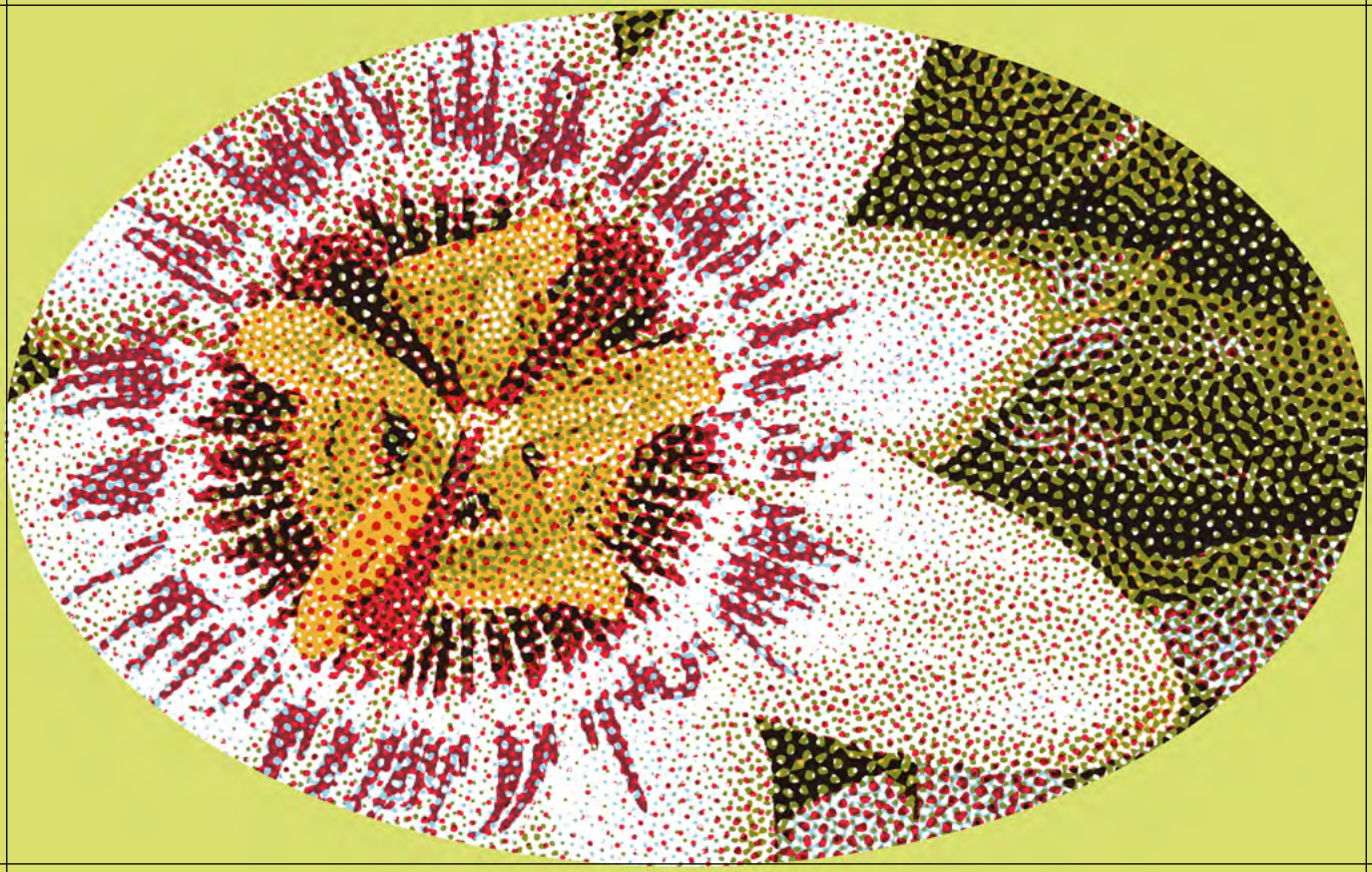
COP30
PLANETARY SCIENCE PAVILION



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COP30 PLANETARY SCIENCE PAVILION

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COP30 PLANETARY SCIENCE PAVILION

LETTER FROM SCIENTISTS TOWARDS A PLANETARY FUTURE

The convening of the 30th Conference of the Parties to the United Nations Framework Convention on Climate Change (COP30) in Brazil marked a turning point in the history of global climate negotiations.

For the first time, the largest and most complex environmental conference on the planet took place in the heart of the Amazon, one of the world's most strategic socioecological systems for climate stability. More than a logistical or symbolic choice, Belém became, during COP30, a living space of confluence between science, policy, society, and territory.

COP30 was, in every sense, unprecedentedly Amazonian. Holding a meeting of this magnitude in the region placed the forest, not merely its abstract representations, at the center of global decision-making. The Amazon ceased to be only an object of concern and asserted itself as a political, scientific, and cultural subject, demonstrating to the world that no viable climatic future is possible without a profound understanding of its natural systems and their associated social dynamics.

The overall organization of COP30 was of the highest standard, reflecting a broad and well coordinated institutional effort to ensure not only the fluidity of official negotiations but also the openness of the process to society at large. The multiple interaction zones, i.e., Blue Zone, Green Zone, Free Zone, and Yellow Zone, functioned as complementary ecosystems for debate, knowledge production, and political engagement. In parallel, leading academic, cultural, and scientific spaces such as the Federal University of Pará (UFPA), the Museu Paraense Emílio Goeldi, and the Museu das Amazônias expanded the reach of COP30 beyond the boundaries of diplomatic negotiation, establishing Belém as a true planetary climate capital throughout these weeks.

Within this context, the Planetary Science Pavilion emerged as one of the most innovative and significant initiatives of COP30. For the first time in more than three decades of COPs, planetary science occupied a central, continuous, and structured space inside the Blue Zone, at the core of negotiations.

THERE CAN BE NO EFFECTIVE CLIMATE SOLUTIONS WITHOUT PROTECTED TERRITORIES, GUARANTEED RIGHTS, AND ADEQUATE FINANCING FOR THOSE WHO LIVE IN AND CARE FOR THE PLANET'S CRITICAL BIOMES.

The Pavilion was not merely a venue for scientific exhibition; it was a space of listening, translation, and mediation, where scientific evidence, ancestral knowledge, and political implications were presented in an integrated way.

One of the most emblematic milestones of this initiative was the dedication of an entire day to the Amazon, both recognizing it as a key system for global climate balance and exposing the forces that threaten it, while also debating the region as a lived, governed, and produced territory shaped by peoples and communities historically responsible for its conservation. The active presence of Indigenous Peoples and Afrodescendants (Quilombola), riverine, and extractivist communities was neither peripheral nor symbolic: their knowledge, experiences, and technical repertoires were acknowledged as legitimate and indispensable for understanding planetary boundaries and the possibilities for adaptation and mitigation towards urgent implementation of Nature-Based Solutions to avoid the tipping point of the Amazon.

Throughout its thematic days, the Planetary Science Pavilion promoted high-level dialogues involving internationally renowned scientists, community leaders, policymakers, youth, communicators, and civil society representatives. The debates revealed the fully systemic character of the climate crisis, addressing, alongside specifically environmental and energy issues, the interconnected challenges related to health, food systems, biodiversity, the economy, social justice, and global governance.

This Final Report Systematises the main debates, diagnoses, and projections that emerged from this process. While documenting the content of the discussions, it seeks to highlight the spirit that permeated COP30: the recognition both of the gravity of the moment, having entered an era of consequences already marked by dramatic transgressions of crucial biophysical limits, and of the possibilities for collective action capable of redirecting pathways, grounded in science, equity, and cooperation.

Produced from within the Amazon, this report gives particular emphasis to the recurring thesis of the Pavilion: that there can be no effective climate solutions without protected territories, guaranteed rights, and adequate financing for those who live in and care for the planet's critical biomes. It also reaffirms that science and policy can no longer follow parallel tracks: science must guide decisions, and political decisions must respect the limits and interdependencies of the Earth system revealed by science. The Pavilion also raised how urgent is the need for zero use of fossil fuels by 2040 and no longer than 2045 as fossil fuels represent 75% of GHG emissions.

We hope that this report serves as a scientific, political, and ethical reference for governments, institutions, organizations, and citizens. May it inspire concrete actions, lasting partnerships, and a renewed collective responsibility in the face of the greatest challenge of our time: ensuring a future for humanity on a planet that remains habitable, with an Amazon that remains alive.

MEMBERS OF THE PLANETARY SCIENCE PAVILION SCIENTIFIC COMMITTEE
Adalberto Luis Val, Carlos Afonso Nobre, Francisco de Assis Costa, Johan Rockström, Julia Arieira and Luiza Portella.

EXECUTIVE SUMMARY

At COP30 in Belém, the Planetary Science Pavilion marked a historic milestone by placing science at the core of the climate negotiations. The Pavilion served as a nexus between planetary science, Indigenous knowledge, and public policy, integrating cutting-edge research with ancestral wisdom to inform decision-making.

The Pavilion's sessions delivered sobering scientific insights about our planet's trajectory. Leading scientists warned that humanity has entered an "era of consequences" as key Earth systems approach dangerous tipping points: tropical coral reefs have effectively collapsed, parts of the Amazon have shifted from absorbing carbon to emitting it, and even the Atlantic Ocean circulation is at risk of disruption. Experts also demonstrated that human health and planetary health are inseparable; climate change is already amplifying the risks of zoonotic diseases, extreme heat events, and pollution impacts.

These findings underscored cascading risks, but also the need to leverage all knowledge systems to address them. Notably, the Pavilion spotlighted positive tipping points that can accelerate solutions. It showcased how surging renewable energy adoption, large-scale ecosystem restoration, the expansion of nature-based "socio-bioeconomic" models in standing forests, and strengthened community governance in vital biomes are beginning to trigger self-reinforcing progress towards climate stability. Indigenous territories – safeguarded by centuries of stewardship – were shown to be crucial for climate regulation, with rigorous data confirming that Indigenous lands help stabilize regional climates. These examples illustrate that the pathway to a livable future is not only defined by looming dangers, but also by the scalable opportunities already emerging.

Building on this scientific foundation, the Pavilion put forward a policy blueprint for action. It called for a definitive phase-out of fossil fuels and a global pact to end deforestation by 2030 – non-negotiable steps without which limiting warming to 1.5°C and protecting essential ecosystems like the Amazon and coral reefs will be barely impossible. The agenda emphasised transforming our economic approach through a socio-bioeconomy that values living forests and rewards the communities who safeguard them, coupled with reforms to climate finance to ensure funds are accessible, equitable, and aligned with conservation and decarbonization goals. Finally, the Pavilion underscored principles of intergenerational justice: it echoed youth leaders' calls to integrate climate education into national strategies and to formally include young people in climate governance decisions, not just as future beneficiaries but as active partners in designing the policies they will inherit. Together, these recommendations frame a comprehensive action plan – grounded in science, equity, and shared responsibility – to secure a stable climate and a thriving planet for current and future generations.

COP30 AS AN OPPORTUNITY TO BRIDGE SCIENCE AND CLIMATE ACTION

The trajectory of global climate summits has long grappled with the challenge of effectively translating scientific urgency into diplomatic ambition. Historically, while science has provided the foundational rationale for the UNFCCC, it has often remained physically and procedurally distinct from the negotiation rooms, delivered via reports prior to the conference rather than integrated into the daily rhythm of decision-making. COP30 in Belém arrived at a moment where this separation was no longer tenable. With global temperatures breaching critical thresholds and the Amazon biome itself approaching a tipping point, the geopolitical context of the conference demanded a fundamental realignment of how knowledge informs action.

This "Amazonian COP" emerged not just as a change of venue, but as a strategic pivot point in the global climate narrative. The political momentum leading into Belém emphasised that protecting the world's tropical forests and stabilizing the Earth's climate are not separate goals, but a singular, intertwined safety imperative for humanity. The urgency of the present scenario, defined by the visible acceleration of extreme events and the risk of irreversible ecosystem collapse, required a space where the "alarm" of scientific diagnostics could directly interface with the "action" of diplomatic agreements.

It was in response to this specific historical and political necessity that the Planetary Science Pavilion, mandated by COP30 Presidency, was conceived. Rather than functioning as a traditional side event, it was positioned to anchor the conference in the biophysical realities of the current world we live in. By physically embedding planetary science within the Blue Zone, COP30 acknowledged a shift in the narrative: in an era of consequences, negotiation texts must be continuously fact-checked against the rigid boundaries of the Earth system.

PROTECTING THE WORLD'S TROPICAL FORESTS AND STABILIZING THE EARTH'S CLIMATE ARE NOT SEPARATE GOALS, BUT A SINGULAR, INTERTWINED SAFETY IMPERATIVE FOR HUMANITY.

AN OVERVIEW OF THE PLANETARY SCIENCE PAVILION

The Planetary Science Pavilion constituted a unique and pioneering initiative that firmly positioned science at the center of the COP30 agenda. Commissioned by the COP30 Presidency, the Pavilion served as a shared space for exchanging and discussing scientific and planetary knowledge, bringing together science research, public policy, social participation, and concrete action. In the center of the Blue Zone, the Pavilion sought to identify priorities, risks, and opportunities to safeguard climate balance and avoid the ongoing climate emergency, through a comprehensive, whole-planet perspective.

It was the first time in 33 years that science stood at the very heart of the negotiations at a UN Climate Conference. This was a historical milestone: **COP30 Presidency has mandated the Planetary Science Pavilion as a cornerstone of its vision to make this the "COP of truth"**. As COP30 CEO Ana Toni stated: "*Science must guide our path to a liveable planet. COP30 will be the COP of truth, where evidence, integrity, and cooperation shape every decision we make for humanity's future.*"

As a reliable scientific reference space at COP30, the Pavilion showcased essential research and innovative solutions, highlighted Brazilian and global excellence

For the first time in 30 COPs, the Presidency extended an invitation for a total integration between science and negotiations. We are at the limit, so we need to think about nature-based solutions and envision the tipping points of biomes to prevent, mitigate, and adapt.

Carlos Nobre, Science Panel for Amazon

in both modern and ancestral science and original knowledge, and emphasised the Amazon and the three tropical forest basins (Amazon, Congo Basin and Southeast Asia) as crucial to maintaining planetary balance.

Planetary science is the science of our living Earth, an integrated understanding of the entire Earth system that connects climate, nature, and people. It recognises that planetary health and human health are strongly connected, and that we cannot have thriving societies on a destabilised planet. By integrating knowledge across all planetary boundaries (tipping points), planetary science helps us quantify, warn, and guide collective action to bring both people and planet back into a safe and just operating space for humanity.

The Planetary Science Pavilion in the COP30 Blue Zone was co-chaired by Johan Rockström, Director of the Potsdam Institute for Climate Impact Research, and Carlos Nobre, Planetary Guardian and Co-Chair of the Science Panel for the Amazon. Moreover, a multidisciplinary team of the COP30

"The scientific community is becoming more concerned than before. The planet is showing the first signs of buffering and cooling down - we are reaching tipping points. There is no chance of having a future without thinking about the systems that balance the climate, which includes the Amazon.

Johan Rockström, Potsdam Institute for Climate Impact Research

Science Council - that included Dr. Marina Hirota (Serapilheira Institute), Dr. Thelma Krug (IPCC), Dr. Paulo Artaxo (University of São Paulo), Dr. Francisco de Assis Costa (UFPA), Dr. Adalberto Luis Val (INPA), Dr. Tim Lenton (University of Exeter), among others - was responsible for the agenda curation of for bridging science and policy, constructing a space of encounter for scientists from different parts of the world.

Between November 10 and November 21, 2025, in the Blue Zone, at the heart of Belém, the Planetary Science Pavilion sought to translate the science of planetary interconnectivity into empathy and action by bridging research, indigenous and traditional knowledge, and policy throughout COP30. The Pavilion agenda counted 59 sessions and panels, organised into 10 thematic days, which drew more than 335 speakers, including scientists, policymakers, negotiators, indigenous leaders, and civil society representatives.

The Pavilion also extended beyond the Blue Zone, bringing planetary science into the Green Zone, Free Zone and engaging civil society audiences with the climate agenda.

The Pavilion was supported by the Potsdam Institute for Climate Impact Research, the Science Panel for the Amazon, Arapyaú Institute, Bloomberg Philanthropies, The David and Lucile Packard Foundation, FINEP Innovation and Research (Brazilian Ministry of Science, Technology and Innovation), Global Challenges Foundation, Mandalah, Planetary Guardians, The Robertson Foundation, The Rockefeller Foundation, Serrapilheira Institute, Vale Institute of Technology (ITV), Vivo and We Don't Have Time, as well as leading Brazilian and international science institutes and networks.

The discussions at the Pavilion expressed that humanity has entered an "era of consequences," where non-linear planetary

Thematic days:

Tuesday, 11/10/25	**State of the Planet**
Tuesday, 11/10/25	**Limiting Overshoot of 1.5°C: Why It Is Vital and How to Achieve It**
Wednesday, 12/10/25	**Transformative Mitigation**
Thursday, 13/10/25	**Transformative Adaptation**
Friday, 14/10/25	**Climate and Finance**
Saturday, 15/10/25	**Amazon Day**
Monday, 17/10/25	**Biodiversity Day**
Tuesday, 18/10/25	**Justice, Human Rights and Health**
Wednesday, 19/10/25	**Agriculture and Food System**
Thursday, 20/10/25	**Strengthening the Science–Policy Interface**

changes and breached safety limits make avoiding a 1.5°C overshoot highly unlikely. Several major tipping points are already approaching: tropical coral reefs have effectively collapsed, parts of the Amazon have shifted from a carbon sink to a carbon source, and the Atlantic Meridional Overturning Circulation (AMOC) is at real risk of disruption.

These events raise the likelihood of cascading failures across Earth systems. The Amazon was reframed as a continental connectivity engine—ecological, hydrological, and socio-cultural—whose "flying rivers" sustain rainfall across South America, but whose resilience is eroding due to deforestation, degradation, wildfires, climate change, and extreme climate phenomena. The renewable energy transition carries its own ecological risks, as mining for critical minerals and deep-sea oil extraction threaten biodiversity and the ocean's carbon and oxygen cycles. Social science revealed parallel "social tipping points," showing that inequality, institutional erosion, and criminal economies undermine environmental enforcement.

INDIGENOUS KNOWLEDGE SYSTEMS WERE RECOGNISED AS RIGOROUS SCIENTIFIC FRAMEWORKS.

Essential for understanding and managing ecosystems, and their territories demonstrably regulate regional climate. Health and climate were shown to be

"We start from the principle that science is the unveiling of a mystery, and that all science is a mystery. Every time we delve deeper, seeking answers, it's a science that stimulates itself. What we've been seeking, therefore, is to empower the population, to inform them of the laws and rights, to encourage communities to produce their own tools and knowledge. Traditional sciences and Western science are complementary. It is necessary to consider the sciences shaped in other spaces and ecosystems.

Cristiane Julião Pankaru, indigenous leader

inseparable, with environmental quality increasingly compromised amid rising zoonotic risks, intensifying extreme heat events, and growing toxic contamination. Ocean and cryosphere research underscored that oceans absorb most excess heat and that polar ice loss further accelerates global warming.

In this sense, the scientific diagnosis calls for a profound restructuring of political, economic, and governance systems. Traditional, nation-centered governance is inadequate for managing planetary-scale risks, requiring polycentric and transboundary cooperation - especially for tropical forests like the Amazon, Congo Basin, and Southeast Asia. Economic models must shift from "Nature-based Solutions" as add-ons to fully integrated Nature-Positive Economies, where nature is treated as a macroeconomic actor.

The Global South's debt burden and reliance on private finance were shown to undermine climate action; public banks must lead mission-driven investment. Justice becomes a prerequisite for resilience: inequality drives climate instability, and the land rights of original peoples and the effective control of public forested lands are identified as the most cost-effective mitigation strategies. Net-zero strategies must prioritise zero deforestation and degradation over expensive, uncertain technological pathways, with renewable-rich regions producing green commodities for global markets.

"Brazil is one of the countries most vulnerable to climate change. Climate change will have a tremendous impact on our economy, society, ecosystems, and people's health. We need to answer society's needs in science as quickly as possible, providing pathways to sustainability in Brazil.

Paulo Artaxo, University of São Paulo

THE PAVILION ESTABLISHED A FIRM SCIENTIFIC RED LINE: NO PATHWAY TO 1.5°C IS COMPATIBLE WITH NEW FOSSIL FUEL EXPANSION, AND ANY AGREEMENT LACKING AN EXPLICIT FOSSIL FUEL PHASE-OUT CONSTITUTES A "BETRAYAL OF SCIENCE."

Conservation alone is insufficient; large-scale ecological restoration is required. Climate finance must stop the net outflow of capital from the Global South and become predictable, grant-based, and aligned with planetary boundaries. Education and youth participation are essential to secure democratic mandates for transformative change.

Crucially, the Pavilion also challenged the traditional view of the Amazon as a purely rural expanse, highlighting that 70% of the Pan-Amazonian population lives in urban centers. Panels dedicated to Cities and Infrastructure and Urban Nature-Based Solutions revealed that cities are both major drivers of emissions and the frontlines of climate impacts, such as extreme heat and flooding. Discussions moved beyond static, colonial planning models toward "amphibious urbanism" and relational planning that adapts to water cycles rather than fighting them. The launch of the Global Roadmap for Urban Nature-Based Solutions further emphasised that addressing the climate crisis requires closing the "nature gap" in cities, integrating biodiversity into infrastructure, and addressing the specific vulnerabilities of informal settlements in the Global South.

Finally, the Pavilion highlighted a suite of solutions grounded in scientific evidence and Indigenous leadership. A transition to a Socio-Bioeconomy of standing forests, including bio-industrialization models like Amazonia 4.0 and circular molecular innovation, can generate high-value products locally while preserving ecosystems. Immediate recognition and demarcation of Indigenous territories was presented as a top-tier climate mitigation policy, paired with full integration of their knowledge systems into national and global climate strategies.

A global commitment to zero deforestation and degradation by 2030, supported by satellite-based traceability systems, must be complemented by a "Marshall Plan for Nature" to restore hundreds of millions of hectares of degraded land globally. Anticipatory humanitarian action, forecast-based finance, and conflict-sensitive policies increase resilience for vulnerable communities. Strengthened transnational governance bodies and fully integrated climate, biodiversity and development funding frameworks are necessary for effective biome protection.

As a result, the Pavilion called for a binding global roadmap that unites fossil fuel phase-out, biome protection, empowerment of biome-based economies, including the biome-regenerative ones, Indigenous rights, economic decarbonization, and reformed climate finance into a single planetary survival strategy. Youth leadership and universal climate education were positioned as essential for long-term civic resilience.

Positive tipping points were highlighted throughout the Pavilion's sessions, demonstrating that the pathway to climate stability is not defined solely by risks. Several presentations identified emerging dynamics capable of triggering rapid, self-reinforcing change, such as the accelerating adoption of renewable energy, large-scale ecological restoration, the expansion of socio-bioeconomic models rooted in standing forests, and the strengthening of community-based governance in critical biomes. These examples showed that transformative shifts are already underway and can be amplified through coordinated policy, investment, and local leadership. By showcasing these positive tipping points across multiple thematic days, the Pavilion underscored that solutions grounded in science, equity, and cooperation are not only possible—they are already taking shape.

PLANETARY SCIENCE PAVILION ON THE MEDIA

During COP30, the Planetary Science Pavilion was not only a physical space for discussions and encounters but also a facilitator in spreading scientific messages during the negotiations, reaching those who could not attend Belém's Conference.

In this sense, the Pavilion served as an authoritative scientific voice for COP30, a trusted reference point that anchored the Conference in rigorous, evidence-based knowledge. Through strategic media engagement, the Pavilion could gain more visibility as its unique role in bridging cutting-edge research with policy action.

"We see a lot of miscommunication in the media, and this calls out the scientists. We cannot lose the hope that we need to strengthen the communication - a Mutirão, everyone needs to be together, a commitment from everyone. Indeed, we have a high probability of overshooting, but I would rather say it is temporary, and with this, I place hope and faith. We need to phase down and then phase out in the energy transition.

Thelma Krug, IPCC

"Unfortunately, the State is not prepared; it starts to create several boxes that separate this knowledge, right? And that's not how we see the world; that's not how we see our science. Because of this, Western science itself needs to reconnect and give some space to traditional knowledge so that it stops separating the sciences from one another.

Mariazinha Baré, APIAM

COMMUNICATION OUTCOMES

ON TRADITIONAL MEDIA, THERE WERE:

758 ARTICLES PUBLISHED QUOTING THE PAVILION

65 INTERVIEWS WITH SCIENTISTS, GLOBAL AND LOCAL LEADERS, AND POLICY MAKERS

184M INDIVIDUALS WERE REACHED

ON SOCIAL MEDIA, THERE WERE:

313 POSTS PUBLISHED

162M INDIVIDUALS WERE REACHED

MAIN MEDIA OUTLETS THAT COVERED THE PAVILION:

ESTADÃO, JORNAL NACIONAL, PIAUÍ MAGAZINE, G1, CNN, FOLHA DE S.PAULO, FORBES, AND THE OBSERVER, AMONG OTHERS.

THE LEADING SPOKESPEOPLE FROM THE GUARDIANS:

AYISHA SIDDIQA
FORMER CLIMATE ADVISOR TO UN SECRETARY-GENERAL; CO-FOUNDER OF POLLUTERS OUT AND FOSSIL FREE UNIVERSITY

CARLOS NOBRE
UNIVERSITY OF SÃO PAULO; SCIENCE PANEL FOR THE AMAZON

CHRISTIANA FIGUERES
FORMER UN CLIMATE CHANGE EXECUTIVE SECRETARY; GLOBAL OPTIMISM CO-FOUNDER

HINDOU IBRAHIM
ASSOCIATION FOR INDIGENOUS WOMEN AND PEOPLES OF CHAD

JOHAN ROCKSTRÖM
POTSDAM INSTITUTE FOR CLIMATE IMPACT RESEARCH

JUAN MANUEL SANTOS
FORMER PRESIDENT OF COLOMBIA; NOBEL PEACE PRIZE LAUREATE

MARY ROBINSON
FORMER PRESIDENT OF IRELAND; MARY ROBINSON FOUNDATION – CLIMATE JUSTICE

NAOKO ISHII
UNIVERSITY OF TOKYO; FORMER CEO AND CHAIRPERSON OF THE GLOBAL ENVIRONMENT FACILITY

PAUL POLMAN
GLOBAL LEADER ON SUSTAINABLE DEVELOPMENT

XIYE BASTIDA
RE-EARTH INITIATIVE CO-FOUNDER

JEAN OELWANG
PLANETARY GUARDIANS ADVISORY COUNCIL MEMBER

RENATA PIAZZON
INSTITUTO ARAPYAÚ; PLANETARY GUARDIANS ADVISORY COUNCIL MEMBER

ESTADÃO

CIENTISTAS CRITICAM PROPOSTAS PARA FÓSSEIS NA COP30: QUANDO A CIÊNCIA FALA, O MUNDO PRECISA OUVIR

JORNAL NACIONAL

O ALERTA DA CIÊNCIA NA COP30: LIMITE DE 1,5°C ESTÁ PRESTES A SER ULTRAPASSADO

THE OBSERVER

THE WORLD MUST UNITE AROUND A CLIMATE PLAN

CNN

COP30: CIENTISTAS PRESSIONAM GOVERNO PARA FREAR COLAPSO CLIMÁTICO

FORBES

NA COP30, PELA PRIMEIRA VEZ A CIÊNCIA PLANETÁRIA TERÁ SEU "LUGAR DE FALA"

MAIN OFFICIAL STATEMENTS

On November 17, 2025, the Pavilion Scientific Committee, led by Carlos Nobre and Johan Rockström, presented a formal document to the negotiators and COP30 Presidency - Ambassador André Corrê do Lago - calling for urgent action based on the latest scientific evidence. Their statement (in Annex) emphasised that the remaining carbon budget to limit global warming to 1.5°C is rapidly shrinking and will be exhausted in just a few years if emissions continue at current levels.

The declaration called for a clear roadmap to phase out fossil fuels and to protect critical ecosystems such as the Amazon forest and tropical coral reefs, both of which are nearing irreversible change due to climate impacts. Scientists stressed the need for negotiators to put science at the core of decision-making and to commit to rapid and deep emission reductions, warning that existing commitments are insufficient and that delayed action will further increase risks to vulnerable communities and natural systems

On November 18, as a response to the ongoing negotiations, scientists declared that the world stands at a planetary crossroads, and pointed out forest fires, degradation and land use as threats to the Amazonia biome.

THIS WAS A SYMBOLIC MOMENT THAT REPRESENTED AN URGENT CALL TO CONSIDER ALL PLANETARY TIPPING POINTS AND TO GROUND THE COP30 DECISIONS AND OUTCOMES WITH SCIENCE-BASED EVIDENCE. THE MESSAGE DELIVERED AT THE CONFERENCE WAS CLEAR: WITHOUT DECISIVE AND SCIENCE-BASED POLICIES, THE WORLD WILL FACE INCREASINGLY SEVERE SOCIAL, ECONOMIC, AND ENVIRONMENTAL CRISES.

This new statement urged that to keep global warming within safe limits, and for that CO_2 and CH4 emissions from fossil fuel emissions must approach absolute zero by around 2040–2045, which requires ending new fossil fuel investments, removing subsidies, and accelerating just transitions to renewable energy. They also stressed that climate finance from rich to poorer countries must be predictable, grant-based, and equitable to uphold the credibility of the Paris Agreement. Additionally, they highlighted that forests could no longer be assumed to act as carbon sinks without a simultaneous fossil fuel phase-out and strong deforestation measures.

IMMEDIATE CUTS IN GHG EMISSIONS, OF AT LEAST 5% PER YEAR STARTING IN 2026, ARE NEEDED TO AVOID SEVERE CLIMATE IMPACTS. MAINTAINING THE REMAINING SCIENTIFIC CARBON BUDGET IN NEGOTIATIONS IS ESSENTIAL TO ENSURING GROUNDED AND EFFECTIVE POLICY ACTION.

"The best scientists ever are the indigenous people who are keeping this alive. This is the first time we are discussing science during the negotiations. We need to indigenous people to remind negotiators who they are and what they are working on.

Hindou Ibrahim Oumarou, Planetary Guardian

"We are outside the safe space; we are in the danger zone. The conclusions: we have a planetary crisis, we have to move fast and urgently, but the window is still open, we can still turn this around.

Johan Rockström, Potsdam Institute for Climate Impact

Immediate cuts in GHG emissions, of at least 5% per year starting in 2026, are needed to avoid severe climate impacts. Maintaining the remaining scientific carbon budget in negotiations is essential to ensuring grounded and effective policy action.

On November 19, as a response to the Mutirão draft, the Pavilion Scientific Committee exposed that this text failed to include the words “fossil fuels”, despite many countries agreeing on roadmaps to end fossil fuel dependence and deforestation.

THEY CALLED THIS OMISSION A BETRAYAL OF SCIENCE AND VULNERABLE POPULATIONS, AND STRESSED THAT WITHOUT EXPLICITLY ADDRESSING THE PHASE-OUT OF FOSSIL FUELS AND ENDING DEFORESTATION, IT IS IMPOSSIBLE TO LIMIT GLOBAL WARMING TO 1.5°C OR SAFEGUARD PEOPLE AND ECOSYSTEMS.

The statement urged negotiators to revise the text in the final hours of the talks to restore clear roadmaps toward a safer, more prosperous future, emphasizing that science remains ready to support effective action.

Finally, on November 22, 2025, as COP30 concluded, scientists released a final declaration expressing both concern and resolve. They acknowledged progress in some areas but made clear that the final negotiation text still fell short of what science demands to keep global warming within safe limits.

This final statement highlighted the critical need for an explicit phase-out of fossil fuels, an end to deforestation and ecosystem degradation, and far more ambitious emissions reductions aligned with the remaining carbon budget for 1.5 °C. The scientists warned that without these commitments, the world risks irreversible impacts on vulnerable communities and essential ecosystems such as the Amazon, coral reefs, and polar regions. They also reaffirmed the importance of full implementation of the Paris Agreement, alongside stronger mechanisms for climate finance, adaptation, and loss & damage. Concluding their message, they urged governments, civil society, and future COP presidencies to advance on the Belém discussions with science-based, urgent, and equitable climate action.

WHAT WAS DISCUSSED DURING THE COP30 PLANETARY SCIENCE PAVILION?

The Planetary Science Pavilion served as a central meeting place to integrate diverse knowledge systems. Across ten thematic days, the discussions moved beyond the traditional silos of "mitigation" and "adaptation" to propose a holistic planetary health framework. The consensus was clear: incremental changes are no longer sufficient to navigate the Anthropocene. We have entered a phase of non-linear risks that requires equally non-linear and systemic solutions.

The discussions moved beyond generic calls for action to provide granular, region-specific, and sector-specific evidence. Below, we present the detailed analytical synthesis of the Pavilion's outcomes, structured into three pillars:

- SCIENTIFIC INSIGHTS
- POLICY IMPLICATIONS
- CALL TO ACTION

1 KEY SCIENTIFIC INSIGHTS

The Pavilion’s sessions confirmed that we have entered the era of consequences, characterised by non-linear changes and the breaching of safety limits. The diagnosis is severe, but the pathway to recovery is clearly mapped by science.

1. THE REALITY OF OVERSHOOT AND TIPPING POINTS
2. CONNECTIVITY AS AMAZON’S CORE FUNCTION
3. INDIGENOUS KNOWLEDGE AS PLANETARY SCIENCE
4. THE HEALTH-CLIMATE NEXUS: A PUBLIC HEALTH EMERGENCY
5. OCEAN AND CRYOSPHERE: THE SILENT GIANTS

1.1 THE REALITY OF OVERSHOOT AND TIPPING POINTS

The scientific community, led by the Earth Commission and the authors of the 2025 Global Tipping Points Report, delivered a sobering consensus: limiting global warming to 1.5°C without at least a temporary overshoot is now geophysically unlikely. The focus of the scientific discourse has shifted to managing the magnitude and duration of this overshoot to prevent cascading systemic failures.

THE FIRST FALLEN DOMINO: Scientists confirmed that the first major Earth system tipping point has likely been crossed: Tropical Coral Reefs. With warming at 1.4°C, over 80% of reefs have experienced bleaching. The loss of this ecosystem is a harbinger of what awaits other systems.

THE AMAZON AT THE BRINK: The Pavilion dedicated significant attention to the Amazon Rainforest, which is considered a tipping point with immediate global repercussions. Data presented by Carlos Nobre and the Science Panel for the Amazon (SPA) showed that the forest is not just suffering from external heat but is losing its internal resilience due to land-use changes, highly linked to the concentrated and illegal pattern of land tenure. The southeastern Amazon has already shifted from a carbon sink to a net emitter.

CASCADING RISKS: Sessions highlighted the connectivity of risk. A potential collapse of the Atlantic Meridional Overturning Circulation (AMOC), once considered a low-probability event, is now a tangible threat that would radically alter monsoon systems in the Global South and dramatically chill Europe. The science is precise: tipping one system significantly raises the probability of tipping others.

CRITICAL MINERALS AND PLANETARY SECURITY: While decarbonization is non-negotiable, the Pavilion hosted a crucial debate on the material demands of this transition. Sessions on Reconciling Climate and Nature revealed a looming "Green Paradox."

- **The mining threat:** The transition to renewable energy requires vast amounts of critical minerals (lithium, cobalt, copper). Speakers warned that unsustainable mining practices threaten to destroy the very biodiversity we are trying to save.
- **Deep-sea dilemma:** The discussion on deep-sea mining was particularly stark. Scientists presented evidence that the deep ocean is not a barren void but a biological engine. The potential destruction of the seabed to harvest nodules for batteries could disrupt the ocean's carbon cycle.
- **Strategic implication:** The concept of "planetary security" was introduced to replace the traditional concept of "National Security." The extraction of transition minerals must be governed by strict ecological "No-Go Zones" based on scientific mapping of biodiversity hotspots, particularly in the Andes-Amazon–Orinoco.

SOCIAL TIPPING POINTS:
Science at the Pavilion was not limited to biophysics; social science played a pivotal role. The Earth4All model applied to Brazil demonstrated that social stability is a prerequisite for environmental protection.

- **The vicious cycle:** Researchers showed how inequality drives environmental degradation. When populations lose trust in governance due to poverty or a lack of services, enforcement mechanisms (such as anti-deforestation laws) fail.
- **Social tipping:** As ecosystems have tipping points, societies do too. The loss of cultural references, the control over the territory by the land market arrangement and rationale, along with the invasion of organised crime in the Amazon (narco-deforestation) and erosion of community cohesion, were identified as "Social Tipping Points" that make climate adaptation impossible. Restoring trust and reducing inequality are therefore considered hard scientific requirements for climate stability.
- **Social-political tipping point:** the Trump administration has been promoting a series of policies to increase use of fossil fuels using military forces. Not only this, the administration is increasingly denying climate change - the United States not only withdrew from the Paris Agreement but also environmental, research and climate institutions have suffered budget cuts. The logic of "drill, baby, drill" - and the expansion of the fossil fuel industry - draws a major risk to political actions on an international level.

POSITIVE TIPPING POINTS (PTPS):
While much of the scientific discourse focused on the risks of collapse, a parallel, equally rigorous body of evidence was presented on Positive Tipping Points (PTPs). The Global Tipping Points Report 2025 demonstrated that social and technological systems are also non-linear; small interventions can trigger rapid, reinforcing cascades of beneficial change.

- **The energy revolution:** The most prominent PTP identified is the exponential growth of renewable energy. Data analysed from the Better Planet Laboratory highlighted the case of China's Solar Boom. Strategic state investment created a tipping point in global manufacturing costs, making solar power cheaper than fossil fuels in most of the world. This is not an incremental change; it is a structural disruption that is now self-propelling.
- **The "S-Curve" of adoption:** Scientists showed that Electric Vehicles (EVs) and battery storage are following an S-curve adoption path. Once market share crosses a critical threshold (often 5-10%), social norms and infrastructure flip, leading to rapid mass adoption. The message was clear: we are closer to the winning side of the energy transition than linear projections suggest.
- **Ecological recovery is possible:** Contrary to the idea that degraded systems remain broken forever, the Pavilion showcased evidence of rapid ecological bounce-back. The "manejo do Pirarucu" (Pirarucu management) in the Amazon was cited as a biological positive tipping point. In the Mamirauá Reserve, a community-based management protocol allowed the population of this giant fish to rebound by 400% in a decade, proving that extracting value from biodiversity can actually increase biomass if governed by scientific and traditional rules.

1.2 CONNECTIVITY AS AMAZON'S CORE FUNCTION

The launch of the Amazon Assessment Report 2025 revolutionised the narrative around the forest, reinforcing that there is no separation between humans and nature and that we are all part of a single, interconnected unity. It moved the conversation beyond "carbon stocks" to seeing it as a continental hydrologic engine.

The concept of "connectivity" emerged as the definitive scientific metric: ecological connectivity (from the Andes to the Atlantic), hydrological connectivity (flying rivers), and socio-cultural connectivity.

ECOLOGICAL CONNECTIVITY: interaction and movement of species across habitat corridors.

HYDROLOGICAL CONNECTIVITY: linking biodiversity and hydrology as fundamental for the stability of the regional and global climate.

SOCIO-CULTURAL CONNECTIVITY: the profound interconnection between ways of life, knowledge systems, and ties to the territory of Indigenous Peoples, Afro-descendant Peoples, and Local Communities grounded in shared values and cultural practices.

RIVERINE CONNECTIVITY: Experts like Andrea Encalada (Science Panel for Amazon) warned that the proposed hydroelectric dams from the Andean headwaters to the Atlantic threaten to sever the longitudinal connectivity of the river system, blocking species migration, sediment, and nutrient flows essential for the Atlantic Ocean's marine life and local peoples' livelihood.

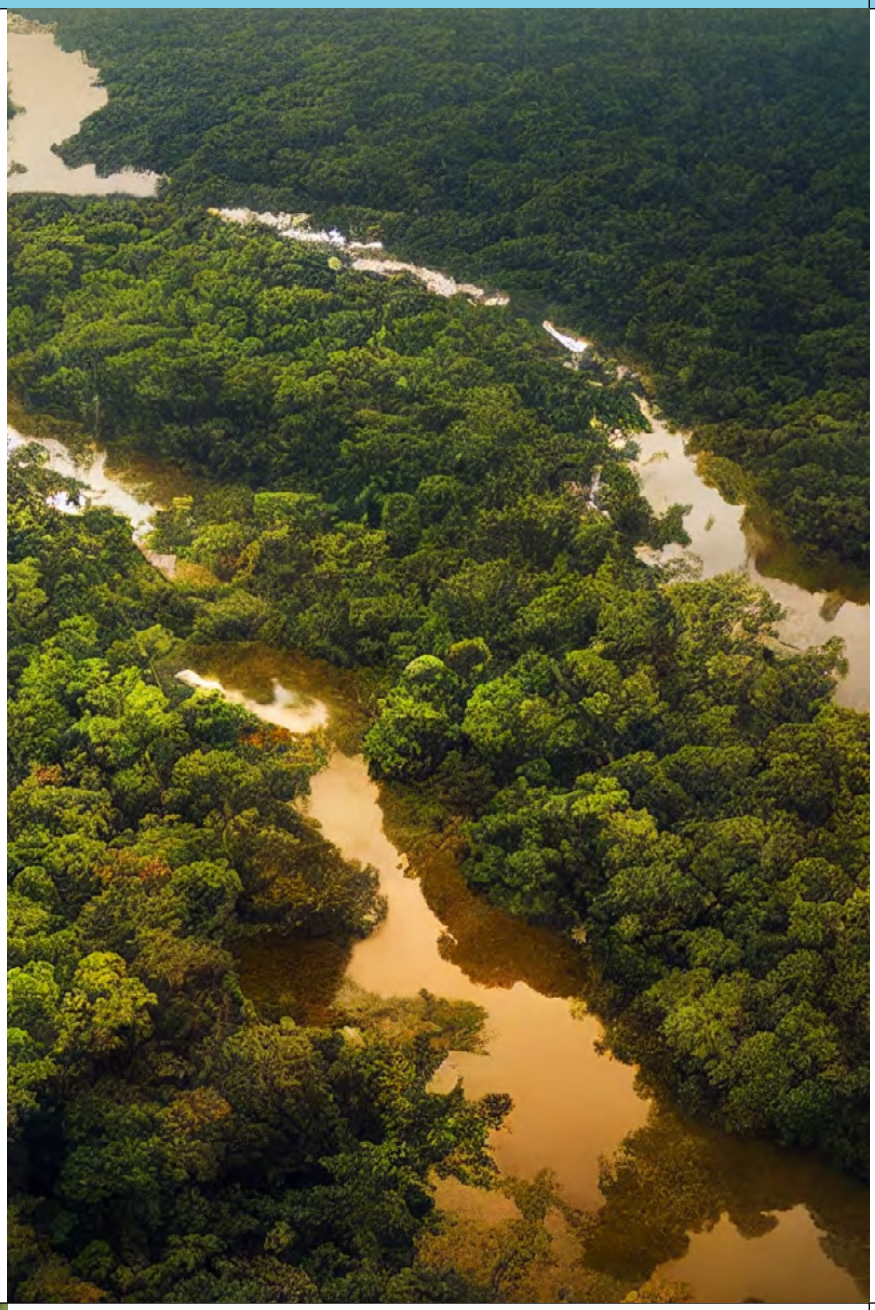
THE FLYING RIVERS: Research presented by Marina Hirota (Serrapilheira Institute) and others quantified the value of the "aerial rivers", showing that up to 50% of regional rainfall is recycled by forest evapotranspiration. The moisture recycled by the Amazon forest feeds agriculture in southern South America. The data reveal that Indigenous Territories act as the primary "water pumps" for the continent's rainfall.

THE PHOSPHORUS LIMIT: New climate Modelling presented by Richard Betts (Met Office/Exeter) introduced a critical constraint: the "fertilization effect" (where forests grow faster due to higher CO_2) may be severely limited in the Amazon by a lack of soil phosphorus. This suggests current climate models may be overly optimistic about the forest's ability to act as a carbon sink in the future.

Moreover, Gregório Mirabal (COICA), Simone Athayde (Florida International University / Amazon Dams Network), Eduardo Brondizio (Indiana University, University of

São Paulo), and Mariana Gómez (Latin America of the Global Solidarity Network), emphasised that reconnecting humanity with nature depends on recognizing the deep interdependence between ecological systems and socio-cultural processes expressed through ways of life, knowledge systems, governance practices, and territorial relations by grounding solutions in forest-based knowledge and practice.

Ilona Szabó (Igarapé Institute) highlighted that illicit economies—starting with the land market privatizing public forested land – ground environmental crimes, illegal mining, logging, wildlife trafficking, and other criminal networks are among the primary drivers of speculation, devastation, and severe environmental degradation in the Amazon, generating cascading social, ecological, and health impacts on local communities.



A tipping point is the point at which you can not come back. So we know that the window is closing in terms of preventing the damaging, irreversible tipping points in the Earth's system. We know we're acting 10 times too slowly at decarbonizing the economy. We need to do some spectacular acceleration. We need that change to become self-compelling and accelerate. To get to a positive tipping point, it's all about a shift in the balance of feedback within a system. There are lots of crucial amplifiers that can create self-propelling change.

Tim Lenton, University of Exeter

1.3 INDIGENOUS KNOWLEDGE AS PLANETARY SCIENCE

A significant epistemological shift was presented in the scientific discourse at the Pavilion, as Indigenous Knowledge Systems (IKS) were incorporated not as supplementary "cultural heritage" or "folklore," but as sophisticated, rigorous science based on millennia of observation, hypothesis, and adaptation.

THE SCIENCE OF DOMESTICATION AND STEWARDSHIP: The sessions challenged the Western definition of "technology." Carlos Nobre and Indigenous leaders highlighted that the Amazon is not a wild accident of nature but a "cultivated garden," the result of over 14,000 years of Indigenous agroecological research.

- **Biotechnology:** Indigenous peoples were presented as the planet's original biotechnologists, having domesticated thousands of species (including cassava, potatoes, and cacao) through millennia of observation and genetic selection. This is not passive habitation; it is active, science-based ecosystem engineering.
- **Social technologies:** The panel on solutions showcased how Indigenous methods, such as the Pirarucu management system

(where fisherpeople count fish surfacing to breathe to determine sustainable quotas), as stated by Adalberto Val (INPA), are often more accurate, cost-effective, and scalable than Western digital monitoring systems.

MYTH AS METHODOLOGY:
The session featuring Piratá Waurá and the virtual reality experience Kamukuwaká demonstrated that indigenous "myths" are actually high-fidelity data storage systems. The story of Kamukuwaká, which encodes ancestral teachings on leadership, community balance, and ecological stewardship, is not a fairytale; it is a complex pedagogical framework for leadership, conflict resolution, and ecological resilience, transmitted orally with rigorous precision.

- **Critical insight:** The vandalism of the sacred Kamukuwaká cave was analysed not just as religious intolerance, but as an act of "epistemicide", the deliberate destruction of a knowledge archive, comparable to burning a library or deleting a climate database.

THE "XINGU SHIELD":
The dialogue between Indigenous masters and Western scientists provided irrefutable biophysical evidence of the efficacy of Indigenous land management. Research presented by Márcia Macedo (Woodwell Climate Research Center) revealed a 5°C temperature differential between the Xingu Indigenous Territory and the surrounding soy monocultures.

- **Implication:** This data demonstrated that Indigenous territories function as regional climate regulators ("air conditioners"). The indigenous "technology" of land management delivers measurable thermodynamic services that Western conservation models (often based on "fences and fines") cannot replicate.

REFRAMING "ADAPTATION":
A critique of the language of climate negotiations emerged. Indigenous leaders like Mariazinha Baré (Articulation of Indigenous Organisations and Peoples of Amazonas) argued that the concept of "Adaptation" is the language of capitalism, implying a negotiation with destruction. Indigenous science, conversely, focuses on "healing" and "restoring" the Earth.

- **The One Health connection:** Speakers argued that Western science fragments the world into silos (biology, sociology, economics), whereas Indigenous science is inherently systemic and relational. As Ayisha Saddiqa (Fossil Free University) noted, recognizing the river as a "relative" is not a metaphor; it is a legal and scientific framework that prevents the accumulation of pollutants, leading to elevated health risks in downstream communities.

EPISTEMIC JUSTICE:
Sessions demonstrated that Indigenous technologies (e.g., agroforestry, fire management, bio-indicators) offer the most effective, time-tested solutions for living within planetary boundaries. The equal valuing of Indigenous science alongside Western science is not a matter of "inclusion" or "diversity quotas." It is a prerequisite for accuracy. Without integrating the "software" of Indigenous knowledge with the "hardware" of satellite monitoring, our understanding of the planetary crisis remains profoundly incomplete.

1.4 THE HEALTH-CLIMATE NEXUS: A PUBLIC HEALTH EMERGENCY

The "One Health" framework was a dominant theme, linking ecosystem integrity directly to human survival. The Pavilion debunked the idea that health and environment are separate sectors.

THE VIRAL RESERVOIR: Sandra Hacon (Fiocruz) presented alarming data: the Amazon hosts the world's largest pool of unknown viruses. The combination of deforestation and high livestock density (Brazil has four heads of cattle per human) creates a perfect storm for zoonotic spillovers. The degradation of the biome is statistically linked to the rise in infectious diseases among Original Peoples.

- **The impact of extremes:** In Central Asia and the Amazon alike, extreme heat is reshaping public health. Data from UNFPA (United Nations Population Fund) showed strong correlations between heatwaves and maternal mortality/stillbirths, framing climate change as a crisis for reproductive health and rights.
- **Pollution and food:** The contamination of Amazonian rivers with mercury (from illegal mining) and microplastics has reached critical levels, with 90% of fish in some areas showing contamination. This creates a serious "toxicity trap" for riverine communities that rely on these protein sources.

> **We have always been scientists and diplomats and social justice people and lawyers and politicians, and the planet is demanding us to be polyvocal and understand how these things connect.**
>
> Tonika Sealy-Thompson, Ambassador from Barbados in Brazil

1.5 OCEAN AND CRYOSPHERE: THE SILENT GIANTS

Ocean discussions, led by initiatives such as FUTURO and High-Level Climate Champions, stressed that the ocean absorbs 90% of excess planetary heat.

BLACK OXYGEN: A groundbreaking discovery shared by Alex Turra (University of São Paulo) revealed that deep-sea nodules produce oxygen in the dark ("Dark Oxygen"). This finding transforms the risk assessment for deep-sea mining, suggesting that extracting these minerals could asphyxiate benthic ecosystems.

THE ICE-ALBEDO FEEDBACK: Sessions on the cryosphere emphasised that the loss of polar ice is not just a symptom of warming but a major driver of Earth's Energy Imbalance.

2 POLICY IMPLICATIONS

The scientific diagnosis demands a radical restructuring of our political, economic, and social institutions. The Pavilion's sessions made it clear that 20th-century governance cannot solve 21st-century planetary problems. Science must now inform the architecture of governance and finance for tackling the climate crisis.

1. FROM "NATURE-BASED SOLUTIONS" TO "NATURE-POSITIVE ECONOMIES"
2. TRANSFORMING FOOD SYSTEMS: THE BATTLE AGAINST MONOTONY
3. THE END OF "BUSINESS AS USUAL" ECONOMICS
4. GOVERNANCE FOR THE ANTHROPOCENE
5. JUSTICE AS A PREREQUISITE FOR RESILIENCE
6. PATHWAYS TO NET ZERO: ENERGY VS. LAND USE

2.1 FROM "NATURE-BASED SOLUTIONS" TO "NATURE-POSITIVE ECONOMIES"

The discussions moved beyond implementing isolated Nature-based Solutions (NbS) as "add-ons" to existing business models, toward a fundamental restructuring of economic systems into a "Nature-Positive Economy".

NATURE AS A MACRO-ECONOMIC ACTOR:
The launch of the Brazilian edition of Becoming Nature Positive (A Era da Natureza), organised by Arapyaú Institute, crystallised a conceptual shift, the consensus that nature can no longer be treated as an externality or a passive resource. Marco Lambertini (WWF) defined the "development paradox" of the 21st century: humanity achieved exponential growth by systematically dismantling its own biological foundations. The Pavilion's debates argued that this model is no longer viable.

- Former Minister Izabella Teixeira elevated this critique to the geopolitical stage, asserting that Nature has evolved into a decisive "political actor."
- In a world transitioning away from fossil fuels, countries holding critical natural assets (water, biodiversity, critical minerals) will define the new security and power dynamics, shifting the narrative from "energy security" to "nature security.".

OPERATIONALIZING THE TRANSITION:
The implication for economic planning is the urgent need to transition from an extractive economy to a socio-bioeconomy of standing forests. At the Pavilion, it was emphasised that developing economic, market, and technological knowledge is essential for building industrial policies that promote flexible industries and services—shifting away from mere raw material exports toward creating local value through technology and expertise.

- **Overcoming lack of statistics:** The Alpha Social Accounts System, developed at the Center for Advanced Amazonian Studies at UFPA and currently being improved by a network of Amazonian universities, was presented as being capable of modeling over long time series all the economic – production, employment, income, and market variables of the socio-biodiversity bioeconomy.

- **Bio-industrialization 4.0:** The discussion moved from theory to practice with the Amazonia 4.0 project. The concept of "Amazonian Creative Labs" (mobile bio-factories) demonstrates how Industry 4.0 technologies (genomics, digital traceability) can be merged with traditional knowledge. By processing cupuaçu and cacao within the forest, these units retain 400% more economic value locally than by selling raw beans, creating a distinct "Rainforest Business School" model.
- **Circular innovation:** The potential for a "molecular economy" was highlighted by cases such as InAmazon, which transforms industrial timber waste (sawdust) into high-value dermocosmetics, proving that the residue of a standing forest can be more valuable than its timber.
- **The scale gap:** However, a critical analysis revealed a disconnection between the "billions" announced in global climate funds (such as the TFFF) and the reality for local bio-entrepreneurs who struggle to access seed capital to develop these products.
- **Amazon Institute of Technology (AmIT):** As an additional strategic pathway, the Pavilion discussions underscored the importance of AmIT, conceived as a modular, scalable structure integrated into the sociocultural diversity of the Pan-Amazon. Its model combines physical research and training centers, digital platforms, and a transnational network designed to promote applied science, transformative education, and sustainable entrepreneurship across the region.

CRITICAL REFRAMING:
While the economic argument for "Nature Positive" is strong, Indigenous leaders provided a necessary ontological correction. Vanda Witoto challenged the technocratic view, arguing that for Indigenous peoples, being "Nature Positive" is not a new economic metric or a market mechanism, but an ancestral way of being, viewing humanity as "small people", cooperative and interdependent, rather than individualistic egos.

- **The bottom line:** This perspective dictates that the most effective economic policy for the Amazon is not just carbon pricing or bio-innovation, but the immediate demarcation of Indigenous territories, recognizing them as the foundational infrastructure that sustains the entire planetary biosphere.
- Without securing the land rights of these traditional custodians, the "Nature Positive" agenda risks becoming another form of commodification rather than a path to genuine planetary recovery.

2.2 TRANSFORMING FOOD SYSTEMS: THE BATTLE AGAINST MONOTONY

A significant portion of the Pavilion's agenda addressed the crisis in global food systems. The diagnosis was that our current agri-food system is breaching seven out of nine planetary boundaries. But the Pavillion also presented evidence-based alternatives that are already working at scale.

THE "MONOTONY" CRISIS: Sociologists and agronomists coined the term "Monotony" to describe the current industrial model, the monotony of crops (reliance on just six species), the monotony of the landscape (monocultures), and the monotony of diet (ultra-processed foods). This uniformity creates heightened vulnerability to climate shocks.

AGROECOLOGY AS RESILIENCE: In contrast, family-based agriculture was presented not as a "social safety net" but as the most scientifically resilient production model. For instance, data from hurricane impacts indicate that diverse agroecological farms suffer significantly less damage than industrial monocultures.

ANCESTRAL FUTURISM: The policy prescription is to move towards "ancestral futurism" in agriculture, combining cutting-edge science (such as participatory breeding of native species) with traditional collective land management to create multifunctional productive landscapes. Public procurement (e.g., school meals) must be used as a strategic lever to develop markets for socio-biodiversity products, breaking the lock-in of industrial food.

FROM MONOTONY TO DIVERSIFICATION:

- **The science of diversification:** Moving beyond the binary of "organic vs. conventional," research presented by the Better Planet Laboratory (University of Colorado Boulder) analysed 2,655 farms across 11 countries. The findings were conclusive: farms that adopt multiple diversification strategies (integrating livestock, water conservation, and non-crop vegetation) significantly outperform monocultures in both social well-being and environmental services.
- **The CAMTA model:** The Japanese-Brazilian cooperative in Tomé-Açu (CAMTA) was highlighted as a living laboratory of Successional Agroforestry Systems (SAFs). By mimicking the forest's natural regeneration cycles while producing high-value crops such as cacao, pepper, and cupuaçu, this model demonstrates that agriculture can be a vector for reforestation, turning the "Arc of Deforestation" into an "Arc of Restoration."
- **Soil as a solution:** The "4 per 1000" Initiative was discussed as a critical policy lever. Scientific models show that increasing soil organic carbon by just 0.4% per year could halt the annual increase in atmospheric CO_2, turning agriculture from a climate villain into a primary hero.

2.3 THE END OF "BUSINESS AS USUAL" ECONOMICS

Economists and policy experts dismantled the prevailing dogmas of fiscal austerity and market neutrality. The "Wall Street Consensus," the idea that the state's role is merely to de-risk private capital, was heavily criticised for failing the Global South.

THE DEBT TRAP:
Penelope Hawkins (UNCTAD) provided a stark reality check: the Global South is currently a net exporter of capital to the North, paying out over $430 billion annually in debt service, more than it receives in aid or investment. This "Silent Debt Crisis" forces countries to exploit natural resources just to remain solvent.

THE CHALLENGES OF BLENDED FINANCE:
Speakers like Gary Dymski argued that reliance on private capital to fund public goods (like adaptation) has failed because mega-banks prioritise scale and profit over problem-solving.

THE LIMITS OF AUTONOMOUS GOVERNANCE:
Similarly, the reliance on the autonomous governance of global agricultural commodity value chains was questioned by Edna Castro and Nirvea Ravena (NAEA-UFPA).

- The policy implication is the need for robust Public Banks and National Development Banks (such as BNDES) and other related state entities to reclaim their role as direct investors and planners, leading with mission-oriented finance that prioritises long-term ecological resilience over short-term profit.

FROM GROWTH TO WELL-BEING:
The Earth4All model presented scenarios showing that social equality is a prerequisite for planetary stability. Policies must shift from GDP growth to indicators of well-being, incorporating the value of nature not as an externality, but as the foundation of the economy.

2.4 GOVERNANCE FOR THE ANTHROPOCENE

Current governance structures were identified as inadequate for the speed and scale of the crisis. The Pavilion highlighted the "governance gap" where global agreements (like the Paris Agreement) fail to translate into local implementation due to silos between ministries (environment vs. agriculture vs. energy) and a lack of state capacity.

POLYCENTRIC GOVERNANCE: The solution lies in polycentric governance, a system of interconnected decision-making centers that operate at multiple scales. Effective climate action requires empowering subnational governments (cities and states) and creating transboundary mechanisms across biomes.

TRANSNATIONAL MANAGEMENT: Ecosystems do not respect borders. The Pavilion called for strengthening bodies such as the OTCA (Amazon Cooperation Treaty Organization) to manage biomes like the Amazon and with potential application to other regions, such as the Congo Basin, as integrated systems, rather than as fragmented national territories.

BREAKING THE SILOS: "Siloed" funding must end. Climate finance can no longer be separated from development finance; it must simultaneously address biodiversity, water security, and social equity.

2.5 JUSTICE AS A PREREQUISITE FOR RESILIENCE

Data presented on "systemic risk" and "social tipping points" proved that inequality is a driver of climate instability. Resilience cannot be built on poverty, and the most vulnerable populations are often invisible to official policy metrics.

ANTICIPATORY ACTION: Humanitarian policy must shift from "response" to "anticipation." Providing cash transfers before a climate shock hits (based on forecasts) is scientifically proven to be more dignified and cost-effective than post-disaster relief. Policies must be designed to "conflict-sensitive," recognizing that resource scarcity drives violence (e.g., farmer-herder conflicts).

LAND TENURE AS CLIMATE POLICY: The data is irrefutable: Protected Areas and Indigenous Territories are the most effective barriers against deforestation and degradation. Therefore, ensuring land tenure security for Indigenous Peoples and effective public control over forested land, also those illegally taken under private control in big plots, are not just human rights and social equity issues; they are also scientifically proven to be the most cost-effective climate mitigation policy available.

2.6 PATHWAYS TO NET ZERO: ENERGY VS. LAND USE

The launch of the Brazil Net-Zero 2040, a study coordinated by Prof. Dr. Carlos Nobre and Instituto Amazonia 4.0, provided a concrete policy roadmap that applies globally, providing connection between technological optimism and ecological realism.

THE POSSIBLE PATHWAYS: The study explores two distinct pathways: a "High-Tech/Energy" pathway, characterised by higher costs and reliance on full energy-sector neutrality, achieved through electrification, renewable energy deployment and still-unproven carbon capture technologies; and a "Nature-Based/AFOLU-centered" pathway which represents a more balanced and cost-effective scenario grounded in achieving neutrality through zero deforestation by 2030, reforestation acting as a major carbon sink, and regenerative agriculture in degraded lands.

THE POLICY VERDICT: The nature-based pathway costs only 1% more than current baselines, whereas the tech-heavy path costs approximately 20% more. The implication for policymakers is clear: Zero Deforestation by 2030 is not just an environmental goal; it is also the most fiscally responsible economic strategy.

INDUSTRIAL REALIGNMENT: For Europe and the Global North, the implication is a redesign of industrial strategy. Instead of subsidizing uncompetitive heavy industry domestically, Europe should import climate-aligned "green commodities" (like green iron and ammonia) produced in the renewable-rich Global South, fostering a true partnership rather than neocolonial resource extraction model.

3 CALL TO ACTION ALONGSIDE “COP30 MUTIRÃO”

The Brazilian concept of “Mutirão”, collective, communal mobilization towards a common goal, guided the Pavilion’s political positioning. The Scientific Committee issued a series of critical statements throughout the two weeks, establishing a new precedent for scientific advocacy during negotiations.

1. ENFORCE A BINDING ROADMAP FOR THE TOTAL PHASE-OUT OF FOSSIL FUELS
2. GO BEYOND ZERO DEFORESTATION TO IMPLEMENT MASSIVE ECOLOGICAL RESTORATION
3. SECURE LAND RIGHTS AND INTEGRATE INDIGENOUS KNOWLEDGE INTO DECISION-MAKING
4. RESTRUCTURE CLIMATE FINANCE TO BE PREDICTABLE, GRANT-BASED, AND EQUITABLE
5. INSTITUTIONALIZE INTERGENERATIONAL JUSTICE
6. SCALE EVIDENCE-BASED PLANETARY SOLUTIONS AND LEGAL FRAMEWORKS

3.1 ENFORCE A BINDING ROADMAP FOR THE TOTAL PHASE-OUT OF FOSSIL FUELS

Throughout the two weeks, the Pavilion's Scientific Committee acted as a real-time scientific "fact-checking" mechanism for the negotiations. When draft texts circulated that omitted the explicit phase-out of fossil fuels or softened language around "unabated" emissions, the Pavilion's response was swift and unequivocal.

THE VERDICT ON "TECHNOLOGICAL NEUTRALITY": Scientists debunked the narrative that technology alone (such as Carbon Capture and Storage, CCS) allows the continued use of fossil fuels. The call to action was precise: There is no 1.5°C pathway compatible with new oil, gas, or coal expansion. The remaining carbon budget (~130 Gt CO_2) is a physical limit, not a political one.

THE "BETRAYAL" STATEMENT: In a historic intervention, the Scientific Committee declared that any final agreement failing to include the words "fossil fuel phase-out" would constitute a "betrayal of science and of vulnerable populations." The demand was for a binding roadmap to reach absolute zero emissions in developed nations by 2040-2045, supported by the removal of subsidies that continue to distort the global economy.

3.2 GO BEYOND ZERO DEFORESTATION TO IMPLEMENT MASSIVE ECOLOGICAL RESTORATION

The Pavilion shifted the goalposts from "conservation" to "regeneration." The consensus was that the Amazon and other critical biomes are too close to their tipping points to survive with merely "reduced" deforestation.

Furthermore, conservation is no longer sufficient; massive ecological restoration (on the scale of millions of hectares) is urgently required to restore the biosphere's carbon sink function.

THE VERDICT ON "TECHNOLOGICAL NEUTRALITY": THE ZERO DEFORESTATION ROADMAP: Leaders called for a global pact to end illegal deforestation and degradation by 2030, enforced not just by pledges but by rigorous, satellite-based traceability systems (like Brazilian PRODES/DETER and Trase).

THE RESTORATION IMPERATIVE: The call to action demanded a "Marshall Plan for Nature": a massive investment in biodiversity protection and ecological restoration of degraded lands (e.g., the Amazonian Arc of Restoration's 24 million hectares target). This must be financed not as charity but as essential planetary infrastructure, using mechanisms such as the Tropical Forest Finance Facility (TFFF).

3.3 SECURE LAND RIGHTS AND INTEGRATE INDIGENOUS KNOWLEDGE INTO DECISION-MAKING

The Pavilion amplified the voices of Indigenous leaders, who hold the most sophisticated indigenous and traditional knowledge systems and socio-ecological technologies for planetary management. The call to action went beyond consultation to demand genuine power sharing and closer integration between scientific research, public policy, and ancestral knowledge frameworks.

DEMARCATION IS MITIGATION: Scientific data proved that Indigenous Territories are the most effective barriers against climate collapse. Therefore, the immediate demarcation of all ancestral lands was presented as a top-tier climate mitigation policy, superior in cost-effectiveness to many technological solutions.

ONTOLOGICAL SHIFT: Leaders like Vanda Witoto and Davi Kopenawa issued a call for humanity to abandon the "Ego" of the Anthropocene and adopt the humility of the "Ant People", recognizing that our survival depends on cooperation with non-human beings. The call was to integrate Indigenous Science into the heart of NDCs (Nationally Determined Contributions) and National Adaptation Plans alongside the knowledge, lived experiences, and environmental stewardship of Afrodescendant communities and urban peripheral populations, whose territories also endure climate injustices and offer essential socio-ecological insights for resilience.

3.4 RESTRUCTURE CLIMATE FINANCE TO BE PREDICTABLE, GRANT-BASED, AND EQUITABLE

Aligning with the Presidency's vision of a "COP of Truth," the Pavilion's final call to action urged negotiators to stop hiding behind ambiguous language. The scientific reality of the Carbon Budget is unforgiving, and its consequences are irreversible.

The call was for a binding roadmap that integrates the protection of the Three Tropical Basins (Amazon, Congo, Borneo-Mekong), the rights of Indigenous Peoples and Afrodescendant Peoples, and the decarbonization of the global economy into a single, enforceable planetary survival plan.

STRUCTURAL REFORM:
The call was to stop the net outflow of capital from the Global South to the North. Scientists and economists demanded that climate finance be grant-based and predictable, rather than loan-based, to prevent vulnerable nations from being trapped in debt, especially at the very moment when they are called upon to safeguard global climate stability.

VALUING THE STANDING FOREST:
The "Mutirão" called for the implementation of a Socio-Bioeconomy that pays for the services nature provides. This means regulating markets to ensure that value is added locally (e.g., bio-factories in the forest) and that the guardians of biodiversity are directly compensated.

"Climate finance will only be effective if it reaches the table based on transparent and equitable sharing of benefits. Declarations of support without real commitment only deepen the problem. To address this challenge, the common good, as a guiding framework, needs to be structured around five key principles: directionality, co-production, knowledge sharing, resource sharing, and transparency.

Mariana Mazzucato,
University College London

3.5 INSTITUTIONALIZE INTERGENERATIONAL JUSTICE

Finally, the Pavilion echoed the demand from youth leaders and educators that Climate Education must be integrated into Nationally Determined Contributions (NDCs).

CIVIC IMMUNITY:
Education was framed as "civic immunity" against disinformation. Without a populace literate in planetary boundaries, democratic mandates for difficult transitions will be impossible to secure.

THE YOUTH MANDATE:
Youth leaders rejected their portrayal as "victims" or "future leaders," asserting themselves as active, present-day agents of change. The call was for formal inclusion of youth in governance structures, not just as observers, but as designers of the policies they will inherit.

3.6 SCALE EVIDENCE-BASED PLANETARY SOLUTIONS AND LEGAL FRAMEWORKS

The Call to Action was not just about stopping the bad (fossil fuels/deforestation), but aggressively scaling the good. The Pavilion showcased a portfolio of "Planetary Solutions", with evidence-based technologies that are ready for massive deployment:

CLEANING THE PLANET'S VEINS:
Initiatives like The Ocean Cleanup were cited as examples of how technology can address legacy pollution. By deploying systems to harvest plastic from the Great Pacific Garbage Patch and intercepting it in rivers (like the Interceptor 001 in Indonesia), these projects demonstrate that human engineering can reverse planetary contamination.

NATURE AS INFRASTRUCTURE:
The call included the immediate scaling of Nature-based Solutions (NbS) for urban resilience. Examples such as the "Sponge Cities" in China or the Floating Wetlands used to treat polluted water were presented not as experimental pilots but as essential municipal infrastructure that development banks must finance.

LEGAL INNOVATION:
The "Mutirão" endorsed the expansion of legal frameworks like the Rights of Nature. Following precedents in New Zealand (Whanganui River) and Ecuador, giving legal personhood to biomes is seen as a necessary "software upgrade" for our judicial systems to cope with the Anthropocene.

CONCLUSION: THE WINDOW IS CLOSING, BUT IT IS STILL OPEN

The final message from the Pavilion was one of **radical realism**. The window to secure a liveable future is rapidly closing, likely within the next five years. However, the diverse coalition gathered in Belém, spanning Nobel laureates, Indigenous shamans, youth activists, and finance ministers, demonstrated that we possess every tool necessary to turn the tide.

The "COP30 Mutirão" was a call to operationalize these tools immediately. It declared that the time for "negotiating" with the laws of physics is over. The only viable path forward is a synchronised, science-based, and socially just transformation of the global system.

Over 10 days, the Pavilion became a space for high-level scientific encounters and discussions, and generated insights that should be at the core of any climate response. As a way of bridging civil society, academia, policymakers, and other social actors, the Pavilion stood as a "light in the dark" - not with all the answers we seek as humanity, but with a critical and sensitive spirit that underscores that we must act now.

ULTIMATELY, THE LESSONS FROM BELÉM POINT TO A MORE PROFOUND TRANSFORMATION: HUMANITY MUST SHIFT FROM AN ANTHROPOCENTRIC WORLDVIEW, WHERE NATURE IS TREATED AS A BACKDROP TO HUMAN ACTIVITY, TOWARD AN ECOCENTRIC PARADIGM THAT RECOGNIZES THE EARTH AS A LIVING SYSTEM TO WHICH WE BELONG AND FOR WHICH WE ARE RESPONSIBLE. ONLY BY EMBRACING THIS RELATIONAL ETHIC CAN WE SECURE A FUTURE THAT IS BOTH JUST AND SUSTAINABLE.

ANNEXES

PLANETARY SCIENCE PAVILION