

Contribution to the

COP30 Presidency Roadmap for Halting and Reversing Deforestation and Forest Degradation by 2030

Submitted by the Center for International Forestry Research and World Agroforestry (CIFOR-ICRAF)

CGIAR Research Center

10 April 2026

Contact: COP30-Forest-Roadmap@unfccc.int

Introduction: The Scale of the Challenge

The commitment to halt and reverse deforestation and forest degradation by 2030, embedded in paragraphs 33 and 34 of the first Global Stocktake (GST1) outcome adopted at COP28, represents one of the most consequential and most difficult targets in the entire Paris Agreement architecture. The 2024 data make the difficulty plain. According to the University of Maryland's GLAD laboratory data published on WRI's Global Forest Watch platform, tropical primary forest loss reached 6.7 million hectares in 2024, nearly double the 2023 figure and the highest on record. The Forest Declaration Assessment finds that total global deforestation reached 8.1 million hectares in 2024, a level 63% above the trajectory required to meet the 2030 target. For the first time in the record, fire rather than agriculture was the leading proximate cause of tropical primary forest loss, accounting for nearly half of all destruction. Forest degradation affected a further 8.8 million hectares. The world is not bending the curve; it is steepening it.

CIFOR-ICRAF, the CGIAR research centre for forests, trees and agroforestry, operates in more than 60 countries across the tropics and subtropics, with dual headquarters in Bogor, Indonesia and Nairobi, Kenya. Over three decades of research on the drivers of deforestation and degradation, forest landscape restoration, agroforestry systems, REDD+ implementation, community forestry, climate finance and the governance of tropical landscapes, we have accumulated a body of evidence that is directly relevant to the design of this Roadmap. We offer this contribution organized around the four questions posed in the COP30 Presidency's invitation letter, drawing on that evidence base while being candid about the limits of what is known and what research alone can deliver.

Question (a): Critical Barriers to Halting and Reversing Deforestation and Forest Degradation

The persistence of agricultural commodity drivers

CIFOR-ICRAF's global comparative research on deforestation drivers, spanning more than 100 countries across all tropical regions, consistently finds that commercial agriculture is the dominant proximate driver of deforestation, present in over 80% of cases studied. In Latin America, pasture expansion for beef production remains the single largest driver. In Southeast Asia, oil palm, rubber plantations and aquaculture ponds have been the primary agents of forest conversion for decades. In sub-Saharan Africa, the pattern is shifting as smallholder agriculture still dominates but commercial pressures from cocoa, palm oil and other export commodities are intensifying, particularly in the Congo Basin and West Africa. The economic incentives underlying these conversions are structural, not episodic. In the case of oil palm, for example, the crop is simply too lucrative for both industrial developers and smallholder farmers to pass up without viable economic alternatives (De Sy et al. 2026).

A critical barrier, frequently overlooked in policy discussions, is the sectoral displacement problem. When policy interventions successfully reduce deforestation from one commodity in one jurisdiction, the economic pressure does not disappear. It migrates to other commodities, other jurisdictions, or both. Broad land-use planning approaches that address the full portfolio of competing land uses simultaneously remain rare. Without them, sector-specific victories are repeatedly undermined by cross-sectoral leakage.

Accounting for context. A central lesson emerging from recent experience is that context matters—deforestation is not a uniform phenomenon. It is spatially concentrated, driven by distinct combinations of actors and incentives, and embedded within broader economic systems—particularly those related to agriculture and land use, infrastructure and trade. Evidence from large forest countries such as Brazil and Indonesia indicates that, while deforestation can result from multiple interacting drivers, the greatest forest loss is often linked to a limited number of dominant pressures, such as pasture expansion and commodity production, shaped by broader governance and policy contexts. This heterogeneity suggests that progress will depend much on understanding how current policies work and on the fine-tuning of how policy tools, incentives and disincentives are designed, combined, targeted and sequenced.

Definitional and monitoring inconsistencies

One of the most fundamental barriers is the absence of agreed, consistent definitions. Forest loss has no single agreed definition, and in public discourse it is generally equated with conversion to other land uses (deforestation). The reality is considerably more complex. The inclusion of forest degradation alongside deforestation in the GST1 outcome was a significant advance, but degradation itself remains variably defined across countries, monitoring frameworks and scientific disciplines. The FAO Global Forest Resources Assessment 2025 reports that only 59 countries, representing 37% of the global forest area, have a national definition of forest degradation. Less than half of countries remotely monitor it. Without

harmonised definitions and monitoring standards, it is impossible to establish credible baselines, measure progress or hold commitments to account.

This definitional problem also creates a hemispheric asymmetry in accountability. Industrial logging in boreal and temperate forests of the Global North represents one of the largest drivers of tree cover loss worldwide, yet it is classified as sustainable forest management rather than deforestation under prevailing definitions. Clearcut landscapes in Canada, Scandinavia and Russia, where forest canopy, soil structure and biodiversity are profoundly altered, are not captured by the same accounting frameworks that apply to tropical forest conversion. The Roadmap should confront this asymmetry directly if it is to be perceived as equitable by tropical forest countries.

Recognition is growing that effective action requires a clearer understanding of the different “contexts” in which deforestation occurs. Analytical approaches that classify forest landscapes into distinct categories—based on forest type, condition, deforestation dynamics and risk factors—offer one way of structuring this understanding (De Sy et al. 2026). Such approaches have shown that deforestation drivers differ depending on local conditions, and that policy effectiveness varies accordingly. Interventions that perform well in one setting may have limited impact on another. For example, enforcement measures supported by monitoring systems have proven particularly effective in deforestation frontiers characterized by large-scale illegal clearing, especially when combined with economic disincentives such as credit restrictions or market exclusion. In contrast, in areas where forests remain largely intact, tenure security and the recognition of Indigenous and local community rights have often provided more durable protection than reactive enforcement. Similarly, in mosaic landscapes where smallholder livelihoods are closely intertwined with forest use, approaches that strengthen human capacities and provide viable economic alternatives appear essential (Cromberg et al. 2026).

Furthermore, tropical forest ecosystems are highly heterogeneous. In particular, greater attention is needed to the management and conservation of key aquatic forest systems—such as floodplains, mangroves, and peatlands (e.g. Murdiyarso et al. 2015; Sasmito et al. 2026). These ecosystems are exceptionally carbon-dense, harbour rich biodiversity, protect coastlines, and underpin fisheries-based food systems and livelihoods, and yet they remain disproportionately under threat.

Monitoring for decision-making. An operational Roadmap also requires moving beyond a narrow understanding of monitoring as a tool for reporting, giving it a more integrated role in decision-making. Advances in satellite-based systems have dramatically improved the ability to detect forest loss at ever smaller scales and in near real time. However, the potential of these systems remains only partially realized when they are not systematically linked to information on the drivers of change, the actors involved, and the economic activities that follow deforestation. Strengthening this connection could allow using monitoring systems to identify the entry points for more strategic responses—helping to identify where deforestation risks are highest, why deforestation is happening, and which interventions are most likely to influence outcomes. Monitoring can be developed into a practical instrument for guiding policy and enforcement.

Transparent monitoring is more than a technical tool; it can effectively mediate fairness and equity, and hence, effective action—a key realization that a new roadmap must reflect (Boettcher et al. 2025 a, b). Advances have been made through the Enhanced Transparency Framework; the Biennial Transparency Reports—that all countries will regularly provide and for which they use their own data—can be used for analysis of a wide variety of questions while respecting national data sovereignty (Martius and Pingault 2025; Pingault and Martius 2025a).

Governance fragmentation

Forest governance at the international level remains deeply fragmented. Forests are addressed under the UNFCCC, the Convention on Biological Diversity's Kunming-Montreal Global Biodiversity Framework, the UN Strategic Plan for Forests, the FAO Global Forest Resources Assessment process and numerous bilateral and regional agreements. CIFOR-ICRAF's institutional analysis of this landscape identifies no fewer than a dozen overlapping mandates with limited operational coordination. The result is duplication, inconsistent guidance to countries and persistent gaps, particularly in connecting the climate and biodiversity conventions on forest-related implementation. At the national level, governance is frequently divided between environment, forestry, agriculture and land-use planning ministries with competing mandates and limited capacity for integrated decision-making.

Planning for diversity. These insights point towards the value of a more differentiated approach to national action planning—one that retains coherence at the national level while allowing for variation in how policies are applied across territories (Chervier et al. 2022). We are in the process of providing a systematic forest policy diagnostic that links policy success at local to national levels to context derived from deforestation archetypes. Rather than prescribing specific models, the roadmap should encourage countries to articulate how they intend to align interventions with the particular characteristics of their forest and agricultural landscapes, and how they will draw on available evidence to inform these choices. This would not require uniform methodologies, but rather a shared emphasis on linking context, drivers, and policy responses in a transparent and iterative manner.

Finance misalignment

Finance represents another critical enabling factor. Financial flows remain grossly misaligned with stated forest goals. The Forest Declaration Assessment estimates that harmful subsidies, primarily to agriculture and fossil fuels that drive deforestation, outweigh green subsidies by a ratio exceeding 200 to 1. Considerable progress has been made in developing instruments aimed at supporting forest conservation, ranging from results-based payments and carbon markets to blended finance and domestic fiscal measures. A new model of forest finance has been proposed in the Tropical Forests Forever Facility (TFFF). International public finance for forests, while growing, still falls far short of what is needed to shift the economics of land use in tropical forest countries. CIFOR-ICRAF's analysis of forest finance mechanisms finds that the architecture of results-based finance (including REDD+) imposes transaction costs and technical requirements that effectively exclude many of the countries and communities with the greatest conservation potential and the least institutional capacity to access global mechanisms. The gap between the rhetoric of forest finance and the actual flow of resources

to the frontlines of deforestation is one of the most consequential barriers the roadmap must address. Yet persistent gaps remain in terms of scale, accessibility, accountability, and alignment with on-the-ground realities. Financing often struggles to reach local actors, including Indigenous Peoples and local communities (IP&LCs), whose roles in forest stewardship are now widely recognized.

Climate feedback loops

The 2024 data introduce a dimension that was marginal in previous deforestation assessments: climate-driven forest loss through fire (Forest Declaration Assessment, 2025). Five times more tropical primary forests were lost to fire in 2024 than in 2023, a spike attributed to El Niño conditions and the broader trajectory of warming. This represents a feedback loop in which climate change intensifies the very drivers of further emissions, undermining both mitigation and adaptation strategies simultaneously. CIFOR-ICRAF's research in the Amazon, Indonesia and Central Africa documents how drought, fire, sea-level rise and forest degradation interact to push forest systems toward tipping points from which recovery is uncertain. The roadmap needs to account for this dynamic dimension, recognizing that the drivers of forest loss in 2030 will not be identical to those of 2020, and that climate itself is now an accelerating driver.

Question (b): Levers for Accelerating Implementation

Agroforestry as a structural response to agricultural drivers

Smallholder and large-scale agriculture are widely recognized as major drivers of deforestation globally, but this pattern is not consistent across all forest types. Where agriculture is a primary source of forest loss, long-term responses must include transforming agricultural practices on and around forest margins. This is the central proposition of agroforestry science, and it is the area where CIFOR-ICRAF brings its deepest and most distinctive expertise. Agroforestry systems, in which trees are deliberately integrated with crops, livestock or both, can reduce the pressure on standing forests by increasing the productivity and diversification of existing agricultural landscapes, by providing ecosystem services (shade, soil fertility, water regulation, pollination) that sustain agricultural output without further clearing, and by creating economic returns from tree products (fruits, timber, fodder, medicinal plants) that make forest-adjacent landscapes more valuable standing than cleared.

The evidence base is substantial. CIFOR-ICRAF maintains the world's largest agroforestry germplasm collection and has documented, across hundreds of field sites in Africa, Asia and Latin America, how well-designed agroforestry systems can achieve Land Equivalent Ratios above 1.0, meaning that a given area of land under mixed tree-crop systems produces more total output than the same area divided between monoculture cropping and forest separately. This metric, developed within CIFOR-ICRAF's research programme, provides a quantitative basis for arguing that the conventional framing of forests versus agriculture as a zero-sum trade-off is both empirically wrong and policy-damaging.

For the Roadmap, the practical lever is this: national strategies to halt deforestation should include explicit agroforestry targets and investment pathways for the agricultural landscapes adjacent to remaining forest frontiers. This means extension services, germplasm access, market linkages for tree products and supportive land-tenure frameworks that recognize and protect trees on farms. It also means ensuring that climate finance mechanisms (including Article 6 and voluntary carbon markets) can recognize the mitigation contributions of agroforestry, which current frameworks frequently fail to do.

Beyond agriculture, consider the food system. The interface between forests and food systems is particularly important in this regard. Agricultural expansion remains the principal direct driver of deforestation in many regions and is closely linked to domestic and international demand for commodities. As a result, measures that address supply chains—such as zero-deforestation commitments, market recognition of credible national assurance schemes (Inacio da Cunha and Yu 2025), mutually beneficial traceability and transparency systems (Inacio da Cunha and Verolme 2025), and jurisdictional approaches—can play a significant role when aligned with public policies and enforcement efforts. At the same time, increasing attention is given to the broader configuration of food systems, including consumption patterns, productivity improvements, food loss and waste management, and effective production (Martius et al. 2024). Emission mitigation and food security need not be antagonistic. Focusing on the most viable mitigation actions can help prioritize cost-efficient measures, reduce input use, and at the same time strengthen food and nutrition outcomes (Pingault and Martius 2025b). Bringing these elements into closer alignment with forest goals can help reduce pressure on remaining forests while supporting livelihoods and inclusive economic development.

Landscape approaches that integrate conservation, production and restoration

CIFOR-ICRAF has been at the forefront of developing and testing integrated landscape approaches, working across jurisdictional, sectoral and institutional boundaries to reconcile conservation, agricultural production and the livelihoods of forest-dependent communities. The evidence from over two decades of applied research suggests that landscape-scale coordination, when it includes multi-stakeholder governance, spatial planning tools and shared monitoring systems, can reduce deforestation rates more effectively than site-level interventions alone. The challenge has always been institutionalizing these approaches within national governance systems, where authority remains organized by sector rather than by landscape.

The roadmap can advance this agenda by encouraging Parties to adopt jurisdictional approaches to deforestation reduction that integrate agriculture, forestry, spatial planning and infrastructure development within a common framework. These approaches should be supported by multi-level governance arrangements that give subnational authorities and local communities meaningful roles in decision-making and benefit-sharing.

Planning for diversity

These insights point towards the value of a more differentiated approach to national action planning—one that retains coherence at the national level while allowing for variation in how policies are applied across territories (Chervier et al. 2022). Rather than prescribing specific models, the roadmap should encourage countries to articulate how they intend to align interventions with the particular characteristics of their forest and agricultural landscapes, and how they will draw on available evidence to inform these choices. This would not require uniform methodologies, but rather a shared emphasis on linking context, drivers, and policy responses in a transparent and iterative manner.

Community and Indigenous-led forest governance

CIFOR-ICRAF's research on community forestry, spanning from Cameroon to Indonesia to Peru, demonstrates that secure tenure and governance authority for IP&LCs is among the most cost-effective strategies for reducing deforestation. Where communities have legally recognized rights over forest resources and the institutional capacity to exercise them, deforestation rates are consistently lower than in comparable areas under state or private management. The meta-analysis is robust across regions and forest types.

However, the evidence also shows that recognition alone is insufficient without accompanying institutional support, enforcement capacity and economic incentives. Community forest management is not costless, and the communities bearing the stewardship burden are disproportionately among the world's poorest. Paragraph 34 of the GST1 rightly notes the need for enhanced support and investment, including through capacity building. The roadmap should operationalize this by specifying mechanisms for direct access to finance for IP&LC-led organizations, bypassing intermediary structures that absorb large proportions of committed funds before they reach the ground.

Livelihoods in times of economic transitions. A related dimension concerns the role of livelihoods and economic transitions. Efforts to reduce deforestation ultimately depend on influencing the decisions of land users, producers and other actors whose choices are shaped by economic opportunities, constraints and expectations. Where deforestation is closely tied to income generation—whether through cattle ranching, crop expansion or speculative land use—policies that rely solely on restrictions are unlikely to be sufficient in the absence of credible alternatives. This underscores the importance of integrating forest objectives within broader strategies for rural development, agricultural productivity, and value chain transformation. The experiences from community forestry, agroforestry and other sustainable land-use systems suggest that positive outcomes are possible when adequate support, access to markets and institutional capacity are provided.

Reforming forest finance architecture

The TFFF launched by Brazil at COP30 represents a potentially important innovation, aiming to mobilize up to USD 4 billion annually for 74 tropical and subtropical forest countries through a results-based model that rewards verified conservation outcomes. CIFOR-ICRAF welcomes this initiative while noting that its success will depend on several conditions that remain to be tested: the adequacy and predictability of the funding base, the quality and

independence of verification systems, and the extent to which benefits reach the communities and institutions doing the actual work of forest protection. A key priority is to connect financial flows more effectively to clearly defined outcomes, so that resources are channeled toward interventions most likely to generate impact in particular contexts. This may require stronger coordination between finance, monitoring and planning processes, while maintaining the flexibility for countries to adapt implementation to their circumstances.

Beyond the TFFF, the roadmap should address the broader architecture of forest finance, which currently privileges large-scale, technically sophisticated proponents over smaller-scale, community-based and national-level actors. CIFOR-ICRAF's analysis of carbon credit projects in the forest and land-use sector finds that the market is dominated by a small number of large developers, with limited participation from the countries and communities that hold the greatest share of remaining tropical forest. Correcting this imbalance requires simplified access, reduced transaction costs, strengthened national intermediary institutions and innovative financial instruments (such as sovereign-backed forest bonds and insurance mechanisms) that can operate at the scales required.

Bioeconomy pathways and sustainable forest management

Halting deforestation requires that forests and forest products are valued more highly standing than cleared. Sustainable forest management, including reduced-impact logging, non-timber forest product enterprises, and forest-based bioeconomy development, offers a pathway to generate economic returns from forests without conversion. CIFOR-ICRAF's research on reduced-impact logging in Southeast Asia and the Congo Basin demonstrates that well-managed selective harvesting can maintain forest structure and ecosystem services while generating revenues that exceed those from conversion agriculture in many contexts. The growing interest in tropical bioeconomy, including sustainable timber, resins, medicinal and forest-based food products, provides an economic foundation for the roadmap's implementation in countries where forests must generate revenue to justify their protection.

Build a functional bioeconomy. Forests already underpin a significant share of livelihoods and economic activity—particularly in Africa, where much of the “informal” economy is in practice a bioeconomy rooted in forest and landscape resources. However, these systems largely remain low-productivity and weakly integrated into formal markets, reflecting gaps in policy, finance, and value chain development (Rosa and Martius 2021). By contrast, countries such as Brazil demonstrate how more structured frameworks, investment and market integration can help scale higher-value, forest-based, sustainable industries. Building a forest-based bioeconomy is therefore essential. It requires upgrading existing systems—by strengthening governance, formalizing and modernizing value chains in a context-sensitive and equitable manner, and aligning incentives with conservation—so that forest resources can support more productive, resilient and inclusive economic growth.

Question (c): Country and Regional Experiences, Best Practices and Lessons Learned

Indonesia: progress, fragility and the limits of enforcement-led approaches

Indonesia provides an important example of both progress and persistent implementation gaps. Political commitment backed by enforcement has shown that deforestation can be reduced significantly. Primary forest loss fell by 11% in 2024 relative to 2023, continuing a multi-year downward trend that began under the moratorium policies of the Jokowi administration. CIFOR-ICRAF, headquartered in Bogor and operating across the Indonesian archipelago for more than three decades, has documented both the achievements and the fragilities of this trajectory. Fire prevention and response improved markedly, supported by more effective collaboration between companies and communities. At the same time, progress remains concentrated in particular geographies and sectors, and primary forest loss continues to rise in areas surrounding pulpwood, oil palm, mining and previously deforested lands, including within protected zones. The principal lesson is that enforcement and moratorium approaches are necessary, but not sufficient; they must be complemented by measures that address the economic drivers that continue to generate demand for forest land (Nofyanza et al. 2020; Purnomo et al. 2024).

Indonesia also illustrates a broader operational lesson concerning the relationship between monitoring, finance and local implementation. CIFOR-ICRAF's field experience with results-based payments and ecological fiscal transfers reveals a persistent gap: although monitoring data often exist, the pathways that convert those data into tangible benefits for local communities and subnational governments remain too thin or too complex to be practically usable. Current access requirements for mechanisms such as REDD+ and carbon credits are largely designed for institutional actors rather than smallholders or indigenous groups. Simplifying this conditionality chain is therefore essential, not only to improve effectiveness, but also to advance climate justice where it matters most (Leimona et al. 2013; Angelsen et al. 2018).

A further lesson from Indonesia is that many important drivers of deforestation, including agricultural encroachment and land clearing with fire, are fundamentally livelihood problems. Monitoring frameworks that record only forest-cover change fail to capture this causal layer. Finance mechanisms therefore need to do more than reward avoided forest loss in narrow terms; they must also be capable of rewarding livelihood improvements for forest communities, thereby supporting the transitions needed to reduce pressure on forests in more durable ways (Hergoualc'h et al. 2018; Leimona et al. 2013).

Indonesia's peatland restoration experience demonstrates both the stakes and the opportunity. Remote sensing, ground-truth data and fire-risk monitoring already exist at significant scale, yet the institutional architecture needed to connect these data streams to community-level payments or conditional transfers remains fragmented or absent. The challenge, therefore, is no longer only one of generating information, but of building

operational pathways that convert that information into locally accessible action and incentives. CIFOR-ICRAF's work on peat landscapes and conservation funding further indicates that effective implementation requires financing models that combine ecological monitoring, agroforestry-based livelihood options, and multi-stakeholder partnerships, including fiscal and incentive mechanisms that can function at landscape and community levels (Hergoualc'h et al. 2018; Laksemi et al. 2024; Erlangga et al. 2025).

Indonesia's mangrove management reflects notable progress alongside persistent fragility, revealing the limits of enforcement-led approaches. Despite regulatory frameworks, pressures from aquaculture expansion, coastal development, and weak local incentives continue to drive degradation, while protection and restoration efforts are often poorly targeted (Sasmito et al. 2023). This underscores that the key challenge is not only improving compliance, but strengthening systems that link information to action at the local level. Without this, the loss of mangroves undermines not only climate change mitigation potential but also critical adaptive functions for coastal communities (Ardhani et al. 2025), increasing exposure to risks. This requires operational mechanisms that connect monitoring and data systems with community-based management, sustainable livelihoods, and financing schemes such as blue carbon initiatives, supported by more integrated and context-sensitive governance.

Brazil: demonstrating that deforestation curves can bend, and unbend

Brazil provides a leading example through satellite-based monitoring systems developed by the National Institute for Space Research (INPE), under the INPE BiomassBR program, which integrates complementary systems such as PRODES (annual deforestation monitoring) and DETER (near real-time deforestation alerts for enforcement). The PRODES system has produced consistent annual estimates of Amazon deforestation since 1988, forming the basis for long-term policy evaluation, while DETER, operational since 2004, delivers near real-time alerts that support field inspections and enforcement actions (INPE, 2026). Their integration has played a central role in supporting Brazil's capacity to control deforestation and has established a global benchmark for tropical forest monitoring. Brazil's experience over the past two decades provides the most dramatic illustration of both what is possible and how quickly gains can be reversed. Amazon deforestation fell by approximately 80% between 2004 and 2012, driven by a combination of law enforcement, satellite monitoring, commodity supply chain interventions (the Soy Moratorium, the cattle agreements) and expansion of protected areas and Indigenous and Quilombola territories. The subsequent period saw a reversal under changed political conditions, with deforestation rates climbing sharply between 2019 and 2022. The current government has again reduced Amazon deforestation to levels roughly half those of the 2022 peak. At COP30, the government recognized four indigenous territories and initiated demarcation of more than twenty others. The lesson for the roadmap is that national political commitment is decisive, but institutional resilience, the capacity of monitoring, enforcement and governance systems to survive changes of government, is the determinant of long-term success.

The Congo Basin: a different driver profile, a different set of solutions

CIFOR-ICRAF's extensive research presence across the Congo Basin, the world's second-largest tropical forest region, highlights a deforestation profile fundamentally different from

Latin America or Southeast Asia. Shifting cultivation remains the primary driver, linked to food security needs of rapidly growing populations, charcoal production for urban energy markets, and expanding artisanal mining. Commercial agriculture is growing but not yet dominant. Forest loss in the DRC and the Republic of Congo continued to climb in 2024. The roadmap must recognize that the solutions effective in Brazil or Indonesia, centered on enforcement against large-scale commercial actors, are poorly suited to contexts where the drivers are millions of smallholder farmers meeting basic livelihood needs. In these settings, the relevant interventions are agroforestry adoption, improved fallow management, clean cooking alternatives to charcoal, and agricultural intensification on already-cleared lands, areas where CIFOR-ICRAF's research programmes are directly operational.

The restoration dimension: Bonn Challenge and beyond

Halting deforestation is only half the commitment; reversing it requires restoration at scale. The Bonn Challenge has attracted pledges exceeding 290 million hectares from 82 countries, and restoration projects are now documented across at least 10.6 million hectares. However, CIFOR-ICRAF's research on the quality and durability of restoration efforts raises important cautions. Many pledges conflate tree planting (often monoculture plantations of non-native species) with ecological restoration of degraded forest ecosystems. The carbon, biodiversity and livelihood outcomes of these two activities are profoundly different. A more honest assessment of the restoration landscape, which CIFOR-ICRAF has contributed to through our mapping of the global forest and landscape restoration sector, finds that fewer than 20% of organizations in the space are direct implementers of on-the-ground restoration. The roadmap should include guidance on restoration quality standards, favoring approaches that restore native species assemblages, support natural regeneration where feasible and integrate tree-based systems with livelihood objectives.

Question (d): Reflecting Diverse National Circumstances, Indigenous Rights and Knowledge

Differentiation must be substantive, not rhetorical

The invitation letter rightly asks how the roadmap can reflect the diverse realities of countries at different stages of development and with different degrees of forest cover. CIFOR-ICRAF's research across the full range of tropical forest contexts suggests that meaningful differentiation requires, at minimum, distinguishing between three situations that demand fundamentally different policy responses. The first is high-forest, low-deforestation countries (such as Gabon, Suriname, Republic of Congo) where the priority is maintaining intact forests through governance, economic incentives and international support, and where the risk is that global commodity demand will trigger rapid transitions that current institutions cannot withstand. The second is high-deforestation frontier countries (such as DRC, Bolivia, parts of Indonesia) where the priority is redirecting agricultural expansion onto already-cleared and degraded lands while strengthening enforcement capacity. The third is post-deforestation restoration contexts (parts of Brazil, Central America, West Africa) where the priority is scaling proven restoration approaches on degraded lands while protecting remaining forest fragments.

The roadmap should avoid the temptation of a single prescription. What works in each of these contexts differs in instruments, institutional requirements, time horizons and cost. One-size-fits-all targets and mechanisms will predictably fail in at least two of the three settings.

Indigenous and community knowledge as an evidence base, not an ornament

CIFOR-ICRAF's research consistently finds that IP&LCs are not merely stakeholders in forest governance but its most effective practitioners in many contexts. Their ecological knowledge, including knowledge of fire management, species assemblages, soil dynamics and sustainable harvesting levels, constitutes a body of evidence that complements and sometimes exceeds what remote sensing and field sampling can detect. The roadmap should integrate this knowledge substantively into its design, not through ceremonial consultation but through governance arrangements that give IP&LCs decision-making authority, monitoring roles and direct access to resources.

In practical terms, this means that the roadmap should require national forest strategies to include specific provisions for IP&LC tenure security, participation in spatial planning and land-use zoning, co-management of protected areas, and direct receipt of results-based finance. CIFOR-ICRAF's work with community forestry institutions across Cameroon, DRC, Peru, Nepal and Indonesia provides operational models for how these arrangements function in practice and where they succeed or fail.

The forest-food security nexus

A dimension frequently absent from climate-centred discussions of deforestation is the direct dependence of hundreds of millions of people on forests for food and nutrition security. CIFOR-ICRAF's research documents that forests and tree-based systems provide critical provisioning services, including direct food supply (bushmeat, fruits, nuts, insects, fungi), energy for cooking, and a range of ecosystem services (pollination, water regulation, soil fertility maintenance) upon which adjacent agricultural systems depend. Any roadmap that treats deforestation as an environmental or climate problem divorced from food security will fail to engage the constituencies whose behavior it needs to change. The roadmap should explicitly connect its forest conservation and restoration targets to the food security and nutrition agendas, including the Sharm el-Sheikh joint work on agriculture and the emerging COP30 agenda on food system transformation, and should ensure that agroforestry and forest-based food systems are recognized as integral components of both climate and food security strategies.

Concluding Observations

The gap between the 2030 target and the 2024 trajectory is not primarily a gap of knowledge. The science of what drives deforestation, what works to reduce it and what conditions enable or prevent effective forest governance is more robust than ever. CIFOR-ICRAF alone publishes over 750 peer-reviewed outputs annually on these questions. The gap is one of implementation, political will, institutional coherence and financial commitment. The COP30 Presidency's roadmap initiative can make a significant contribution if it achieves three things.

In this context, the roadmap can play a catalytic role by articulating a set of principles that support more operational forms of cooperation. These would include encouraging the use of monitoring systems as tools for decision-making; promoting approaches that explicitly link policies to the drivers of deforestation; supporting the alignment of agricultural and trade policies with forest strategies; and reinforcing the central role of Indigenous Peoples and local communities. Importantly, such principles need not prescribe specific action but instead provide a common direction of travel that can be adapted to national contexts.

First, it must provide an honest assessment of where the world stands relative to the 2030 commitment, including the uncomfortable data from 2024, the definitional inconsistencies that undermine accountability and the financial misalignment that contradicts stated goals. Second, it must offer differentiated, actionable guidance that recognizes the fundamentally different contexts in which deforestation occurs and avoids the pretense that a single set of instruments will work everywhere. Third, it must centre the actors who hold the greatest demonstrated capacity for forest stewardship, IP&LCs, not as beneficiaries of top-down programmes but as principals in governance, monitoring and resource allocation. Finally, Artificial Intelligence (AI) has already been enhancing forest monitoring, particularly through remote sensing and data integration, for some time. However, its transformative potential for implementing forest and bioeconomy roadmaps remains largely underutilized. Unlocking this potential requires moving beyond observation to application: embedding AI into problem definition, the design of solutions, decision-making, planning and enforcement systems. This entails investing in high-quality, interoperable data (including ground-truthing), building institutional and local capacity to use AI tools, and developing governance frameworks that address equity, data sovereignty and environmental costs. Crucially, AI systems must be developed that integrate with local and scientific knowledge systems and are deployed through coordinated, cross-sector partnerships—so that they support not just better diagnostics, but more effective, inclusive and scalable action on the ground.

CIFOR-ICRAF stands ready to contribute its research, its field presence across more than 60 countries, its institutional relationships with national forest agencies and IP&LC organizations, and its analytical capacity to the continued development and implementation of this roadmap. The COP30 process offers an opportunity to consolidate these lessons into a roadmap that is ambitious yet also grounded in the practical realities of implementation. By emphasizing the connections between monitoring, diagnostics, livelihoods, commodity systems and finance, it may be possible to strengthen the conditions under which national efforts can translate into measurable and lasting outcomes. The deadline of 2030 leaves less than four years, and CIFOR-ICRAF is well-equipped to join forces for further holistically and effectively halting and reversing deforestation.

Contributions from: Robert Nasi, Beria Leimona, Christopher Martius, Marcelo Inacio da Cunha, Arimatéa C. Ximenes, Tania Benita, Erlangga, Trialaksita Ardhani.

Contact: Dr. Beria Leimona, L.Beria@cifor-icraf.org; Dr. Christopher Martius, C.Martius@cifor-icraf.org, Dr. Robert Nasi, R.Nasi@cifor-icraf.org

References

Ardhani TSP, Kusmana C, Bengen DG, Rahajoe JS, Sagala PM, Hanggara BB, Ginting YRS, Royna M and Murdiyarso D. 2025. Restoration of declining soil carbon stocks and lost surface elevations in degraded mangroves on the northern coast of Java, Indonesia. *Front. Ecol. Evol.* 13:1448702. doi: 10.3389/fevo.2025.1448702

Böttcher, H., Urrutia, C., Benndorf, A., Martius, C., Atmadja, S., Boissiere, M., Hergoualc'h, K., Larson, A. M., Pratihast, A., Malaga Duran, N., Masolele, R., Fritz, S., McCallum, I., Pirker, J., Walker, N., Cooper, L., & Kalman, R. 2025a. Transparent monitoring in practice: A guide to effective monitoring in the land sector. Book I – Background for understanding transparent monitoring approaches. CIFOR-ICRAF. <https://doi.org/10.17528/cifor-icraf/009367>

Böttcher, H., Urrutia, C., Benndorf, A., Martius, C., Atmadja, S., Boissiere, M., Hergoualc'h, K., Larson, A. M., Pratihast, A., Malaga Duran, N., Masolele, R., Fritz, S., McCallum, I., Pirker, J., Walker, N., Cooper, L., & Kalman, R. 2025b. Transparent monitoring in practice: A guide to effective monitoring in the land sector. Book II – Case studies of transparent monitoring approaches. CIFOR-ICRAF. <https://doi.org/10.17528/cifor-icraf/009368>

Chervier C, Naime J, Ladewig M, Angelsen A. 2022. Archetype analysis of forest policies and measures: Towards a new typology. Working Paper No. 9. Bogor, Indonesia: CIFOR; Nairobi, Kenya: World Agroforestry. <https://doi.org/10.17528/cifor-icraf/008789>

Cromberg, M., J. Naime, C. Chervier, A. Angelsen, C. Martius 2026. Forest policy diagnostics for Brazil. CIFOR-ICRAF Working paper (in print)

De Sy V, Angelsen A, Naime J, Herold M, Robiglio V, Vergara K, Martius C. 2026. Archetypes of tropical moist forest change. Working Paper 69. Bogor, Indonesia: CIFOR; Nairobi, Kenya: ICRAF. <https://doi.org/10.17528/cifor-icraf/009455>

Erlangga, T. Benita, A. Prasetyo, I.C.S. Mallawa, Nakicah, S. Fatimah, N. Baso, S.A. Achmad, F. Johana, B. Lusiana, and B. Leimona. 2025. Leveraging Ecological Fiscal Transfers (TAKE) to Support Village-Level Implementation of the Sustainable Cocoa Development Roadmap in North Luwu. Bogor, Indonesia: World Agroforestry (ICRAF).

Forest Declaration Assessment. 2025. Forest Declaration Assessment 2025.

Hojas-Gascon L, Cerutti PO, Eva H, Nasi R, Martius C. 2015. *Monitoring deforestation and forest degradation in the context of REDD+: Lessons from Tanzania*. Center for International Forestry Research (CIFOR). [accessed 2026 April 7]. Available at: <http://www.cifor.org/library/5642/monitoring-deforestation-and-forest-degradation-in-the-context-of-redd-lessons-from-tanzania/>

Inacio da Cunha, M. and Yu, V. 2025. *National Assurance Schemes and Market Recognition: Emerging Opportunities and Takeaways in the FACT Dialogue and Beyond*. Info Brief. Bogor, Indonesia: CIFOR; Nairobi, Kenya: ICRAF. [accessed 2026 April 9]. Available in five languages at: <https://www.factdialogue.org/resource/national-assurance-schemes-and-market-recognition-emerging-opportunities-and-takeaways-in-the-fact-dialogue-and-beyond/>

Inacio da Cunha, M. and Verolme, H. 2025. *Promising Approaches by Governments to Strengthen Forest and Agricultural Traceability and Transparency Systems*. FACT. Bogor, Indonesia: CIFOR; Nairobi, Kenya: ICRAF. [accessed 2026 April 8]. Available in five languages at: <https://www.factdialogue.org/resource/promising-approaches-by-governments-to-strengthen-forest-and-agricultural-traceability-and-transparency-systems/>

Laksemi, NST., Leimona, B., Rahayu S., Adzani T., and Benita T. 2024. *Designing Conservation Funding for Peat Landscapes: Case Study: Fostering Harmony between Wild Elephants and Human Communities in Peat Ecosystems through Agroforestry Practices and Multi-Stakeholder Partnership*. Bogor, Indonesia: World Agroforestry (ICRAF).

Leimona B, van Noordwijk M, Jindal R, Villamor GB, Vardhan M, Namirembe S, Catacutan D, Kerr J, Minang PA and Tomich TP. 2013. *Payments for ecosystem services: Evolution towards efficient and fair incentives for multifunctional landscapes*. Brief No. 40, RUPES Series. Bogor, Indonesia: World Agroforestry Centre (ICRAF).

Martius, C., Pingault, N., Mwambo, F. M., & Guérin, L. 2024. *Reducing greenhouse gas emissions in the global food system*. CIFOR-ICRAF. <https://doi.org/10.17528/cifor-icraf/009317>

Martius, C., & Pingault, N. 2025. *Are countries delivering on transparency? Key takeaways from the first Biennial Transparency Reports to the UNFCCC*. CIFOR-ICRAF Infobrief 424. CIFOR-ICRAF. <https://doi.org/10.17528/cifor-icraf/009366>

Murdiyarso D, Purbopuspito J, Kauffman JB, Warren MW, Sasmito SD, Donato DC, Manuri S, Krisnawati H, Taberima S, Kurnianto S. 2015. *The potential of Indonesian mangrove forests for global climate change mitigation*. *Nat. Clim. Change*. 5(12):1089–1092. <https://doi.org/10.1038/nclimate2734>.

National Institute for Space Research (INPE). 2026. *BiomassBR: Brazilian Biomes Monitoring Program*. Ministry of Science, Technology and Innovation (MCTI), Brazil. Available at: <https://data.inpe.br/biomassbr/>

Nofyanza S, Atmadja S, de Jong W, Intarini DY and Ekaputri AD. 2020. *Revisiting the REDD+ experience in Indonesia: Lessons from national, subnational and local implementation*. CIFOR Infobrief. Bogor, Indonesia: CIFOR.

Pingault, N., and Martius, C. 2025a. A bottom-up approach to estimating emissions from food systems: Using Biennial Transparency Reports for fine-grained, country-level estimations. <https://doi.org/10.17528/cifor-icraf/009409>

Pingault, N., and Martius, C. 2025b. Prioritizing mitigation pathways in land use and food systems: A systematic framework to assess opportunities. CIFOR-ICRAF. <https://doi.org/10.17528/cifor-icraf/009387>

Purnomo H et al. 2024. Community-based fire prevention and peatland restoration in Indonesia: A participatory action research approach. CIFOR-ICRAF publication.

Rosa, S. F. P., and Martius, C. 2021. Forest-based bioeconomy in sub-Saharan Africa: Looking at benefits and burdens from a social sustainability standpoint. Center for International Forestry Research (CIFOR). <https://doi.org/10.17528/cifor/007951>

Sasmito SD, Basyuni M, Kridalaksana A, Saragi-Sasmito M, Lovelock CE, Murdiyarso D. Challenges and opportunities for achieving Sustainable Development Goals through restoration of Indonesia's mangroves. *Nat. Ecol. Evol.* 7: 62–70 (2023). <https://doi.org/10.1038/s41559-022-01926-5>

Sasmito SD, Murdiyarso D, Friess DA, Kurnianto S. 2016. Can mangroves keep pace with contemporary sea level rise? A global data review. *Wetl. Ecol. Manag.* 24(2):263–278. <https://doi.org/10.1007/s11273-015-9466-7>.

van Noordwijk M, Namirembe S and Leimona B. 2018. “Monitoring for performance-based PES: contract compliance, learning and trust building.” In Namirembe S, Leimona B, van Noordwijk M and Minang P, eds. *Co-Investment in Ecosystem Services: Global Lessons from Payment and Incentive Schemes*.
