



Policy Forum

From promises to practice: a call for building an integrated, decolonial, and stable framework for Amazonian science

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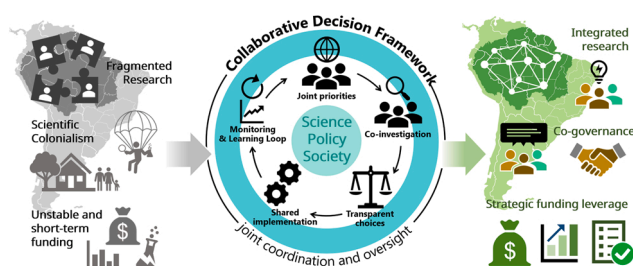
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HIGHLIGHTS

- Persistent governance gaps limit the effectiveness of Amazonian science.
- Fragmentation, inequity, and short-term funding remain core bottlenecks.
- Integration across networks is essential for efficiency, credibility, and equity.
- Co-governance shifts Amazonian science from representation to shared authority.
- A collaborative framework links science, policy, and territory beyond COP30.

GRAPHICAL ABSTRACT



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ABSTRACT

Global efforts to halt biodiversity loss and address climate change increasingly depend on scientific knowledge generated in the Amazon. The outcomes of COP30, hosted in Belém in November 2025, reaffirmed the centrality of Amazonian science to global environmental agendas, while also exposing persistent structural constraints that limit its effectiveness. Fragmented governance, short-term and externally controlled funding, and enduring inequities in leadership, data ownership, and decision-making continue to undermine the region's capacity to deliver credible, policy-relevant, and socially legitimate science at scale. Here, we argue that incremental reforms are insufficient. We identify three interrelated bottlenecks: integration across initiatives, co-governance with local institutions and knowledge holders, and long-term funding stability, and propose a collaborative, polycentric framework to address them. We further argue that, without structural transformation, current investments risk reproducing existing asymmetries rather than enabling durable and territorially grounded conservation outcomes. We outline priority actions for governments, funders, and research networks to

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consolidate Amazon-based leadership and translate scientific investments into durable conservation and socio-ecological outcomes beyond COP30.

In the years surrounding COP30, the Amazon emerged as an epicenter of political, scientific, and social mobilization. A series of high-profile initiatives articulated a shared vision of an integrated and plural Amazonian science, emphasizing regional leadership and the inclusion of local knowledge systems. However, the outcomes of COP30 revealed that these ambitions remain fragile, as institutional fragmentation and governance gaps continue to limit their practical impact.

This Policy Forum argues that translating such visions into effective conservation and climate action requires confronting three persistent structural constraints: limited integration among monitoring and research networks; enduring asymmetries in scientific leadership and decision-making; and unstable, short-term funding that undermines long-term regional capacity. Together, these challenges form the bottleneck between ambition and action. The path forward requires evidence-based governance linking science, policy, and society in a lasting, regionally led framework for biodiversity research and climate action. Here, we aim to (i) diagnose the structural bottlenecks limiting the effectiveness of Amazonian science, (ii) examine how current governance models reproduce fragmentation and inequities, and (iii) propose a feasible, polycentric, and regionally grounded framework to align scientific production with conservation outcomes and societal needs.

A convergence of declarations, but fragmentation in practice

In the lead-up to and during COP30, a series of high-level declarations sought to reposition Amazonian science as a cornerstone of regional and global climate and biodiversity action. The ‘Belém Declaration’ (OTCA, 2023) revitalized intergovernmental cooperation among Amazonian countries. It laid the diplomatic groundwork for collective climate and biodiversity action, calling for instruments such as the Science Panel for the Amazon and the Regional Observatory. Subsequent documents sought to operationalize these ambitions while narrowing the gap between diplomacy and implementation. The ‘Amazonian Scientific Contributions to Brazil’s NDC’ (Encontro da Comunidade Científica e Tecnológica da Amazônia com a Presidência da COP30, 2025), from over 70 Amazonian institutions, translated global commitments into national pathways across energy, agriculture, forests, and cities, linking Amazonia’s knowledge base to Brazil’s climate agenda. The ‘Belém Letter’ (Conexões Amazônicas: Ciência em Rede para a COP 30, 2025), also showed how Amazonian scientific networks contribute to Brazil’s NDCs, and advanced toward an epistemic integration, promoting open data, ethical co-production, and inclusion of local knowledge. The ‘Mamirauá Declaration’ (Instituto Mamirauá, 2025) added a technological dimension, proposing an International Alliance for Biodiversity Monitoring that joins governments, scientists, Indigenous Peoples, and civil society through technology-enabled observation systems and the FAIR, CARE, and TRUST data principles. Finally, the ‘CENBAM Letter’ (CENBAM/PPBio, 2025) addressed integration within Brazil’s long-term research programs, such as the Brazilian ‘Program for Biodiversity Research’ (PPBio), the ‘Long-Term Ecological Research’ (PELD – the Brazilian acronym for LTER), and the ‘National Institutes for Science and Technology’ (INCTs) – highlighting the need for standardized protocols, data interoperability, and permanent governance among networks.

Taken together, this suite of initiatives signals genuine momentum and a growing consensus on the role of Amazonian science in global environmental governance. Yet COP30 also exposed persistent structural weaknesses. First, there is no shared operational architecture capable of aligning efforts under a coherent, long-term governance framework, resulting in parallel efforts and fragmented coordination.

Second, communication, training, and education infrastructures remain peripheral, despite their centrality to public legitimacy, capacity building, and science diplomacy. Third, equity commitments remain largely aspirational, with few measurable targets for Amazon-based leadership, authorship, data stewardship, or funding allocation. This combination of convergence and fragmentation underscores the need for a polycentric, regionally led governance framework that moves beyond declarations to enable durable coordination across diplomacy, science, policy, and practice. Importantly, this coordination must also be judged by whether scientific agendas address the fundamental socioecological conditions that shape the well-being of local populations, recognizing that locally grounded interventions can generate cascading regional and global benefits.

Integration as a condition for efficiency and coherence

Across the Amazon, research and monitoring efforts frequently overlap spatially while relying on incompatible methods. This fragmentation inflates costs, limits comparability, and weakens the capacity of science to inform conservation and policy decisions. In a context of scarce and unstable funding, duplication represents not only inefficiency but a structural governance failure. Existing long-term programs, such as the Brazilian Biodiversity Research Program (PPBio; Rosa et al., 2021) demonstrate that integration is both feasible and beneficial. Standardized protocols, shared infrastructures, and coordinated sampling designs reduce costs, increase analytical power, and strengthen scientific credibility across scales. For example, PPBio’s standardized sampling design has supported hundreds of studies spanning multiple taxa, scales, and disciplines (Rosa et al., 2021). Recent initiatives further demonstrate that such integration is not only feasible but already underway. In fact, coordinated research across the Amazon has been developing for over two decades through the articulation of regional PPBio networks, integrated under broader initiatives such as INCT CENBAM, 2026 (Rosa et al., 2021). This collaborative architecture has enabled the synthesis of biodiversity data and the coordination of research efforts across scales, and continues to be strengthened by newer networks and INCTs, such as SynBiAm (Resende et al., 2025).

Importantly, such integration does not require rigid uniformity, but rather the establishment of compatible frameworks that allow methodological flexibility and innovation within a shared structure. Integration should therefore prioritize consolidation around established long-term initiatives, while remaining open to complementary approaches that expand questions, methods, and scales of inquiry, rather than creating parallel, short-lived projects that dilute accumulated scientific and local knowledge.

Integration is not merely administrative. Large-scale biodiversity science depends on epistemic coherence: compatible protocols, open data standards, and transparent governance embedded within community-based and long-term monitoring systems (Heberling et al., 2021; Pettorelli et al., 2021). Networks such as PPBio, PELD, and INCT already provide a continental backbone for integration, training scientists and fostering long-term capacity. Importantly, these networks do not constrain scientific creativity; rather, they enable it by providing standardized spatial and infrastructural baselines upon which diverse and independent research questions can be built.

New initiatives should align with these structures from inception, ensuring comparable sampling designs and interoperable data. A practical policy instrument is the adoption of a funding “compatibility clause” requiring projects to (i) justify deviations from consolidated standard designs, (ii) ensure open and interoperable data under FAIR, CARE, and TRUST principles, and (iii) coordinate spatially to minimize

redundancy. Integration, in this sense, is a prerequisite for both scientific effectiveness and equitable regional leadership.

Confronting scientific colonialism: from representation to co-governance

A second structural challenge is the persistence of scientific colonialism operating at two interconnected scales. Externally, Amazonian research still mirrors global patterns of “helicopter” (Adame, 2021), “parachute” (de Vos and Schwartz, 2022), and “remote-control” (Dáttilo and Rivera-Núñez, 2025) science, in which agendas, data flows, and decision-making are dominated by actors based outside the region. Internally, similar asymmetries arise when Amazon-based institutions themselves exclude local researchers, Indigenous Peoples, and traditional communities from leadership and strategic decisions. Such practices, often justified by the climate urgency, reproduce a colonial science that undermines data sovereignty, local capacity building, trust, and the social legitimacy of scientific outputs.

These asymmetries are not only anecdotal but systemic. Despite widespread recognition of Indigenous Peoples and Local Communities as central actors in biodiversity conservation (Levis et al., 2024), their participation in scientific authorship remains extremely limited, and research leadership remains concentrated in institutions of the Global North. Recent bibliometric evidence reinforces this diagnosis: Indigenous co-authorship was identified in only 6.4% of studies addressing biodiversity conservation in the Amazon, despite the central role of Indigenous Peoples in territorial stewardship and environmental monitoring (Silva-Santos et al., 2026). Importantly, emerging Amazon-based collaborative networks illustrate that it is possible to shift from externally driven science toward regionally led initiatives. Initiatives, such as the Amazonian PPBio networks, as well as INCTs CENBAM and Syn-BiAm, are exclusively coordinated by Amazonian institutions and includes strong representation of researchers based in the region, demonstrating that scientific leadership can be both locally grounded and globally connected (Resende et al., 2025). This reveals a persistent gap between the rhetorical inclusion of local knowledge and its translation into shared authority over scientific production, reinforcing patterns of knowledge extraction rather than equitable collaboration.

Moving beyond symbolic inclusion requires a shift from representation to co-governance. Scientific initiatives must be designed with Amazonian institutions and, wherever possible, effectively be led or co-led by them. Territorial anchoring, through the formal involvement of institutions and researchers located near study sites, strengthens continuity, builds technical capacity, and supports the formation of new generations of Amazonian scientists. Equally important, initiatives must embed co-governance mechanisms that give local and Indigenous organizations equal decision-making power and budgetary authority. Crucially, participation cannot be limited to consultation; it must extend to the collaborative co-design of research agendas themselves (Penha, 2026). Without such foundational involvement, scientific questions risk remaining misaligned with territorial priorities, limiting their relevance for addressing the socioecological challenges faced by local populations. This shift moves Amazonian science from a model *about* the region to one *by* and *with* its people, bridging the epistemic gap between science and territory.

Recent mobilizations by Indigenous, quilombola, extractivist, and smallholder organizations reinforce this imperative (Carta da Semana da Sociobiodiversidade, 2025). Their collective demands position Amazonian peoples not as beneficiaries of externally defined programs, but as protagonists of climate and biodiversity action, linking traditional livelihoods to ecosystem regulation and economic sustainability. In this context, the legitimacy and effectiveness of Amazonian science depend on its ability to engage with the fundamental drivers of well-being in these territories, recognizing that locally grounded interventions have cascading effects on regional and global climate stability. For conservation science, this implies aligning research agendas with territorial

governance instruments, such as payment for environmental services and community-based management, rather than treating local knowledge as ancillary or merely consultative.

Empirical evidence shows that Indigenous and local knowledge systems are not merely complementary, but foundational to effective Amazonian science and conservation. Indigenous-led monitoring initiatives, for instance, have generated robust data on environmental change and socioecological impacts, including assessments of hydrological and biodiversity responses to large-scale infrastructure (e.g., Juruna et al., 2025). Likewise, recent research in the Panará Indigenous Territory showed that participatory monitoring and strong local habitat integrity help sustain freshwater biodiversity patterns and improve the interpretation of ecological thresholds, illustrating that co-produced science strengthens both scientific robustness and conservation relevance (Miranda-Filho et al., 2026). Integrating these knowledge systems strengthens both the accuracy and legitimacy of conservation outcomes. Reframing Amazonian science as a co-produced enterprise, grounded equally in empirical data and territorial knowledge systems, is essential to overcoming historical asymmetries and enabling durable, legitimate conservation outcomes.

From project cycles to institutions

The third structural gap is the unstable and inequitable funding architecture underpinning Amazonian science. Research costs in Amazonia remain disproportionately high due to logistical isolation, limited infrastructure, and the expense of accessing remote sites, yet financial resources continue to flow largely to institutions outside the region. Within Amazonia, these constraints restrict the ability of local groups to sustain long-term research, while undervaluing essential field-based labor further entrenches precarity and dependency. Such inequities help to perpetuate dependency and centralize leadership outside the region.

Effective biodiversity conservation and climate mitigation depend less on the volume of investment than on its predictability, territorial fairness, and institutional durability (Waldron et al., 2013; Magnusson et al., 2016; Malcom et al., 2019). Short-term, project-based funding generates boom-and-bust cycles that fragment datasets, disrupt scientific careers, and weaken regional research capacity. Without stable support, monitoring systems critical for adaptive management and policy evaluation cannot be sustained.

Addressing these challenges requires recognizing that funding instability is rooted in broader national and regional structural constraints, including fiscal limitations and shifting political priorities. In this context, solutions must be both strategic and incremental. A key step is the development of a Permanent Amazonia Fund dedicated to long-term research and monitoring. Rather than a standalone mechanism, such a fund could progressively emerge by pooling and stabilizing resources from existing governmental, multilateral, and philanthropic instruments, providing multi-year operational support for existing research programs, shared data platforms, and technological infrastructure, while explicitly accounting for the Amazonian cost of science. This approach shifts the focus from increasing funding volumes to improving how existing resources are structured, distributed, and sustained over time.

A fixed allocation for community- and Indigenous-led monitoring would further align conservation finance with territorial knowledge and stewardship. Complementarily, strengthening and partially redirecting existing mechanisms, such as the Fundo Amazônia, toward socio-biodiversity research and long-term monitoring would provide a more immediate and politically feasible pathway to implementation.

Financial continuity, however, must be matched by governance. The ‘PPBio Letter’ proposal for a permanent inter-network commission and national forum of Amazonian research networks deserves political endorsement and stable funding support at national and Pan-Amazonian scales. Correcting infrastructure asymmetries is essential for equity. In

Amazonian science, institutional stability, rather than constant innovation and project turnover, is the condition for effectiveness and equity.

From ambition to implementation: a collaborative governance framework

Despite their normative alignment, recent Amazonian declarations lack a shared architecture for implementation. To address this gap, we propose a Collaborative Decision Framework (CDF) for Amazonian science governance, adapted from principles of structured decision-making (López-Cubillos et al., 2025). The framework is designed as a cyclical and transparent process encompassing joint problem definition, co-generation of evidence, explicit prioritization of actions, distributed implementation, and adaptive monitoring (Fig. 1). Its purpose is not to replace existing initiatives, but to coordinate them through a common operational logic.

Oversight of the CDF could be entrusted to a Regional Amazonia Science Council, jointly coordinated by intergovernmental, scientific, and territorial actors, including Amazon Cooperation Treaty Organization (ACTO), Red Bioamazonia (Biodiversity Research and Innovation Institutes – [redbioamazonia.org]), or CISAM (Integrated Center for Sociobiodiversity of the Amazonia), together with representative community organizations. Rather than constituting a new standalone institution, this council should emerge as a coordinating platform embedded within existing regional governance architectures. Its legitimacy could be anchored through ongoing intergovernmental processes and scientific networks, particularly those mobilized in the lead-up to COP30, as well as through alignment with national science and policy bodies in Amazonian countries. In this sense, the council would articulate, rather than duplicate, existing mandates – linking diplomatic commitments, scientific coordination, open and ethical data practices, technological

innovation, long-term research programs, and territorial governance. This flexible institutional anchoring allows the framework to adapt to different national contexts while maintaining a shared regional logic.

Crucially, the framework recognizes that multiple “Amazonias” coexist across ecological, political, institutional, and epistemic dimensions. Effective integration therefore depends on reinforcing and interlinking existing networks, not creating new bureaucratic layers. Operationalizing collaboration requires confronting trade-offs: integration demands shared protagonism, decolonization requires redistribution of power and credit, and stable governance demands prioritization of long-term institutional stability over short project cycles. Addressing these tensions is essential to move Amazonian science from symbolic coordination toward durable, territorially grounded implementation.

Conclusion: from transition to consolidation

Amazonian science is undergoing a critical generational and institutional transition. Leadership changes within long-standing research programs and the emergence of new regional networks create a rare opportunity to strengthen connectivity across data systems, infrastructures, governance arrangements, and territories. This moment of renewal is not merely organizational; it reflects a broader shift in how knowledge is produced, governed, and legitimized in the Amazon. Consolidating this transition requires mutual learning between established and emerging actors, balancing accumulated experience with new approaches grounded in collaboration, openness, and regional leadership.

COP30 marked a turning point by elevating Amazonian science to the center of global climate and biodiversity debates. Yet it also made clear that momentum alone is insufficient. Translating shared principles into durable outcomes now depends on three priorities: integrating

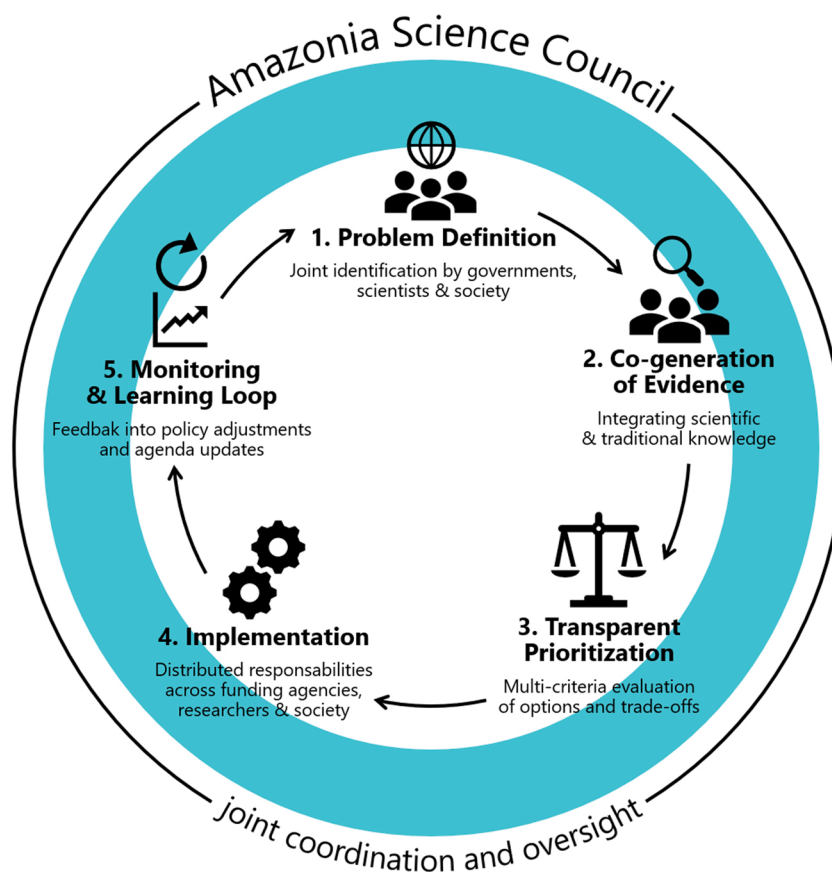


Fig. 1. Diagram of a Collaborative Decision Framework. This framework would institutionalize a cyclical process of problem definition, co-generation of evidence, prioritization, implementation and monitoring and feeding back into policy adjustments.

research and monitoring networks under common standards; institutionalizing co-governance, including data sovereignty and leadership by Amazonian peoples and institutions; and securing predictable, long-term financing that reflects the true costs of doing science in the world's largest tropical forest.

Ultimately, the Amazon is not a passive repository of data or carbon, but a political, ecological, and epistemic actor. Recognizing this agency is essential for building a stable, inclusive, and effective science governance system capable of supporting conservation and resilience beyond COP30. Strengthening Amazonian science is therefore not only a regional imperative, but a global one, without more integrated, decolonial, and durable research systems in the Amazon, efforts to address biodiversity loss and climate instability will remain structurally incomplete.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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