Submission by Woodwell Climate Research Center for the COP 30 Presidency Roadmap on Halting and Reversing Deforestation and Forest Degradation by 2030

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Introduction

Woodwell Climate Research Center (Woodwell) appreciates the initiative and efforts by the COP 30 Presidency to launch a process to develop two Roadmaps to implement key recommendations from the first global stocktake related to transition away from fossil fuels (paragraph 28(d) of decision 1/CMA.5) and on halting and reversing deforestation (paragraphs 33 and 34 of decision 1/CMA.5).

We welcome in particular the Presidency's launch of a consultative process to solicit input for these two Roadmaps. The quality, legitimacy and continuity of the Roadmaps will depend on the expertise and buy-in of Parties and non-Party stakeholders. Therefore, we also welcome the invitation to submit contributions to the two Roadmaps being elaborated by the COP 30 Presidency.[1] This submission provides initial contributions by Woodwell to the Roadmap on Halting and Reversing Deforestation and Forest Degradation by 2030. It provides input to questions (a), (b) and (d) presented by the Presidency. Woodwell looks forward to engaging further in this key process towards the implementation of the Paris Agreement.

The questions provided by the Presidency are a good starting point for elaborating the Roadmap. In addition, we would like to highlight the following overarching considerations that will be essential for the Roadmap to have its intended impact, and to ensure scientific rigor, consistency and integrity.

- The Roadmap should focus on a limited number of the most urgent and important challenges and opportunities that are actionable in the relevant timeframe. It should not attempt to be comprehensive, and recommended actions should be prioritized on a list sufficiently short for senior officials to remember and repeat them.
- The Roadmap should highlight actions needed by specific actors in specific policy arenas through specific initiatives, and it should suggest interim milestones for those actions between 2026 and 2030, making clear "who should do what by when".
- The recommendations generated by the Roadmap should make clear how the "extended mitigation hierarchy" (IUCN, 2025) applies to forest-related actions, including a subset of those listed as topics in the request for submissions. Specifically, although all the actions listed are needed, they should be addressed in the order of "avoid, minimize, remediate, offset" (Arlidge et al, 2018). Accordingly, conservation of existing forests and halting forest loss and degradation must take priority over forest restoration.
- The Roadmap should explicitly be linked to and coordinated with the Roadmap on the Transition Away from Fossil Fuels in a Just, Orderly and Equitable Manner (TAFF), to ensure that:
    - The TAFF does not encourage false climate solutions that undermine forest goals, such as policies that promote electricity generation from wood pellets (Sterman et al., 2018; Newsome, 2024); and

[1] https://unfccc.int/sites/default/files/resource/COP30Presidencyinvitation_to_submit_contributions.pdf.

- The TAFF does recognize the important role of forests in maintaining the productivity of hydroelectric generation capacity (Pinto et al., 2024).

- The process of consultation in development of the Roadmap and the document itself should be explicit about next steps to ensure that the Roadmap is a living and relevant document at least through its target year of 2030. Such continuity could be achieved, for example, through partnerships with the COP31 and COP32 Presidencies, and specifying how the Roadmap could pave the way for strong, globally agreed messages to emerge from the second global stocktake.

Designing a robust, and science-based Roadmap on Halting and Reversing Deforestation and Forest Degradation

Question (a): What are the most critical barriers — whether physical, economic, financial, institutional, technological or social — preventing the halting and reversing of deforestation and forest degradation?

Barrier #1: Failure to recognize the full economic value of standing forests (maps primarily to "deforestation" topic)

Most decision-makers – both public and private – lack understanding and/or appreciation for the full range of economic benefits provided by standing forests. Agricultural and pasture expansion, particularly for globally traded commodities (e.g. beef, soy, palm oil, cocoa, etc.), remains the dominant driver of tropical deforestation, meaning that standing forests are undervalued compared to these alternative land uses.

The role forests play in the global carbon cycle is well-known, but less appreciated are the non-carbon effects of forests on climate. Forests moderate average and extreme temperatures locally and regulate rainfall at regional to continental scales (Lawrence et al., 2022, Baker et al., 2026). These non-carbon climate benefits are a subset of the well-documented broader set of benefits of forests and trees for agriculture (and thus food security) in particular, including soil moisture and fertility, pollination, and pest management services (FAO, SEI, CI, and TNC 2025). Maintaining forests is also an underappreciated adaptation strategy, as the non-carbon, biophysical services of forests buffer the adverse warming and drying effects of greenhouse warming, including the increased frequency and severity of extreme weather events (Seymour et al., 2022; Reek et al., 2026).

In forest-climate policy arenas, the failure to recognize the non-carbon and other benefits of forests misses the opportunity to harness local self-interest for climate change mitigation via forest conservation. Deforestation disrupts these non-carbon climate benefits. For example, where deforestation has occurred extremely hot days are far more common (Vogel et al., 2017, Stoy et al., 2018), hot dry summers are two to four times more frequent and intense (Findell et al., 2017), and as a result about one third of the recent increase in temperature of the hottest day of the year at any location can be attributed to local deforestation (Lejeune et al., 2018). Deforestation thus imposes costs, in addition to those from GHG- driven climate change, on demand and supply of electrical power generation (Rangelova et al., 2025, Pinto et al., 2024), agricultural productivity (Yamamoto et al., 2019), and public health through exposure to heat stress and drought (Alves de Oliveira et al., 2021).

Failure to include these costs in government decision-making affecting forests and land use negatively impacts national economies, reducing revenues from sectors dependent on these non-carbon stabilizing factors of forests (including agriculture and energy) and imposing costs through impacts on public health and exposure to natural disasters. For example, deforestation of upland watersheds is estimated to put some

379 billion USD of agricultural GDP at risk in developing countries by decreasing downstream soil moisture (Damania et al., 2025). Furthermore, the value of the financial and social costs and benefits of forest loss, where and to whom they accrue, are poorly understood. These dynamics are compounded by weak governance, insecure tenure conditions and widespread illegality, distorting markets and undermining efforts to value standing forests. If the opportunity costs of forest conservation are underestimated, policy interventions cannot be realistically priced or well targeted, and they will be inefficient or ineffective (Bush et al., 2024).

Failure to include the risks of deforestation in private-sector investment decisions also leads to under-investment maintaining forest resilience and avoiding deforestation in commodity supply chains. Although producer companies and their financiers and insurers have begun to recognize the reputational risks of being associated with deforestation, and are increasingly incorporating climate risk into their financial assessments, these assessments do not yet systematically include the additional disruptions to climate stability directly attributable to forest loss and associated financial value at risk, estimated by private corporations reporting their forest-related risk to total 269 billion USD (CDP, 2025).

Finally, failure to value the full suite of benefits from standing forests could reinforce a perverse tendency reflected in some public and private resource allocation decisions to favor investment in forest restoration over conserving the forests we still have, along their multiple ecosystem services that cannot be replaced in the relevant timeframe.

Barrier #2: Increasing frequency and severity of wildfire (maps primarily to "forest degradation" topic)

In recent decades, wildfire has emerged as a leading driver of forest loss and degradation across latitudes, affecting both fire-adapted and fire-sensitive ecosystems, and generating substantial ecological, economic and public health impacts (Zhao et al., 2025). While fire is an intrinsic ecological process in many systems, observed changes in fire regimes – characterized by increasing frequency, extent and intensity – are exceeding historical variability and challenging ecosystem resilience (Rogers et al., 2020). Climate change is a key driver of these trends through rising temperatures, altered precipitation patterns, and more frequent and severe droughts, which collectively increase fuel flammability and lengthens fire seasons (Jones et al., 2022). However, in tropical regions wildfires are predominantly human-driven mostly related to deforestation and land management and affecting fire-sensitive forests. When these burned forests are exposed to warmer, drier conditions directly attributable to forest loss and degradation, they become even more vulnerable to recurrent fires, creating a self-reinforced feedback loop of degradation and increasing the risk of reaching tipping points (Flores et al., 2024; Brando et al., 2025).

A central barrier lies in the mismatch between dominant fire management strategies and evolving fire regimes. Many national and regional approaches remain heavily oriented toward suppression or blanket fire bans, despite strong evidence that these approaches are insufficient under increasingly flammable conditions and, in some contexts, can contribute to fuel accumulation and more severe fires (Machado et al., 2024). This challenge is global in scope: in fire-adapted systems, altered fire regimes can drive ecosystem transitions (e.g., woody encroachment, vegetation loss and shifts in composition), while in fire-sensitive forests, even low-intensity or infrequent fires can trigger long-term degradation and increased vulnerability to subsequent disturbances (Brando et al., 2025; Mndela et al., 2025).

A second barrier is the limited integration of fire-driven degradation into monitoring, reporting and policy frameworks. While deforestation is relatively well tracked through satellite-based systems, degradation associated with fire, often resulting in partial structural loss, remains inconsistently detected and quantified (Lapola et al., 2023). This leads to underestimation of emissions and weak alignment of policy and financial mechanisms with the full scope of fire related impacts, that can undermine the environmental integrity, credibility and effectiveness of climate mitigation strategies and finance mechanisms.

Third, institutional and governance fragmentation constrains effective action. Fire management responsibilities are often distributed across sectors (forestry, agriculture, disaster response), with limited coordination across administrative levels and national boundaries, particularly in regions where fire dynamics and impacts are transboundary. This fragmentation is further compounded by the absence of integrated fire management (IFM) framework and policies in the majority of the Countries (i.e. there are fewer than a dozen countries with national IFM policies). In regions such as the Amazon, where the basin contains multiple national boundaries, the lack of coordination directly undermines effective responses to cross-border fire events.

Finally, social and knowledge barriers persist. Indigenous and local fire management practices, which have historically contributed to landscape resilience in many regions, are often marginalized or excluded from formal governance systems, reducing the effectiveness of fire management strategies and overlooking locally adapted knowledge that can inform more context-specific and preventative approaches (Welch et al., 2013). At the same time, community-based fire management lacks investment, access to early warning systems and local response capacity, limiting their ability to adapt and respond to increasingly extreme climate events.

Barrier #3: Incomplete recognition of Indigenous rights and reward for Indigenous forest stewardship (maps primarily to "Indigenous Peoples" topic)

The evidence supporting the effectiveness of Indigenous communities as forest stewards is robust and growing (Walker et al., 2020, Sze et al., 2024), and Indigenous groups have increasingly demanded recognition of their territorial rights to forests, as well as their place in forest-related decision-making and access to forest finance. Secure land rights promote healthy forests, with deforestation rates on lands managed by Indigenous Peoples, Afro-descendants, and local communities up to 26 per cent lower than the global average (Sze et al., 2022). These communities oversee over 54 per cent of the world's intact forests, often maintaining higher biodiversity and carbon storage (Reytar et al., 2024) Their recognition and engagement is essential to achieving deforestation and climate goals at scale.

Although the international community has begun to recognize and respond to these demands, progress needs to be accelerated. Over 1.3 billion hectares of traditional lands lack legal recognition, hindering access to capital and decision-making power (RRI, 2023).

Barrier #4: Inadequate finance for forest conservation (Maps primarily to "conservation" and "international forest finance" topics)

An important barrier to forest conservation is the limited finance available to governments and other forest stewards (such as the Indigenous communities mentioned above) to defray the costs of forest management and reward performance in keeping forest standing. "Forest positive" financial flows from official

development assistance, philanthropy, and private investment are tiny compared to flows of finance that are at best blind to forest conservation goals (FDAP, 2025; UNEP State of Forest Finance report, 2025).

Two instruments – markets for high-integrity forest carbon credits (especially jurisdictional-scale REDD+ credits, or JREDD+) and the Tropical Forest Forever Facility (TFFF) – noted below as potential levers – are designed to address this gap. These instruments face their own barriers, including uncertain market demand for JREDD+ credits, which is in part constrained by a perverse preference among some standard-setting bodies and buyers for purchasing credits for removals (whether nature-based or industrial) over credits from forest-based emissions reductions, even though the latter are more urgently needed and provide a wealth of co-benefits (Seymour, 2020). In the meantime, constrained public finances and geopolitical headwinds face efforts to raise sponsor capital for the TFFF.

However, even if carbon market finance for JREDD+ reaches its full potential and TFFF is fully capitalized, the financial flows generated by those actions will not be sufficient to protect forests as long as trillions of dollars continue to be invested in activities that result in forest clearing and degradation. Systematic shifts in the global financial system to internalize the costs of forest loss (such as those detailed in the Forest Finance Roadmap of the Forest Carbon Leaders Partnership (FCLP) and summarized in the next section below) are required.

Barrier #5: Siloed decision-making within governments and international organizations (maps primarily to "deforestation" and "forest degradation" topics)

Although Ministries of Forestry (and their equivalents at subnational levels) have responsibility for managing public forest lands and regulating private forest enterprises, forest loss and degradation is often caused by decisions made in other ministries. For example, agricultural subsidy regimes often perversely incentivize farmers to clear forests (Damania et al, 2023). Licensing of extractive activities such as mining and the siting of infrastructure development often takes place in the absence of integrated land-use planning. Energy sector planning often fails to address current and prospective pressures on forests due to demand for woody biomass for cooking or co-firing or other land-based feedstocks for biofuels.

Similarly, decision-making by international organizations on what appear to be non-forest-related topics can nevertheless inadvertently have significant impacts on deforestation and forest degradation. Current practices related to managing sovereign debt provide a clear example. Analysis has shown that countries entering into programs of the International Monetary Fund (IMF) experience on average a 9.2 per cent increase in deforestation (Forster et al. 2024) suggesting that countries are reducing investment in forest protection and/or are intentionally exploiting forest resources as a source of revenue to fulfil debt service obligations. Ironically, the loss of forest-based resilience is likely to compound the countries' exposure to climate risk and have the effect of reducing resilience and creditworthiness.

Question (b): What potential levers, whether economic, financial, institutional, social or technological, exist for accelerating the implementation of the commitment to halt and reverse deforestation and forest degradation?

Solution #1: Actions to incorporate deforestation-related risks into economic and financial decision-making (maps primarily to "deforestation" topic)

Systematic incorporation of the costs and risks of deforestation and forest degradation into economic and financial decision-making processes is a key lever to shift public investment and private financial flows away from activities that cause forest loss and towards investment in maintaining forest resilience. Actions to make this happen include:

- International organizations and science-based initiatives curate the evidence linking forest loss to economic impacts and raise awareness of the nature and significance of the issue. Examples include the FAO's recent report on the linkages between forests and agriculture (FAO, 2025) and the Science Panel for the Amazon's most recent Assessment Report (Science Panel for the Amazon, 2025). Platforms such as the World Economic Forum and the World Business Council for Sustainable Development can help raise awareness among private business and financiers.
- Governments, philanthropies, and private companies increase investment in data collection and analysis to enable more spatially explicit quantification and monetization of risks from deforestation to downwind/downstream landscapes. The SERVIR Global Collaborative is an example of an initiative to use satellite data to develop tools useful for similar applications.
- Governments and development finance organizations systematically incorporate analysis of the economic risks of deforestation (as additional climate risk based on greenhouse warming only) into fiscal policies (especially agricultural subsidy regimes) and public investment allocation, including in the context of debt sustainability assessments such as those conducted by the IMF;
- Producer companies, private financiers, insurers, and risk-rating agencies systematically incorporate and disclose the material risks of deforestation to their supply chains and financial portfolios, whether through regulatory or voluntary approaches.

Further elaboration of these and other actions are included in Seymour et al. (2022), Damania et al. (2025), and CDP (2025).

Solution #2: Actions to improve monitoring and targeting of fire prevention and suppression efforts (maps primarily to "forest degradation" topic)

Addressing fire as a driver of forest degradation requires a shift from reactive suppression towards IFM, combining prevention, risk assessment, preparedness, response, and recovery, and explicitly recognising the socio-ecological and cultural context in which fires occur (FAO et al., Oliveras Menor et al., 2025). This approach is critical for both fire-sensitive forests such as the tropical forests in the Amazon where fire is largely anthropogenic, and for fire-dependent forests where fire suppression has altered the ecological dynamics and increased the risk of more severe and uncontrolled fires. This effort should build on and scale existing global coordination mechanisms, including the Global Fire Management Hub hosted by FAO, which is designed to strengthen international capacity in IFM by providing tools, data and knowledge sharing, to support policy and enhancing community resilience to wildfires.

The COP30 Leaders' Summit issued a Call to Action on Integrated Fire Management and Wildfire Resilience. Success in achieving its goals depends in large part on the following actions:

First, advance global fire monitoring and risk forecasting systems to support targeted prevention and preparedness. Recent advances in Earth observation and climate data enable near-real-time detections of active fires, burned area, vegetation condition, and atmospheric dryness, as well as some local early warning systems (examples include NASA FIRMS[2] and INPE TerraBrasilis[3]). However, these capabilities remain unevenly integrated into operational decision-making processes. Scaling existing platforms (examples include GWIS[4] and Servir[5]) requires improved interoperability across datasets, sustained financing, and stronger institutional uptake. Critically, monitoring systems must move beyond detection towards actionable risk intelligence, linking early warning outputs to predefined management responses at national and subnational levels, and appropriate for different biomes. This includes pre-positioning firefighting resources, implementing temporal restrictions on high-risk activities, and tailoring solutions according to local realities.

Second, strengthen transboundary and cross-sectoral governance mechanisms. Fire is inherently a landscape-scale process, often spanning administrative and national boundaries, while its drivers are distributed across sectors including agriculture, forestry, and infrastructure development. Existing regional frameworks, such as the ASEAN Agreement on Transboundary Haze Pollution and the Amazon Cooperation Treaty Organization provide institutional entry points but require reinforcement through shared data systems, coordinated response protocols, and clearer accountability mechanisms. At the same time, international climate and development finance should explicitly incorporate fire-related prevention and degradation metrics. Current frameworks tend to prioritize avoided deforestation, overlooking emissions and ecosystem impacts associated with recurrent burning and degradation. Expanding mechanisms such as the REDD+ and the Action Plan for the Prevention and Control of Deforestation in the Legal Amazon to include fire prevention, risk reduction, and post-fire recovery would better align financial incentives with observed drivers of forest loss (Gu et al., 2025).

Third, recognize and resource Indigenous and community-led fire stewardship as a core component of fire management systems. A growing body of evidence across multiple regions demonstrates that Indigenous and local fire management practices can reduce the incidence of high-severity fire and maintain ecosystem function (Welch, 2013; Resende, 2021). Scaling these approaches requires secure land tenure, direct and sustained financing, and technical support co-developed with communities, including access to monitoring tools and early warning systems. Importantly, integration of Indigenous knowledge with scientific approaches should be based on equitable partnerships and governance structures, rather than top-down incorporation.

Together, these actions – improving risk-informed decision-making, strengthening coordinated governance, and supporting community-led fire stewardship – provide a scientifically grounded and operationally feasible pathway to reduce fire-driven forest degradation and support broader commitments to halt and reverse deforestation.

[2] https://firms.modaps.eosdis.nasa.gov/
[3] https://terrabrasilis.dpi.inpe.br/app/dashboard/fires/biomes/aggregated/
[4] https://gwis.jrc.ec.europa.eu/
[5] https://amzfire.servirglobal.net/dashboard/

Solution #3: Actions to accelerate implementation of commitments to Indigenous tenure recognition and access to finance (maps primarily to "Indigenous Peoples" topic)

To effectively combat deforestation, the Roadmap should prioritize the legal recognition of Indigenous Peoples' and local communities' land rights and implement robust Free, Prior and Informed Consent (FPIC) processes. Secure land rights empower these communities to exercise their forest stewardship roles; rights recognition requires accelerating national implementation of the Intergovernmental Land Tenure Commitment and enacting legal frameworks that protect customary tenure. FPIC should be mandated in national law and policy for forest-related decisions to ensure that communities have a genuine voice in matters involving land use by governmental bodies and industries. For example, in November 2022, the Democratic Republic of the Congo enacted a law on the Promotion and Protection of the Rights of the Indigenous Pygmy Peoples, formally acknowledging the defined rights of Indigenous people.

Independent bodies can be used to certify compliance with FPIC guidelines to foster accountability and transparency (FDAP, 2025). Stronger land rights should go hand in hand with greater access to finance. Previously, only about 10 per cent of the 1.7 billion USD Forest and Land Tenure Pledge reached Indigenous Peoples and local communities (Quitkin, 2025). The Roadmap should include measures to increase direct access to financing for community-led solutions. Such access requires simplified access to funding modalities, long-term and flexible funding, and mechanisms adapted to community governance systems.

Specifically, a renewed commitment to the Forest and Land Tenure Pledge should ensure that a substantial portion of the 1.8 billion USD reaches Indigenous communities directly, eliminating intermediaries, such as through initiatives such as the GATC Shandia Platform[6]. Coupling these measures with the development of fiduciary capacity within communities can enable effective fund management. Finally, establishing gender-balanced Indigenous advisory bodies in national climate councils can ensure that these stakeholders are integral to decision-making. By embedding these strategies into the Roadmap, the international community can create equitable and sustainable Indigenous-lead forest management solutions.

Solution #4: Actions to accelerate financial flows to incentivize forest conservation (maps primarily to "conservation" and "international forest finance" topics)

A key set of solutions involve sending price signals that reward standing forests. Domestically, these can include Payments for Ecosystems Service schemes. Payments from such schemes can often surpass the opportunity costs associated with land conversion (Izquierdo-Tort, 2024) especially where there is careful consideration of local contextual social and economic factors and developing the national legislative environment to support the mechanism.

Internationally, global carbon markets and the TFFF are two innovative financial mechanisms that show the most promise for generating finance at scale in the relevant timeframe.

Global carbon markets provide the most promising near-term source of significant revenues to incentivize forest conservation for tropical forest countries with a conservatively estimated potential of 3-6 billion USD

[6] https://globalalliance.me/shandia/

per year by 2030 for high-integrity JREDD+ credits (FCLP, 2025). Realizing this potential will require three strands of international support.

- First, supplier countries (including those "graduating" from results-based payments provided through the World Bank's Forest Carbon Partnership Facility's Carbon Fund) will need continuing concessional support from governments, multilateral initiatives, and private philanthropies to demonstrate compliance with high-integrity standards for environmental and social integrity (such as ART/TREES, which provides methodologies for crediting both emissions reductions and removals at jurisdictional scale).
- Second, governments, multilateral forums, and standard-setting initiatives need to signal to prospective buyers of such credits that purchases of high-integrity forest carbon credits with appropriate claims are encouraged as an appropriate way of compensating for unabated emissions on the pathway to net zero. For example, a leading norm-setting body for corporate decarbonization highlighted the purchase and retirement of JREDD+ credits as an example of how companies could maximize the scale of outcomes through mitigation actions beyond their value chains (SBTi 2024).
- Third, governments and multilateral fora, norm-setting bodies, and private carbon credit ratings agencies need to ensure that eligibility requirements for compliance schemes (such as ICAO-CORSIA and the Paris Agreement Crediting Mechanism under Article 6 of the Paris Agreement) and labels indicating high quality (such as the ICVCM's CCP label) are appropriately tailored to jurisdictional-scale forest-based credits to ensure that unnecessarily high thresholds (e.g., for certainty) or onerous reporting burdens (e.g., for permanence) do not have the effect of excluding forest-based credits from the market altogether.

Similarly, realizing the potential of the TFFF requires two strands of action.

First, additional sovereign governments need to step up and add to the pledges made at COP 30 in Belem to fully capitalize the sponsor tranche of the Tropical Forest Investment Fund (TFIF) and enable it to attract commercial investors and start generating the target of 4 billion USD per year to distribute to tropical forest countries.

Second, the World Bank (as initial host of the TFFF Secretariat) and other supporting organizations need to assist tropical forest counties with concessional finance and technical assistance to achieve eligibility for payments, Crucially, such assistance should build on the considerable infrastructure already in place in tropical forest countries thanks to almost two decades of investment in JREDD+ programs. This infrastructure includes forest monitoring capacity as well as structures developed for ensuring safeguards compliance and equitable sharing of benefits. Creating parallel structures would miss a huge opportunity to realize synergies between these two complementary forest finance mechanisms.

However, as mentioned above, it is important to stress that innovative forest finance mechanisms alone cannot achieve the goal of halting and reversing deforestation and forest degradation. A full suite of efforts to integrate forest values into mainstream financial flows, such as those described in the FCLP's Forest Finance Roadmap (FCLP, 2025), are required.

Solution #5: Actions to integrate policy and planning across sectors that affect forests (maps primarily to "deforestation" and "forest degradation" topics)

The recommendations generated by the process of constructing the Roadmap should not be limited to the forest sector, but should include actions needed to address pressures on forests that originate from other sectors with land-sector footprints, including agriculture, extractive industry and infrastructure, and energy. Integrated national land-use and climate plans (Naegele and Bush, 2025) can facilitate alignment across different sectors, allowing for comprehensive resource allocation and law enforcement. In addition, the Roadmap should also address misalignments in policies governing global finance and trade (such as how debt sustainability analyses are conducted by the IMF) that currently undermine the goal of halting and reversing forest loss and degradation. All of these offer the potential to redirect some portion of current financial flows that are at best "forest blind" into forest-positive investments (FCLP, 2025).

It is especially critical that the Roadmap itself models best practice by ensuring appropriate integration with the TAFF. Deforestation and forest degradation often results from a failure to integrate forest goals into energy sector planning and investment. For example, policies to replace coal with wood pellets for electricity generation can perversely *increase* life-cycle emissions even while leading to the clearing of intact forests. Conversely, energy sector investments can be undermined by a failure to consider forest-based ecosystems services, such as the role of forested watersheds in maintaining the productivity of hydroelectric dams.

Solution #6: Use of data and integrated information (cross-cutting)

Implementation of the solutions summarized above, as well as others not detailed in this submission (e.g., those related to getting deforestation out of commodity supply chains and improving law enforcement) depend on the integration of multiple types of data and information to enable the efficient and effective targeting of interventions and finance. International support is needed to assist countries to generate and access spatial and temporal information on where and how forest loss occurs; supply chain and trade data to identify demand-side drivers, and governance, tenure, and macroeconomic indicators to better understand underlying incentives and constraints.

Support is needed to generate, maintain and integrate the following:

- High-resolution datasets on forest loss and its proximate drivers, including satellite-based monitoring and modelled attribution to commodities (such as the annual forest cover data generated by the University of Maryland for the Global Forest Watch platform or the one produced by the European Space Agency);
- Spatially explicit data on production, trade flows, and supply chain linkages connecting producing regions to global markets and firms (such as the Global Forest Review commodity indicator and analyses produced by TRASE);
- Regulatory and policy datasets capturing the scope and implementation of deforestation-free measures and risk assessments;
- Data on tenure status, governance, and law enforcement to assess institutional effectiveness and risks of illegality (e.g., geo-referenced records of illegal deforestation, fines, prosecutions, and seizures related to forest crimes and illegal commodity production);
- Financial, economic, and macroeconomic indicators that shape incentives for land-use decisions (GDP growth, exchange rates, commodity prices, terms of trade, and debt service burdens); and

- Baseline datasets on forest condition and legal land-use classifications to support consistent definitions and policy alignment (e.g., Natural Forests of the World 2020 AI-based map distinguishing natural forest from other tree cover).

Question (d): How can forest conservation, sustainable management, and restoration best reflect the diverse realities of countries at different stages of development, the rights and knowledge of indigenous peoples and local communities, and different degrees of forest cover?

The Roadmap can best reflect the diverse realities of countries by focusing on international collective action that can expand rather than restrict the menu of options available. The Roadmap should prioritize actions that provide incentives for governments and private sector actors to choose those options more aligned with the global goal of halting and reversing deforestation, with a focus on those that are feasible within the constraints and opportunities of a variety of national circumstances.

For example, approaches to operationalizing REDD+ should ensure availability of funding for results-based payments (such as those offered by the Green Climate Fund) as well as promoting actions to ensure adequate demand for forest carbon credits in voluntary and regulatory markets. "Less ready" countries should be supported with concessional funding to progress from results-based payments to market readiness, as has been illustrated by the World Bank - administered Forest Carbon Partnership Facility and Carbon Fund. Similarly, voluntary and compliance markets, including eligibility for Article 6 transactions, should encompass methodologies for jurisdictional-scale crediting for emissions reductions – including from High Forest Low Deforestation jurisdictions – and for removals based on large-scale forest restoration, so as to ensure that countries spanning the forest transition curve are able to participate.

In addition, the eligibility and payment criteria for international forest finance schemes should strike a balance between common standards and flexibility to reflect various national circumstances. For example, the TFFF proposes that *at least* 20 percent of payments be allocated to frontline Indigenous peoples and local communities, recognizing that in many countries the appropriate share would be higher.

In the **Congo Basin**, the current instruments include the COMIFAC Convergence Plan and national REDD+ strategies. However, significant challenges persist, including fragmented governance and limited land tenure records (Wabasa et al., 2026). To address these issues, a comprehensive legislative review is essential to align forest codes, alongside the establishment of anti-corruption protocols for climate funds (Pirker and Carodenuto, 2021). Moreover, enhancing monitoring, reporting, and verification (MRV) systems through a regional academy would train technical personnel to manage monitoring efforts more effectively.

In **Latin America**, with many nations in the region poised to scale high-quality compliance and voluntary forest carbon markets, there remain critical challenges on governance and transparency. Shifting to jurisdictional baselines for MRV will enhance the credibility of carbon credits (Blanton et al., 2024). More generally, challenges stemming from political volatility and overlapping land governance have constrained forest finance (Furumo et al., 2024); in Brazil, establishing protected areas on currently undesignated public lands would help control land-grabbing and illegal registration (Azevedo-Ramos et al, 2020). Multi-level forest policy observatories that embed Indigenous Peoples in decision-making processes can help build capacity.

In **Southeast Asia**, challenges include sub-national implementation gaps in REDD+ strategies, such as the inability to effectively address major deforestation drivers and an overemphasis on project-based approaches (Lau et al., 2025). Persistent problems include over-crediting due to inflated project-scale baselines, limited effectiveness in reducing deforestation, insufficient financial incentives, and initiatives that largely neglect local community voices and broader forest functions, leading to negative social impacts and inequities (Tang et al., 2025). Regional variability in project performance further complicates outcomes, underlining the need for improved methodologies and a more inclusive approach that integrates diverse knowledge systems and addresses systemic deforestation causes, such as through jurisdictional-scale crediting. Blended financing for peatland restoration remains a priority. Mandatory corporate disclosures through stock exchanges can stimulate significant progress in getting deforestation out of commodity supply chains.

To achieve the ambitious goal of eliminating deforestation by 2030 **across the tropics**, scaling predictable performance-based payments, creating national investment platforms, and leveraging sovereign sustainability-linked bonds (among others) are all potential components of a forest-positive financial architecture (FCLP, 2025). Capacity building efforts should focus on providing continuous professional development for local officers managing forest units. Establishing predictable funding for forest monitoring is also crucial. Establishing standardized benefit-sharing plans (e.g., for JREDD+ and TFFF), backed up by credible finance plans, ensures that communities receive timely rewards for their participation. By addressing these capacity needs through targeted actions, both state and non-state actors in the Congo Basin, Amazon, and Southeast Asia can effectively meet their deforestation ambitions, thereby safeguarding vital forest ecosystems and promoting sustainable development.

About Woodwell Climate Research Center

Originally founded as the Woods Hole Research Center in 1985, Woodwell's world-leading science helps individuals, communities, corporations, and nations understand the realities of climate change, recognize the impact it is having everywhere on our planet, and embrace the urgent action needed to safeguard the future of life on Earth. We work with partners, stakeholders, and government officials in more than 20 countries across six continents, from the Arctic to the Amazon. Woodwell's researchers conduct science for solutions at the nexus of climate, people, and nature-based solutions that are urgently needed to propel us toward a more equitable, healthy, and sustainable world. Together with our global network of partners, we generate breakthrough insights into the risks we face and the just, effective solutions we can develop.

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References

Alves de Oliveira, B.F., et al., 2021: Deforestation and climate change are projected to increase heat stress risk in the Brazilian Amazon. Commun Earth Environ 2, 207 (2021). https://doi.org/10.1038/s43247-021-00275-8.

Arlidge, W.N.S. et al. 2018: A Global Mitigation Hierarchy for Nature Conservation. BioScience 68(5), 336–347. https://doi.org/10.1093/biosci/biy029.

Azevedo-Ramos, C. et al., 2020: Lawless land in no man's land: The undesignated public forests in the Brazilian Amazon. Land Use Policy 99, 104863. https://doi.org/10.1016/j.landusepol.2020.104863.

Baker, J.C.A. et al. 2026: Quantifying tropical forest rainfall generation. Communications Earth & Environment 7, 150. https://doi.org/10.1038/s43247-025-03159-3.

Blanton, A. et al. 2024: The status of forest carbon markets in Latin America. Journal of Environmental Management 352. https://doi.org/10.1016/j.jenvman.2023.119921.

Brando, P. M. et al., 2025: Tipping Points of Amazonian Forests: Beyond Myths and Toward Solutions. Annual Review Environment and Resources 50, 97-131. https://doi.org/10.1146/annurev-environ-111522-112804.

Bush, G. et al. 2024: Evaluating the costs of primary forest conservation in the Democratic Republic of Congo, implications for policy and practice. Journal of Environmental Management 352, 119975. https://doi.org/10.1016/j.jenvman.2023.119975.

Ewerton, M. et al., 2025: "Blind Spots on the Balance Sheet: Uncovering Financial Implications of Deforestation". Carbon Disclosure Project (CDP) Report. London. https://www.cdp.net/en/insights/uncovering-financial-implications-of-deforestation.

Damania, R. et al. 2025: Reboot Development: The Economics of a Livable Planet. Washington, DC: World Bank. doi:10.1596/978-1-4648-2271-1. License: CC BY 3.0 IGO.

Damania, R. 2023: Detox Development: Repurposing Environmentally Harmful Subsidies. © World Bank. http://hdl.handle.net/10986/39423. License: CC BY 3.0 IGO.

Food and Agriculture Organization of the United Nations (FAO), Stockholm Environment Institute (SEI), Conservation International (CI) and The Nature Conservancy (TNC) 2025: Climate and ecosystem service benefits of forests and trees for agriculture. Rome, Stockholm, and Arlington. https://doi.org/10.4060/cd7599en.

Findell, K. L. et al. 2017: The impact of anthropogenic land use and land cover change on regional climate extremes. Nature communications, 8(1), 989. https://doi.org/10.1038/s41467-017-01038-w.

Flores, B.M. et al. 2024: Critical transitions in the Amazon forest system. Nature 626, 555–564. https://doi.org/10.1038/s41586-023-06970-0.

Forest Declaration Assessment Partners (FDAP) 2025: Forest Declaration Assessment 2025. Climate Focus (ed.). www. forestdeclaration.org.

Forest Climate Leaders Partnership (FCLP) 2025: Unlocking Forest Finance: a Roadmap For Action. https://forestclimateleaders.org/wp-content/uploads/2025/10/Unlocking-Forest-Finance_Roadmap_FINAL-1-1.pdf.

Forster, T. et al. 2024: The International Monetary Fund And Deforestation Analyzing The Environmental Consequences Of Conditional Lending. Report. The Task Force on Climate, Development and the IMF. https://www.bu.edu/gdp/files/2024/10/TF-WP-014-FIN.pdf.

Furumo, P.R. et al. 2024: Land conflicts from overlapping claims in Brazil's rural environmental registry. Proc. Natl. Acad. Sci. U.S.A. 121, 33, e2407357121. https://doi.org/10.1073/pnas.2407357121.

Gu, X. et al. 2025: Banking on Forest. SSRN 5303222. https://sustainablefinancealliance.org/paper/banking-on-forest/.

International Union for the Conservation of Nature (IUCN) 2025: The nature-positive goal and the mitigation hierarchy. https://iucn.org/sites/default/files/2025-10/brief-2-the-nature-positive-goal-and-the-mitigation-hierarchy-look-feel-v4.pdf.

Izquierdo-Tort, S. et. al. 2024: Redesigning Payments for Ecosystem Services to Increase Cost-Effectiveness. NBER Working Paper No. 32689. https://www.nber.org/papers/w32689.

Jones, M.W. et al. 2022: Global and Regional Trends and Drivers of Fire Under Climate Change, Reviews of Geophysics. https://agupubs.onlinelibrary.wiley.com/doi/full/10.1029/2020RG000726.

Lapola, D.M. et al. 2023: The drivers and impacts of Amazon forest degradation. Science 379, 6630. DOI: 10.1126/science.abp8622.

Lau, Y. et al. 2025: Challenges in Forest Carbon Governance: Insights From Southeast Asia. Wiley Interdisciplinary Reviews: Climate Change 16, 5, e70018. https://doi.org/10.1002/wcc.70018.

Lawrence, D. et al. 2022: The unseen effects of deforestation: Biophysical effects on climate, Front. For. Glob. Change 5, 756115. https://doi.org/10.3389/ffgc.2022.756115.

Lejeune, Q. et al. 2018: Historical deforestation locally increased the intensity of hot days in northern mid-latitudes. Nature Climate Change, 8(5), 386. https://doi.org/10.1038/s41558-018-0131-z.

Machado, M. et al. 2024: Emergency policies are not enough to resolve Amazonia's fire crises. Nature Communications Earth and Environment. https://www.nature.com/articles/s43247-024-01344-4.

Mndela, M., et al. 2025: Fire and herbivory control shrub encroachment and restore herbaceous vegetation in mesic grasslands of South Africa. Plant Ecology & Diversity, 18(1-2), 25-38. https://doi.org/10.1080/17550874.2025.2537152.

Naegele, A. and Bush, G. 2025: Climate Analysis and Policy Recommendations on Incorporating Climate Change Considerations into Integrated Land Use Management Plans in the Congo Basin. United Nations Environment Programme. Congo Basin Landscapes Initiative. https://www.congolandscapes.org/node/1032.

Newsome, M. 2024: How 'green' electricity from wood harms the planet — and people. News Feature. Nature. https://www.nature.com/articles/d41586-024-02676-z.

Oliveras Menor, I. et al. 2025: Integrated fire management as an adaptation and mitigation strategy to altered fire regimes. Communications Earth & Environment 6, 202. https://www.nature.com/articles/s43247-025-02165-9.

Pinto, G.R.S. et al. 2024: Cutting Down the (Hydropower) Plants: How the Amazon Deforestation is Jeopardizing Electricity Generation in Brazil. Report. Climate Policy Initiative/Pontifical Catholic University of Rio de Janeiro (CPI/PUC-RIO). https://www.climatepolicyinitiative.org/publication/cutting-down-the-hydropower-plants-how-the-amazon-deforestation-is-jeopardizing-electricity-generation-in-brazil/.

Pirker, J., and Carodenuto, S. 2021: Current State, Barriers and Perspectives for REDD+ in the Congo Basin. Congo Basin Forest Partnership Report. https://pfbc-cbfp.org/fileadmin/user_upload/pfbc-cbfp/Ressources/Etudes_du_PFBC/2021_CBFP_REDD__in_the_Congo_Basin_Report.pdf.

Quitkin, M. 2025: Indigenous Peoples and Local Communities Forest Tenure Pledge Annual Report 2024-2025. https://landportal.org/sites/default/files/library/resources/ftfg-annual-report-2024-full.pdf.

Rangelova, K. et al. 2025: Powering through the heat: how 2024 heatwaves reshaped electricity demand, EMBER, report. https://ember-energy.org/latest-insights/powering-through-the-heat-how-2024-heatwaves-reshaped-electricity-demand/.

Reek, J. E. et al. 2026: More than mitigation: The role of forests in climate adaptation. Science 391, 669-678. DOI:10.1126/science.ads4361.

Resende, F.M. et al. 2021: The importance of protected areas and Indigenous lands in securing ecosystem services and biodiversity in the Cerrado. Ecosystem Services 49, 101282. https://www.sciencedirect.com/science/article/abs/pii/S2212041621000401?via%3Dihub.

Reytar, K. et al. 2024: Protecting Biodiversity Hinges on Securing Indigenous and Community Land Rights. WRI. Online article. https://www.wri.org/insights/indigenous-and-local-community-land-rights-protect-biodiversity.

Rights and Resources Initiative (RRI). 2023: Who owns the world's land; Global State Of Indigenous, Afro-Descendant, And Local Community Land Rights Recognition From 2015–2020. Second edition June 2023. https://rightsandresources.org/wp-content/uploads/Who-Owns-the-Worlds-Land_Final-EN.pdf.

Rogers, B. et al. 2020: Focus on changing fire regimes: interactions with climate, ecosystems, and society, Environmental Research Letters. https://iopscience.iop.org/article/10.1088/1748-9326/ab6d3a/meta.

Science-Based Targets initiative (SBTi). 2024: Above and Beyond: an SBTi Report on the Design and Implementation of Beyond Value Chain Mitigation (BVCM). February 2024. https://files.sciencebasedtargets.org/production/files/Above-and-Beyond-Report-on-BVCM.pdf.

Science Panel for the Amazon 2025: Executive Summary. Amazon Assessment Report 2025 - Connectivity of the Amazon for a Living Planet. SDSN, New York, USA. www.sp-amazon.org/ ar2025. DOI: 10.55161/JJZR4160.

Seymour, F. et al. 2022: Not Just Carbon: Capturing All the Benefits of Forests for Stabilizing the Climate from Local to Global Scales. World Resources Institute. 10.46830/wrirpt.19.00004.

Seymour F. 2020: Seeing the Forests as well as the (Trillion) Trees in Corporate Climate Strategies. One Earth, 2, 390-393. https://www.cell.com/one-earth/fulltext/S2590-3322(20)30211-6.

Sterman, J.D. 2018: Does replacing coal with wood lower CO2 emissions? Dynamic lifecycle analysis of wood bioenergy. Environ. Res. Lett. 13, 015007. DOI 10.1088/1748-9326/aaa512.

Stoy, P. C. 2018: Deforestation intensifies hot days. Nature Climate Change 8(5), 366-368. https://doi.org/10.1038/s41558-018-0153-6.

Sze, J. S. et al. 2024: Indigenous Peoples' Lands are critical for safeguarding vertebrate diversity across the tropics. Global Change Biology, 30, e16981. https://doi-org.library.proxy.mbl.edu/10.1111/gcb.16981.

Sze, J.S. et al. 2022: Reduced deforestation and degradation in Indigenous Lands pan-tropically. Nat Sustain 5, 123-130. https://doi.org/10.1038/s41893-021-00815-2.

Tang, Y. et al. 2025: Tropical forest carbon offsets deliver partial gains amid persistent over-crediting. Science 390, 182-187 (2025). https://doi.org/10.1126/science.adw4094.

United Nations Environment Programme (UNEP). 2025: State of Finance for Forests 2025: Unlock. Unleash. Realizing Forest Potential requires Tripling Investments in Forests by 2030. URI: https://wedocs.unep.org/handle/20.500.11822/48718.

Vogel, M.M. et al. 2017: Regional amplification of projected changes in extreme temperatures strongly controlled by soil moisture-temperature feedbacks. Geophysical Research Letters 44(3), 1511-1519. https://doi.org/10.1002/2016GL071235

Wabasa, S. M. et al. 2026: Natural Resource Management Policies in the Congo Basin. In: Inogwabini, B.I., Sonke, B., Koutika, LS., White, L.J. (eds): Resilience and Sustainability in the Congo Basin. Springer, Cham. https://doi.org/10.1007/978-3-032-02023-9_38-1.

Walker, W. S. et al. 2020: The role of forest conversion, degradation, and disturbance in the carbon dynamics of Amazon indigenous territories and protected areas, Proc. Natl. Acad. Sci. U.S.A. 117 (6) 3015-3025, https://doi.org/10.1073/pnas.1913321117.

Welch, J.R. et al. 2013: Indigenous Burning as Conservation Practice: Neotropical Savanna Recovery amid Agribusiness Deforestation in Central Brazil. PLoS ONE 8, 12), e81226. https://doi.org/10.1371/journal.pone.0081226.

Yamamoto, Y. et al. 2019: Forest change and agricultural productivity: Evidence from Indonesia. World Development, 114, 196-207. https://doi.org/10.1016/j.worlddev.2018.10.001.

Zhao, J. et al. 2025: Global warming amplifies wildfire health burden and reshapes inequality. Nature, 647, 8091, 928-934. https://doi.org/10.1038/s41586-025-09612-9.