities

Focusing on near-term success to attract funding can result in predetermined project selection bias toward PES programs that can demonstrate results quickly (Lapeyre et al. 2015). In environmental projects such as PES, the pressure to deliver quick results, meet deadlines, and secure and maintain funding can undermine the focus on relevant ES and meaningful stakeholder engagement, which risks overlooking key dynamics and their implications for intended outcomes (Hanna et al. 2018; Thompson et al. 2023).

Trust must be cultivated to establish the local legitimacy necessary for PES programs to succeed (Wunder et al. 2020), but building such relationships requires time and repeated interactions, which can conflict with funding models that prioritize short-term results (Silva-Muller 2022). Program developers are therefore incentivized to target areas where conservation threats are already low and with that low opportunity costs, resulting in adverse selection at the administrative level (Giudice et al. 2019; Molina-Murillo et al. 2014; Silva-Muller 2022; Wunder et al. 2020). In other cases, developers may be inclined to enroll communities most likely to deliver the intended objectives over working with communities where additional support may be needed or to cut extension services (Lee et al. 2016). PES programs predisposed to engage with groups and communities with greater organizational capacity risk being exclusionary (Lapeyre et al. 2015), potentially deepening existing inequalities and further marginalizing vulnerable groups.

Program designs that emphasize resource-use restrictions without offering alternative livelihoods can restrict communities' rights and are particularly vulnerable to both program funding volatility and household income insecurity. Inad-

equately planned resource use restrictions can also intensify conflicts within communities over access, particularly when PES regulations are applied beyond the intended areas or when certain community members, such as women, youth, and ethnic minorities, are excluded (Corbera et al. 2020; Kaiser et al. 2023; Tegegne et al. 2021). These use-restricting[9] programs require participants to reduce or eliminate certain activities—making them more exposed to financial instability than asset-building[10] programs that generate benefits over time—because they depend on reliable, sufficient access to financial resources (Engel et al. 2008; Etchart et al. 2020; Wunder et al. 2020).

Moreover, such programs are more susceptible to mistrust from community members, especially when they fail to provide tangible, long-term benefits or alternative livelihoods well suited to the community (Etchart et al. 2020; Tegegne et al. 2021). Consequently, payments in use-restricting programs must remain sufficiently high for participants to benefit and sustain PES activities (Engel et al. 2008). For example, after a two-year trial of a use-restricting program in Uganda, participants resumed deforestation (Jack and Jayachandran 2019). Similarly, some focus groups in Ecuador indicated that those affected by the two-year suspension payments needed to revert to cultivation expansion (Etchart et al. 2020). Consequently, long-term contracts (over 10 years) are often required (Wunder 2005), but sustaining these long-term payments is challenging due to the structural and institutional barriers to accessing financial resources.

Heterogeneity of local contexts increases operational complexity and increases costs for supporting equitable PES implementation and benefit-sharing. For larger-scale programs, the geographic dispersion of sites can challenge the program's ability to maintain regular contact with communities, thereby raising costs related to understanding local community contexts and ensuring procedural equity (Rontard et al. 2020). Moreover, although the opportunity costs of participating in PES and the levels of deforestation threat are often lower in remote areas far from villages and markets, the monitoring is more difficult and costly (Cisneros et al. 2022). This increases monitoring challenges and costs, which in turn undermines the efficiency of flat pay rates for ES provision. As a result, such heterogeneous opportunity costs can lead to diseconomies of scale, complicating efforts to efficiently scale PES programs (Benjamin and Sauer 2016). This complexity often results in simplified program designs that prioritize administrative ease, undermining programmatic alignment with the community context.

PES programs often prioritize administrative ease and simplicity over addressing the complexities of local contexts, thereby undermining equitable benefit-sharing. For example, due to the complexity and scale of determining opportunity costs and monitoring required to assess the exact level of ES provision, PES programs frequently lack payment differentiation in practice (Wunder et al. 2018). This has been found in programs in China (Liu et al. 2018), Costa Rica (Bollman and Hardy 2012; Ola et al. 2019), Peru (Montoya-Zumaeta et al. 2021), and Vietnam (Chu et al. 2019). Vietnam's PFES initially utilized a formula to calculate payments in line with local conditions and efforts but later abandoned this in favor of per hectare payments (Chu et al. 2019; Haas et al. 2019), despite a general preference for merit-based payment distribution (Loft et al. 2017).

Additionally, many programs overlook baseline analyses ahead of project initiation that would facilitate the measurement of ES changes and additionality (Lliso et al. 2021; Naeem et al. 2015; Pattanayak et al. 2010). Insufficient baseline research often limits the ability to isolate PES impacts and conduct rigorous impact evaluations, hindering comparisons and cross-program learning. This lack of rigorous evaluation is especially problematic when it comes to understanding the trade-offs between environmental, social, economic, and political impacts (Salzman et al. 2018). For instance, in Costa Rica, evaluations failed to assess the economic impacts on marginalized groups such as women, children, and seniors (Molina-Murillo et al. 2014).

Oversimplified land classification that ignores local land-use practices can undermine equitable participation and hinder the success of PES programs. In Cambodia's Cardamom Mountains PES, NGO developers simplified land classification into just "forest" or "nonforest," overlooking local practices such as fallow land and shifting agriculture. This approach inadvertently allowed the government to assert greater state control over land, disregarding ongoing local land claims and weakening community resource control, ultimately fostering mistrust between the community and project implementers (Milne and Adams 2012).

Exclusionary enrollment requirements

Many programs require secure land tenure, including formal titles or recognition of customary tenure, and land size thresholds, which often benefit wealthier landowners and marginalize those with less land or no formal title (Corbera et al. 2020; Tamba et al. 2021; Tran et al. 2016). Tenure-

related barriers are found in PES programs in Argentina (Nuñez Godoy and Pienaar 2023), Brazil (Ruggiero et al. 2019), Colombia (Arias-Arévalo and Pacheco-Valdés 2022), Ecuador (Etchart et al. 2020), Mexico (Ruiz-Mallén et al. 2015; Jones et al. 2018), Uganda (Aganyira et al. 2020), and Vietnam (Tran et al. 2016), among many others. Such requirements also have significant implications for equitable access within communities, particularly disadvantaging women and youth in contexts where elder men traditionally hold tenure rights (Kariuki et al. 2018). In other cases, land size requirements prevent eligibility, as seen in TGB in Uganda, where requirements to enroll 0.3 ha prevent many from enrollment (Shames et al. 2016).

PES programs that prioritize private landownership over customary communal land practices can facilitate land privatization, potentially displacing local people by those with the economic means to acquire land. This can lead to "green grabbing," where international companies acquire land titles and displace LCs (Kaiser et al. 2023). Additionally, when PES programs only allow for individual contracts rather than including collective tenure systems in contexts with customary communal tenure, they can undermine traditional systems of collective land management, which weakens community cohesion and resource governance (Corbera et al. 2020). In Argentina, this has led to conflicts between private landowners and Indigenous communities because the PES program requires landowners to fence their properties, which blocks Indigenous communities from accessing the land for traditional hunting and gathering (Nuñez Godoy and Pienaar 2023).

Inequitable and unfair contract processes and obligations

Unequal contract processes and conditions result in IPs and LCs taking on inequitable risks as ES providers compared to ES buyers. Contract processes favor and advantage ES buyers over ES providers and rarely are carried out as a negotiation of equals; instead, they tend to reflect the unequal power imbalances between them. For example, there is much less attention paid to ES buyer compliance and accountability to their contract terms as compared to ES provider compliance. In Ecuador, during a two-year payment disruption with limited and inconsistent communication, Programa Socio Bosque participants were still required to fulfill their PES obligations. The contract's failure to guarantee payments or provide safeguards for government nonpayment, combined with poor communication that left participants confused about their rights, exacerbated mistrust while requiring them to conserve forests without support (Etchart et al. 2020). In other cases, programs may not permit participants to keep a copy of the PES contract (Etchart et al. 2020; Kariuki et al. 2018; Lee et al. 2016).

Many PES programs do not allow ES providers to negotiate payments (e.g., Long et al. 2015; Mangubhai and Lumelume 2019; McBurney et al. 2023; Thompson 2019). In Fiji's Kilaka Forest Conservation Area PES program, the deal between ES buyers (the Wildlife Conservation Society) and ES providers (the Nadicake clan) was brokered through the Fiji government's iTaukei Land Trust Board. The payment amounts for the 99-year conservation lease were based on a fixed formula tied to timber valuation, with no room for negotiation or adjustments for market fluctuations or the full conservation value (Mangubhai and Lumelume 2019).

Another clear example of inequitable contract processes favoring ES buyers can be found in a user-financed watershed PES in Thailand's Mae Rim, where biennial payments of about US$6,600 to the community were determined solely by the willingness of the buyer (a water-bottling plant) to pay without negotiation or consideration of the upland community's opportunity costs. One farmer explained that while they participated in PES activities in the first year because "we would have done similar activities anyway; the support helps, but really the amount of money is insignificant" (Thompson 2019, 9). This disconnect underscores how payment-setting processes often prioritize the ES buyer's willingness to pay but fail to address the needs of ES providers, which risks placing the financial burden of sustaining PES activities disproportionately on IPs and LCs and threatens the long-term viability of the program.

Complex application processes and monitoring, reporting, and verification (MRV) requirements create barriers for IPs and LCs with less experience and capacity with such procedures. They also increase transaction costs that reduce the level of funds reaching IPs and LCs. This is especially true for carbon-focused PES programs aimed at carbon markets, which are institutionally and technically complex, multilevel initiatives that are often unfamiliar to many stakeholders. in the carbon market pose significant challenges. For IPs and LCs wanting to enter the carbon market, the complexity in rules and high technical requirements for verification pose significant challenges because they often require specialized knowledge (Garcia et al. 2021). Such complexities reinforce the need for external support through intermediaries and

field-workers, which creates dependencies on external actors to function as brokers, further disadvantaging communities without strong ties to government or civil society institutions. This culminates in operational costs absorbing up to 40 percent of carbon payments across several user-financed carbon-focused PES programs (Clinton Development Initiative 2017; Cooperativa AMBIO 2019; ECOTRUST 2023; EthioTrees 2017; Lee et al. 2016; Osborne and Shapiro-Garza 2018; Vi Agroforestry 2018). Box 5 further elucidates the complexity of carbon-focused PES and barriers faced by IPs and LCs.

Many program communications and contract details use non-Indigenous languages and technical terminology. Especially for IPs and LCs with high instances of illiteracy, this creates barriers to equitable program enrollment and undermines program outcomes (Loft et al. 2017). A 2016 study examining PES projects in East Africa found that the exclusive use of English in The International Small Group Tree Planting (TIST) program in Kenya and the TGB program in Uganda has undermined the validity of the contracts to support mutual understanding, transparency, and informed consent (Lee et al. 2016). Similarly, the use of vague or technical terminology in contracts for PES programs that are institutional and technically complex may lead to confusion that undermines program outcomes (Lee et al. 2016). Even worse, insufficient information may deter enrollment, as was found in four PES programs in Uganda (Aganyira et al. 2020).

BOX 5 | Carbon-focused programs face heightened barriers to equitable participation and benefit-sharing

Payments for ecosystem services (PES) programs that emphasize carbon sequestration face many common barriers across PES models, but they also encounter distinct challenges due to their reliance on carbon markets. Carbon-focused PES programs, including private carbon credit schemes or those integrated into REDD+ (reducing emissions from deforestation and forest degradation in developing countries) initiatives, are considered PES when they provide financial incentives to Indigenous peoples and local communities (IPs and LCs) in exchange for carbon-related ecosystem services, such as carbon sequestration, in line with the definition set out by Muradian et al. (2010). These programs typically depend on voluntary carbon markets (VCMs) or compliance markets for trading carbon credits, with VCMs currently dominating but compliance markets expected to grow.[a]

VCMs are characterized by price instability[b] and low prices,[c] with demand highly vulnerable to political and economic shocks.[d] VCMs are also highly heterogeneous, with buyers valuing characteristics such as sector, geography, and cobenefits like biodiversity and livelihoods.[e] Investors increasingly demand noncarbon benefits such as biodiversity protection alongside carbon credits, further complicating market dynamics. Despite this, private sector demand often remains insufficient to match the supply of carbon credits through PES programs, placing downward pressure on prices and resulting in low payments.[f] In some cases, such as Uganda's Trees for Global Benefits (TGB) program, enrolled farmers experienced delayed payments because developers struggled to find buyers for carbon credits.[g]

Inadequate legal recognition severely limits IPs' and LCs' ability to participate equitably in carbon sequestration projects. Although political interest in carbon sequestration has increased focus on carbon credits, PES programs focused solely on carbon often prioritize efficiency in tree production, undermining community decision-making and local context.[h] Legal frameworks for carbon transactions are insufficient, with few countries having clearly defined regulations for forest carbon exchanges.[i] A study of 33 countries covering an estimated 67 percent of the world's tropical and subtropical forests found that only 3 countries explicitly recognize community-based carbon rights (Indonesia, Peru, and, to a limited extent, the Republic of Congo); however, in 14 other countries, carbon rights can be inferred as linked to community land or forest rights. The right to receive compensation from carbon projects is similarly explicitly recognized in only 3 countries; for the rest, compensation rights hinge upon the community land or forest rights or are based on general laws that safeguard community rights from infringement. Less than half, or 15 countries, have regulations related to carbon trading, and no country has established grievance and redress mechanisms that cover carbon trading activities outside of REDD+.[j]

Engaging in carbon markets entails high project costs due to the complex technical requirements for developing, verifying, and issuing carbon credits. As a result, a significant portion of carbon payments often goes to operational expenses and other costs. In a limited subset of reviewed projects with available data, operational costs averaged 40 percent, with a median target of 60 percent of income directed to ES providers. In addition, a portion of credits is often set aside in reserve pools to mitigate risks like

BOX 5 | Carbon-focused programs face heightened barriers to equitable participation and benefit-sharing (cont.)

wildfires, as seen in Scolel Té and TGB, where 10 percent is deducted to cover nondelivery risks, further reducing the credits available for sale and the funds received by the providers of ecosystem services (ES).[k] Particularly for local projects, these costs place additional strain—especially when prices are low—deepening financial and technical barriers.[l] Likewise, the focus on government-defined "jurisdictions" in many PES programs conflicts with traditional land governance systems. Such complexities make it difficult for IPs and LCs to develop their own projects because they often require external support from donors and certification actors to meet technical requirements and verify carbon credits.[m] Moreover, these technical challenges often lead to misunderstandings about payment processes at the community level. In East Africa, such misunderstandings caused confusion among community members and dissatisfaction with payment processes.[n]

Carbon PES programs are also vulnerable to delays between land-use changes and carbon credit purchases, increasing risks for ES providers. Delays often involve three payment scenarios: payment based on land-use change confirmation, confirmation of land-use change and buyer identification, or buyer identification and credit verification before payment.[o] Delays in the third scenario can expose providers to significant risks and deepen misunderstandings.

Due to the complexity and cost of participation, PES programs may prioritize administrative ease over local environmental and socioeconomic benefits. Many PES programs require clear land rights—whether individual or collective—especially for projects using verified carbon credits, to facilitate the sale and compensation of credits within the VCM.[p] For example, some programs have bypassed traditional land governance structures, undermining community-based land tenure and governance in favor of easier monitoring.[q]

Sources: a. World Bank 2023; b. World Bank 2022; c. Lee 2017; d. Yu et al. 2022; e. Lee et al. 2016; World Bank 2022; f. Garcia et al. 2021; Hendrickson and Corbera 2015; Lee 2017; Lee et al. 2016; Salzman et al. 2018; g. Shames et al. 2016; h. Osborne and Shapiro-Garza 2018; i. RRI 2021; j. RRI and McGill University 2024; k. Balmford et al. 2023; Hendrickson and Corbera 2015; Masiga et al. 2012; l. Lee 2017; m. Alvarez et al. 2016; Lee 2017; n. Lee et al. 2016; o. Lee et al. 2016; p. Aganyira et al. 2020; Cooperativa AMBIO 2019; Lee et al. 2016; Tamba et al. 2021; q. Osborne and Shapiro-Garza 2018.

Limited entry points for participation in decision-making

The top-down institutional structure of most PES programs is not conducive to IPs and LCs equitably participating in decision-making, and communities are rarely engaged in shaping program design (e.g., Bremer et al. 2023; Kariuki et al. 2018; Montero-de-Oliveira et al. 2023). A recent review of conservation initiatives found that when the tenure institutions of IPs and LCs were recognized as governance institutions with decision-making authority, conservation outcomes were stronger (Dawson et al. 2021). However, while consultations with communities often occur ahead of program design, PES programs are rarely designed through cocreation with local communities.

In most cases, PES programs are found to be structured linearly—from developers down to households in communities. Linearly structured programs often delegate one-way responsibility for sharing information but fail to include accountability mechanisms to ensure that communities have been sufficiently consulted. While this structure helps to reduce transaction costs associated with multiple levels of actors and multiple geographies, it has also constrained how information is shared about and to communities. Research indicates that reliance on local leaders and community institutions to disseminate critical information about a PES program to households may result in wide variances in understanding contract terms (Hayes 2012; Hayes et al. 2017; Tran et al. 2016). It also limits entry points for decision-making that would improve the outcome of PES implemented with IPs and LCs.

The absence of and failure to properly implement robust FPIC frameworks undermines IPs' and LCs' participation and decision-making power (Mei 2023). When FPIC is implemented, the focus is often on obtaining consent at the outset of the project rather than ensuring ongoing consent and the right to withdraw throughout the duration of a PES program (Smith et al. 2019).

PES programs structured as top-down with one-way processes lack mechanisms for information to flow from the community to inform those making decisions at the implementation and design levels. This misses local knowledge and relevant information about the community's experience in PES. Especially in cases where programs will be implemented at larger scales, across heterogenous or complex local contexts, it is difficult to ensure that incentive mechanisms align with local contexts at scale. One-way processes miss the opportunity to integrate insights from the community level that could facilitate alignment. Furthermore, one-way directional processes do not facilitate the integration of lessons learned at the community level of what is and is not working across differing contexts, unforeseen challenges, and the necessary resources for addressing them.

Vietnam's national PES policy for PFES is structured as a hierarchical, one-way process—from the national to provincial to community level—which provides provinces with authority over implementation (Loft et al. 2017; Nguyen et al. 2022). Being unidirectional hinders institutional learning in the PFES because it lacks a mechanism for information to flow from the context and experiences of a community to inform those making decisions at the implementation and design levels. Despite efforts to prioritize local benefits, this lack of participation has also been identified as resulting in gaps between legislated rules for payment distribution and local perceptions of equity. This gap arises because legislated rules for payment distribution do not sufficiently address contextual inequities—specifically, how inequitable land allocation affects equitable benefit-sharing outcomes when payments are based on forest quality or type (Loft et al. 2017).

When program design overlooks local power dynamics and inequalities, it limits equitable participation in decision-making. This enables dominant groups to exert disproportionate influence, resulting in elite capture and inequitable benefit-sharing within communities. Many PES programs fail to adequately address these power imbalances, hindering the involvement of marginalized groups in decision-making. For instance, in Cameroon, the Baka Indigenous group reported that more extensive FPIC processes made their decision to enroll feel less voluntary because the locally dominant Bantu–Fang peoples had increased opportunities to exert pressure (Tegegne et al. 2021). Many respondents, especially women, reported limited access to information, such as a lack of awareness about community bank accounts for project funds and insufficient notice of project meetings, which excluded them from key discussions (Tegegne et al. 2021).

While consultations with communities often occur ahead of program design, PES programs are rarely designed through cocreation with local communities.

The reliance on community institutions and local leaders to be the primary conduit for PES decisions presents challenges tied to information asymmetries, governance structures, and the equitable representation of diverse community interests. Communities and groups are not monolithic, and local institutions—whether customary or formal—vary widely in legitimacy, equity, and inclusiveness. Without a clear understanding of these governance structures, PES implementers cannot assume that community institutions or leaders will fairly represent the views and interests of all members, particularly marginalized groups. This dynamic, which lacks appropriate checks and balances, can undermine FPIC and contribute to power imbalances and elite capture, as seen in Bolivia (Montero-de-Oliveira et al. 2023), Cambodia (Milne and Adams 2012), and Madagascar (Sommerville et al. 2010a). In Peru's conditional cash transfer program under the National Forest Conservation Program, top-down engagement processes limited the flow of information to disadvantaged groups, particularly women, which exacerbated power imbalances and led to perceptions that the program's fairness was compromised (Montero-de-Oliveira et al. 2023).

Likewise, in the Cidanau Watershed PES program in West Java, Indonesia, group leaders have disproportionate decision-making power as the sole signatory of a contract and manage several aspects of PES implementation—from participant selection to information and benefit-sharing. This resulted in households having a very limited understanding of the PES program and contract details; about 85 percent of households were unable to comment on the size of payments or when they would be distributed, despite this information being in the contract (Lapeyre et al. 2015). Box 6 provides an example of this issue, where internal community conflicts, delays in financial resource distribution, and power imbalances together resulted in the ultimate suspension of the SFCP.

BOX 6 | Compounding barriers result in the suspension of the first Indigenous-led payments for ecosystem services initiative in the voluntary carbon market

The Suruí Forest Carbon Project (SFCP) in Brazil, launched in 2009, was the first Indigenous-led PES initiative in the voluntary carbon market (VCM). Despite early successes, the project was suspended in 2018 due to the mounting internal conflicts and external pressures it faced.

Driven by the Suruí Indigenous Association's strong institutional capacity, the project was an endogenous initiative that enabled the community to coordinate and prepare the Verified Carbon Standard certified project.[a] During its first five years of operation (2009–14), the project achieved both environmental and social success. Deforestation was substantially reduced, generating carbon credits equivalent to preventing nearly 300,000 metric tons of carbon dioxide from entering the atmosphere. This success also enabled the funding of six community initiatives.[b]

Despite being an Indigenous-led initiative, the SFCP faced internal opposition. Disagreements over resource allocation and differing economic interests intensified preexisting internal conflicts within the territory's clan-based governance system, where power is held by clan chiefs.[c] Economic dependence on land, compounded by limited livelihood alternatives, fueled competing priorities for land use.[d] These grievances were further exacerbated by pro-logging factions, which argued that the project undermined their autonomy and rights to use the land, calling for the SFCP to be halted.[e] The lack of a formal resolution process to address internal conflicts deepened divisions, and pressures to deforest grew following the discovery of gold deposits in 2016.[f]

Furthermore, social norms limiting women's participation in decision-making meant that the project did not achieve broad and inclusive community involvement, despite efforts to inform the community members about the project.[g] This lack of inclusion further complicated efforts to address local concerns and build unified support for the project.

These internal conflicts were exacerbated by delays in the flow of financial resources to the community, which fueled factionalism and dissent.[h] Without an international carbon market and the corresponding United Nations Framework Convention on Climate Change rules, the SFCP relied on the VCM. However, due to high technical requirements, coupled with an oversupply of credits and low demand, only one batch of carbon credits was issued.[i] As a result of these compounded challenges and resulting rising deforestation, the project could no longer fulfill its promises, leading to its suspension in 2018.[j]

Sources: a. Alvarez et al. 2016; b. Zwick 2019; c. Alvarez et al. 2016; Garcia et al. 2021; d. Alvarez et al. 2016; Zwick 2019; e, f. Zwick 2019; g. Alvarez et al. 2016; h. Gebara et al. 2014; Zwick 2019; i. Garcia et al. 2021; j. Zwick 2019.

Illustrative case study: Lingering contextual and programmatic barriers in Guatemala's PINPEP

Guatemala's PINPEP fostered more equitable access to PES for IPs and LCs; however, there remain sociopolitical factors within the broader national context, as well as interlinked programmatic limitations and gaps within PINPEP, that hinder more equitable PES outcomes for IPs and LCs.

Structural barriers

A key barrier is Guatemala's highly unequal landownership structure. In this structure, 85 percent of land is held by 15 percent of landowners, and the majority of smallholders and Indigenous and communal groups often have insecure land tenure (Elías 2015). PINPEP increased access to PES for Indigenous communities and smallholders by recognizing other forms of land tenure beyond formal or registered title and stipulating low land size requirements; nonetheless, many are still unable to access the program. These individuals are typically the poorest members of the community. They have fewer and smaller land parcels used for livelihoods and daily subsistence, and they lack land to spare for participation in PINPEP (Osborne 2013; vonHedemann and Osborne 2016). Similarly, while PINPEP has made strides in terms of gender equity, customary norms privileging landownership for men limit women from directly participating in the program (USAID LandLinks 2010). Without a change in the skewed landownership structure, it is unlikely that subsistence house-

holds—the poorest of the poor—and women can benefit from PINPEP or any other PES program (Elías et al. 2009; vonHedemann 2019). Some communities are taking it upon themselves to tackle the exclusion by some of their members. For example, a community in Totonicapán in the western highlands prioritizes the poorest families for small-scale commercial exploitation of communal forests (Elías 2015).

Moreover, cultural norms assigning forestry within the realm of men's roles and activities additionally bar women from capturing benefits from PES (Elías and Wittman 2005; vonHedemann 2020). Men are the ones primarily charged with reforestation and other forestry work, and they represent most of the professional forest technicians or managers. Women are often relegated to a secondary role in community forestry organizations, despite their many contributions and majority composition in some of them. They may also bear greater burdens when communal forests are fenced off for PES given their domestic responsibilities of collecting firewood and forest products and herding livestock and ruminants (Elías 2015; Elías et al. 2009).

In addition, funding shortfalls in some years result in increased transaction costs and productivity losses for program participants because PINPEP participants are forced to travel to Guatemala City to meet with government officials or protest to get their payments. PINPEP's stipulated budget is between 0.5 and 1 percent of the annual national budget, lower than the budget for PINFOR and PROBOSQUE. The actual amount allocated to the program has steadily increased through the years but has yet to reach the upper limit of the budget. This reflects the low prioritization of community forestry PES programs dominated by IPs and smallholders compared to the PES programs dominated by large landowners, which have never contended with funding gaps (Elías 2015; vonHedemann 2019).

Institutional barriers

Institutionally, IPs and LCs are the only stakeholders without representation in the highest governance body related to PES, the executive board of INAB. Whereas PINPEP has, positively, designated an organizational representative for IPs and LCs in PINPEP's governance structure, IPs and LCs remain without direct representation on the INAB board, whose members consist of all the relevant public and private sector stakeholders, including the forest industry chamber, municipalities, academia, and NGOs, thus limiting their participation in decision-making related to PES.

Programmatic barriers

Funding gaps in PINPEP lead to gaps and limitations in institutional support for the program. INAB, which administers PINPEP, has a limited budget and capacity to implement and monitor the program, with constraints including complex and unharmonized regulations and processes, inadequate automation and incompatibility between information and process management systems, a lack of staff to conduct field visits, and insufficient training of staff. These constraints contribute to slow response time from INAB for project approvals and certifications of compliance required to receive PES payments.

Finally, unclear regulations result in INAB's inconsistent recognition of IPs' ancestral titles issued by the Spanish colonial government as proof of landownership. The lack of explicit guidelines for the review of customary titles has resulted in varying decisions by subregional offices (vonHedemann 2019). One IP community had to go to court and acquire a judicial validation of its crown deed to enroll its forest in PINPEP (Pers. Comm. 2023b). Moreover, communities that opt to partner with the municipalities holding title to Indigenous and communal lands face institutional challenges in terms of decision-making, forest governance, and the sharing of incentive benefits. The lack of guidelines can result in conflict because new institutional arrangements are made regardless of the community's longtime stewardship of its forest (Elías 2015; vonHedemann 2019, 2020). (See Appendix C for information on the case study methodology. An unpublished version of the full case study is available upon request.)





Call to action: A multitiered approach to enhancing equitable participation and benefit-sharing of IPs and LCs and supporting program impact

A coordinated, multitiered approach is needed to improve IPs' and LCs' access to finance and resources, focusing on rights recognition, participation, and financing mechanisms. This section outlines evidence-based actions tailored to local contexts to address key barriers. Crucially, PES programs must be co-created with IPs and LCs to ensure their relevance and effectiveness. Achieving lasting change requires cross-sectoral collaboration, with broad engagement from policy, finance, and governance actors to transform the financing landscape and overcome systemic challenges.

Achieving equitable outcomes for IPs and LCs in PES programs requires a multitiered approach that addresses barriers at the programmatic, community-level, and macro-level contexts. As the conceptual framework illustrates, these barriers are interconnected and multifaceted, demanding a coordinated effort across stakeholders at each level. Interventions must be tailored to the unique dynamics of each context, recognizing that solutions effective in one setting may not be suitable in another.

The recommendations outlined in this section are drawn from the literature review. They are based on key lessons learned and best practices identified across a diverse and extensive range of PES programs. A phased approach, spanning short-, medium-, and long-term actions, is proposed to effectively address the range of challenges, from immediate programmatic obstacles to systemic barriers requiring more extensive reform. Depending on the barrier, recommendations will be at differing levels of intervention and needed investment (see Figure 8).

To improve equitable benefit-sharing and finance access, collaborative action is needed across all levels. Interventions must be adaptable to local contexts; program design elements that work in one setting may exacerbate challenges in another. A simplified hypothetical example is illustrated in Appendix D.

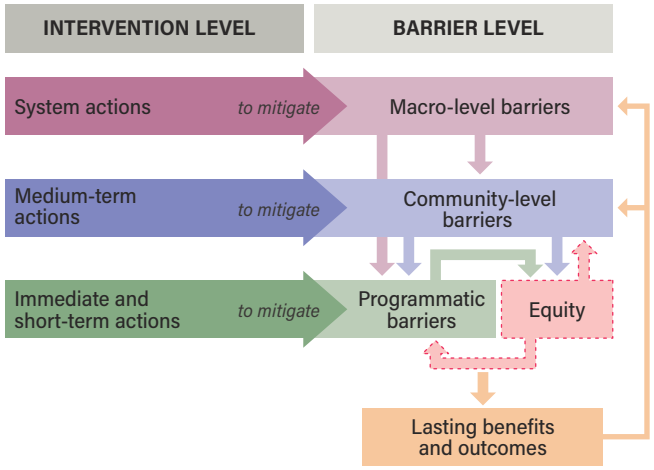
In many cases, actions can be taken simultaneously across different levels by aligning incentives and leveraging complementarities. A multitiered approach can thus integrate bottom-up and top-down processes, addressing barriers at all levels and strengthening IP and LC participation and access to finance. The actors involved will depend on the level of the barrier, with more actors engaged as the complexity of the barrier increases. Figure 9 summarizes the key actors and actions for each level of intervention identified from the literature.

In general, actions should focus on improving three interlinked areas:

- rights recognition and governance
- participation and representation
- and benefits and financing mechanisms

Transforming the financing landscape requires different actions in the short, medium, and long terms to tackle these barriers from immediate improvements to lasting change.

FIGURE 8 | Intervention level needed by level of barrier



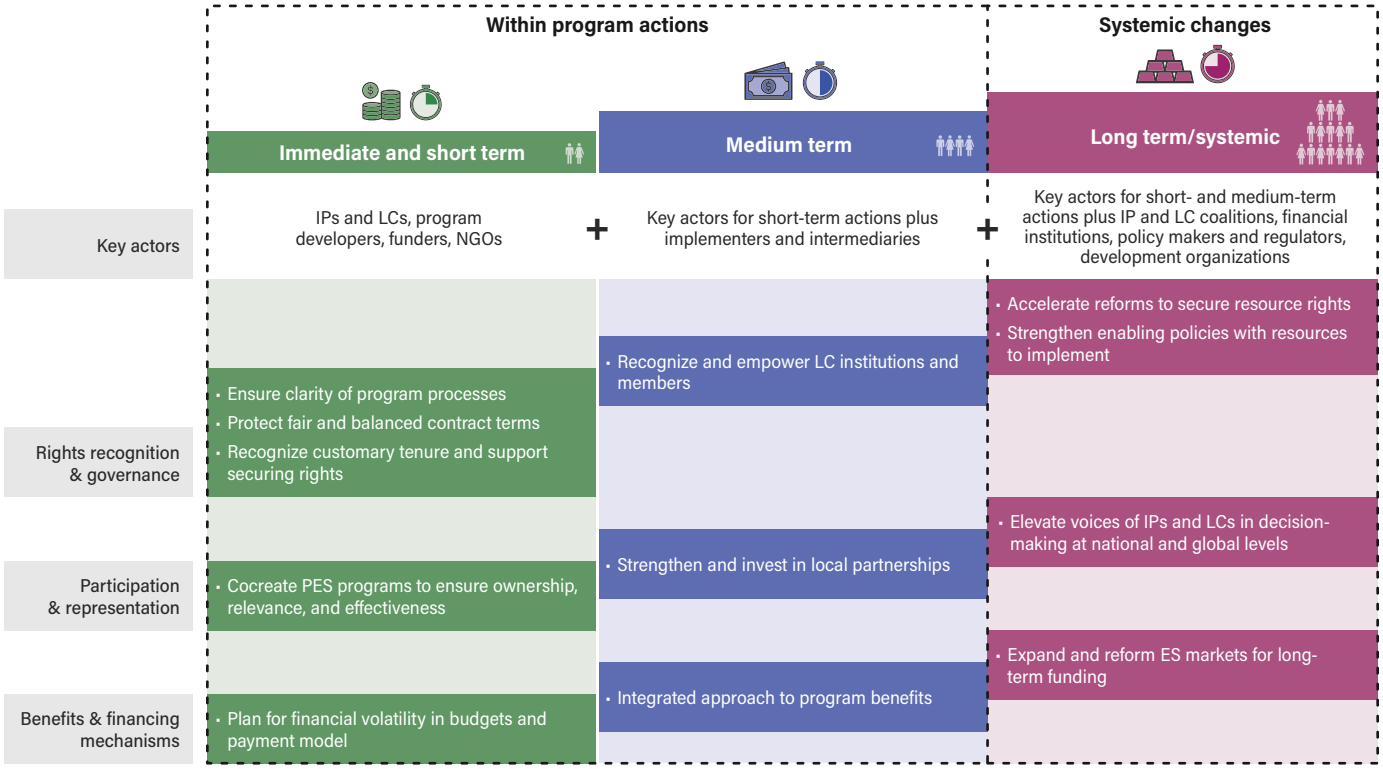
Source: WRI authors.

To address programmatic barriers, such as biases in design, exclusionary enrollment requirements, unfair contract processes, and limited entry points for participation, immediate and short-term actions can yield quick improvements. Collaboration between program developers (e.g., governments, NGOs, private companies), funders, and IPs and LCs are essential to ensure that PES programs are tailored to local contexts and are cocreated from the start with IPs and LCs.

Mitigating barriers stemming from contextual inequities at the community level requires more time and investment. Medium-term actions will involve expanding collaboration to include intermediaries and implementers who can support IPs and LCs and strengthen capacities at the individual and community level, ensuring effective participation and benefit-sharing.

Addressing structural and institutional barriers in the macro-level context, such as land tenure reform, enabling legislation, and representation of IPs and LCs in agenda-setting bodies, extends beyond the scope of individual PES programs and requires systemic change. This will necessitate cooperation that includes actors outside of PES programs. This includes government actors (across differing resource-related ministries and agencies, regulators, and policy makers), financial institutions (banks, investors, market developers), IP and LC coalitions, and development organizations (international organizations, civil society organizations, etc.) in addition to the actors relevant to the immediate- and medium-term actions. All of these stakeholders will need to work together

FIGURE 9 | Overview of actions and stakeholders needed to overcome barriers at different levels of intervention



Notes: IP = Indigenous people; LC = local community; NGO = nongovernmental organization; PES = payments for ecosystem services.
Source: WRI authors.

to reshape the broader environment for PES. Sustained collaboration and coordination across these levels of actors will be necessary to ensure the equitable participation and benefit-sharing of IPs and LCs in PES and beyond.

The following subsections will dive more deeply into each of these areas of focus and the levels of intervention, providing detailed actions, examples, and specific stakeholders involved to illustrate how targeted efforts can address the barriers identified and support more equitable participation and benefit-sharing for IPs and LCs in PES programs.

Rights recognition and governance

Key actions include the following:

- Immediate action:
  - Make PES program rules, criteria, and processes transparent, accessible, and understandable for all community members.
  - Ensure fair and balanced contract terms for IPs and LCs in PES.
  - Recognize customary land tenure rights and support efforts to secure resource rights.
- Medium-term action:
  - Recognize and empower local community institutions and members.
- Systemic action:
  - Accelerate legal reforms to secure the land rights of IPs and LCs, especially resource rights.
  - Strengthen and resource regulatory, legal, and policy frameworks, and enhance coordination across levels.

Immediate actions

Make PES program rules, criteria, and processes transparent, accessible, and understandable for all community members

Programs can ensure that rules and processes are clear and accessible, enabling all community members and communities to make informed decisions regarding enrollment and actively participate in decision-making and implementation.

Clear and accessible rules and processes empower community members to understand and verify their rights and obligations (Narloch et al. 2017) and promote enhanced local legitimacy critical for PES effectiveness (Wells et al. 2020). For instance, when rules are clear and accessible, sanctions imposed are more likely to be perceived by the community as fair and justified (Wells et al. 2020). Strengthened understanding will also better equip community members with the information needed to identify concerns and contribute relevant information and feedback to improve PES in their communities. For example, in Cameroon's Nomedjoh–Nkolenyeng PES, the local pastor in Nomedjoh played a key role in ensuring equitable access to important program information, with one Baka Indigenous minority female participant remarking, "Though most of us do not read, the pastor in our village played a crucial role in enhancing our understanding of the implications of the project as well as our rights" (Tegegne et al. 2021, 330). Such clarity also reduces the potential for information asymmetries within communities that would otherwise open the scope for elite capture and inequitable benefit-sharing.

Ensure fair and balanced contract terms for IPs and LCs in PES

PES programs can enhance the protection of ES providers' contract rights by addressing the insufficient focus on ensuring buyers fulfill their obligations.

This approach would help reduce the inequitable sharing of risks between providers and buyers, particularly in cases where providers lack the resources to pursue legal recourse (Etchart et al. 2020). Furthermore, PES contracts should specify conditions for termination or withdrawal and ensure that the FPIC of IPs and LCs is obtained, ensuring their participation is voluntary and fully informed at all stages of the agreement.

Recognize customary land tenure rights and support efforts to secure resource rights

Program designers can design eligibility requirements to account for characteristics of IPs and LCs, drawing on baseline studies to ensure they reflect customary land tenure regimes and prevent the exclusion of IPs and LCs.

Where programs such as the KACP in Kenya (Lee 2017) or PINPEP in Guatemala (vonHedemann 2020) accept customary land tenure rather than legal land titles, PES has not only enabled access to payments but also facilitated formal recognition and backing by governments or international organizations of customary land tenure regimes in the absence of formal titles (Aguilar-Støen 2018). Similarly, the RUPES programs in Southeast Asia have facilitated wider access to benefits by targeting LCs with tenure insecurity and varying de facto land management practices (Leimona et al. 2015b; McGrath et al. 2017).

Program developers, where feasible, can support communities in securing their land and resource rights to strengthen alignment between program objectives and benefits for IPs and LCs.

For example, in Tanzania's Simanjiro program, efforts to strengthen tenure rights increased community motivation, enhanced trust with PES actors, and secured long-term access to benefits, such as higher livestock market values and improved communal land control. The resulting success has led neighboring villages to request inclusion in the program, demonstrating how tenure support can catalyze program scaling and replication (Davis and Goldman 2019). Additionally, securing tenure can help address bottlenecks to investment by creating greater certainty for external stakeholders and financial contributors (IFC 2023).

Medium-term actions

Recognize and empower local community institutions and members

Leverage existing strong governance structures within local communities during the design and benefit-sharing decision-making process to enhance the success of PES program implementation.

Communities with greater institutional capacity are more likely to have existing modalities for community organization,

decision-making processes, rules, and sanctions regarding land use. When these mechanisms are already functioning, they can facilitate self-monitoring and enforcement of PES rules that increase the likelihood of delivering outcome-based PES payment (Hayes et al. 2015, 2017; Ingram et al. 2014). Transferring management of program implementation to local institutions in the Wolaita Zone of the South Ethiopia Regional State has been cited as key to the success of the Humbo Ethiopia Assisted Natural Regeneration Project in scaling (Murugan and Israel 2017; Tamba et al. 2021).

Moreover, this capacity enables communities to adapt more effectively to potential changes in PES requirements. Mexico's national PES program recognizes existing local governance structures and devolves implementation responsibility, which incentivizes communities to ensure these structures are effective in fulfilling PES requirements for payment. Communities are responsible for developing and validating resource management plans, guided by general guidelines and approved conservation activities provided by CONAFOR (Denham 2023). This approach is associated with the enhancement of community social capital; a study of over 800 communities found that the program increased community social capital—measured through an index of metrics for community-level governance, trust, participation, and infrastructure investment—by 8–9 percent (Alix-Garcia et al. 2018). Devolving authority of benefit-sharing within communities has also allowed communities in Mexico to reflect their individual distribution preferences, improving the local legitimacy of the program and also enabling communities to create and adapt benefit-sharing arrangements as preferences and needs in the community also change (Izquierdo-Tort et al. 2022; Shapiro-Garza 2020).

Invest in strengthening social capital at the community level to improve the effectiveness, fairness, and sustainability of PES programs.

Strengthening community governance institutions can enable IPs and LCs to more effectively engage in PES program decision-making that ensures that benefits are equitably shared within the community. PES program design can promote trust-building and the strengthening of social bonds within communities, as these support perceived fairness in institutions, reduce member attrition, and help prevent and resolve disputes (Davis and Goldman 2019; Hayes et al. 2019; Kaiser et al. 2023; Kumar et al. 2014; Moros et al. 2020). Strengthening local institutions and fostering greater organization can improve the perceived fairness of



PES programs, as evidenced by communities in Ecuador and Mexico, where stronger organizational capacity and institutional strength led to higher satisfaction with PES outcomes and fairer benefit distribution (Costedoat et al. 2016; Hayes and Murtinho 2018; Hayes et al. 2015; Jones et al. 2018; Nieratka et al. 2015). For example, in Ecuador's Programa Socio Bosque, participating households from six Quichua Indigenous communities were more likely to receive benefits when communities were more organized (Hayes and Murtinho 2018).

In cases of weak community governance institutions, PES programs can invest in building capacity and empowering local institutions while also including safeguards to protect against elite capture.

Such investments are found to create greater efficiency and effectiveness over the long term. In Cambodia's Kulen Promtep Wildlife Sanctuary, investments to facilitate local management of the two communal programs required more time and initial administrative costs than needed for the direct payments program but led to a more robust institutional structure in the long term. Building and empowering community institutional capacity was credited with generating community support for conservation with locally established and validated rules (Clements et al. 2010).

In contexts of intracommunity mistrust, prioritizing comanagement approaches can help enhance legitimacy and buy-in.

When local institutions lack community trust to effectively communicate information or represent their interests, full devolution of implementation to these institutions is unlikely to facilitate perceived or realized equitable benefits for IPs and LCs.

In these cases, comanagement institutional structures can enhance legitimacy, accountability, and community inclusion while safeguarding against elite capture. In the Muellamues *resguardo*[11] in Colombia, a study on preferences for PES found concerns among inhabitants—primarily members of the Pasto Indigenous group—about singular leadership by either the local Indigenous institution (viewed as inadequate for environmental protection) or the regional environmental agency (mistrusted for past control attempts). Consequently, participants in five focus groups proposed a comanagement model (Lliso et al. 2020). A similar preference emerged in Rwanda's Reconciling Biodiversity and Development through Direct Payments for Conservation (ReDirect) PES, where unilateral benefit-sharing decisions by local officials were seen as unjust. Overall, participants preferred collaboration between these leaders and the community. While men in the community were more likely to favor community leadership, women were significantly more likely to be wary of community leadership and skeptical that it would represent their needs or empower their contributions to decision-making (Martin et al. 2014b).

Systemic actions

Accelerate legal reforms to secure the land rights of IPs and LCs, especially resource rights

For tenure to be considered secure, land and resource rights must be both formally recognized within legal frameworks and also respect and integrate customary rights held by IPs and LCs (Resosudarmo et al. 2014).

Legal recognition by governments is still pending for nearly half of community lands and territories across the globe, undermining IPs' and LCs' rights to the benefits generated from the land and acting as a substantial barrier to equitable participation and benefit-sharing in PES (Bottazzi et al. 2018; McBurney et al. 2023; RRI 2021; Tamba et al. 2021; Yin and Vang 2019).

While advances have been made in recent years to recognize customary tenure, such as the strengthening of legal frameworks or efforts to title lands traditionally managed by IPs and LCs, these may hold weak legal status (Fauzi and Anna 2013); fail to include accessible pathways to formalization (Ramírez-Cover 2017); or ignore complex, heterogenous land rights and uses at the community level (Costedoat et al. 2016; Leimona et al. 2015b; Lliso et al. 2020; Loft et al. 2017; Tran et al. 2016). Processes for formalization can be better streamlined to avoid cases where procedures exist but are not accessible to IPs and LCs in practice. At the same time, securing formal recognition that reflects the complexity and heterogeneity of land rights will require sufficient political will, with strong political commitment and leadership, to progress quickly.

Governments can increase investments in legal recognition and titling of community lands, including investing in mapping processes to better delineate community land boundaries, as well as efforts to protect IPs and LCs from external threats (e.g., extractive industry licenses and encroachment on lands from legal and illegal actors). Effective coordination across different levels and sectors of state actors, coupled with political will, is essential to ensure these efforts are well integrated, adequately resourced, and implemented efficiently and swiftly. This will require long-term investments from governments and external stakeholders (e.g., private sector actors, international organizations, and civil society) to create secure tenure systems, formalize land rights, and protect communities from land-related threats.

Such actions will require an in-depth understanding of diverse local contexts, which can be supported through the investments recommended for the short- to long-term PES programs to ensure processes include local people, are not driven solely by the government (Haas et al. 2019), and internalize localized knowledge (Kim et al. 2016).

Strengthen and resource regulatory, legal, and policy frameworks, and enhance coordination across levels

Frameworks can be designed to reduce power imbalances between IPs and LCs and ES buyers, clarify the rights of IPs and LCs, and ensure equitable benefit-sharing mechanisms in PES.

To ensure that these frameworks are coherent, they should align with existing legal and regulatory systems governing related sectors (e.g., water, forests, carbon). This alignment can help reduce gaps and barriers where sector-specific regulations may conflict or fail to address critical aspects of PES implementation. Where such regulations are not yet in place, governments should lead efforts to carefully draft and discuss them with relevant stakeholders to ensure they are equitable and fair, taking into account the perspectives and needs of IPs and LCs. For instance, Kenya amended its Climate

Change Act for the Mikoko Pamoja and Vanga Blue Forest projects to integrate carbon markets with regulations ensuring community involvement and equitable benefit-sharing (Wylie et al. 2016).

The evolution of Guatemala's national PES programs—from PINFOR to PINPEP and PROBOSQUE—highlights how such frameworks, while not perfect, can be developed, amended, and strengthened over time through sustained coordination and collaboration between state and nonstate actors, particularly Indigenous organizations (vonHedemann 2020) (see the "Illustrative case study of PES benefit pathways: Guatamala's PINPEP"). While in Australia, advocacy by Aboriginal and allied researchers and knowledge holders led to the integration of traditional Indigenous fire management practices, known as "cultural burning," into the national carbon-offsetting program. This legal recognition of Indigenous landowners' rights to benefit from carbon reduction activities allows Indigenous landowners to participate in carbon markets and receive compensation for their fire management practices while also safeguarding the cultural, social, and environmental significance of these practices (Bremer et al. 2023).

To reduce jurisdictional issues and challenges associated with implementing PES programs, ensure coherence and coordination with existing sectoral policies and relevant governmental and nongovernmental implementing actors (Rakotomahazo et al. 2023; Yin and Vang 2019).

Additionally, clearly defining mandates and levels of institutional coordination can help ensure that PES regulations are consistently applied and enforced across various resource systems and jurisdictions. Governments must ensure that responsibilities for implementation are clearly defined, with appropriate resources allocated to guarantee execution and enforcement.

Institutionalizing PES mechanisms can also be considered in contexts where stable political environments, strong government support, and existing legal frameworks are in place.

In these cases, transitioning from project-based models to more policy-oriented frameworks can help shift from short-term funding biases toward promoting greater long-term regulatory and financial stability. Countries such as Costa Rica, China, Guatemala, and Vietnam have embedded PES programs into national policy. Through such an approach, governments can strengthen financial stability by earmarking and ring-fencing funding streams—such as Costa Rica's use of fuel and water taxes or Vietnam's water usage taxes on hydroelectric dams and water companies—through contracts at the provincial and national levels to fund PFES activities (Gallemore et al. 2024; Porras and Chacón-Cascante 2018). In cases where full integration into national systems may not be suitable, governments can still foster long-term stability in ES markets, as demonstrated by Kenya's amendment of its Climate Change Act (Karpowicz et al. 2024).

Participation and representation in decision-making

Key actions include the following:

- Immediate action:
  - Cocreate PES programs to ensure ownership, relevance, and effectiveness.
- Medium-term action:
  - Strengthen and invest in local partnerships.
- Systemic action:
  - Advance the leadership of IPs and LCs in agenda setting and strengthen cross-sector collaboration for collective action.

Immediate actions

Cocreate PES programs to ensure ownership, relevance, and effectiveness

Programs can prioritize cocreating PES initiatives with IPs and LCs to amplify benefits, enhance equity, and leverage their proven expertise as stewards of ES.

This approach promotes more direct access to funding, builds on local skills and capacities, and increases program effectiveness through strategies rooted in community priorities. By cocreating programs, PES initiatives can reward those delivering ecosystem services in the way and level most beneficial to the communities, enhancing program impacts, and ensuring long-term sustainability of the intended actions. Research shows that engagement from the design phase helps establish trust and ensures alignment with community needs, leading to durable and lasting changes (Ezzine-de-Blas et al. 2019). Participation can also facilitate project legitimacy and buy-in in contexts of mistrust of both community-level

institutions and government officials (Martin et al. 2014a). Local perceptions of project legitimacy can play a critical role in the success of PES initiatives (Fisher et al. 2018; Wells et al. 2020). When communities are actively involved, they can help design enforcement measures for noncompliance that are locally accepted and perceived as fair and justified. Programs can shift their focus to early and meaningful participation by IPs and LCs, avoiding the common practice of involving them only during implementation or monitoring stages, to unlock the full potential of cocreation.

Incorporating collaborative decision-making processes that actively involve IPs and LCs from the design phase supports program ownership, strengthens sustainable territorial governance, and ensures alignment with local priorities.

The Nadicake clan and the Wildlife Conservation Society cocreated an ecosystem-based management plan for Fiji's Kilaka Forest Conservation Area, providing a sustainable alternative to leasing land for logging and mining. This bottom-up approach, with extensive community consultation, fostered community ownership and addressed inequity concerns through a trust fund that distributed benefits across the community. By aligning conservation efforts with local priorities, this cocreated plan formalized preexisting forest protections, thereby strengthening territorial governance through long-term commitments to conservation that address threats from destructive land-use pressures (Mangubhai and Lumelume 2019).



The Rarakau Forest Carbon Project in Aotearoa, New Zealand, illustrates how early and meaningful Indigenous participation can advance PES goals. Codesigned by Māori landowners and project developers, the project aligns with Māori cultural values and traditional practices to enhance the Māori's *mana* (prestige, authority, power, and spiritual significance). By integrating *kaitiakitanga* (guardianship) principles and prioritizing locally determined benefit-sharing and transparent financial arrangements, the project supports enhanced forest management and biodiversity outcomes while generating revenue through carbon credits (Weaver and Roughan 2024).

Integrate local decision-making in monitoring to enhance legitimacy, accuracy, and community ownership.

Endogenous rules and sanctions are more likely to be understood and followed at the local community level (Ostrom 1990) and have been found to strengthen community ownership over resource management (Hayes et al. 2015). In Mexico and Uganda, monitoring methodologies with local participation resulted in greater legitimacy and equity at the community level while also performing better in costs and accuracy (Wells et al. 2017); likewise, in Madagascar, participatory approaches led to more effective monitoring (Sommerville et al. 2010b).

However, this approach may also create additional costs for communities and local organizations, which should be identified in conjunction with communities and considered in the planning of PES programs as part of the overall budget to ensure adequate resources are allocated for their implementation. In Mongolia's Pastures, Conservation and Climate Action program, the codevelopment of monitoring procedures, including herder self-assessments and reporting based on metrics aligned with herder values, priorities, and practices, ensured that the monitoring process was less burdensome for participants. As a result, all herder groups involved in Phase 1 expressed a strong interest in continuing to the next phase (Upton 2020).

Prioritize local participation in decision-making to harness local knowledge, ensuring locally accepted and cost-effective PES programs that enhance impact and equity for the long term.

PES programs that engage communities from the early stages can embed local knowledge and values into programs, supporting the establishment of necessary baselines while ensuring efforts are practical and tailored to the community context (Bremer et al. 2023; Brownson et al. 2020; Ingram et al. 2014; Rakotomahazo et al. 2019; Shah and Race 2024; Wylie et al. 2016). For instance, Box 7 highlights how the Bolsa Floresta program in Brazil successfully mobilizes local knowledge and builds and maintains community trust to enhance monitoring effectiveness, overcome challenges, and attract and maintain participation. The Simanjiro PES program in Tanzania incentivizes Maasai pastoralists' traditional land-use practices, promoting wildlife habitat conservation. By formalizing these grazing practices, the PES program created a cost-effective conservation strategy (Davis and Goldman 2019; Ingram et al. 2014).

A study comparing the land selection (targeting decisions) made by local governments and rural landowners in China's new SLCP reinforces the importance of incorporating local decision-making power for effective, sustainable, and equitable outcomes. When local governments made targeting decisions, they prioritized environmental benefits and ease of implementation, preferring lands nearer to roads for ease of access and monitoring, which limited enrollment. In contrast, when landholders made targeting decisions, they focused on minimizing opportunity costs, resulting in more equitable outcomes because enrolling lower-yielding lands enabled more poorer households to participate. The later approach led to more cost-effective land selection and reduced reconversion risks, illustrating how empowering local communities to make land-use decisions can enhance both the equity and effectiveness of PES programs (Ren et al. 2020).

In local contexts with strong social norms for collective action and reciprocity, programs can integrate these values into PES programs to enhance local acceptance and sustain intrinsic motivations to improve program outcomes.

For example, a study of how Zapotec Indigenous communities perceive Mexico's national PES program highlights the benefits of aligning program design with traditional practices. The study found that preserving the practice of *tequio* (volunteer collective work) enabled PES to "crowd in" motivations for engaging in natural resource protection. This alignment

BOX 7 | Enhancing participation and effectiveness in Bolsa Floresta through local knowledge and trust

Bolsa Floresta,[a] launched in 2007 by Brazil's Amazonas state, is one of South America's largest payments for ecosystem services (PES) programs by geographic coverage, promoting conservation and sustainable forest use across 16 protected areas.[b] Spanning 11 million hectares as of 2023,[c] the program faces significant monitoring challenges.

In the Uatumã Sustainable Development Reserve, one of Bolsa Floresta's key areas and home to around 20 riverine communities, internal deforestation threats are low.[d] Instead, illegal deforestation is typically conducted by outsiders.[e] To address this, field-workers have leveraged local expertise to better understand deforestation drivers and implement targeted interventions, compensating for the limitations of remote sensing, which cannot capture forest changes at the required scale.[f]

Local knowledge has also been vital in building and maintaining high levels of community participation and trust. Bolsa Floresta adopts a discursive approach, fostering community dialogue on deforestation and improved practices, rather than emphasizing conditionality.[g] Through frequent interactions, field-workers focus on building organizational and personal trust, distancing themselves from external actors like environmental police, who are often distrusted by the community.[h] Despite perceptions of small payments,[i] the program boasts participation rates of 70–100 percent,[j] with around 9,300 families registered.[k] A quasi-experimental evaluation found that although prioritizing low-pressure sites limited the program's additionality, it still reduced annual deforestation by about 10 percent (about 856 hectares).[l]

Notes and Sources: a. In 2022 the Bolsa Floresta program was restructured into the Guardiões da Floresta program and expanded to 28 conservation units (FAS 2023); b. Viana et al. 2021; c. FAS 2023; d. Silva-Muller 2022; Unidades de Conservação no Brasil n.d.; e, f. Silva-Muller 2022; g. Cisneros et al. 2022; Silva-Muller 2022; h. Silva-Muller 2022; i. Since its introduction in 2007, payments have been R$50 (about US$9) per month per family despite inflation (Silva-Muller 2022). In 2019 the payment was to be increased to R$100 (about US$18) per family per month; however, due to the COVID-19 pandemic, it was not included in the budget. In 2021, it was included in the Budget Guidelines Law No. 5.248, dated September 14, 2020 (Viana et al. 2021); j. Cisneros et al. 2022; k. FAS 2023; l. Cisneros et al. 2022.

strengthened collective action and fostered institutional development (Rodríguez-Robayo et al. 2016). Similarly, another study in Mexico found that members of Chinantec Indigenous communities preferred framing PES payments as contributions to the common good rather than compensation for individual efforts, supporting collective stewardship and program success (Denham 2023).

Shifting toward a model that empowers IPs and LCs from the design phase will build on these successes to promote deepened ownership, alignment with the local context, and ensure inclusiveness across diverse groups within communities.

PES programs that strengthen social capital within communities have been shown to improve local legitimacy, program compliance, and local capacity for management and monitoring activities critical for PES success (Brownson et al. 2019). Importantly, engaging women, youth, and other marginalized groups—while recognizing how intersecting factors such as gender, age, race, migratory status, and religion influence their access to and participation in PES programs—can lead to more equitable outcomes, enhance community buy-in, foster program success, and empower marginalized groups while also contributing to the transformation of gender norms. For example, in Uganda, women's participation in agroforestry through PES programs was shown to strengthen their financial independence (Benjamin et al. 2018).

Integrating women into project design and leadership, as recommended by Shames et al. (2016), may help identify both immediate and long-term strategies to challenge deeply ingrained community beliefs and gender norms that create barriers to equitable participation in PES within communities. Moreover, taking an intersectional approach to include other marginalized groups can further address broader power structures and systemic inequities.

Utilize a community-first program design tailored to the community context to strengthen the PES implementation and promote self-learning (Ezzine-de-Blas et al. 2016a).

Several studies recommend a two-stage approach to PES implementation that first aligns with the local context and then applies appropriate incentives to ensure local legitimacy and community buy-in of the program (Bremer et al. 2014a; Cranford and Mourato 2011; Grillos et al. 2019; Lliso et al. 2020).

To ensure equitable participation, it is important to assess how the program's design can facilitate discussions around local community groups or organizations that may unintentionally create barriers to participation or equitable benefit-sharing.

Local contexts are not static, so adaptive program design that enables flexibility is recommended to better integrate learnings from implementation (Haas et al. 2019; Hendrickson and Corbera 2015; Shames et al. 2016). Programs that do incorporate a learning approach—with baseline studies, rigorous evaluations, and adaptive design—can integrate valuable lessons to strengthen programs (Asquith 2020; Wiik et al. 2020).

Medium-term actions

Strengthen and invest in local partnerships

Reenvision PES as a long-term investment that prioritizes trust and relationship-building between PES programs and local communities.

A truly participatory PES process requires that communities' voices are heard and respected throughout program development, implementation, and scaling. This can be achieved through direct local involvement and the support of intermediary actors. Local-level intermediary actors committed to supporting the interests of IPs and LCs can play a crucial role in aligning PES programs with local contexts, overcoming barriers to participation, and providing essential support in navigating complex rules, securing resources, and ensuring financial transparency. These actors should empower local communities to actively engage in decision-making, strengthening their capacity to shape PES outcomes based on their needs and capacities and work as a bridge connecting local communities with subnational, national, and international actors. The ultimate aim is for intermediaries to assist local communities in strengthening their own capacities to lead PES efforts on their own terms, fostering long-term sustainability and self-governance, without encroaching upon or replacing local leadership.

It is widely acknowledged that external support from trusted intermediaries—who are well ingrained in the local context and are trusted and recognized by IPs and LCs for their credibility—can be integral for ensuring that IP and LC individuals and communities can effectively benefit from PES (Asquith 2020; Denham 2023; Ingram et al. 2014; Izquierdo-Tort et al. 2022; Lee 2017; Silva-Muller 2022). These actors

can play a pivotal role in securing financial resources or advocating for mechanisms that enable IPs and LCs to access resources through PES (Izquierdo-Tort et al. 2021). Such support significantly increases the likelihood of enrollment (Murtinho and Hayes 2017).

Intermediaries can support community actors throughout all stages of the PES process—from program development (Asquith et al. 2008; Ingram et al. 2014) to providing information and reducing information asymmetries between actors, facilitating applications, negotiating contracts, conducting training, administrating payments, monitoring, sanctioning, and verification (Grima et al. 2016; Hejnowicz et al. 2014; Pham et al. 2010, Pascual et al. 2010). They can also help them adapt to PES program changes and localized challenges (Izquierdo-Tort et al. 2021). In local contexts where government laws and policies relating to land and forest use and management are particularly complex, intermediaries with such knowledge can support communities and individuals who would otherwise lack access to such information (Kim et al. 2016).

Research shows that for PES to deliver equitable benefits at the community level, the program must align with the local context (Haas et al. 2019; Hayes et al. 2019; Kaiser et al. 2023; Ola et al. 2019; Rodríguez-Robayo et al. 2020). This creates a challenge to scale subnational and national PES programs, particularly with extensive heterogeneity in community contexts between and within countries. Strengthening coordination across levels can be supported by intermediary actors who can play a critical role in connecting local and subnational, national, or international efforts. Intermediaries, who are well positioned to foresee or identify challenges and their root causes faced by communities, can be valuable for earlier detection of problems and better alignment with community needs, giving community members the best chance of fulfilling PES conditions and the program the greatest likelihood of delivering impactful benefits. Box 8 illustrates a successful model for scaling local NGO partnerships across heterogeneous conditions, highlighting how local intermediaries in Mexico facilitate trust and alignment with community needs in PES programs.

BOX 8 | Model to scale local nongovernmental organization partnerships across heterogeneous conditions

Mexico's federally run payments for ecosystem services (PES) programs provide a good example of how, in a context of strong civil society institutions, national-level programs can be designed to provide this localized support and trust across heterogeneous Indigenous peoples and local communities (IPs and LCs) and varying local community contexts. While all programs are implemented by the National Forestry Commission (Comisión Nacional Forestal; CONAFOR), intermediaries on the ground support communities from the preparation of applications to the implementation of PES activities. These intermediaries must be entities legally recognized by CONAFOR, but they are chosen and hired by the communities to support the alignment of incentives and promote trust between local-level actors.

For 10 communities in the Selva Lacandona rainforest in the state of Chiapas, collaboration with Natura y Ecosistemas Mexicanos (Natura Mexicana), a nongovernmental organization (NGO) focused on the conservation and sustainable management of Selva Lacandona, enabled the communities to adapt to the 2014 top-down changes in PES requirements. Having experience in the region since the 1970s and working with the communities on PES since 2008, even donating their intermediary fees between 2008 and 2019 to the communities to invest in collective projects, Natura Mexicana built experience and trust within the communities. Through this collaboration, Natura Mexicana worked with the communities when enrollment requirements changed to strategically approach PES applications, select the most beneficial program, and implement the necessary adaptations to support the communities' desired outcomes.

While this approach may be emulated in other contexts, its success has been the result of highly committed and capacitated NGOs. Therefore, emulating this approach may not be feasible in contexts lacking the availability of such actors across the PES landscape.

Sources: Izquierdo-Tort et al. 2021, 2022.

Trusted intermediaries can also be instrumental in elevating community members' concerns and interests to PES decision-makers because of their understanding of the context and relationship with communities.

Cultivating trust is critical in establishing the local legitimacy necessary for PES programs to succeed (Wunder et al. 2020), but establishing such relationships requires trust-building and repeated interactions over time (Silva-Muller 2022), which can be threatened in the case of high turnover of staff (Etchart et al. 2020). In Tanzania's Simanjiro PES program, concerns in the community that conservation activities may threaten community land-use rights were addressed through collaboration with local traditional and community leaders from a trust NGO that facilitated communities' meetings; these meetings helped to clarify the program and alleviate community concerns (Ingram et al. 2014). Intermediaries can further operate as a bridge to access markets and information that might otherwise be inaccessible to IPs and LCs (Lee et al. 2016). Where complexities and disruptions in carbon markets cause misunderstandings and delays in payments, intermediaries can help address barriers before they lead to mistrust. In Kenya's KACP and Tanzania's Emiti Nibwo Bulora program, committed NGOs working closely with IPs and LCs on the ground were instrumental in identifying and working to correct these issues and to address barriers for IPs and LCs to enroll and benefit (Lee et al. 2016).

Systemic actions

Advance the leadership of IPs and LCs in agenda setting and strengthen cross-sector collaboration for collective action

To ensure that the needs of IPs and LCs are prioritized and their rights recognized, it is essential not only to include them in decision-making within PES programs but also to strengthen their influence in broader decision-making arenas that shape funding priorities and thematic agendas.

Investing in the empowerment of existing coalitions of IPs and LCs, or fostering the emergence of new ones, can ensure that the contributions of all groups within IP and LC communities—including women, youth, and marginalized ethnic groups—are recognized and integrated into the agenda-setting process. This approach addresses their diverse expertise, needs, and concerns and mitigates the risk of deepening existing inequalities. To be truly transformative, these efforts must be paired with broader cross-sector collaboration, enabling the creation of effective, long-term solutions that overcome barriers IPs and LCs cannot address alone.

It is critical to strengthen coordination between IPs and LCs and key stakeholders, including governments, development organizations, and the private sector, to drive a unified approach for change. Governments and development organizations can expand civic space by reforming restrictive policies, facilitating inclusive dialogue, and providing financial and technical support, which enables civil society—and particularly IP and LC organizations—to mobilize and play a more active role in decision-making processes to elevate and empower the rights and interests of all community members within IPs and LCs. These efforts should be supported by a deeper understanding of state-nonstate relations to ensure effective collaboration and long-term impact. This approach will also enhance civil society's capacity to act as bridging organizations between various institutions and IPs and LCs (KimDung et al. 2016).

Benefits and financing mechanisms

Key actions include the following:

- Immediate action:
  - Plan for financial volatility in budgets and payment models.
- Medium-term action:
  - Strengthen PES programs through integrated benefits that promote participation and program effectiveness.
- Systemic action:
  - Expand and reform ES markets to strengthen long-term stability of financial flows.

Immediate actions

Plan for financial volatility in budgets and payment models

To ensure sustained benefits to IPs and LCs, PES programs can account for financial volatility in their design and implementation by diversifying funding sources and enhancing nonmonetary benefits.

Programs that incorporate strategies to mitigate financial risks tend to foster and maintain trust and deliver consistent benefits to communities amidst constrained financial



resources (Lee 2017). As most PES programs are funded through governments and taxation, donor support, or international markets for ES, financial volatility is a reality that jeopardizes both the funding sustainability and the payment increases needed over time to maintain the real value of payments. One way of protecting IPs and LCs against financial volatility is to establish a steady revenue stream in PES contracts. For example, in the KACP in Kenya, PES developers ensured steady payments by negotiating with the World Bank BioCarbon Fund for the purchase of a specified amount of carbon credits (35,000 credits) annually at a guaranteed price (set per ton of carbon dioxide) and for an established period (nine years) (Lee 2017).

Another way is through mixed funding approaches that position PES efforts within complementary priorities at local, national, and international levels that may open opportunities to diversify and access new funding sources (Perevochtchikova et al. 2021). In several East African PES projects initially focused on carbon, developers have shifted to multiple ES (e.g., carbon and biodiversity) to diversify their funding sources to hedge against price fluctuations in the carbon market (Lee et al. 2016). In Mexico, local PES programs were launched through Local Mechanisms for Payment for Environmental Services through Matching Funds (Mecanismos Locales de Pago por Servicios Ambientales a través de Fondos Concurrentes), where national funds cover 50 percent and then the other 50 percent comes from the local level, either from user fees, local governments, or the private sector (Nava-López et al. 2018). In order to ensure financial sustainability of its national PES program, PSA, Costa Rica buttressed funds from the national budget (from fuel tax and water tax) with small grants from multilateral institutions (such as the German Development Bank and Global Environment Facility) and agreements with private and semiprivate companies interested in promoting environmental services (e.g., conservation organizations and ecotourism groups) (Porras and Chacón-Cascante 2018).

Programs delivering strong nonmonetary benefits can mitigate risks of financial volatility.

Use-restricting programs, as outlined in the "Barriers" section, tend to rely solely on payments to incentivize behavior change and ensure benefits for enrolled IPs and LCs. Consequently, disruptions or delays in funding in use-restricting programs tend to have more negative implications for the flow of benefits to IPs and LCs.

Asset-building programs support the generation of benefits for ES providers irrespective of payments. These benefits include increased agricultural productivity, higher yields, and improved livelihood opportunities (Kwayu et al. 2017; Pagiola et al. 2020; Shames et al. 2016; Tamba et al. 2021); reduced reliance on agricultural inputs (Lee et al. 2016); healthier livestock (Davis and Goldman 2019); and enhanced environmental benefits, such as improved water quality and availability (Bottazzi et al. 2018). Consequently, such programs are more likely to shield those enrolled from the risks associated with financial volatility. For example, several years after completing the Regional Integrated Silvopastoral Ecosystem

Management Projects in Colombia and Nicaragua, landowners continued to maintain the land-use changes. This was due to the silvopastoral practices they adopted, supported by extension services and technologies accessed through the program, on degraded pastures (Calle 2020; Pagiola et al. 2020).

Utilize technical assistance and support that strengthens livelihood opportunities to ensure IPs and LCs benefit.

In PES programs focused on carbon, where there is often a mismatch between the timing of PES activities and the verification of carbon credits, nonmonetary benefits become especially important. For example, in the TIST and KACP programs in Kenya, technical assistance provided through the PES led to improved agricultural practices that boosted crop yields within a year (Lee et al. 2016).

The application of direct payments through mobile banking can reduce operating and transaction costs, enabling PES programs to allocate more resources to the actual benefits for IPs and LCs.

In countries with high fintech uptake such as Cambodia, China, Kenya, Tanzania, and Uganda, where over 10 percent of adults have mobile money accounts, mobile money technologies offer an opportunity to distribute monetary payments more efficiently to individuals, particularly where traditional banking is less used (Thompson 2017). Promoting access to mobile banking may also help address gender and youth exclusion. However, it is crucial to assess access across all community members, including those without mobile phones or digital literacy, and to engage all groups early to ensure the technology promotes inclusiveness.

Establishing more direct systems for distributing funds may also reduce opportunities for elite capture and corruption (Thompson 2017). Payment distribution through mobile money is applied in the TGB in Uganda (ECOTRUST 2023). Likewise, in Kenya, the TIST program uses M-PESA, a Kenyan mobile phone-based money transfer system to reduce transaction costs of payment distribution (Tamba et al. 2021). However, the use of these technologies must be undertaken with oversight and is unlikely to be suitable in the immediate term in countries without a high penetration of mobile banking.

> Benefits that align with local communities not only contribute to the success of individual projects but also create a foundation for scaling PES programs.

Even with sufficient political will and market interest, increasing resources to allocate to PES is unlikely to result in an immediate increase in payments. Therefore, opportunities to strengthen the benefit of existing payment amounts can provide an important bridge in the short term. Studies found that it is not just the scale of payments that matters but also the timing and consistency. Studies have found that structuring payment delivery to correspond with periods of greater expense, such as the New Year festival in Vietnam (Tran et al. 2016) or school payment deadlines in Kenya (Davis and Goldman 2019), can enhance the benefits of the same scale of payments (Randrianarison et al. 2017). Meanwhile, in Ecuador, PES participants identify payment stability as more important than the payment amount (Etchart et al. 2020).

Medium-term actions

Strengthen PES programs through integrated benefits that promote participation and program effectiveness

Adopt an integrated approach to PES benefits, consisting of cash and nonmonetary benefits to tackle barriers to participation and enhance program effectiveness.

Such an approach can help mitigate the risks community members perceive of switching livelihoods by lowering the costs of participating, especially where communities lack access to capital and face limited alternative livelihood opportunities. Benefits from PES are most impactful when they cover both opportunity costs and address the barriers to accessing benefits in the local context (Ola et al. 2019). Providing community members with the resources needed to implement PES activities, or providing payments up front so that they can purchase such inputs, helps to reduce the financial burden and risks for those with limited disposable income to enroll in PES (Clements and Milner-Gulland 2015). Supporting community members through training on improved and new practices, supplying needed materials for PES activities, and encouraging the formation of village sav-

ings and loan associations has been shown to strengthen success from the adoption of new practices (Lee et al. 2016). An integrated approach to PES also helps to mitigate the risks of volatile payments. Where communities have preexisting distrust in external actors, such approaches can help ensure those enrolled continue to have access to some benefits and maintain their relationship with program implementers.

Engage community members in determining PES benefits to improve the effectiveness of programs and ensure they meet their objectives.

This approach ensures that PES benefits align with local needs and contexts, fostering greater participation and long-term success. Through the active participation of local communities in the design and implementation phases, the Mikoko Pamoja project delivered both monetary and nonmonetary benefits, including financial benefits and diversified income sources, expanded opportunities for women, and improved community infrastructure, ensuring that PES benefits were directly aligned with local needs. These benefits have effectively reduced pressures on mangrove forests and successfully incentivized mangrove planting and conservation (Wylie et al. 2016). Benefits that align with local communities not only contribute to the success of individual projects but also create a foundation for scaling PES programs, as demonstrated by the community-led mangrove conservation project Vanga Blue Forest, which was initiated after the Vanga, Jimbo, and Kiwegu villages witnessed the benefits of Mikoko Pamoja up the coast (Plan Vivo 2020; Wylie et al. 2016).

To secure the necessary resources for this approach, PES programs should integrate these benefits into the overall program costs as essential components for achieving program objectives.

Partnerships with donor organizations, NGOs, and civil society groups can leverage blended finance models that align PES incentives with additional contributions from these actors, whose mandates include supporting IPs and LCs. This has been demonstrated by programs in Kenya (Lee et al. 2016), Mexico (Izquierdo-Tort et al. 2021), and Tanzania (Davis and Goldman 2019). PES programs can incorporate blended finance approaches into PES program design to enhance long-term sustainability by clearly defining the responsibilities of such external actor organizations to ensure their contributions to capacity-building and financial resources are effectively integrated.

Systemic actions

Expand and reform ES markets to strengthen long-term stability of financial flows

To increase the resources available to IPs and LCs through mechanisms like PES, it is essential to establish financial arrangements that are sustainable over the long term (Hejnowicz et al. 2014).

This necessitates reforms and expansion of ecosystem service markets at a broader systemic level. Currently, an overreliance on carbon markets risks leading to unstable resource flows, while heavy dependence on public funding often competes with other political priorities (Benjamin and Sauer 2016; Lee et al. 2016; McBurney et al. 2023; Perevochtchikova et al. 2021; Shames et al. 2016).

Simplifying the complexity of regulations and procedures, along with improving market transparency, can reduce reliance on external actors and lower transaction costs for PES programs, enabling easier access for LCs and increasing their participation in ES markets (Lee 2017).

These reforms at the market level will create a more stable and diverse funding environment for PES programs, enhancing their long-term viability and the benefits available to IPs and LCs.

To ensure more stable and diversified financial flows, governments, market regulators, and financial actors—such as market developers, banks, investors, and multilateral organizations—can support the development of noncarbon ecosystem service markets, which are currently underdeveloped.

Additionally, tapping into new financial mechanisms, green bonds, blended finance, impact investing, sustainability-linked financing, and so forth, and aligning with global finance initiatives focused on ecosystem services, has the potential to help build a more robust and diversified financial ecosystem for PES, ensuring stable and sustainable funding for IPs and LCs. Financial actors can play a key role in driving such reforms by helping to design mechanisms and investments that support broader market access and long-term stability.





Conclusions and future research

PES has made significant strides since the 1990s, expanding beyond environmental goals to include social objectives and increasing the participation of IPs and LCs. Yet barriers to equitable access remain, demanding a coordinated, multitiered approach. Future research should explore ways to enhance IP and LC inclusion in emerging ecosystem markets and cost-reducing technologies, while prioritizing participatory research methods.

Conclusions

PES has developed significantly since it emerged as a climate policy instrument during the late 1990s. Two of the more significant ways in which PES has advanced include the expansion from primarily environmental objectives, such as conservation and restoration of ecosystems, to environmental and social objectives, such as poverty alleviation and food security and greater participation of IPs, LCs, and smallholders in PES programs through communal contracts, nonmonetary benefits, provision of technical and extension services, and more attention to localized challenges, among others.

These advances in the design and implementation of PES programs reflect an increased recognition of the role of IPs and LCs as stewards and managers of lands with standing forests, rivers, rich estuarine areas, and healthy ecosystems holding most of the world's biodiversity. In turn, IPs and LCs have benefited from PES programs in important ways, both directly and indirectly, through cash and nonmonetary benefits, such as technical assistance, capacity-building, and resources such as tree seedlings and agricultural inputs. A critical benefit for IPs and LCs is the strengthening of land tenure security, with some PES programs granting formal user rights to public lands or formalizing land rights, while others enhance territorial sovereignty and governance by codifying community-led stewardship and decision-making and often supported by critical financial resources to sustain these efforts. Likewise, the improvement of ES through PES, including water provision, restored forests, improved pastures, and increased soil productivity and yields, provides significant environmental and livelihood benefits to IPs and LCs.

However, there remain manifold barriers at multiple levels that limit IPs and LCs from equitably accessing finance and participating in and benefiting from PES. At the structural and institutional level, these include barriers from current systems and historical legacies that govern decision-making at the macro level and how priorities and funding allocations are set. IPs and LCs also face barriers specific to the local social, political, environmental, and economic context at the community level that impede local capacities to effectively and equitably participate. Additionally, at the programmatic level, operational and technical barriers arising from PES program design result in unequal contract processes and limited opportunities for participation in decision-making.

Some of the critical actions for international and national actors—funders, development agencies, policymakers, national and subnational governments—to address barriers and pave the way for more equitable PES for IPs and LCs span from systemic and long-term commitments. These involve recognizing land and resource rights and improving tenure security for IPs and LCs and establishing mechanisms for their participation in high-level agenda-setting bodies. In the medium term, actors can establish integrated approaches to PES implementation that strengthen capacities, empower community institutions and members, and invest in intermediaries who understand the local context. In the short term, key steps include setting clear and accessible program rules and processes, adopting flexible program designs tailored to heterogeneous local contexts, hedging against financial volatility, and instituting balanced PES contract provisions that reduce risks for IPs and LCs.

Importantly, PES can be reenvisioned from standard conceptualizations that prioritize short-term effectiveness to long-term commitments to support wider benefits from PES and ensure equity in design and implementation and promote and maintain sustainable behavior change (Börner et al. 2017;

A critical benefit for IPs and LCs is the strengthening of land tenure security, with some PES programs granting formal user rights to public lands or formalizing land rights, while others enhance territorial sovereignty and governance by codifying community-led stewardship and decision-making, often supported by critical financial resources to sustain these efforts.

Martin et al. 2014a). The current limited focus on specific economically valued ecosystem services (e.g., carbon sequestration) can be shifted toward a more holistic approach that recognizes the complete range of ecosystem services (from climate regulation to cultural services) as an interconnected system. At a more fundamental level, PES can be reenvisioned from a transactional exchange between a buyer and a seller to a more equitable exchange between social actors, respecting the worldviews of IPs and LCs and their right to self-determination (Muradian et al. 2010).

Future research

Based on the research findings and gaps identified in the literature, policymakers, regulators, and funders at the international and national levels can, in addition to the actions suggested above, also support a research agenda that advances the interests and concerns of IPs and LCs in the following areas.

Growing and emerging ES markets that unlock additional funding opportunities for IPs and LCs

This includes, among others, the rapidly growing market for voluntary biodiversity credit schemes, emanating from a growing attention to the importance of natural resources and biodiversity loss (Pollination 2023). Target 19 of the 2022 Kunming-Montreal Global Biodiversity Framework specifically refers to the relevance of PES as a vehicle for biodiversity funding, calling for the leveraging of public and private finance to stimulate "innovative schemes such as payment for ecosystem services, green bonds, biodiversity offsets and credits, and benefit-sharing mechanisms, with environmental and social safeguards" (CBD 2022, 12).

Another example is watershed PES programs. An increasing awareness of predicted shortfalls in freshwater availability and their impact on businesses opens the scope for more watershed PES programs. For example, the estimated financial impacts from water risks for listed equities alone can potentially reach as high as $225 billion (CDP 2022). The cost of inaction on water security is estimated to be five times higher than the cost of action for companies in sectors affected by diminishing water resources (CDP 2021). Because watershed PES programs directly link ecosystem service users and providers, future research can map hotspots and identify key opportunities for IPs and LCs to protect watersheds and



water security through PES. This approach could provide funding opportunities insulated from some of the barriers of reliance on indirect national and international markets.

The research can also investigate ways to align the preferences of buyers in emerging and expanding ES markets with IPs and LCs by identifying the motivations and demand from buyers to invest in emerging and expanding ecosystem markets. As buyers in national and international markets are often indirectly benefiting from the provision of ecosystem services, a better understanding of their motivations and incentives to purchase ES credits will enable programs to better tailor to those objectives and unlock additional financing, enhance market efficiency and adaptability to market changes, and promote accountability to social objectives by identifying buyers motivated by both social and environmental objectives.

Operational barriers specific to emerging markets and how to extenuate them can also be examined. For example, biodiversity is multifaceted, and as such it is not possible to measure through a singular measure, making it more complex to measure than carbon (GEF 2023; Soto-Navarro et al. 2020). Additionally, biodiversity is inherently localized and lacks fungibility, which limits the capacity for compensating for biodiversity losses through offset markets (Karlsson and Björnberg 2021; Maron et al. 2016). Further research is needed to identify and develop MRV requirements for biodiversity credit markets that are both effective and cost-efficient, with minimal external support. This would help reduce the transaction costs and complexities that often prevent IPs and LCs from fully benefiting from carbon credit PES programs.



Future research can prioritize participatory approaches that directly and centrally incorporate the voices and knowledge of IPs and LCs.

Leveraging technology to increase IPs' and LCs' direct access to funds

More research is needed to better understand how technology can be used to enable a larger share of PES funds to reach IPs and LCs. This can be examined in two directions:

- **Technology to streamline operations, increase transparency, and reduce transaction costs.** Cost savings are particularly relevant for PES programs operating through national and international ecosystem markets. For instance, carbon-focused PES programs face fluctuating carbon prices and high operating costs due to complex MRV requirements and multiple levels of actors, which restrict the funds available for PES payments. Technological innovations that reduce the need for multiple external actors or improve MRV efficiency could increase the level of resources available to channel to IPs and LCs. The research can build on initial explorations of the potential of blockchain technology in PES programs to advance verifiability and financial transparency, reduce transaction costs in applications, and facilitate community-level contracts (Kotsialou et al. 2022). Increasing the reliability and efficiency of PES programs and MRV systems can bolster investor confidence by strengthening the credibility and transparency of impact assessments, increasing the viability of these programs. However, it is important to focus on the safeguards necessary to ensure that technology empowers, rather than weakens, the agency of local communities across various local contexts (Kotsialou et al. 2022).
- **Technology that expands opportunities for IPs and LCs to engage in and benefit directly from operational activities.** This refers particularly to low-cost, user-friendly tools for data collection, remote sensing, and real-time monitoring that empower IPs and LCs to conduct more PES MRV activities and channel and retain more resources within the community. Over time, such innovations are likely to lower operational costs, particularly in the case of remote communities, by reducing reliance on external program staff and the associated travel expenses. Future research can also identify the local capacities needed to ensure these activities can be carried out with minimal external support to yield greater IP and LC ownership of PES activities and reduce barriers to enrollment stemming from mistrust. Furthermore, building on previous research by Thompson (2017) that explored financial technology opportunities, future research can also examine how technologies and innovations such as blockchain can enable direct peer-to-peer transactions, further reducing reliance on external actors and transaction costs and limiting opportunities for elite capture by enhancing transparency and accountability.

Greater incorporation of the voices of IPs and LCs in research

Existing research on PES largely focuses on published studies and secondary data, which often have limited direct engagement with IPs and LCs. As a result, the depth of understanding regarding their experiences and perspectives is limited. Future research can prioritize participatory approaches that directly and centrally incorporate the voices and knowledge of IPs and LCs. This will ensure that PES policies and programs better align with their needs, challenges, and aspirations and will help build a more inclusive and equitable framework for PES participation and benefit-sharing.

In all cases, close attention must be given to the macro-level and community-level contexts of successful case studies, particularly the level of technology penetration and enabling environment for technology use, to appropriately identify opportunities for replicating and scaling successful cases. The identification of such opportunities has the potential to instill greater investor confidence therein, leading to increased resource allocation to IPs and LCs through programs like PES.



Appendices

Appendix A. Extended literature review methodology

The report draws on a diverse range of PES initiatives operating in various policy contexts, with differing objectives, characteristics, and scales, to capture a broader spectrum of IP and LC experiences and generate more generalizable findings and recommendations. The literature review examines PES programs broadly, without focusing on the specific mechanisms of REDD+ but drawing on relevant lessons from specific REDD+ projects and initiatives that offer insights into PES involving IPs and LCs. The review prioritizes key insights from the literature rather than attempting to cover all active PES programs.

Search strategy

The search was conducted primarily in English, with secondary searches in Spanish, reflecting the extensive PES implementation in Latin America. However, as noted in recent reviews, most peer-reviewed articles are published in English, and many Spanish-language articles also appear in English (Kolinjivadi et al. 2023; Perevochtchikova et al. 2021). Despite the prevalence of PES programs in non-English-speaking countries, English dominates peer-reviewed publications on the topic. A 2021 review of PES research in Latin America (2000–20) found that 89 percent of publications on PES in the Scopus, SciELO, and Redalyc databases (the latter two of which feature Spanish and Portuguese journals) are written in English, with only 8.3 percent in Spanish and 2.7 percent in Portuguese (Perevochtchikova et al. 2021). Similarly, a large-scale meta-analysis of over 1000 English-language PES related articles (2005–19) conducted a sensitivity analysis of Spanish and Chinese search queries via Scopus" to "Spanish and Chinese search queries, given the predominance of PES research focus in Latin America and China, via Scopus, Web of Science, CNKI.net, and SciELO to account for research in Latin America and China, but it found fewer than 20 articles in each language, with most research already published in English (Kolinjivadi et al. 2023).

Recognizing the varied terminology used to describe PES programs and IPs and LCs, which has both evolved over the years and encompasses a wide range of diverse groups, the search included a comprehensive range of terms for both PES and IPs and LCs. To enhance search comprehensiveness, snowball methods identified additional relevant studies by examining references and citations from key articles. This iterative process revealed new terms and concepts, allowing for continuous refinement of the search strategy. The resulting searches incorporated a range of terms for both PES and IPs and LCs to address the diverse terminology used across different contexts and time periods, as shown in Table A-1, and employed Boolean operators (AND, OR) to combine and refine the results.

Some key terms differ between English and Spanish due to linguistic and conceptual differences between the two languages. In certain cases, the translated terms reflect cultural and contextual distinctions that are important for accurately representing the research themes in each language. For example, *benefit-sharing* is used in English to highlight specific mechanisms of distribution, whereas *beneficio* in Spanish encompasses a broader understanding of benefits in general. Such variations are intended to respect the local context and ensure clarity in both languages.



TABLE A-1 | Search terms used in English and Spanish

CATEGORY	ENGLISH	SPANISH
PES program	"PES," "payments for ecosystem services," "payments for environmental services," "payments for hydrological services," "payments for watershed services," "ecosystem service rewards," "conservation payments," "rewards for ecosystem services," "compensation," "incentive"	"pagos por conservación," "pagos por servicios ecosistémicos," "esquemas de compensación," "pagos por servicios ambientales," "incentivos económicos para la conservación"
Target groups	"IPLC," "IP&LC," "IP," "LC," "indigenous," "local community," "ethnic minority," "pastoralist," "afro-descendant"	"comunidades," "indígenas," "pueblos indígenas," "comunidades originarias," "comunidades rurales," "comunidades campesinas"
Key topics	"evaluation," "impact," "outcomes," "participation," "perception," "engagement," "involvement," "benefit," "benefit-sharing," "distribution," "equity," "barriers"	"evaluación," "desafíos," "participación," "percepciones," "impacto," "barreras," "equidad," "distribución," "beneficio"

Note: IP = Indigenous people; LC = local community; PES = payments for ecosystem services.
Source: WRI authors.

Literature coding and selection

TABLE A-2 | Categorization and coding of PES program literature

CATEGORY	DESCRIPTION	SPECIFIC ELEMENTS
Document details	Captures fundamental bibliographic and contextual information about each document to allow for the identification, prioritization, and tracking of relevant sources and their contributions to the topic	▪ **Bibliographic info:** Article name, citation, document type, study type, year published, language ▪ **Contextual info:** Abstract
PES program attributes	Details the characteristics and operational aspects of the PES program/s covered in the document to understand the structure and functioning of different PES programs, enabling insights into their design and implementation	▪ **Basics**: Program title, objective/s, location (of program and study), spatial scale, scope, time frame ▪ **IPs and LCs discussed** ▪ **Program characteristics:** Ecosystem services targeted, program modality, eligibility requirements (including tenure type), payment source, payment type, payment distribution, conditionality, level, and frequency ▪ **Stakeholders:** ES providers, ES buyers, program developer, intermediary, funder

TABLE A-2 | Categorization and coding of PES program literature (cont.)

CATEGORY	DESCRIPTION	SPECIFIC ELEMENTS
Study findings and methodology	Summarizes the research methods used, general findings, and detailed analysis of enabling conditions, barriers, and design features with specific evaluation of equity and access as they pertain to IPs and LCs	▪ **Research methods and findings:** Methodology, general findings, recommendations ▪ **Outcomes and conditions:** Economic, social, and environmental outcomes for IPs and LCs, barriers, enabling conditions for IPs and LCs ▪ **Design features:** Positive design features, negative design features for IPs and LCs ▪ **Equity considerations** for IPs and LCs: Procedural, recognition, contextual, and distributive equity

Notes: ES = ecosystem services; IP = Indigenous people; LC = local community; PES = payments for ecosystem services.
Source: WRI authors.

TABLE A-3 | Detailed sample of PES characteristics tracked in tables for reviewing literature

CHARACTERISTICS	SUBCRITERIA	OPTIONS	SOURCE
General	Location	Region; country; specific location	Aguilar-Gómez et al. 2020; Perevochtchikova et al. 2021
	Spatial scale	National; subnational (or regional); local	Aguilar-Gómez et al. 2020 Calvet-Mir et al. 2015; Ezzine de Blas et al. 2017; Grima et al. 2016; Perevochtchikova et al. 2021
	Time frame	Start year; end year	Ezzine de Blas et al. 2017; Perevochtchikova et al. 2021
	Tenure type	Communal; private; public; undefined	Calvet-Mir et al. 2015; Lliso et al. 2021
	Ecosystem service	Biodiversity; carbon sequestration; hydrological/water/shed; landscape conservation/scenic beauty; bundled	Grima et al. 2016; Lliso et al. 2021; Ola et al. 2019
	Objective	Environmental; dual environmental and social	Lliso et al. 2021; Muradian et al. 2013; Pascual et al. 2014
Actors	Funding	Public; user-based (private); donor; hybrid	Blundo-Canto et al. 2018; Hayes et al. 2019
	ES provider/seller	Individual; group; community	Blundo-Canto et al. 2018
	Developer	Government; private sector; NGO	Calvet-Mir et al. 2015; Hayes et al. 2019
	Intermediary	Government; private sector; NGO	Ola et al. 2019
PES activities	Modality	Asset building; use restricting; monitoring	Clements et al. 2010; Wunder et al. 2020
	Activities	Conducted to receive payment	Blundo-Canto et al. 2018; Calvet-Mir et al. 2015
Payment	Method	Community; group; individual	Akers and Yasué 2019
	Type	Cash; nonmonetary (in-kind); both	Blundo-Canto et al. 2018; Grima et al. 2016; Hayes et al. 2019
	Amount	Amount and frequency	Perevochtchikova 2016

Notes: ES = ecosystem services; NGO = nongovernmental organization; PES = payments for ecosystem services.
Source: WRI authors, based on sources listed.

Appendix B. Overview of PES literature

The literature review covered 129 PES programs across a wide geography, with 44 from Central and South America, 38 from Asia, 33 from Africa, 8 from North America (7 from Mexico), and 6 from Oceania. This section summarizes key trends in PES programs that emerged from the literature.

Ecosystem services

Ecosystem services are the benefits humans gain from natural ecosystems, including clean water, air quality, soil fertility, and climate regulation (Bennett and Chaplin-Kramer 2016). These services are often valued or quantified to facilitate transactions between those who steward their provision and those who benefit, directly or indirectly. These are the most common types of ES in PES schemes:

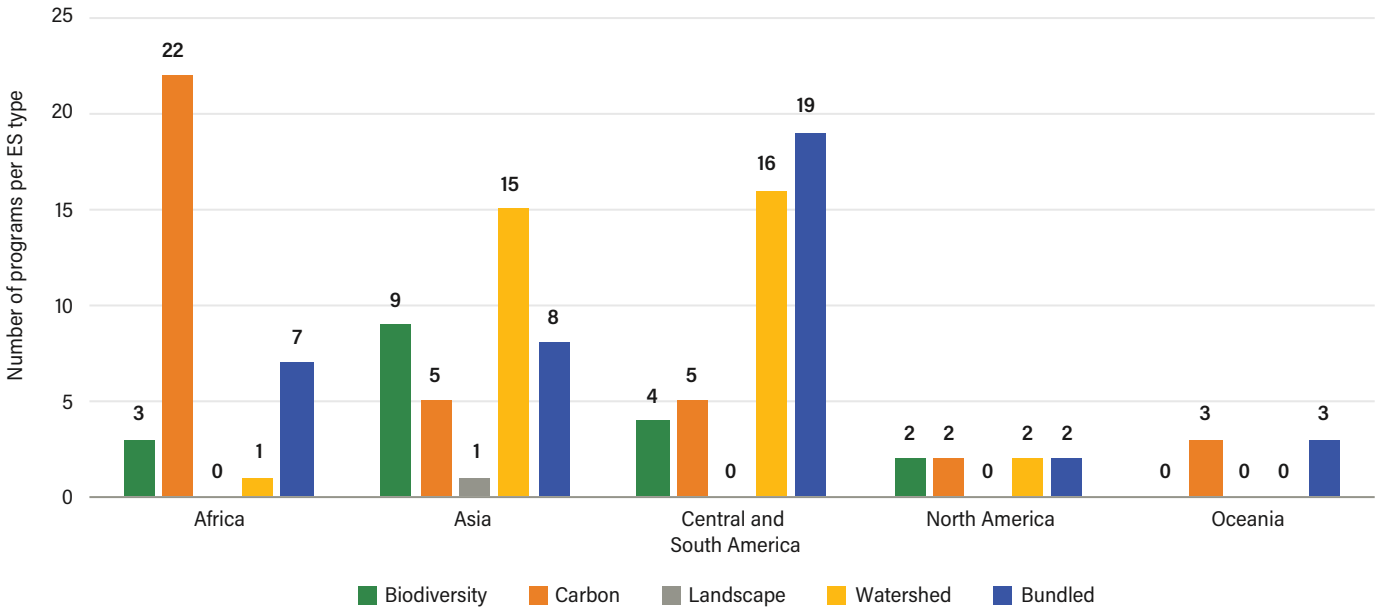
- Carbon sequestration
- Watershed services
- Biodiversity
- Landscape conservation and scenic beauty
- Bundled services[12] (two or more of the above)

In this review, bundled ecosystem services are most common (30 percent), followed by programs focusing on an individual service such as carbon sequestration (29 percent), watershed services (26 percent), biodiversity (14 percent), and landscape conservation and scenic beauty (less than 1 percent). The primary ES focus of PES programs varies by region. In Africa, most PES programs focus on carbon sequestration (67 percent), whereas in Asia, watershed services (39 percent) and biodiversity (24 percent) are the primary focus. In Central and South America, bundled services (43 percent) and watershed services (36 percent) dominate, while in North America PES programs are evenly distributed across all ES types, except landscape. In Oceania, there is an even split between carbon and bundled programs (see Figure B-1).

Payment types

PES payments can be in the form of cash, nonmonetary payments in the form of goods or services (most commonly agricultural inputs, equipment for alternative livelihood activities, or infrastructure), or a combination thereof. The literature reveals that most programs make cash payments to ES providers, accounting for 64 percent of the total programs reviewed. This is followed by a combination of both cash and nonmonetary payments (19 percent) and only nonmonetary payments (16 percent). Percentages have been rounded for clarity.

FIGURE B-1 | Distribution of ES types by geographic region



Note: ES = ecosystem services.

Source: WRI authors.

Program scale

A PES program's scale refers to its implementation within a country and is categorized by national, subnational, and local programs. National programs refer to programs that are rolled out as part of a national initiative or have countrywide eligibility. Subnational programs refer to PES programs that are implemented in a specific region or a few locations around a country. Local programs refer to PES programs implemented in specific local contexts, such as in a specific community.

The majority of these programs have been implemented at a subnational scale (50 percent), followed by local (35 percent) and national (15 percent). This trend prevails in Central and South America and Asia, where subnational programs account for 64 percent and 53 percent, respectively. In Africa and Oceania, local programs dominate (55 percent and 83 percent, respectively), whereas in North America the small number of programs is split between local and subnational programs (25 percent each) and national programs (50 percent). Figure B-2 shows a detailed variation of program focus across geographic regions.

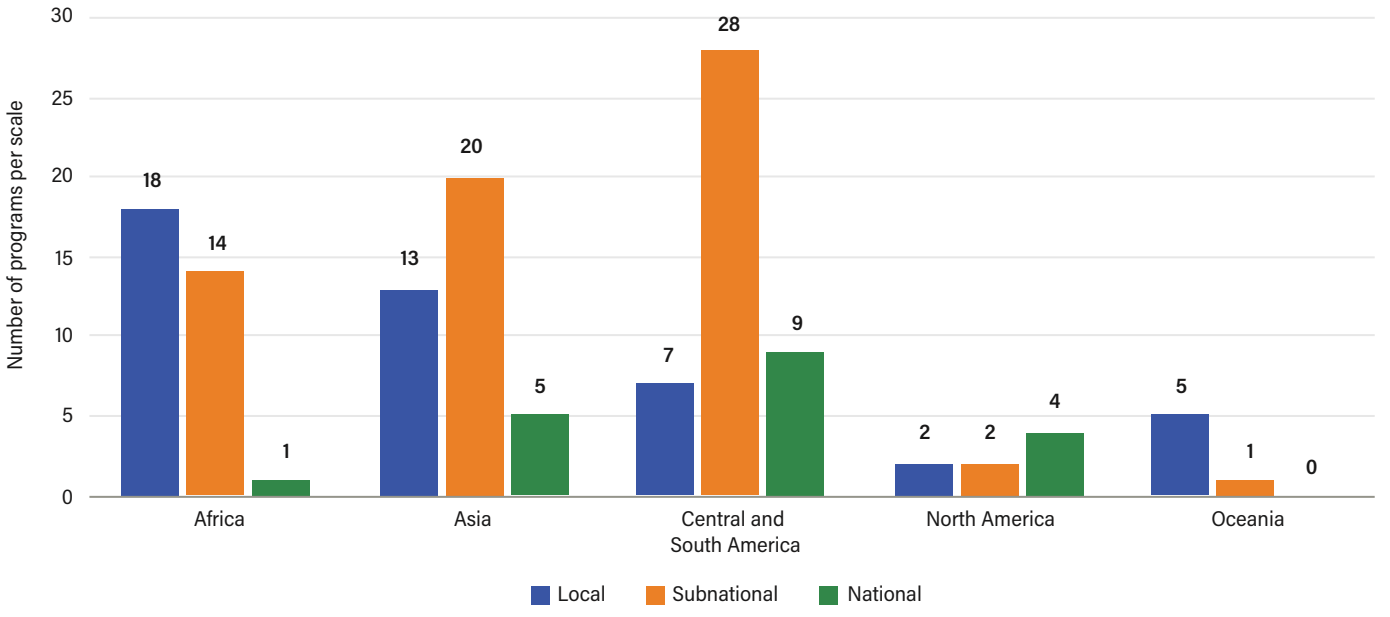
Contract types and institutional structures

Although PES was originally conceived as a direct transaction between a buyer and a seller, in practice, contracts often connect many ES providers with buyers. This study found that PES buyers are most often government agencies, with other buyers including the private sector, NGOs, or a blend of these three. Contracts with ES providers can be made at three different levels—individual, group, or community—or may be a combination. Individual contracts are the most direct; they link one ES provider or household with ES buyers and represent the only contract type offered in 39 percent of programs reviewed. Group contracts (9 percent) are made with several individuals or a subgroup within a community, often with a group leader being responsible for activity and payment dispersal. PES programs that focus on communal contracts (34 percent) are made at the community level, often going through community institutions or a community fund for activity implementation and payment dispersal. Some programs offer the choice between individual, group, and/or communal contracts, as seen in 19 percent of programs reviewed.

In practice, PES programs are not direct transactions between providers and buyers. Rather, they involve several additional institutional actors at various levels, including different types of governmental actors, private companies, NGOs, and international organizations. The exact institutional structure for PES programs varies depending on a given program, but broadly speaking, there are seven key roles played by institutional actors:

- **ES providers** are the IP and LC actors who manage natural resources and ecosystems to deliver specific ES; they include individuals and households (which may include smallholder farmers), groups of individuals, or communities. ES providers

FIGURE B-2 | Program scale by geographic region

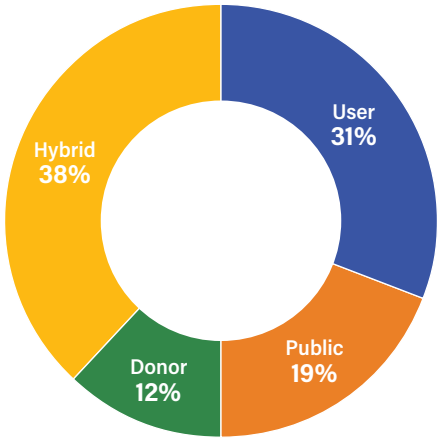


Source: WRI authors.

also include larger private landowners and even companies, but they are not a focus of this report. When ES providers are communities, local governance institutions, community funds, and, at times, traditional leaders play an important role in sharing program information with community members, organizing PES activities, setting and enforcing internal rules and sanctions, and distributing PES payments and benefits.

- **ES buyers** are the entities that pay for the ES provided by IPs and LCs. They typically include government agencies (publicly funded programs); private companies, such as water utilities, hydropower companies, and some tourism operators (user financed); NGOs; development organizations, including bilateral development organizations, funds, and banks (donor funded); carbon or other ecosystem service market buyers (user financed); or certification programs (user financed). As Figure B-3 shows, hybrid funding models, which have a blend of buyer types, are most common. User-financed programs are nearly as common, followed by publicly funded programs and donor- financed programs.
- **Developers** lead the conceptualization and design of the overall structure of a PES program. This includes defining the program objectives; the services that include the target ES; accepted activities and payment structure; the roles and responsibilities of the different actors, including the entry points for participation in decision-making; the conditions of the PES agreements; and the eligibility criteria. Developers can be government agencies; NGOs; development organizations; research institutions; private companies, from international to community levels; or consortiums of these actors.
- **Intermediaries and implementers** are responsible for facilitating the exchange between ES providers and ES buyers and tend to be NGOs, research institutions, CBOs, government agencies, private entities, or multistakeholder forums. They facilitate the design, coordination, and implementation of PES activities broadly to support the provision of ES and benefit-sharing among ES providers. They are often responsible for providing information to communities and their members, carrying out stakeholder consultations and engagement before and during program implementation, facilitating applications, negotiating contracts, administering payments, and facilitating MRV as well as sanctioning. In other cases, particularly when intermediaries are CBOs or NGOs, they may support communities and their members in their broader development goals or help them adapt to program changes and localized challenges.
- **Funders** typically provide the up-front capital through grants, loans, and investments to initiate a PES program's development and implementation. Funders can be government agencies; impact investors; corporate social responsibility initiatives within private companies; development organizations, including multilateral development banks and funds;

FIGURE B-3 | Composition of buyer types of the programs reviewed



Source: WRI authors.

and donors, such as bilateral aid organizations providing ODA, international NGOs or research institutions, and philanthropies. Often, they provide resources additional to the PES payments to support research activities or community development, capacity-building, and technical support in communities.

- **Regulators** establish and enforce the policy and legal environment in which PES programs are implemented. This includes how IPs and LCs and their land rights are formally recognized, what government entities have jurisdictional authority over PES implementation, and complementary or contradictory laws relating to resource and land use. At the national and subnational scales, regulators may enact specific PES legislation that establishes and regulates national or subnational PES programs, such as those in Costa Rica, Ecuador, and Vietnam. In other cases, regulators develop policy frameworks that regulate how PES programs are generally to be designed and implemented in the country, as found in Colombia. At the international level, regulators are primarily related to the international carbon market and include international bodies such as the UNFCCC, which establish the guidelines for carbon trading and offsetting; independent carbon standards and certification bodies, which set the criteria for creating and trading carbon credits; and financial regulators.
- **Monitoring and evaluation entities** are responsible for monitoring and assessing the PES program's performance in relation to its environmental and social objectives. This role can be fulfilled by private independent monitoring certifiers and includes carbon certifiers who verify carbon credits, community members or groups, civil society organizations, NGOs, or government agencies.

Appendix C. Guatemala case study: Methodology and questions explored

World Resources Institute (WRI) conducted a case study of Guatemala's PINPEP to supplement the literature review. The selection of Guatemala and PINPEP was jointly made by WRI and the funder, the Climate and Land Use Alliance (CLUA), after a desk review of PES programs across the developing world. WRI created snapshots of 37 PES programs in Africa, Asia, and Latin America that covered key information about the program and a preliminary assessment of the program based on criteria drawn from the case study analytical framework (described below)—namely, effectiveness, efficiency, and equity. Out of the PES programs assessed, WRI created a shortlist of two potential case studies for each region, which was further narrowed down to the two Latin American programs based on the programs' characteristics and CLUA's geographic priorities. WRI conducted a rapid analysis of Ecuador's Programa Socio Bosque and Guatemala's PINPEP, expanding the snapshots of each program to allow further comparison, resulting in the final selection of PINPEP in Guatemala.

The case study used qualitative methods: a literature review and key informant interviews and focus group discussions (FGDs) conducted during field visits in Guatemala on August 21–25, 2023. The fieldwork team visited the offices of INAB in Guatemala City to conduct key informant interviews and communities that participate in Guatemala's PES programs for the FGDs. The team visited three municipalities: Chimaltenango, Totonicapán, and Cobán, located in Guatemala's western and northern highlands, where Indigenous communities participating in forest incentive programs are concentrated. The visit in each municipality was coordinated with a local organization: the INAB regional office based in Chimaltenango, the Asociación de Forestería Comunitaria Utz Che' in Totonicapán, and the Federación de Cooperativas de las Verapaces (FEDECOVERA) in Cobán. The local organizations invited PES program participants within their area to a meeting hall where the FGDs were held. Two or more communities were represented in each municipality in the meetings. The format for meetings consisted of the following:

- An introductory plenary, in which the fieldwork team introduced itself and the purpose of the meeting and obtained the attendees' consent to be interviewed in accordance with WRI's Human Subjects Protocol
- Breakout groups, in which attendees were divided into small groups and asked a set of questions drawn from the case study analytical framework
- Plenary discussion after the breakout groups to report back to the whole group what each breakout group discussed and to ask interactive questions to the whole group
- Summary and closing statements and group lunch

A caveat is that the short duration of the field visits limited the amount of interaction with program participants and precluded in-depth conversations and interactions with diverse participants that would have led to a more comprehensive understanding of local perspectives.

The case study analytical framework drew mainly from two conceptual frameworks. The first is Angelsen and Wertz-Kanounnikoff's (2008) proposed 3E framework for assessing initiatives on REDD+. 3E stands for effectiveness, efficiency, and equity, and for each criterion, Angelsen and Wertz-Kanounnikoff developed a set of components or indicators to be accounted for when evaluating REDD+ projects. For the case study, WRI applied an adapted version of the 3E framework, selecting the most relevant indicators and modifying them to fit the broader PES context. Under WRI's adapted version, the 3E is defined as follows:

- *Effectiveness* refers to the ability of the PES program to achieve its environmental objectives.
- *Efficiency* refers to cost-effectiveness, in terms of program implementation and the transaction and opportunity costs borne by participants.
- *Equity* refers to fair access and distribution of costs and benefits from the program, accounting for relative power and capabilities.

The analysis additionally drew from the multidimensional framework by McDermott et al. (2013) for assessing equity in PES to elaborate the equity criterion. The multidimensional equity framework identifies three core dimensions of equity: contextual, procedural, and distributive equity. *Contextual equity* refers to the preexisting political, economic, and social conditions under which stakeholders engage in and benefit from resource distributions and which limit or enable their capacity to do both. *Procedural equity* refers to the inclusion, representation, and meaningful participation of all affected groups, especially those typically marginalized with respect to natural resources, including the landless, ethnic minorities, and women. *Distributive equity* refers to the allocation of costs, risks, and benefits among stakeholders in a manner that maximizes social welfare. A fourth dimension, recognitional equity, elaborated by Pascual et al. (2014), was also applied in the analysis. *Recognitional equity* refers to the respect for knowledge systems, values, social norms, and the rights of all stakeholders in the design and implementation of the programs.

For each criterion, WRI identified a set of indicators from the 3E and multidimensional frameworks and developed questions to be explored for each indicator (Table C-1). An unpublished version of the complete case study findings is available upon request.

TABLE C-1 | Analytical framework indicators and questions

ANALYTICAL CRITERIA	INDICATOR	QUESTION(S) ASKED
Effectiveness: Achievement of the program's environmental objectives	Depth and additionality	▪ What has been achieved so far? Is the PES program on track to achieving its objectives and targets?
	Breadth/scope	▪ Does the PES program cover priority areas in terms of environmental and ecosystem degradation as well as key land users?
Efficiency: Cost-effective establishment and implementation of the PES program	Program costs	▪ Has the PES program allocated adequate funding to ensure the achievement of its objectives? ▪ Is the institutional and administrative framework for implementation efficient? ▪ Is compensation paid/received in a timely manner?
	Participants' transaction costs	▪ Are the costs of joining the program in terms of time, capital, and application requirements affordable and reasonable for different participants?
	Participants' opportunity costs	▪ Does the PES program adequately compensate landowners for their opportunity costs, especially for land uses that provide food security and essential livelihoods?
Equity: Fair access and distribution of costs and benefits from the PES program	Contextual equity and rights recognition: Are power, land tenure, information, and capability asymmetries addressed by the PES program?	▪ To what extent were initial social inequities or asymmetries incorporated or addressed in the design and implementation of the program? ▪ Are the rights and roles of Indigenous peoples and local communities recognized, and do they have fair access to the PES program?
	Procedural equity: How inclusive are rules and decision-making?	▪ Are the program's decision-making processes inclusive and transparent, providing access to information needed to make informed decisions? ▪ Does the program have mechanisms to ensure and incentivize participation by all stakeholders, especially marginalized groups such as women, ethnic minorities, youth, landless laborers, etc.?
	Distributional equity: How are benefits and costs allocated?	▪ Are the benefits fair for program participants at the national level and within the program itself? Benefits include compensation in cash and nonmonetary benefits. ▪ Who receives the benefits? Are the benefits distributed equitably between different land users or participants, including marginalized groups? ▪ Are the costs distributed equitably at the national level and within the program itself? Costs include land-use restrictions, time and labor requirements, capital requirements, etc.

Note: PES = payments for ecosystem services.
Source: WRI authors and field work team.

Appendix D. Hypothetical illustration comparing benefit-sharing pathways in two contrasting local contexts

Figure D-1 presents a hypothetical example illustrating how variations in local governance and institutional capacity require different approaches in PES program design and implementation to support equitable participation and benefit-sharing. This simplified example contrasts two extreme scenarios to illustrate the importance of accounting for local context in program design. In both cases, the program can be designed to include community input, but how this is pursued would vary to reflect the local context:

Strong governance:

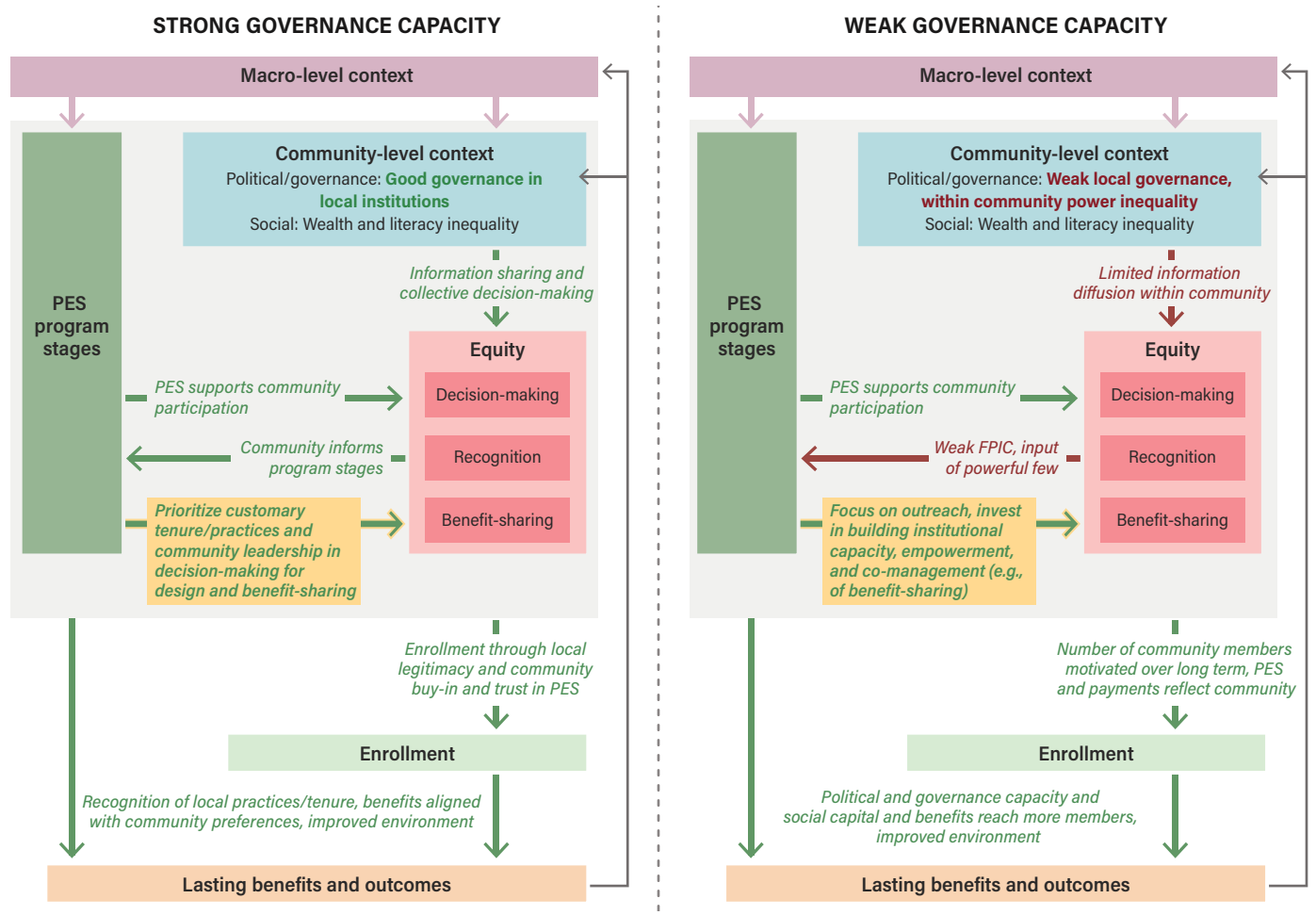
- **Local context:** There is high institutional capacity with trusted local leadership. Information flows easily, and decisions reflect the community's needs, with effective community participation.
- **Program:** The program is designed to prioritize community input, integrating community decision-making processes and recognizing customary practices, tenure, and community leadership.

- **Potential outcome:** The program aligns with local priorities and knowledge, boosting legitimacy and trust and ensuring benefits that reflect community values.

Weak governance:

- **Local context:** There are strong power imbalances or corruption, limited information sharing, and decision-making and benefit-sharing favor a powerful few.
- **Program:** The program is designed to prioritize outreach to marginalized members, strengthening institutional capacity and incorporating safeguards to ensure inclusive decision-making. Comanagement between community leaders and PES intermediaries can be considered to ensure that benefit-sharing and decision-making processes are inclusive and transparent.
- **Potential outcome:** The program increases participation from marginalized community members, enhances governance capacity and equitable participation of community members in decision-making, and equitably distributes benefits.

FIGURE D-1 | Illustration of the application of the conceptual framework



Notes: FPIC = free, prior, and informed consent; PES = payments for ecosystem services. These examples are stylized and hypothetical, designed to simplify complex dynamics for illustrative purposes. While these scenarios are intended to highlight the implications of key differences, real-world local contexts are typically more nuanced and complex, often reflecting a mix of strengths, weaknesses, and dynamic arrangements.

Sources: WRI authors, based on Dawson et al. (2021), Denham (2023), Hayes and Murtinho (2018), Lliso et al. (2020), Martin et al. (2014b), Milne and Adams (2012), Montero-de-Oliveira et al. (2023), Sommerville et al. (2010a), and Tamba et al. (2021).

List of abbreviations

ACFO	Alliance of Community Forest Organizations
ADI	Asociación de Desarrollo Integral (Integral Development Association)
CBO	community-based organization
CLUA	Climate and Land Use Alliance
CONAFOR	Comisión Nacional Forestal (National Forestry Commission; Mexico)
COP	Conference of the Parties to the United Nations Framework Convention on Climate Change
CORENCHI	Comité de Recursos Naturales de la Chinantla Alta (Natural Resources Committee of the Upper Chinantla)
ES	ecosystem services
FGD	focus group discussion
FPIC	free, prior, and informed consent
ICCA	Indigenous and Community Conserved Area
INAB	Instituto Nacional de Bosques (National Forestry Institute; Guatemala)
IP	Indigenous people
IUCN	International Union for the Conservation of Nature
KACP	Kenya Agricultural Carbon Project
LC	local community
MRV	monitoring, reporting, and verification
NGO	nongovernmental organization
ODA	official development assistance
PES	payments for ecosystem services
PFES	Payments for Forest Environmental Services (Vietnam)
PINFOR	Programa de Incentivos Forestales (Forestry Incentive Program; Guatemala)
PINPEP	Programa de Incentivos Forestales para Poseedores de Pequeñas Extensiones de Tierra de Vocación Forestal o Agroforestal (Forestry Incentive Program for Owners of Small Landholdings Used for Forestry or Agroforestry; Guatemala)
PROBOSQUE	Incentivos para el Establecimiento, Recuperación, Restauración, Manejo, Producción y Protección de Bosques (Incentive Program for the Establishment, Recovery, Restoration, Management, Production, and Protection of Forests)
PSA	Pago por Servicios Ambientales (Payment for Environmental Services; Costa Rica)
REDD+	reducing emissions from deforestation and forest degradation in developing countries
ReDirect	Reconciling Biodiversity and Development through Direct Payments for Conservation (Rwanda)
RED-PINPEP	Red Nacional de Comunidades Organizadas Beneficiarias del PINPEP (National Network of Organized Beneficiary Communities of PINPEP)
RUPES	Rewarding Upland Poor for Environmental Services
SFCP	Suruí Forest Carbon Project
SLCP	Sloping Lands Conversion Program (China)
TGB	Trees for Global Benefits (Uganda)
3E	effectiveness, efficiency, and equity
TIST	The International Small Group Tree Planting Program
UNFCCC	United Nations Framework Convention on Climate Change
UNPFII	United Nations Permanent Forum on Indigenous Issues
VCM	voluntary carbon market

Glossary

cash benefits: Cash payments to IPs and LCs in exchange for land-use practices and actions undertaken that conserve or increase the provision of ES, such as carbon sequestration, water purification, and biodiversity protection by IPs and LCs and/or individual members (see Ingram et al. 2014; Ramírez-Cover 2017).

developers: Developers lead the conceptualization and design of the overall structure of a PES program. This includes defining the program objectives; the services that include the target ES; accepted activities and payment structure; the roles and responsibilities of the different actors, including the entry points for participation in decision-making; the conditions of the PES agreements; and the eligibility criteria. Developers can be government agencies, NGOs, development organizations, research institutions, private companies (from international to community levels), or consortiums of these actors (see Engel et al. 2008).

ecosystem services (ES): The benefits humans gain from the natural ecosystems—including clean water, air quality, soil fertility, and climate regulation—that are valued and/or quantified to facilitate transactions between those who steward their provision and those who benefit, directly or indirectly, from that provision (see Bennett and Chaplin-Kramer 2016). The most common types of ES involved in PES schemes are carbon sequestration, watershed services, biodiversity, landscape conservation and scenic beauty, and bundling of two or more of the above.

ES buyers: The entities that pay for the ES provided by IPs and LCs. They typically include government agencies; private and state-owned companies (particularly water utilities, hydropower companies, and some tourism operators); NGOs; development organizations, including bilateral development organizations, funds, and banks; carbon market buyers; or certification programs (see Engel et al. 2008; Wunder 2005, 2007).

ES providers: The different IP and LC actors who manage natural resources and ecosystems to deliver specific ES; they include individuals and households (which may include smallholder farmers), groups of individuals, or communities. ES providers also include larger private landowners and even companies, but they are not a focus of this report. When ES providers are communities, local governance institutions, community funds, and, at times, traditional leaders play an important role in sharing program information with community members, organizing PES activities, setting and enforcing internal rules and sanctions, and distributing PES payments and benefits (see Engel et al. 2008; Wunder 2005, 2007).

intermediaries and implementers: Organizations that facilitate the exchange between ES providers and ES buyers and tend to be NGOs, research institutions, CBOs, government agencies, private entities, or multistakeholder forums. They facilitate the design, coordination, and implementation of PES activities broadly to support the provision of ES and benefit-sharing among ES providers. They are often responsible for providing information to communities and their members, carrying out stakeholder consultations and engagement before and during program implementation, facilitating applications, negotiating contracts, administering payments, and facilitating MRV as well as sanctioning. In other cases, particularly when intermediaries are CBOs or NGOs, they may support communities and their members in their broader development goals or help them adapt to program changes and localized challenges (see Asquith et al. 2008; Ingram et al. 2014).

nonmonetary benefits: Both nonmonetary payments to IPs and LCs in PES (e.g., goods and materials, etc.) and the broader opportunities and support provided through enrollment in a PES program. These benefits include improvement in land tenure recognition and security, technical assistance to implement PES activities, broader capacity-building and community development support, and integration in new institutional partnerships. Nonmonetary benefits can be as, or even more, important to IPs and LCs than direct monetary payments (see Denham 2023; Nieratka et al. 2015).

payments for ecosystem services (PES): PES was originally conceptualized as a market-based approach to incentivize the conservation, restoration, and sustainable management of ecosystems. The initial objective of PES was to provide an effective and efficient way of facilitating environmental outcomes by aligning the incentives of those using and providing ES. Most ES are used free of charge; hence, the ecosystem products that are sold in conventional marketplaces are often underpriced, which leads to a serious underprovision of ES (Costanza et al. 1997). Wunder (2005) describes the criteria distinguishing PES from other mechanisms: a voluntary transaction where a well-defined ES (or a land use likely to secure that service) is being "bought" by a (minimum of one) ES buyer from a (minimum of one) ES provider if and only if the ES provider secures ES provision (conditionality). PES appeared as an instrument to correct market failure that creates a surrogate market where transactions between ES buyers and providers can be facilitated to ensure the continued provision of ES. The concept of PES has evolved through the years; a newer definition aims to recognize that PES is beyond a market transaction and is instead "a transfer of resources between social actors, which aims to create incentives to align individual and/or collective land use decisions with the social interest in the management of natural resources" (Muradian et al. 2010, 1205).

social capital: The networks, shared norms, values, and understanding that foster cooperation within and between groups (Social and Human Capitals Coalition 2019).

Endnotes

1. The estimate covers an IP and LC managed land area of 38 million square kilometers containing tropical forests, woodlands, and grasslands (Sangha 2020).

2. While some IP and LC organizations and funders call for a massive scaling up of capacity to manage funds, others say that the overemphasis on the lack of IP and LC capacity to manage funds is an "excuse" to maintain the paradigm in which donors control the money and how it is spent (Gabay 2023; Koop 2023).

3. For PES, the theoretical foundations in economic theory lie between the internalization of externalities (Pigou 1921) and the reduction of transaction costs through clear property rights and efficient bargaining processes (Coase 1960). In this approach, payments are designed to align the willingness of buyers to pay with the opportunity costs of providers. Ideally, monetary payments occur directly between ES buyers and sellers. However, in cases involving multiple ES buyers and sellers, intermediaries can facilitate transactions and reduce transaction costs. Wunder's (2005) proposed definition stipulates that for a program to be classified as PES, it must be a "voluntary transaction where well-defined ES (or land use to secure ES) is bought by ES buyer/s from ES provider/s, with payment conditional on provision of ES." However, in practice, few programs fulfill these conditions, with the implementation of PES over the decades taking different shapes and evolving over time.

4. In the Reciprocal Watershed Agreements (Acuerdo Recíprocos por el Agua) in Bolivia, participants could choose between equipment for alternative livelihood opportunities, like fruit tree seedlings, beehives, or barbed wire, and plastic piping to protect water sources (McWherter et al. 2022). Similarly, in the Moyobamba Rewards for Hydrological Ecosystem Services Mechanism program in Peru, in-kind payments included sanitation infrastructure and support for shaded coffee systems, beekeeping, sustainable tourism, handicrafts (Montoya-Zumaeta et al. 2021).

5. Law No. 14.119 (Política Nacional de Pagamentos por Serviços Ambientais) establishes a framework for operationalizing and promoting the Brazil PES market, clarifying eligible ecosystem services, aligning with the objectives of the Brazilian National Environmental Policy, to establish policy certainty and coherence where previously PES programs were implemented and governed with significant heterogeneity (Mamedes et al. 2023).

6. The Rights and Resources Initiative defines land that is owned by IPs, Afro-descendants, and LCs as those lands where states have formally recognized that communities have certain rights that strengthen the security of their claims to land. These rights include community tenure with unlimited duration; the legal right to exclude outsiders from using their resources; and entitlement to due process and compensation in the face of potential extinguishment by the state of some or all of their rights. Land that is designated for IPs, Afro-descendants, and LCs are those where the state recognizes some rights on a conditional basis for communities. While rights holders have some level of "control" exercised through use, management, and/or exclusion rights over land, they lack the full legal means to secure their claims to those lands (i.e., they do not have all rights required under the "ownership" designation: the right to exclude, to due process and compensation, and to retain rights for an unlimited duration (RRI 2021).

7. The regional breakdown of lands with ownership rights and lands with control rights are as follows: Asia, 21.5 percent ownership rights (98 percent of which is in China) and 3.4 percent control rights; Latin America, 17.5 percent ownership, 3.2 percent control; and sub-Saharan Africa, 9.6 percent ownership, 9.4 percent control (RRI 2023).

8. Another factor that could limit the availability of labor for PES activities is rural-urban migration, which is a phenomenon in many developing countries. Its causes include poverty, lack of opportunity, pursuit of education and jobs, climate impacts (e.g., drought, extreme weather events), conflict, and others (Selod and Shilpi 2021).

9. Use-restricting PES programs compensate those enrolled to refrain from carrying out activities such as logging or grazing.

10. Asset-building programs compensate those enrolled for enhancing resources (i.e., implementing sustainable soil management practices, planting new trees).

11. In Colombia, resguardos are sociopolitical organizations established and governed by an Indigenous community based on their traditions and principles.

12. Often national and subnational government programs, such as several found in China, Costa Rica, Ecuador, Guatemala, and Vietnam, bundle three or four types of ES. This recognizes and compensates for interconnected benefits and reduces the administrative burdens of quantifying individual services. Similarly, in Kenya and Tanzania several programs combine biodiversity services and landscape scenic beauty. This bundling accounts for the importance of preserving ecosystems both for the maintenance of various ecological functions and benefits, including the conservation of iconic species, and for opportunities for recreation and ecotourism.

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