

THE THREE BASINS, ONE LIFELINE

AMAZON | CONGO | SOUTHEAST ASIA



Planetary[®]
Guardians

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OPENING LETTER

Global economic wellbeing is dependent on nature's life-giving resources and the stewardship of Indigenous Peoples, yet they are glaringly missing from our current economic model.

This report comes at a time when we are unveiling a new 2025 Planetary Health Check which clearly shows that seven out of nine Planetary Boundaries have now been breached. We are nearing a high risk red line that if crossed, could cause irreversible and catastrophic damage to life as we know it.

It is not alarmist to say that our very survival depends on humanity collectively investing in the Three Basins, a lifeline for all of us. The world needs to step up to invest US\$125 billion into the Tropical Forest Forever Fund (TFFF) to secure a future for generations to come. Without this critical investment, our water and food systems will collapse, and the world will continue to get wetter, hotter, and more dangerous, causing immense suffering.

We have asked Systemiq to write this report to share with nations, multilaterals, regional development banks, pension funds, and others who have an opportunity (and a responsibility) to protect their own economic wellbeing and to stop a global economic collapse.

As Planetary Guardians we believe that by valuing a living nature, and staying within Planetary Boundaries, we will create a far better future than the one we are currently headed towards. We also understand that we cannot change the embedded economic model overnight and that right now, unfortunately, there is no value being given to nature; it is simply being extracted and destroyed. Some of the language used in this report is not necessarily the language we would use; it is that of the existing economic model, with the hope that it will resonate with the finance community so you can see the importance of the Three Basins to your own nation, companies, and ultimately your own families.

The good news is that if we invest in solutions that exist in harmony with nature, we are running towards a world that is a healthier, safer, and more wondrous world than our current trajectory.

Thanks for taking the time to read this and to take action. We stand by ready to support however we can.

With gratitude,

The Planetary Guardians

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CALL TO ACTION

The Amazon, Congo and Southeast Asia rainforest basins, the “Three Basins”, provide essential economic, social and security services indispensable to the rainforest countries themselves and the global economy. The Three Basins hold 80% of the remaining rainforest and two thirds of terrestrial global biodiversity. They are critical for the world to stay within Planetary Boundaries. Indigenous Peoples and local communities play a leading role, inhabiting the Three Basins in close harmony with living nature.

However, the Three Basins are being degraded rapidly and nearing irreversible tipping points. Of the original 14.5 million km² of tropical rainforest, only 36% remains intact, and 34% has been lost entirely. The majority of deforestation is driven by large-scale agricultural expansion for seven globally traded commodities: palm oil, soy, cattle, wood fibre, cocoa, coffee, and rubber. These are not local effects but the result of global supply chains and consumptions patterns around the world that contribute to the erosion of the Three Basins. The profits of these supply chains are mostly captured by international corporations instead of local stakeholders.

The Three Basin rainforests are central to the stability and functioning of national and global economies. Their degradation will wreak havoc on weather systems, undermining productivity, driving up the cost of living, and destabilising macroeconomic, financial and social systems worldwide. This will fuel increases in food prices, job losses, energy insecurity, weaker trade, declining public health, reduced infrastructure resilience, and lower sovereign credit. These effects will play out on a global scale, not just locally. The resilience of the Three Basins is not simply an environmental priority; it is a macroeconomic imperative, and an imperative for humanity to thrive.

The Planetary Boundaries Science (PBS) gives finance ministers and other leaders a critical framework to better understand a whole planet approach, which is the only way we will protect the Three Basins, and have a shot at reaching global climate targets. The Planetary Boundaries framework is a compass that allows you to 1) measure where you currently are across nine Planetary Boundaries, 2) prioritise solutions and actions to protect the security of your nation, company, etc., 3) collaborate across ministries and with other partners, and 4) track your progression.

Protecting the Three Basins is urgent, no matter where you are in the world:

Nature underpins the global economy: around 55% of GDP depends on ecosystem services. Biodiversity loss and ecosystem degradation could trigger shocks costing upwards of US\$5 trillion. The Three Basins' biomes are indispensable infrastructure for the economies within and around the rainforests, and for the global economy at large. We must start to value living nature: research shows that nature-based solutions (NBS), primarily forest conservation and restoration, can deliver about 37% of cost-effective climate mitigation needed by 2030.²

Over 50% of global food production and up to 8% of global GDP is at risk by 2050 without urgent protection of the freshwater systems within the Three Basins, severely threatening food security and affordability globally, with economic losses exceeding US\$1 trillion annually due to crop failure and other shortages.³ Tropical commodities such as coffee, cacao and others are heavily dependent on rainforest landscapes, with price volatility exceeding 100%, due to abnormal rainfall.⁴

Hundreds of millions could become climate migrants by 2050, including 86 million in sub-Saharan Africa, 49 million in East Asia and the Pacific and 17 million in Latin America. While climate migration is shaped by many factors – from sea-level rise to desertification – the destabilisation of rainfall, food systems and livelihoods linked to the Three Basins will be a contributor. Their degradation will intensify existing pressures, accelerating displacement within and across borders, with direct fiscal, social and geopolitical consequences.⁵

The impact of global heat-stress productivity is estimated at US\$2.4 trillion and up to 5% of the euro area GDP is at risk due to climate change by 2030. The ECB and Bank of England warn about threat to European financial stability and inflationary risks. The Amazon alone stores five times global annual emissions and halting rainforest deforestation is indispensable to slowing climate change.⁶ Avoided deforestation provides over 40% of low-cost abatement potential at US\$20–50 per tCO₂, making it 7–10 times cheaper than reforestation (US\$20–100 per tCO₂).

The Three Basins drive weather patterns globally, and extreme weather across the Global North will become more frequent as rainforest deforestation continues. Emerging science shows Amazon and Congo deforestation disrupts rainfall as far as North America and Europe, raising risks for agriculture and hydropower.⁷ For example, deforestation in the Amazon can reduce rainfall along the Northwest coast of the US by 20% and 50% in the Sierra Nevada snowpack (a key water source for Californian farms and cities).⁸

Tropical deforestation is causing 28,000 heat related deaths per year, with mortality rates the highest in Southeast Asia (8–11 deaths for every 100,000 people living in deforested areas), followed by tropical regions of Africa and the Americas.⁹

Extreme weather events, biodiversity loss and ecosystem collapse, and critical change to Earth systems are now seen as the first, second and third most material 10-year risks according to the WEF Global Risk Report, demonstrating growing concern across business, policymakers, civil society and academic leaders alike about the economic damages caused by environmental upheaval in the Three Basins.¹⁰

The failure to account for these relationships is a blind spot in how we plan for growth, manage public budgets, and evaluate investment risk. But resolute action to protect the Three Basins is possible and would bring vastly better economic, social and weather outcomes around the world. There is a key role for finance ministers and other economic and financial decision-makers to play.

Finance ministers around the world have a responsibility to invest in the protection of the Three Basins as macroeconomic infrastructure for the global economy. No country or economy can do without them, and it is in the interest of every country to act resolutely.

Invest in the Three Basins. Earmark explicit, multi-year resources for contributions to the dedicated investment vehicles to protect the Three Basins. Modest relative to donor country national budgets, these contributions can unlock large-scale concessional and blended finance, multiplying their impact many times over. Crucially, this does not all have to be new money; a share can come from redirecting harmful subsidies that today undermine forests and ecosystems.

→ **Tropical Forest Forever Facility** (see Box): Earmark explicit, multi-year resources, starting with contributions to the Tropical Forest Finance Facility (TFFF) ahead of COP30 towards their goal of raising US\$125 billion. Current funding for forest protection is only US\$2–3 billion annually. Expecting this gap to be filled solely by concessional flows, philanthropy, or voluntary carbon markets is unrealistic.

Lower the cost of capital for Three Basin countries to enable public investments at lower cost in natural capital through guarantees and blended finance.

→ **Climate-aligned sovereign support.** Pilot nature-conditional Special Drawing Rights or green credit enhancement facilities through the IMF and other MDBs with donor support to improve rainforest countries' borrowing terms when they meet conservation milestones.

Trade and market access. Introduce preferential access and procurement for deforestation-free goods and harmonise deforestation rules for business with supportive financing for rainforest economies to comply.

→ **Deforestation regulation.** Strengthen regulation to make deforestation-free production a prerequisite to improve access to global markets, effectively pricing forest integrity into global supply chains.

Put rainforests on the balance sheet so companies pay for extracting from and damaging nature. Treat the Three Basins as macroeconomic infrastructure by embedding their value into national accounts, fiscal frameworks, and debt analyses. This means that the economic contribution of living forests – and the costs of their loss – are visible in budgets, trade policy, and investment decisions.

→ **Trade-based nature accounts.** Implement measurement of “imported” natural degradation and deforestation to quantify how national production and consumption patterns contribute to the erosion of the Three Basins.

The finance ministers of the Three Basins can take the lead and initiate urgent and resolute action to value their rainforests as living nature and indispensable infrastructure for their economies. This way they can recognise their true economic contribution and integrate rainforests in all major economic decisions, including:

Budgets: Assess all public spending and investment for its impact on rainforest health. Establish ring-fenced budget lines dedicated to forest protection and restoration. Ensure each public spending decision is evaluated by its impact on the rainforest.

→ **Harmful subsidies:** Assess where current subsidies provide incentives towards extractive practices or disincentives to value living nature. Recalibrate subsidies to meet social objectives at lower cost to nature.

Investments: Channel domestic and international resources into projects that markets will not fund such as conserving intact primary forests or protecting community-managed areas. Link debt-raising to investments in rainforests with green bonds and debt-for-nature swaps.

→ **Rainforest funds.** Establish or scale national funds with green mandates that invest international resources (e.g. from the TFFF), natural resource rents, and other resource streams into long-term regenerative practices. Ensure direct benefit-sharing with Indigenous Peoples and local communities for legitimacy and impact. Such funds can contribute towards the fiscal buffers against climate-related shocks (crop failures, floods) that explicitly incorporate rainforest degradation risks. These could be supported by international institutions as part of macro-prudential stability frameworks.

Policies: Review subsidies, regulations, and licensing frameworks to ensure they reinforce, rather than undermine, forest stability. Where necessary, adjust to create the right incentives for conservation and regenerative development.

→ **Tackle illegality.** Calibrate policies carefully against unintended consequences, particularly in the informal and illegal economy. Illegal farming and mining are the major driver of deforestation and policies should be evaluated against unintended effects. International supply chains amplify these pressures, which means solutions require joint action – finance ministers can partner with trade and regulatory counterparts to strengthen traceability and ensure corporations share responsibility for deforestation-free imports.

Value living nature: Recognise and value the rainforests as living nature, integral to sustainable economic outcomes in the long term and learn from Indigenous Peoples and local communities whose economic practices lead to sustainable and inclusive outcomes.

→ **Rainforests on the balance sheet.** Embed the value of the Three Basins into national accounts and fiscal frameworks – including GDP, budgets, and debt sustainability analysis – so that the risks of degradation and the benefits of protection are visible in economic decision-making.

Respect GATC five demands: The Global Alliance of Territorial Communities pursue five demands to allow them to safeguard nature. Next to direct financing, these include land rights; free, prior and informed consent; protection of life; and traditional knowledge.

→ **Direct financing:** the GATC demands adequate, direct and accessible financing to be made available to invest in their territories to combat climate change, desertification, and biodiversity loss for the whole of humanity.

Finance ministers around the world must collaborate to protect the Three Basins through collective action. The responsibilities towards Three Basins go beyond individual countries as they bring collective and indispensable benefits to the global economy. This value flows across borders, and responsibility for their protection must be shared.

The Coalition of Finance Ministers for Climate Action: Install a dedicated agenda on the Three Basins, mobilising programmes such as the TFFF and beyond. Use group leverage to align incentives and pool resources to drive collective action.

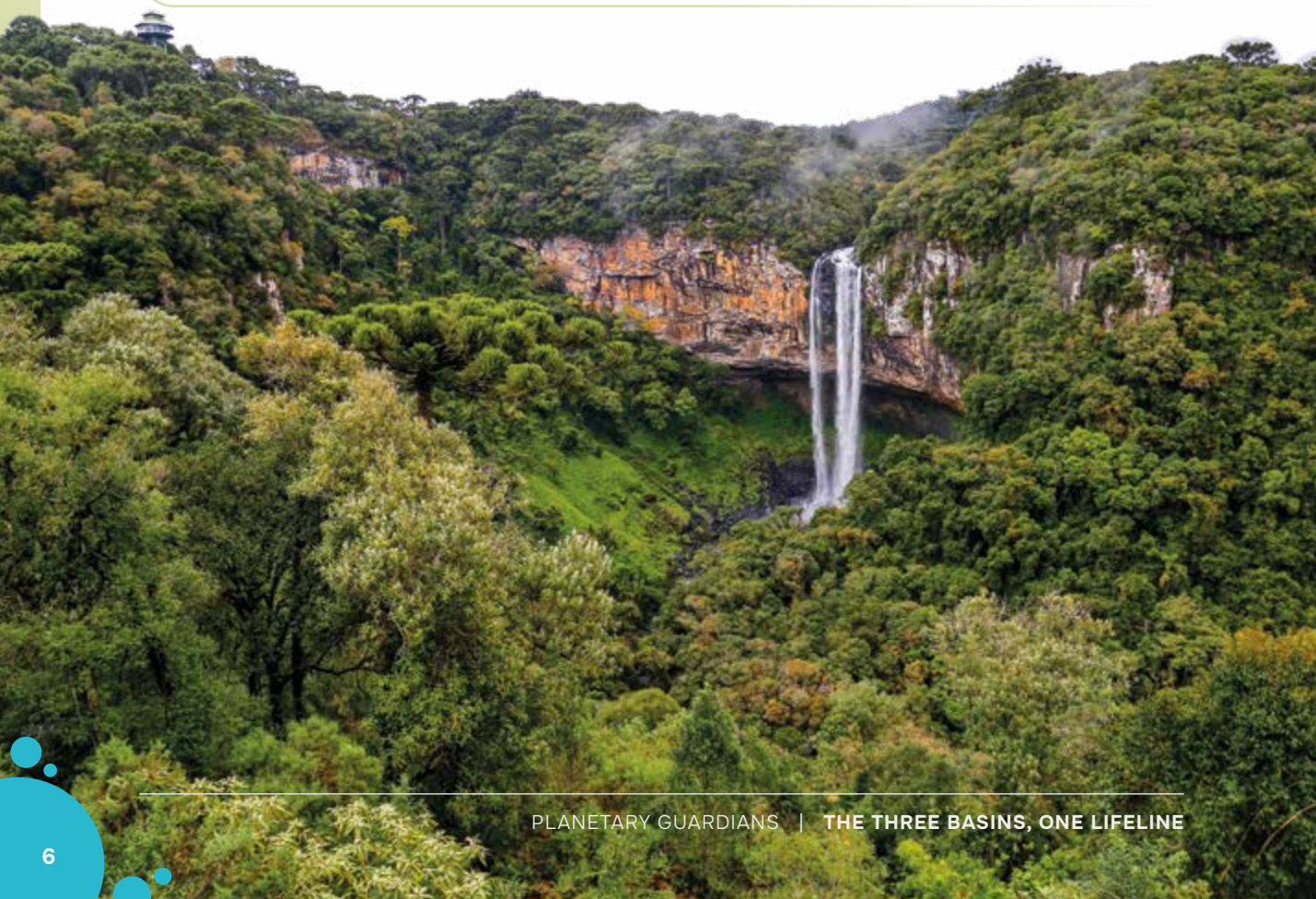
→ **Planetary Boundaries.** Leverage the Planetary Boundaries as a scientifically robust measurement and operating framework to mobilise international cooperation around the Three Basins to pursue opportunities and minimise risks. The UN Science panels on the Three Basins can help inform policymakers on the latest knowledge.

Reinforce bilateral and regional partnerships. Deepen ties with rainforest economies by backing national strategies, co-investing in high-integrity projects, and designing cross-border initiatives that reflect shared ecological systems.

→ **Bilateral bioeconomy deals.** Co-invest together with trade partners in bioeconomy sectors (e.g. sustainable food systems, pharmaceuticals) that diversify rainforest-country exports and reduce dependence on extractive commodities.

Global engagement. Work with international peers to strengthen the economic case for basin protection and advance regulatory reforms that create stronger market signals for sustainable investment.

→ **Macroeconomic diplomacy.** Embed Planetary Boundaries and the Three Basins into the Security Council, G20, IMF Article IV consultations, and EU budgetary dialogues so ministers view rainforest protection as a fiscal stability issue, not just an environmental one.



Tropical Forest Forever Facility (TFFF)

TFFF provides long-term, permanent, results-based forest finance that rewards tropical forest countries for conserving and restoring their tropical and subtropical moist broadleaf forests, without relying on volatile carbon markets or grants. Launching at COP30 in Belém, it aims to deliver US\$4 billion annually in predictable payments, funded by sovereigns and institutional investors. The facility complements existing programmes and guarantees that at least 20% of funds go directly to Indigenous Peoples and local communities.

How It Works

The TFFF operates through a dual-arm structure:

1. **Tropical Forest Investment Fund (TFIF)** raises capital from sovereign governments, sovereign wealth funds, development finance institutions, and institutional bond markets. Funds are invested in low-cost, long-dated instruments, such as emerging market sovereign debt and global public equities, while excluding activities on the Fund's exclusion list, such as oil and gas.
2. **Tropical Forest Facility ("The Facility")** sets eligibility criteria, verifies performance using national or third-party satellite-based monitoring, and coordinates payments to participating countries.

Profits generated above funding costs are channelled into results-based payments to eligible tropical forest countries. Payments are typically structured at around US\$4 per year per hectare of tropical forest, with significant penalties (up to US\$800 per hectare) for deforestation and forest degradation.

Eligibility

Countries must:

- Be low- or middle-income (per World Bank IBRD thresholds) and host **tropical or subtropical moist broadleaf forests**.
- Maintain annual deforestation rates below 0.5% and on a decreasing trend.
- Use transparent, reliable forest monitoring systems.
- Commit to public financial transparency and direct at least **20% of disbursed funds to IPLCs**.

Why It Matters

With a target capitalisation of US\$125 billion on a 10-year grace period and a 30-year repayment horizon, the TFFF is designed as a long-term, potentially evergreen facility. By blending public and private-sector investment, it offers a steady, depoliticised financial flow for forest protection, insulated from carbon market volatility.

Sources: TFFF.earth: Concept Note, WWF: A breakthrough for forest finance: how the TFFF can deliver on its potential

1. THE THREE BASINS PROVIDE ESSENTIAL SERVICES TO THE WORLD

The Amazon, Congo, and Southeast Asia rainforest basins are more than ecological marvels and biodiversity reserves. Together, these regions function as the planet's "biophysical engine room", providing essential ecosystem services for both local development and global ecological, geopolitical and socio-economic stability. They are essential to keep us within safe operating thresholds for people and planet to thrive – the Planetary Boundaries, seven of which have already been transgressed. For example, the Three Basins play a key role in:



Climate change: The Three Basins store 300 gigatonnes (Gt) of carbon dioxide. This is equivalent to 5 years of today's emissions and is an essential buffer to limiting runaway climate change.



Land system change: 80% of remaining rainforests are located within the Three Basins, but deforestation, mangrove and peatland degradation continue apace.



Biosphere integrity: The Three Basins contain two-thirds of terrestrial biodiversity, essential for agricultural productivity, pharmaceutical innovation and pandemic/pest prevention.

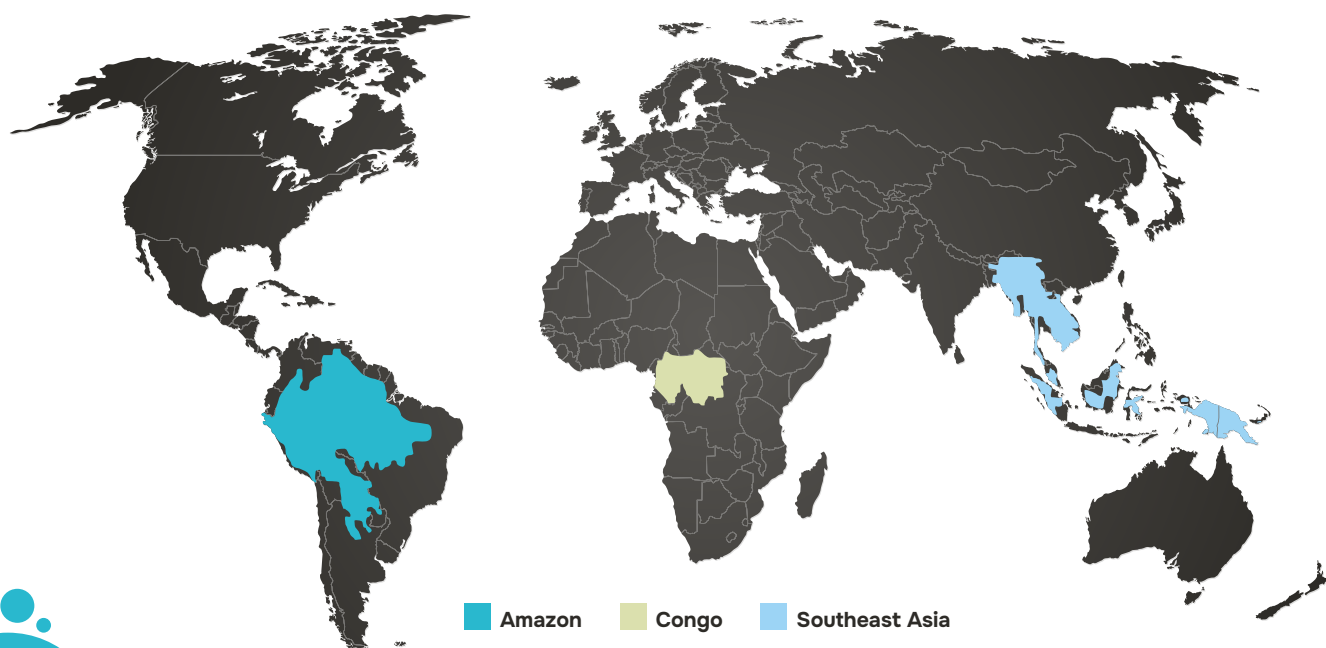


Freshwater change: The freshwater recirculation systems of the Three Basins determine atmospheric patterns around the world, linking extreme weather events in Europe with degradation of the rainforest in the Congo and Amazon basins.



Novel entities: The Three Basins are abundant in critical raw materials, but the extraction processes of mining are introducing pollutants into air, water and soil at unprecedented scale.

Figure 1: Map of the Three Basins



The Planetary Boundaries: Our Safe Operating Space



Planetary Health Check 2025



The Planetary Boundaries define the safe operating space for humanity by setting limits on the key Earth systems that keep our planet stable. Crossing them risks pushing the Earth into conditions far less hospitable to human societies and economies.

Science shows that nine Earth system processes have been essential for maintaining stable ecological conditions, and our economies, of the past 12,000 years. When these systems are pushed beyond critical thresholds, their ability to regulate the planet is weakened, triggering feedback loops that can cause abrupt, irreversible changes.

Today, seven of the nine boundaries have already been breached (Planetary Health Check 2025). The Three Basins are central to several of these boundaries, helping regulate rainfall, store carbon, protect biodiversity, and maintain healthy land and oceans. Ongoing degradation in these regions is accelerating breaches, with direct consequences for food security, water availability, and economic stability. **Protecting these Earth system processes is vital for safeguarding the global economy. It is a precondition for a stable, liveable planet for future generations.**

The Planetary Boundaries framework is an essential tool for finance ministers to 1) measure and track impacts to each of the boundaries, 2) to allocate budget to high leverage actions, 3) to proactively manage extreme weather and other emergencies, 4) to create policies, incentives, and partnerships that protect our natural wealth, 5) to create integrated strategies across ministries to better address health issues, like extreme heat and pollution, and 6) to safeguard against security risks. For all decision-makers, it also gives a lens into the importance of the Three Basins and how they can be elevated in your budgets, policies, and multilateral agreements. The TFFF and other tools serve as vehicles to make critical investments in the Three Basins, and our future.

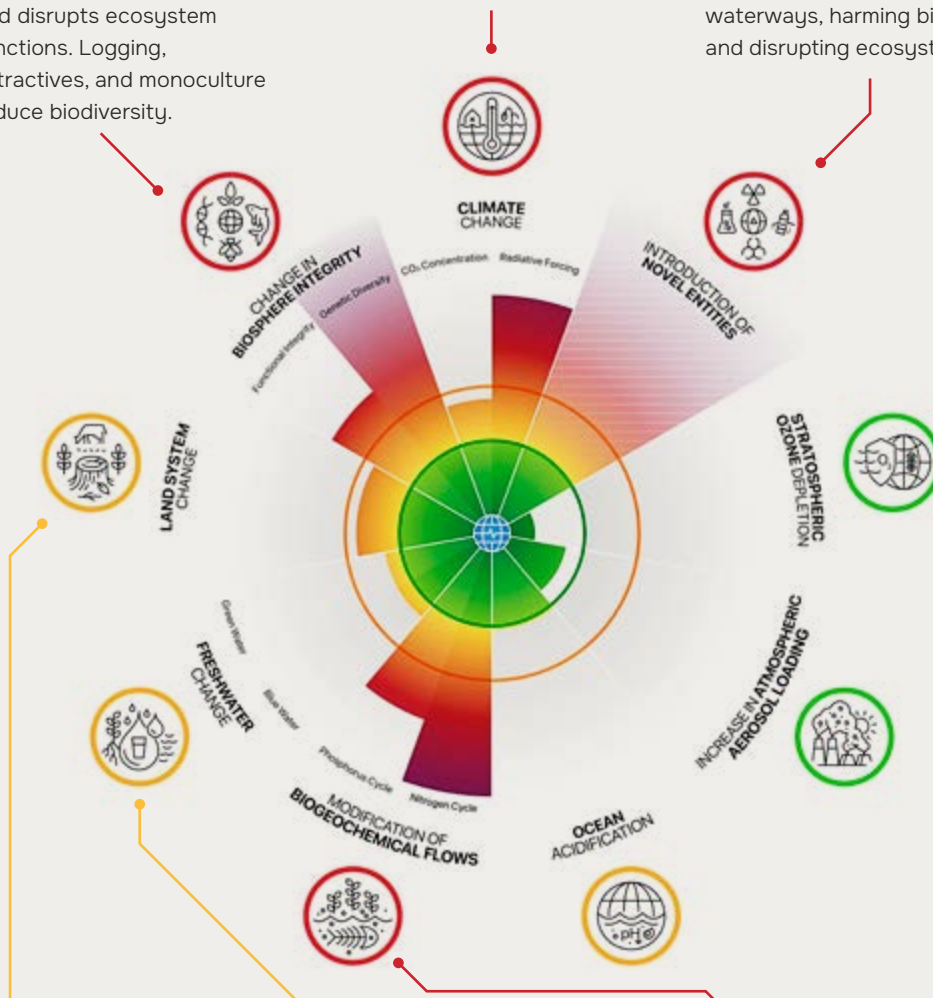
Source: www.planetaryhealthcheck.org

The Planetary Boundaries: Our Safe Operating Space

Loss of habitat from land conversion, mining, overfishing, and pollution reduces populations and disrupts ecosystem functions. Logging, extractives, and monoculture reduce biodiversity.

Forest loss, peatland drainage, and land degradation **release carbon irrecoverably**, weakening climate regulation.

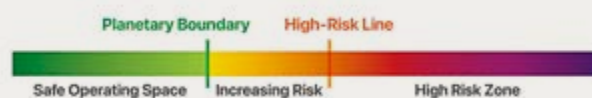
Metals, plastics, and other toxic human-made by-products from mining and industrial activity contaminate forest soils and waterways, harming biodiversity, and disrupting ecosystem functions.



Deforestation for agriculture, infrastructure, and mining. Forests, peatlands, and mangroves are being cleared or fragmented, undermining land function and ecological integrity.

Irrigation-intensive farming, mining operations, and urban sprawl **reduce water availability. Forest loss weakens transpiration, watershed regulation**, increasing water stress and flood risk.

Fertilizers in industrial agriculture and runoff from aquaculture release reactive nitrogen and phosphorus into water bodies, creating dead zones and accelerating marine degradation.



How are the Three Basins and Planetary Boundaries linked?

1. Climate Change

The Three Basins' rainforests are massive carbon sinks accounting for well over a third of irrecoverable carbon in the world:

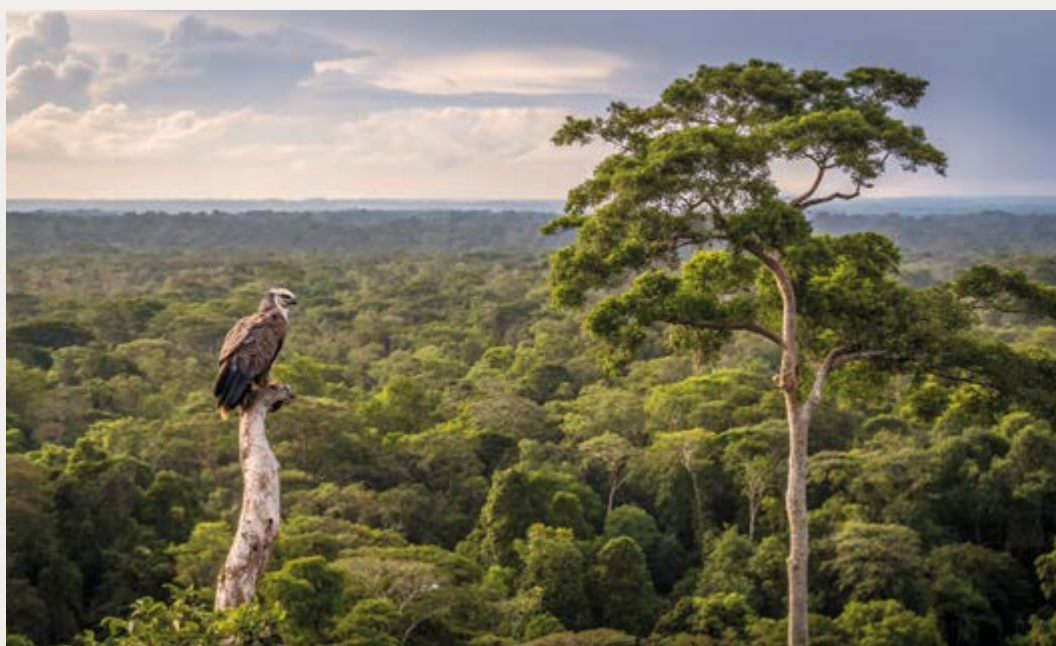
Irrecoverable Carbon in the Three Basins

Basin / Region	IC (GtC)	IC (GtCO ₂ e)	Share of Global Total (%)
Amazon	31.5	115.5	22.6%
Congo	8.2	30.1	5.9%
Southeast Asia	13.1	48.0	9.4%
Three Basins total	52.8	193.6	37.9%
Global total	139.0	510.0	100%

Source: Noon, Goldstein, Rockström, Turner et al. (2021/22, *Nature Sustainability*); Conservation International regional briefs for Amazon, Congo Basin, Insular SE Asia.

For comparison, the remaining carbon budget for 1.5°C and 2°C are in the range of 235 GtCO₂e and 1,110 GtCO₂e, respectively.

The Three Basins' forest systems accounted for well over half of the terrestrial land carbon sink in the 1990s. But climate change and the degradation of these biomes have already weakened these carbon sinks. Today, they account for some 15% of terrestrial carbon sinks.¹¹



The Planetary Boundaries: Our Safe Operating Space

...continued from page 11

2. Biosphere Integrity (Biodiversity)

The Three Basins host the majority of the world's terrestrial biodiversity with hotspots in Wallacea, Congo peatlands and Amazonian floodplains. This biodiversity holds massive potential for the bioeconomy and biosphere integrity.



3. Land-System Change

The rainforests in the Three Basins provide critical services. Land-use change through deforestation and forest fires alters hydrological cycles, reduces crop yields, increases water stress, and regional instability. Protecting intact forest cover is essential for keeping land-system change within safe limits.



4. Freshwater Use

Basins act as freshwater generators and regulators – generating about half their own rainfall. The Amazon and Congo recycle and export atmospheric moisture; Indonesia's peatlands and mangroves regulate aquifers and delta water flows. Their degradation drives droughts, irregular monsoons, and water crises. Forest cover regulates rainfall locally and across continents ("flying rivers"). Together, the Three Basins enable agriculture in neighbouring regions and globally through their regulating role in regional monsoon patterns.



5. Biogeochemical Flows (Nitrogen & Phosphorus)

The Three Basins account for one-third to one-half of global terrestrial nitrogen fixation. Excessive fertiliser use (particularly in Southeast Asia for palm oil, rice, and other crops) leads to nutrient runoff, degrading water quality, triggering harmful algal blooms, and harming marine ecosystems. The Three Basins play a modest role in global phosphorous cycles.



6. Ocean Acidification

Ocean acidification is primarily driven by the ocean's uptake of atmospheric CO₂. The Three Basins influence this boundary indirectly through their role in the global carbon cycle. Intact rainforests, peatlands, and mangroves are immense carbon sinks. When these ecosystems are degraded, they become carbon sources. This accelerates CO₂ buildup in the atmosphere, much of which is absorbed by oceans, driving acidification.



7. Atmospheric Aerosols

Intact rainforests generate large volumes of natural aerosols that seed clouds and play a major role in regional monsoon patterns. They also increase albedo, which cools the climate. Yet, the destruction of rainforests, particularly through peatland fires, releases enormous quantities of soot and smoke, which undermine human health and have a strong climate forcing impact.



8. Novel Entities (Pollution, Plastics, Chemicals)

Forest degradation is linked with mining and extractives (nickel in Indonesia, cobalt in Congo, gold in the Amazon), releasing mercury, tailings, and plastics into rivers. Healthy ecosystems buffer some of these impacts; degradation amplifies them.



9. Stratospheric Ozone Depletion

No major link.

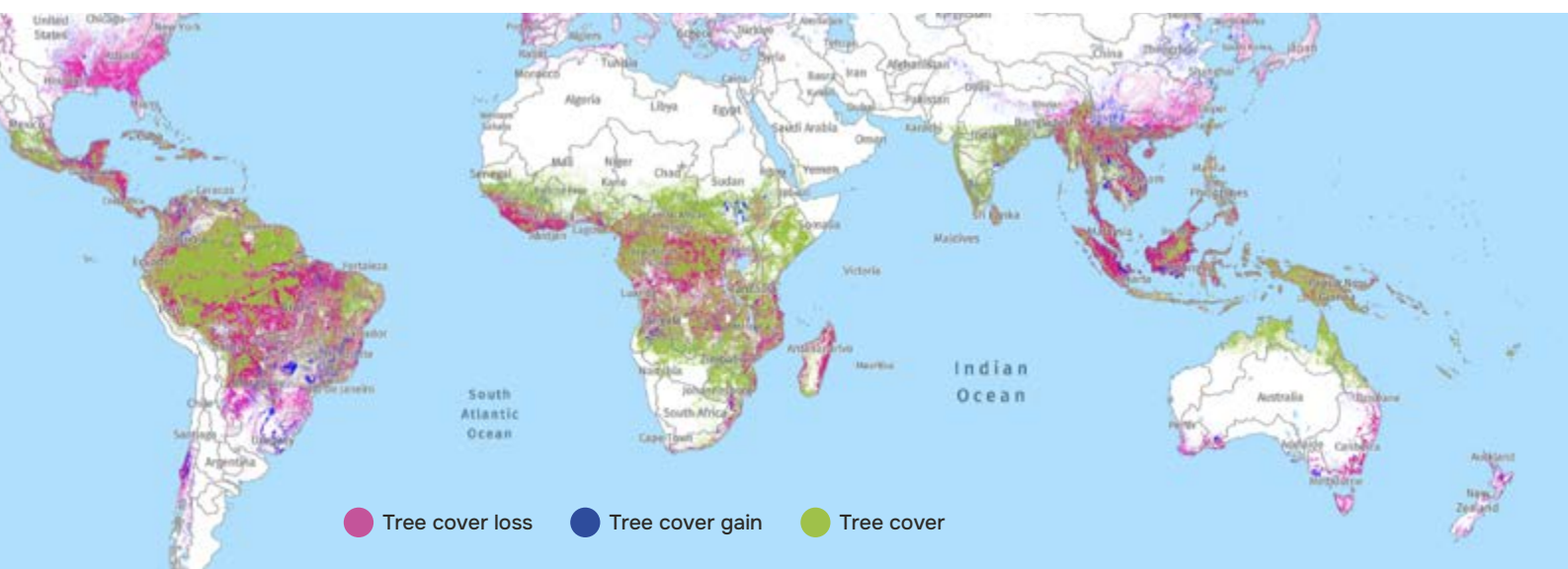




These forests are not just natural assets; they are foundational planetary economic infrastructure. They provide irreplaceable habitat and homelands, regulate rainfall and atmospheric temperatures, and sustain industries ranging from fuel and timber to food and pharmaceuticals. The annual value of the Amazon rainforest alone is estimated at a minimum of US\$317 billion for the communities that live there.¹² At the national level, rainforest health underpins bioeconomies, public health, cultural heritage, community wellbeing, and resilience to climate hazards. Globally, their deep integration into weather and water cycles, trade, and markets means that their loss or degradation reverberates far beyond their boundaries, driving market pressures internationally and affecting the daily lives of consumers everywhere.

But this stability is increasingly at risk. Deforestation, land degradation, and ecological changes threaten to unravel the critical services these forests provide. In 2024, a record-shattering 6.7 million hectares of primary forests were lost, nearly double that of 2023.¹³ This downward trend is impacting every country on the planet both directly through economic and fiscal consequences, and via inter-continental climate and ecological feedback loops. Therefore, the protection of these forests is not only an environmental imperative but a macroeconomic necessity.

Figure 2: Map of change in global tropical forest cover over the last 10 years



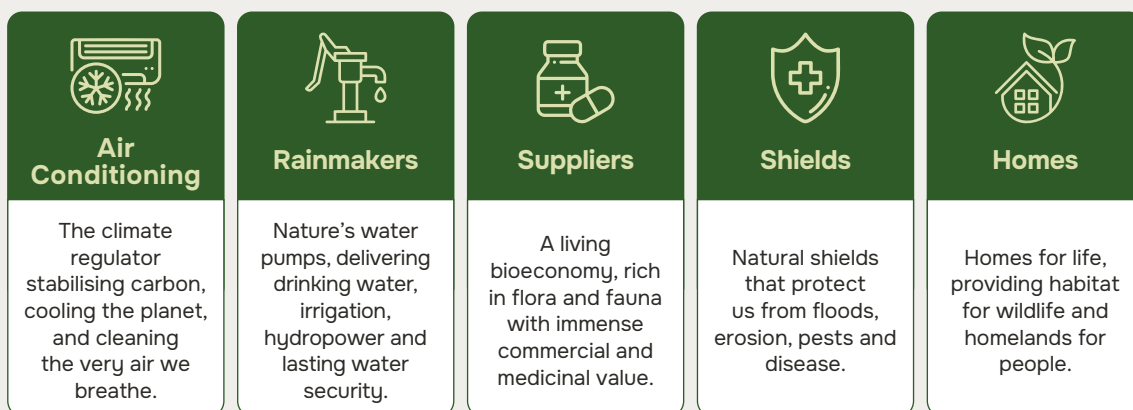
From: Global Forest Watch

Protecting forests avoids costly infrastructure. The Three Basins provide essential macroeconomic services that are currently undervalued in public budgets. These services are often treated as “free goods”, leading to their systematic exclusion from economic planning. Without an understanding of their contributions to modern economies, and how they prevent costlier infrastructure needs, rallying action for their preservation and restoration remains a challenge.

Recognising these biomes as critical infrastructure, even more valuable than built, engineered systems, can help clarify their value both to local and global economies. Here we demonstrate 5 ways that rainforests provide infrastructure services that directly influence GDP, employment, and public welfare.

Figure 3: Rainforests are macro-infrastructure, providing essential economic services

The Three Basins are...



The Three Basins are...

Productive capital: Each basin generates important economic services locally that in turn generate value globally.

Global infrastructure: The basins ensure climate stability locally and internationally that reduces GDP volatility.

Insurance: Maintaining them insures the world against risks that would have severe economic consequences locally and globally.

1.1 Forests as air conditioning: regulating climate, temperature and air quality

Forests are the Earth's most powerful air conditioners: they act as carbon sinks, helping balance climate change by storing vast amounts of carbon, cooling the land, and shaping rainfall patterns across continents.

- **Carbon stores:** Spanning almost **11 million km²**, the Amazon, Congo, and Southeast Asia rainforests together hold more than **300 Gt of carbon (41 Gt of which is irrecoverable), worth about 5 years of current global CO₂ emissions.**¹⁶ They absorb carbon far faster than temperate forests, making them irreplaceable in stabilising the global climate and keeping us within Planetary Boundaries. Yet this role is under accelerating threat: Earth system modelling shows that losing just **20–25% of Amazon tree cover** could tip it from carbon sink to carbon source, releasing gigatonnes of CO₂, intensifying extreme weather, and pushing global temperatures higher.¹⁷ The role of forests in global carbon “balance sheets” and reducing long-term climate mitigation and adaptation costs are significant, yet they are largely unprotected and depreciating fast.
- **Temperature regulation:** When forests are lost, so is their cooling power. In the tropics, deforestation has been shown to raise local daytime temperatures by about **4.4°C** and increases heat stress up to 100 km away.¹⁸ In the Amazon, just a 10% loss of nearby forest can warm surrounding areas by 0.7°C, eroding thermal refuges for people, crops, and wildlife. The local impacts are deadly: in 32 Amazonian cities, severe heatwaves have been linked to up to 18% higher

mortality, with the elderly and women most at risk.¹⁹ Recent research links tropical deforestation with 28,000 heat related deaths per year, with mortality rates the highest in Southeast Asia (8–11 deaths for every 100,000 people living in deforested areas), followed by tropical regions of Africa and the Americas.²⁰ Globally, by regulating humidity, reflecting sunlight, and recycling moisture, tropical forests help cool climate across continents. Therefore, their loss is not a local problem, but a planetary one.

→ **Air quality:** Forests act as natural filters that help reduce air pollution by absorbing harmful gases; however, when degraded or mismanaged, they can become significant sources of haze. In Indonesia, peatland fires from deforestation have been shown to emit up to **16 million tonnes of CO₂ per day**, while choking cities in toxic haze, damaging biodiversity, and causing the country **US\$16 billion in recovery costs** in 2015 alone.²¹ For national governments, protecting these forests is more cost effective than absorbing the recovery costs and macroeconomic spillover of warming, which would undermine water security, food production, and public health.

The science is clear: heat- and carbon-risks are no longer distant scenarios, and they are no longer only impacting tropical forest countries. Their effects and costs are imminent. With up to 5% of the euro area GDP at risk due to climate change by 2030, the threat is increasingly visible not only environmentally but also economically. Both the ECB and Bank of England warn about threat to European financial stability and inflationary risks. As the world's largest carbon stores, the Three Basins can act as either a brake or accelerator, depending on the pace of deforestation.

1.2 Forests as rainmakers: providing physical and economic liquidity

Forests play an active role in the global water cycle, influencing rainfall generation within their basins and weather patterns far beyond. By providing shade and cooling, they enable water vapour to settle and infiltrate into plants and groundwater, fuelling rivers, drinking water, and nourishing ecosystems. Through evapotranspiration, forests release vast amounts of moisture into the atmosphere, driving precipitation and river flows that underpin agriculture, hydropower, and industrial production. In this sense, rainforests are not only local ecological assets but part of the global hydrological cycle and a global common good, as Mariana Mazzucato and the Global Commission on the Economics of Water have argued.

Their function is macro-critical because they underpin GDP growth, fiscal stability, and export performance. Put simply, **rainfall is economic liquidity and forests are its source**. The stakes are enormous: without urgent protection of water-generating biomes like the Amazon, Congo, and Southeast Asia's forests, the global water crisis could threaten more than half of world food production and reduce global GDP by up to 8% by 2050, with losses of up to 15% in low-income countries.

- **Agriculture:** On average, tropical forests recycle over 40% of the rainfall they receive,²² generating and sustaining the water needed for agriculture and other critical sectors. In countries like Indonesia, where agriculture employs 29% of the workforce, this forest-driven rainfall underpins national food security and rural livelihoods.²³ When forests are lost, this service declines amplifying drought and heat, reducing crop yields, and driving up economic losses. Globally, over 34% of crop and livestock production losses in least-developed countries (LDCs) and low- to middle-income countries (LMICs) are attributed to drought, resulting in billions of dollars lost.²⁴
- **Water security:** Forests play a vital role in regulating local and regional rainfall, ensuring the steady recharge of aquifers, reservoirs, and rivers that provide drinking water for both people and industry. The Congo Basin, for instance, recycles 75% of its own rainfall and supplies 30% of Africa's freshwater and feeds the Congo river, supporting 75 million people and food security across central Africa. With current deforestation trends maintained, rainfall is projected to decline by up to 8–10% by 2100, putting freshwater dependent systems like agriculture, industry and drinking water supply at risk.²⁶
- **Hydropower:** Rainfall variability has significant implications on the security and renewability of hydroelectric power (HEP). In 2023, HEP made up approximately 48.6% of Brazil's installed capacity and accounted for 60.2% of its electricity generation. However, in 2024, due to deforestation in the Amazon some facilities like Teles Pires saw monthly declines of 2.5–10% in generation, resulting in estimated annual losses of around US\$21 million. Even hydropower plants in the more distant Paraná Basin experienced a roughly 3% drop in generation, highlighting the widespread impact of forest loss on energy systems.²⁷

Forests do more than support local rainfall; they function as giant atmospheric water pumps influencing atmospheric moisture levels and inevitably rainfall patterns, supporting weather systems, food production and market economics globally. Science suggests that large-scale forest loss in the tropics can alter jet streams and storm tracks, with knock-on effects on rainfall and extreme weather events as far away as North America and Europe.²⁸

- The Amazon actively participates in global weather event networks, acting both as an initiator and receiver of atmospheric signals. Extreme cold events in the Amazon can propagate to Europe (as well as eastern Australia and tropical Africa) through Rossby wave trains – powerful atmospheric mechanisms that connect weather anomalies around the world.²⁹
- The Congo Basin is among the largest convergence zones for convective rainfall (alongside the other basins) and strongly influences weather patterns beyond equatorial Africa. Convective heating and deep upward motion over the Congo are statistically linked to rainfall anomalies in the Sahel via a Rossby-wave (Matsuno–Gill) response. These convection-driven teleconnections can alter the mid-latitude jet stream over Europe, influencing storm tracks and regional weather.³⁰

CASE STUDY | The Amazon's Flying Rivers

In the Amazon, immense flows of moisture carry water vapour westward and southward across South America. Each day, the forest transpires ~20 billion tons of water into the atmosphere. These flows sustain La Plata Basin, a key agricultural heartland spanning Brazil, Argentina, Bolivia, and Paraguay.

These airborne conveyors, dubbed the region's "flying rivers", recycle humidity, moderate temperature, and seed the storm systems that deliver up to 50% of all rainfall to Brazil's soy- and cattle-belt, Argentina's Pampas, Paraguay's grasslands, and the Andean foothills. In effect, the forest provides continent-scale irrigation and climate control indispensable to South America's economy.

When forest cover shrinks:

- **Agricultural output decreases:** Soy, beef, and grain hubs in Mato Grosso, Goiás, and Argentina face yield losses and export volatility.
- **Fresh water supplies sink:** Cities and industry compete for scarcer supplies as irrigation demand rises.
- **Energy generation is disrupted:** Diminished river-flow cuts output from hydropower giants such as Itaipu, eroding grid stability and industrial capacity and inflating prices.

Modelled scenarios show that losing **20–25% of Amazon forest could slash regional rainfall by up to 40%**, with spill-over effects on food security, energy markets, and GDP across the continent and even weakening distant monsoon systems.

The bottom line is rainfall is economic infrastructure. Safeguarding the Amazon is not just an ecological goal; it is essential to the agricultural, energy, and development prospects of an entire region.

Source: The Economics of the Amazon – Mariana Mazzucato et al. (2023)



1.3 Forests as suppliers: providing goods through the bioeconomy

Rainforests are cornerstone assets in the global economy. Across the Three Basins, they fuel local bio economies by providing timber, fuelwood, bushmeat, medicinal plants, and other non-timber products that sustain millions of livelihoods. But the connection runs deeper: the same forests also feed into global supply chains, whether as the rubber in car tires, the soy and beef in global food markets, or the metals in the batteries powering our phones and electric vehicles.

- **Engines of inclusive growth:** These forests supply and support rural economies and international industries alike, and at scale. Around 300 million rural workers depend directly on healthy forests for their livelihoods.³¹ Community forests generate the highest per-hectare value (US\$159/ha), far outperforming statutory or customary tenure systems. For example, Congo's forests directly sustain 60 million people and help feed another 40 million.³²
- **Everyday commodities are at stake:** Forest degradation disrupts rainfall and soil health, threatening crops like coffee and cocoa. The resulting supply shocks drive up prices, weaken food security, and affect everyone from smallholder farmers to global consumers. Rainforest landscapes are central to these supply chains: smallholders produce 84% of the world's coffee,³³ while Côte d'Ivoire and Ghana alone provide over 60% of cocoa, much of it grown in agroforestry systems that depend on healthy forest cover.³⁴
- **Roles in value chains:** Their economic significance is rising sharply as demand accelerates for raw materials that enable clean-energy, digital, and defence technologies: nickel and cobalt for electric vehicle (EV) batteries, bauxite and manganese for grid storage, and rare-earth and platinum-group metals for AI hardware and semiconductors. This will attract the attention of international business and capital but also raise concerns on unintended consequences and the responsibility of companies at the top of the chain to share value fairly.
- **Biodiversity-rich forests** also provide a nature-based development pathway through ecotourism, generating income while incentivising conservation. In Indonesia, ecotourism accounts for about 45% of total tourism revenue, with rainforests central to flagship destinations like Komodo and Gunung Leuser National Park. When managed well, ecotourism creates jobs, supports Indigenous Peoples-led conservation, and funds protected-area management.³⁴

Unchecked deforestation flips these forests from carbon sinks to risk multipliers, driving extreme weather, compounded crop failures, water scarcity, and disease outbreaks. In the Amazon, climate-driven migration is already on the rise, while in the Congo Basin, environmental stress is intensifying competition over land and mineral royalties. The result: destabilised supply chains, rising geopolitical tensions, and increased humanitarian pressures.

CASE STUDY | The Critical-Minerals Paradox

The long anticipated low-carbon economy will run on metals (nickel, cobalt, lithium, copper, rare earths), instead of fossil fuels. Yet the very forests that stabilise the climate now sit atop the richest seams of those minerals. Further, the global race for critical raw materials is reshaping geopolitics, economic strategy, and the physical landscapes of resource-rich regions. Nowhere is the tension sharper than in the Amazon, Congo Basin, and Southeast Asia. The environmentally, socially and even politically destabilising effects of these extractive value chains are significant. When land is confiscated, smallholder farming (which provides food security and diversified livelihoods) is replaced by mining that creates insecure, poorly paid jobs. Communities become more dependent on volatile cash economies while losing traditional food systems and face dangerous working conditions (where accidents and health risks are common). Indigenous Peoples and local communities must be involved much more closely, not only in more equitable revenue sharing, but in decision-making and leadership more broadly.

- ➔ **Indonesia:** Vast nickel reserves in Sulawesi and the Maluku Islands are being mined at breakneck speed to fuel the global EV boom. But this extraction is often powered by coal and linked to deforestation, marine pollution, and displacement of Indigenous Peoples, undermining the very climate goals it seeks to enable.
- ➔ **Democratic Republic of Congo:** Cobalt- and copper-rich deposits along forest margins generate about 70% of global cobalt, an essential input for battery manufacturing. The DRC alone holds an estimated US\$24 trillion in untapped mineral value, offering substantial development potential. Yet extracting these resources in ecologically sensitive areas with evolving regulatory frameworks poses significant governance and environmental challenges, in addition to social effects, including the health impact of pollution and unsafe working conditions.
- ➔ **Amazon (Brazil and Peru):** Gold, bauxite, and rare-earth prospecting is driving illegal logging and mercury-laden rivers, pushing violence into Indigenous Peoples' lands.

This points to a paradox: that the same materials needed to power a low-carbon future are being extracted in ways that deepen immense ecological destruction and social harm. However, clean-tech demand does not have to equal forest and human sacrifice. Binding environmental safeguards, transparent contracts, and local ownership and engagement are the opportunity for truly sustainable minerals and are the only way to keep these Three Basins as engines of planetary resilience rather than zones of irreversible loss. The leadership and ownership of Indigenous Peoples and local communities will be critical to making these value chains work with minimal impact on the resilience of the Three Basins.

Source: Power Metal: The Race for the Resources that Will Shape the Future; Vince Beiser (2024)

1.4 Forests as a shield: against floods, erosion, pests and disease

Rainforests stabilise soils, prevent erosion, and regulate floods. Their extensive root systems anchor slopes, minimise landslides, and absorb excess rainfall, thereby moderating extreme hydrological events. Intact forest biomes also suppress agricultural pests and serve as barriers that reduce contact between wildlife disease reservoirs and human settlements, lowering the risk of zoonotic outbreaks. When these forests are degraded or cleared, all of these protective functions diminish, leading to heightened flood frequency and severity, crop failures, land degradation, infrastructure damage, and increased public-health threats. The economic repercussions ripple across agriculture, transportation, healthcare, and disaster-recovery budgets.

- **Flash floods:** In the DRC, forest loss in upland areas around Lake Kivu and the Ituri forest has increased the risk of flash floods and landslides. The 2019–20 Congo River floods hit 16 provinces, affecting about 923,000 people and displacing over 400,000.³⁶ Indonesia has faced similar impacts: in 2024, torrential rains in West Sumatra triggered some of the country's deadliest landslides in years, affecting over 40,000 families. Just weeks earlier, flooding in Central Java, 1,200 km away, displaced 11,500 people.³⁷ Many such disasters are tied to illegal logging and forest clearing for farms, plantations, and mining, which strip away vegetation, leave soils exposed, and speed up runoff into rivers.³⁸
- **Pandemic prevention:** Keeping forests intact is one of the most cost-effective ways to prevent future pandemics. Deforestation and agricultural expansion are major drivers of infectious disease emergence. Healthy, intact rainforests limit human–wildlife contact, reduce wildlife stress and viral shedding, and maintain natural buffers that dilute pathogen loads.³⁹ Forest fragmentation, by contrast, has emerged as a top predictor of Ebola outbreaks in Central and West Africa. In Malaysia, cases of zoonotic malaria rose by >8x coinciding with rapid plantation-driven deforestation.⁴⁰ HIV, Zika, SARS, mpox, and Ebola are among the many diseases that have emerged from tropical forests.
- **Pests and crops:** Forest cover and habitat diversity help slow pest spread, while terrestrial biodiversity loss removes natural predators and pollinators vital for farming. Deforestation and rising temperatures are intensifying pest threats to agriculture. For example, the coffee berry borer, among the most damaging coffee pests, is moving into higher-altitude areas as the climate warms, already cutting yields in Ethiopia, Kenya, Colombia, and Brazil. It causes over US\$500 million in annual losses, and by mid-century could endanger most Arabica and Robusta coffee regions worldwide.⁴¹

1.5 Forests as homes: for communities and wildlife

Forest basins are living systems that house both human cultures and biological wealth. They are home to millions of people whose identities, livelihoods, and traditions are deeply rooted in these landscapes. At the same time, they shelter a variety of species and genetic resources essential to global food systems, medicine, and ecological resilience. Though difficult to ascribe a dollar value to, forest degradation threatens not only environmental integrity, but also cultural survival, social stability, and long-term development.

- **Home:** About 350 million people live in or near dense forests and depend on them for subsistence and income (including 60 million Indigenous People), many in the Three Basins.⁴² For IPLCs, forests are homelands, spiritual spaces, and sources of livelihood. These communities occupy roughly half the world's forests yet hold legal rights to only 10%. While 39% of global lands in good ecological condition are governed by Indigenous Peoples, recognition of rights varies.⁴³ In practice, however, recognition of rights and tenure varies widely. In Brazil, for instance, progress on land demarcation and reform has coincided with subsidies for agribusiness expansion, creating tensions that threaten tenure security and risk displacing communities that have sustained forests for generations.
- **Habitats:** The Three Basins are unmatched in their role as dense habitats for global terrestrial biodiversity. They hold over 80% of the world's remaining tropical forests and are home to more than two-thirds of all known terrestrial species. From endemic plants and medicinal flora to endangered mammals, amphibians and birds, they serve as genetic reservoirs for food security, pharmaceutical development, and ecosystem resilience. Over 25% of modern medicines are derived from rainforest plants, many of which have yet to be studied.

The erosion of livelihoods and habitats in the Amazon is already contributing to regional instability with inevitable global repercussions. Climate-induced migration offers a clear example, driving displacement and disruption at local, regional, and even intercontinental scales. Current trends could result in 17 million climate migrants by 2050 in Latin America, 86 million in Sub Saharan Africa and 49 million in East Asia and the Pacific.⁴⁴

The Three Basins do far more than support local livelihoods and the national GDPs of rainforest countries. They anchor global supply chains in timber, agriculture, and mining, and lower the worldwide costs of climate mitigation and adaptation. When degraded, they flip from climate sinks to risk multipliers, driving extreme weather, urban heat, water and food insecurity, and disruptions to trade. The fallout is global: destabilised markets, rising migration, and threats to the liveability of cities.

Forests in the Three Basins function as macroeconomic infrastructure, stabilising continental and global systems. Yet their decline is still framed too often as a regional issue, masking the cascading, cross-border risks they pose to Earth systems and economic security. Recognising their strategic value is essential to mobilise the scale of investment and policy action they demand.

Three Basins, Three Science Panels

The UN Sustainable Development Solutions Network (SDSN) convenes high-level, independent Scientific Panels for each of the Three Basins to synthesise and communicate scientific knowledge, integrated with Indigenous Peoples' knowledge to accelerate nature-based solutions for the conservation, restoration and sustainable development of these unique tropical forests. These panels bring together hundreds of leading scientists, and Indigenous Peoples knowledge holders to contribute scientific evidence and provide actionable insights for policymakers, stakeholders, and international partners.

- ➔ The Science Panel for the Amazon (SPA). Launched in 2020 the SPA is composed of over 300 scientists from across the region and beyond. Its landmark 2021 report ("The Amazon We Want") set out a comprehensive analysis of the current state of the basin, ecological tipping points, threats, and sustainable pathways. A second assessment report focused on Connectivity is expected to be launched at COP30 in Belém.
- ➔ The Science Panel for the Congo Basin (SPCB). The SPCB was established in 2023 and is led by and comprises scientists from across the region together with international scientists engaged in research in the basin. The Panel will provide an independent assessment of the Congo Basin by examining key questions related to its ecosystems, current impacts, and future threats from local, regional, and global human activity. Their first assessment report will be launched at COP30.
- ➔ The Science Panel for Borneo (SPB). The SPB scientific assessment focuses pathways to address species overexploitation, pollution, land and sea use change, climate change, and invasive species and diseases in Borneo. It includes a coalition of some 15 institutions from Indonesia, Malaysia, Brunei, and regional research groups. The Borneo first assessment report is scheduled for presentation at COP30.

Together, these Science Panels form a critical global knowledge infrastructure. They provide the evidence base to understand the planetary role of the Three Basins, engage local and Indigenous Peoples' knowledge with international science, to inform policymaking to conserve and advance sustainable development in these three globally significant tropical forests.

Source: UN Sustainable Development Solutions Network

2. CHANGES TO THE THREE BASINS CASCADE THROUGH THE GLOBAL ECONOMY

The forests of the Amazon, Congo Basin, and Southeast Asia are not only facing ecological crisis; they are central to the stability and functioning of national and global economies. Their degradation fuels food inflation, job losses, energy insecurity, weaker trade, declining public health, reduced infrastructure resilience, and lower sovereign credit, with consequences that ripple worldwide.

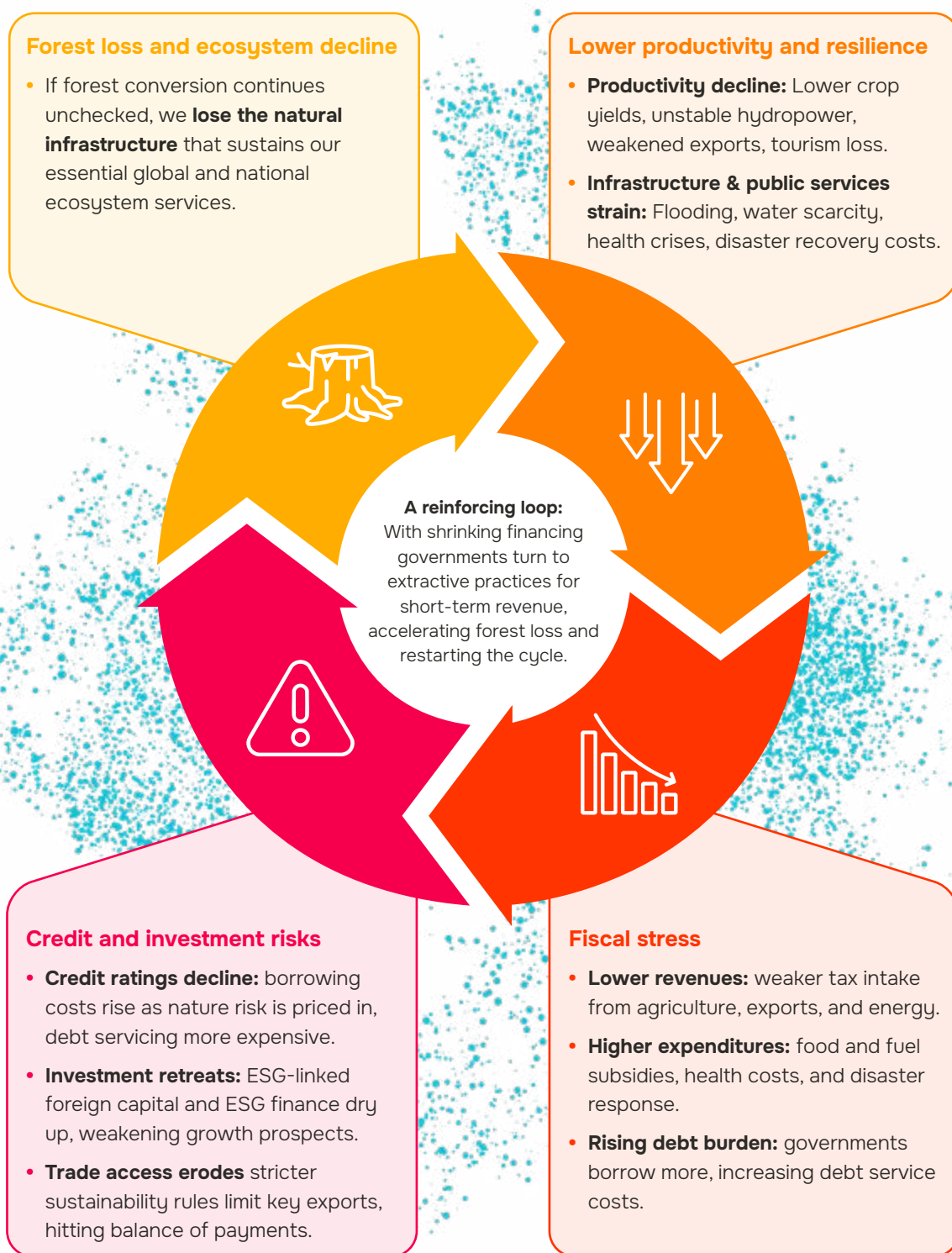
These biomes are not just harmed by economic activity; they also shape economic outcomes. The failure to account for this relationship is a blind spot in how we plan for growth, manage public budgets, and evaluate investment risk. This chapter connects Planetary Boundaries to macroeconomic and public finance outcomes. It outlines how the stability and resilience of the Three Basins is not just an environmental priority; it is a macroeconomic imperative. It also makes clear that this is not about the rainforest economies, but how these matter for every economy around the world.

2.1 Overshoot in the three basin impacts national economies

Planetary overshoot means that humanity is using more natural resources and ecological services than the Earth can sustainably provide, pushing beyond the “safe operating space” of the planet. Once we exceed those limits, the global economy faces escalating costs from droughts, floods, food and energy insecurity, and declining productivity. The degradation of the Three Basins is not just an environmental crisis but is directly translating into economic losses and fiscal stress. This triggers a negative feedback loop across the economy.

Forest loss means less rain, undermining agricultural yields, energy reliability, and nature-based industries, reducing GDP and raising inflation. Natural protections are also eroded, leaving infrastructure more vulnerable to disasters, which increases recovery and health costs. The hit to productivity and infrastructure weakens fiscal revenues and driving up spending on subsidies, disaster response, straining public finances. Investors and rating agencies factor these risks into credit assessments, while new trade rules reduce market access raising borrowing costs and undermining competitiveness.

Figure 4: Degradation of the Three Basins drives macroeconomic and fiscal instability



2.1.1 Decline in economic productivity

As ecosystem services degrade, so does output across critical industries. Agricultural yields fall due to disrupted rainfall and pollination. Hydropower generation becomes less reliable with altered water flows. Forestry output declines with reduced biodiversity and soil stability. Meanwhile, tourism (especially ecotourism and nature-based experiences) suffers from the loss of scenic, biodiversity-rich environments. Together, these effects contribute to increased commodity price volatility, reduced export performance, and lower GDP growth.

- **Agriculture** is particularly exposed to changes in rainfall, soil fertility, and pollination patterns. Declining crop yields lead to rising food prices, increasing volatility in trade flows and elevating pressure on government subsidies to stabilise markets. Effects directly undermine rural incomes and food security, with broader impacts on inflation and social stability.
- **Energy and electricity**, especially when dependent on hydropower, faces growing instability as water cycles shift and river flows decline. Reduced hydroelectric generation increases reliance on fossil fuel imports, driving up energy prices and forcing governments to expand electricity subsidies. This not only inflates fiscal burdens but also weakens energy resilience during peak demand seasons.
- **Tourism** suffers from both the visible and subtle impacts of nature loss. Coastal erosion, biodiversity decline, and degraded landscapes reduce the appeal of ecotourism and nature-based travel. At the same time, rising disaster recovery costs from floods, storms, and fires put additional strain on public budgets and infrastructure.
- **Extractive industries**, such as nickel, cobalt, copper, or rare earths, are increasingly contending with local water stress, land degradation, and community conflicts. These dynamics heighten social risk and can jeopardise access to ESG (environmental, social and governance)-aligned financing, especially as global standards for responsible sourcing tighten.

2.1.2 Public infrastructure is undermined

Urbanising and industrialising economies are increasingly exposed to systemic risk as natural buffers degrade under pressure from land-use change, pollution, and climate stress. As cities expand into ecologically sensitive areas, they lose the very biomes that regulate temperature, store water, and absorb shocks, undermining the foundations of urban resilience. Neglecting forest health and failing to maintain its ecosystem services creates risks: global flows harmful to nature (e.g. deforestation for agriculture) now exceed US\$7 trillion annually – more than the GDP of the UK and India combined.⁴⁴

- **Flood protection** is one of the first casualties of natural capital loss. Wetlands, mangroves, and forested floodplains that once absorbed excess rainfall are replaced by impermeable surfaces, leading to more frequent and severe urban flooding. Without natural water retention, storm surges overwhelm drainage systems, damage infrastructure, and displace vulnerable communities, raising disaster recovery costs and insurance claims.

- **Water supply and quality** also deteriorate. As watersheds are deforested and soils erode, natural filtration systems break down. Rivers and aquifers become more polluted and less reliable, while increasing demand from growing populations puts additional strain on already-stressed water systems. The result is **rising costs for water treatment** and growing competition for access, particularly during drought periods or in informal urban settlements.
- **Infrastructure and public** become more fragile. Heatwaves, flooding, and water stress reduce the reliability of energy grids, transport networks, and health services. Roads and power lines are damaged more easily, while hospitals and emergency responders are stretched thin. Informal settlements often bear the brunt of these failures, lacking the services and protections of formal infrastructure.

2.1.3 Impact cascades through the economy and fiscal position

Lower economic productivity and undermined infrastructure's economic impact does not stay isolated to sectors or assets but strain the aggregate economy and fiscal position. Lower output, deteriorating trade position, food and fuel inflation all erode long-term growth prospects. This cascades through the entire economy (e.g. as lower sector earning impacts the demand multiplier) and lowers the fiscal base of the economy for governments to tax. Revenues decrease but spending increases: infrastructure bills rise, and social spending is needed to offset higher cost of living and unemployment. For finance ministries, this is not an environmental concern – it is a matter of fiscal stability and national economic resilience.

The economic dependencies on the Three Basins are manifold, but the key transmission channels touch on all aspects of economic livelihood and wellbeing. This includes:

- **Food inflation leads to subsidy pressure:** As rainfall patterns shift and soils degrade, agricultural yields decline. This leads to rising food prices, increasing the cost of living and pushing governments to expand food subsidies to maintain social stability. This could severely affect rice production in Indonesia, soy cultivation in Brazil and staple crops like cassava and maize in the DRC, all of which are vulnerable to ecological shocks. In addition, lower fish stocks also undermine food security and reduce economic incomes.
- **Strain on energy systems and fiscal exposure:** Declining rainfall diminishes hydropower capacity, forcing countries to rely more heavily on fossil fuel imports, particularly expensive petroleum products. This drives up energy costs and often necessitates costly government subsidies to shield consumers and businesses from price spikes. It also leads to deteriorating balance of payments due to precious foreign exchange outlays for fossil fuel imports.
- **Export volatility and rural income loss:** As forest biomes degrade, the reliability of agricultural and forest-based exports diminishes. Reduced production can lead to falling foreign exchange earnings, weakening the balance of payments further and undermining rural livelihoods that depend on commodity markets. Cash crop farmers sink further into debt spirals but lack the resources to move towards more diversified cropping. Debt sustainability comes into question as major sources of export revenues erode.

→ **Disaster response and recovery spending:**

Deforestation, water stress, and climate instability heighten the frequency and severity of natural disasters such as fires, floods, and droughts. These events drive up public expenditures for emergency response, reconstruction, and compensation, diverting resources from long-term development goals. This additional spend drives up sovereign debt and interest rates rise as debt sustainability is questioned.

→ **Rising public health and infrastructure costs:**

Nutrient runoff occurs when excess fertilisers, mainly nitrogen and phosphorus, are washed off farmland by rain or irrigation and flow into nearby rivers, lakes, or coastal waters. This runoff causes water pollution, leading to problems like algal blooms, fish die-offs, and unsafe drinking water. This increases the incidence of disease and spending on healthcare systems, burdening public budgets further.

2.1.4 Inward investment starts drying up

The cumulative impacts start eroding the attractiveness of the national economy for foreign investors. This applies to sovereign debt as well as private sector equity and credit instruments or foreign direct investment. The structural indicators set by credit agencies start flashing red, and the risk premium and cost of capital rise. Environmental decline and worsening social outcomes act as a red flag for ESG-sensitive private investors. This pressure triggers self-reinforcing downturns, where environmental shocks and financial stress compound, creating a downward spiral.

Sovereign creditworthiness

Sovereign credit markets are starting to recognise the material risks posed by environmental degradation and climate vulnerability. Leading rating agencies such as S&P, Moody's, and Fitch are incorporating environmental factors into sovereign credit assessments through ESG scoring frameworks.

- In its 2023 ESG Sovereign Review, S&P explicitly cited nature loss and climate vulnerability as core risks for several emerging markets (including both Indonesia and Brazil) highlighting how ecological





instability now influences debt sustainability and investor confidence.

- Structural risks like forest loss, water stress, and exposure to climate extremes are increasingly flagged in sovereign outlooks, affecting countries' ability to borrow and the cost of capital.

As the increased frequency of extreme weather and related events makes the economic cost clearer year by year, investors will only increase the credence they attach to these warnings. This will increase the yields investors demand and erode demand from some investors altogether.

Foreign private investment and international market access:

Global commodity markets are also reacting to rising ecological fragility, with direct consequences for commodity prices, terms of trade and export revenues.

- Buyers and regulators are embedding environmental criteria into purchasing decisions, as deforestation, biodiversity loss, and climate impacts create reputational, regulatory, and compliance risks for key exports such as palm oil, soy, and beef.
- New ESG-aligned trade rules such as the European Union Deforestation Regulation (EUDR), threaten to restrict market access for products linked to unsustainable land use and forest loss. These dynamics have compounding effects on national economies.
- Falling demand for unsustainable commodities reduces export earnings, weakens the balance of payments, and amplifies pressure on rural employment and income stability.

Extreme weather events, biodiversity loss and ecosystem collapse, and critical change to Earth systems are now seen as the first, second and third most material 10-year risks according to the WEF Global Risk Report,⁴⁶ demonstrating growing concern across business leaders and financiers that the impacts of nature degradation are becoming a vector of investment decisions. The upheavals caused by the degradation of the Three Basins bring economic damages which are felt locally and globally. They are increasingly becoming a make-or-break factor in portfolio allocations and production plans alike.

Together, the financial signals of creditworthiness and market access reveal an inescapable economic reality: planetary stability is a prerequisite for fiscal and macroeconomic stability. As Planetary Boundaries are breached, the foundational assumptions behind public budgets, investment strategies, and development pathways begin to erode. Understanding and responding to these signals is not optional. It is central to safeguarding long-term national resilience.

2.2 Three basins impact economies at global scale

It is essential to stress that the repercussions are not confined to the Amazon, Congo Basin, or Southeast Asia. These biomes function as global economic stabilisers. Their degradation acts as a macroeconomically destabilising driver for the Global North every bit as much as for the Global South, with cascading impacts across trade, finance, and security. Atmospheric changes in the Three Basins biomes have weather impacts the world over, with for example direct effects from the Amazon and Congo Basins to European weather conditions through Rossby wave trains. Deforestation in the Amazon can reduce 20% of rainfall along the Northwest coast of the US and 50% in the Sierra Nevada snowpack (a key water source for Californian farms and cities).⁴⁷

Figure 5: Degradation of the Three Basins drives macroeconomic and fiscal instability



Global weather and ecosystem disruption

Loss of forest-linked climate regulation services shifts rainfall, winds and temperatures with transboundary effects.



Global supply chain transmission

Global bioeconomies are disrupted threatening supply chains and food security, driving inflation and economic instability worldwide.



Lower global aggregate demand

Rising costs reduces household spending and imports, suppressing global trade and triggering slowdowns.



Global financial repercussions

Risks in interconnected markets threaten global financial stability by triggering capital flight, credit tightening, and systemic shocks.

2.2.1 Global weather and ecosystem disruption

Climate change is a universal phenomenon, and the Global North is already experiencing an upsurge in extreme weather events from unprecedented flash floods in cities like Valencia to prolonged, more intense heatwaves. These disruptions will escalate further as the “carbon battery” of the Three Basins discharges.

The forests, wetlands, and river systems of these basins help regulate planetary weather patterns by driving monsoons, shaping trade winds, and influencing seasonal cycles. As these patterns destabilise, the resulting shifts will compound existing and irreversible climate change impacts, creating additive pressures on agricultural productivity, water security, and energy supply worldwide.

While the value of nature is long recognised by economists, this knowledge is only now starting to translate into an understanding of global transmission mechanisms across declining output, rising infrastructure damage, increased fiscal strain, and ultimately diminished investor confidence. This complex feedback loop is not unique to rainforest economies; it will increasingly affect industrialised economies as well.

2.2.2 Global supply chain transmission

The agricultural outputs and rainforest commodities from the Three Basins, ranging from soy, palm oil, and coffee to timber, fisheries, and minerals are deeply embedded in global supply chains. Declining yields, disrupted harvests, and price spikes originating in these regions will cascade through manufacturing networks, driving up production costs, eroding corporate profitability, and fuelling inflationary pressures. Commodity prices for both coffee and cocoa have more than doubled between 2024 and 2025, mostly due to extreme weather impacts, and trade analysts expect this level of price volatility to endure.⁴⁸

Food security will be particularly at risk, amplifying the inflation and cost-of-living crises already straining both advanced and emerging economies. In a tightly interconnected global market, shocks in one basin reverberate across continents.

2.2.3 Lower global aggregate demand

As countries most directly affected by ecological breakdown confront rising costs from food and energy to health and disaster recovery, households are likely to shift spending patterns from consumption to precautionary savings. This contraction in domestic demand translates into reduced imports, suppressing global trade flows.

For major exporters in the Global North and South alike, the consequence is a direct hit to aggregate demand and the flow of goods, triggering secondary slowdowns in manufacturing, logistics, and related services worldwide.

2.2.4 Global financial repercussions

Ecological degradation in the Three Basins has direct implications for asset valuations across infrastructure, real estate, corporate securities, and sovereign debt. Climate-linked damage and productivity loss erode asset values, triggering downward revaluations.

In today's highly integrated capital markets, savings and investments in one jurisdiction are often directly exposed to risks originating halfway around the world. The “search for yield” during the low-interest-rate era further concentrated capital into higher-risk markets, many of them tied to climate-sensitive sectors. As substantial revaluations take hold, they present clear threats to international financial stability, raising the risk of capital flight, credit tightening, and systemic financial shocks.

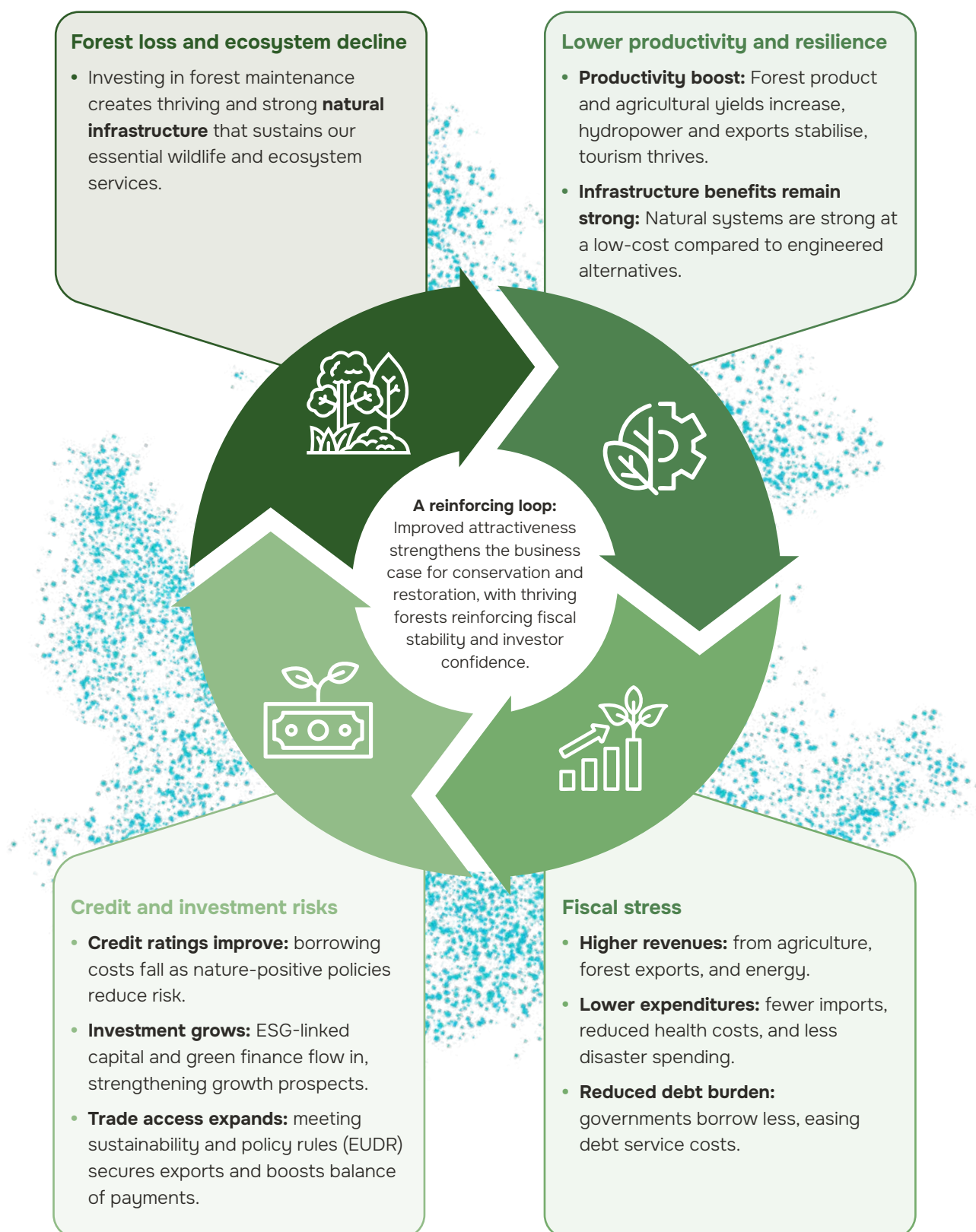
2.3 The cost of inaction is the value of action

Inaction on forest conservation and restoration carries major risks. By contrast, active stewardship strengthens economies and forests alike. Targeted action has positive knock-on effects on value of forests for national and global economies by stabilising and strengthening critical ecosystem services. Thriving forests underpin resilient businesses, food systems, and ecosystems, while also reducing fiscal risks for forest countries and for trading partners linked to deforestation-driven commodities.

In fact, the same macroeconomic transmission mechanisms from Three Basin erosion are at work, but then in the other direction. Economic productivity and agricultural yields increase as the rainforests' productive capacity gets restored. Essential infrastructure can withstand better as nature acts as a shield against extreme weather. The fiscal position improves as the public purse is not called on for costly repairs and social spending to compensate for economic loss. Overall, economies become more attractive again to invest in either sovereign debt or private investments.

Beyond the direct economic transmission mechanism “going in reverse” through positive feedback loops, the benefits also extend into low-cost carbon abatement, economic development in harmony with conservation and important co-benefits for people and planet.

Figure 6: The prize from managing forests better is a positive feedback loop for economies



Forests are a cost-effective path to large-scale carbon abatement. Natural capital underpins the global economy: around 55% of GDP depends on ecosystem services. Biodiversity loss and ecosystem degradation could trigger shocks costing upwards of US\$5 trillion. Yet research shows that nature-based solutions (NBS), primarily forest conservation and restoration, can deliver about 37% of cost-effective climate mitigation needed by 2030.

- **Forests as low-cost abatement:** Avoided deforestation provides over 40% of low-cost abatement potential at US\$20–50 per tCO₂, making it 7–10 times cheaper than reforestation (US\$20–100 per tCO₂). By comparison, technological alternatives are far costlier: carbon capture storage (US\$50–150), transport-sector measures (US\$308–548),⁵⁰ transport-sector measures (US\$308–548),⁵² green hydrogen (US\$500–1,250),⁵² and direct air capture (US\$600–1,000).⁵³
- **High returns on investment:** Ecosystem restoration generates US\$7–30 in benefits for every US\$1 invested,⁵⁴ through higher yields, reduced disaster losses, and carbon storage.

Conservation does not stall economic growth: Efforts that protect and restore nature are increasingly recognised by investors as drivers of long-term value. Aligning capital with ecosystem preservation through approaches such as revenue stacking, which combines multiple income streams from the same landscape such as carbon credits, commodities, and tourism, creates diversified returns while hedging against the rising costs of ecosystem degradation.

- **Indonesia:** Between 2008 and 2022, Indonesia reduced deforestation to its lowest levels in two decades while sustaining GDP growth of ~5% annually, proving that forest protection and economic expansion can advance together.⁵⁵
- **Brazil (Amazon):** Between 2004 and 2012, Brazil reduced Amazon deforestation by 80% while GDP grew x4 (from US\$669 billion to \$2.47 trillion), demonstrating that strong forest policies can align with robust economic performance.

Significant co-benefits for people and the planet: Projects and businesses which centre nature regeneration create co-benefits such as cleaner water, flood protection or community livelihoods that further strengthen economic and business resilience.

- **Homes and livelihoods:** Around 350 million people live in or near dense forests, directly relying on them for survival. This includes 60 million Indigenous People who are fully dependent on tropical forests.⁵⁷





→ **Cost savings through ecosystem services:**

Protecting forests avoids costly infrastructure. Nature-based infrastructure offers strong cost advantages compared to built alternatives, averaging 50.7% lower costs while delivering 28% greater value.⁵⁸

The evidence is clear: The forests of the Amazon, Congo Basin, and Southeast Asia are not only environmental assets but core pillars of global economic stability. Their loss drives food and energy inflation, undermines fiscal space, and erodes sovereign creditworthiness, impacts that cascade far beyond rainforest economies into global trade and financial markets. However, protecting them brings powerful co-benefits for local communities, national security, and global welfare. Protecting them is therefore a macroeconomic imperative.

Yet finance for forest protection remains dangerously out of line with what is needed. The Energy Transitions Commission estimates that ending deforestation could require **between US\$130 and US\$900 billion per year** in concessional or grant payments by 2030 if not accompanied by systemic shifts such as reducing demand for deforestation-linked products, developing alternative business models, and strengthening governance. However, current funding is only **US\$2–3 billion annually**.⁵⁹ Expecting this gap to be filled solely by concessional flows, philanthropy, or voluntary carbon markets is unrealistic.

Forests must be treated as essential economic infrastructure, supported through domestic budgets, redirected subsidies, and large-scale mobilisation of

private capital. The costs of inaction will be counted in trillions, while the returns on action are lasting resilience and stability for every economy. This is a global responsibility, in line with global benefits and macroeconomic transmission effects.

The Coalition of Finance Ministers for Climate Action can take a lead role to address this challenge and should install a dedicated agenda around the Three Basins. This can help mobilise the international finance minister community around the Tropical Forest Forever Facility and similar programmes. Similarly, forums such as the G20 or institutional mechanisms such as the IMF Article IV consultations are opportunities to integrate the Three Basins into macroeconomic diplomacy. Sovereign support, for example through nature-conditional Special Drawing Rights or green credit enhancement facilities through the IMF can greatly enhance rainforest borrowing terms.

3. THE PLANETARY OVERSHOOT IN THE THREE BASINS CAN BE STOPPED

We are witnessing the fastest rate of forest loss in human history. A trajectory that could dismantle the planet's most vital biomes within a single generation. Of the original 14.5 million km² of tropical rainforest, only 36% remains intact, and 34% has already been lost entirely.⁵⁰

This chapter diagnoses the main drivers of deforestation and ecosystem degradation, both direct and indirect, and the structural forces that sustain them, from agricultural expansion and illegal extraction to climate change-driven fires and droughts. We explore how pressures threaten planetary health and economic resilience, compounded by chronic underinvestment in maintenance and stewardship.

Reversing this requires systemic change which can be achieved in different ways. It is also important to recognise the harmonious ecological and economic relationships that Indigenous Peoples and local communities have often built in balance with living nature. Ways forward include:

1. **Governance and land-use reform** to strengthen rights, enforcement, and planning.
2. **Shifting business and sectors** from expansion into productivity-driven growth models.
3. **Aligning international markets and finance** with long-term forest stewardship.
4. **Tourism and recreation** to support communities, economic development and conservation.

To date, efforts to halt and reverse forest loss and degradation have not yet reached the necessary scale, institutionalisation and cohesion. However, we have clear solutions for the path forward. There are proven policies and initiatives demonstrating that deforestation and land-use change can be brought under control. The task now is to build on the momentum of these successes and mobilise sustained international support.

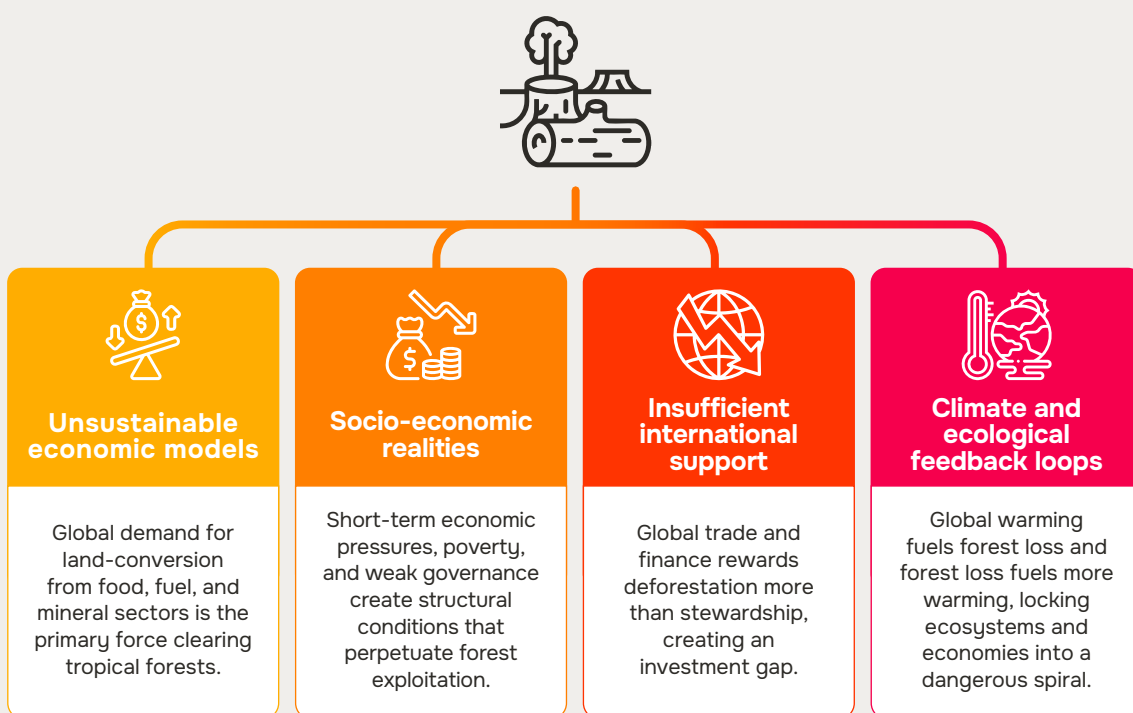
3.1 Rainforest loss pushes toward critical planetary limits

Today, the core drivers of deforestation include unsustainable agricultural expansion, illegal logging, and mining, with urbanisation playing a smaller but persistent role. In 2024, climate-driven feedback intensified the crisis, with fire-related forest losses reaching their highest levels in two decades. Beneath these immediate pressures lie deeper structural forces: weak governance and limited enforcement of land-use laws, short-term growth imperatives for forest commodities, rapid advances in extraction and transport technologies without adequate ecological safeguards, and the poverty and livelihood vulnerabilities that compel communities toward unsustainable practices.

These drivers are often attributed to forest nations, yet global trade and markets link local degradation to distant demand and magnify the international consequences of forest loss. Non-forested nations also rely on the conservation of the Three Basins as collective goods that benefit all, but too often without providing sufficient support for their protection. Together, these forces have expanded humanity's ecological footprint and eroded the natural buffers that forests provide.

If left unchecked, this trajectory will be damaging for the Three Basins nations and for economies in the Global North alike. The ongoing extraction of ecological assets undermines the stability of global systems and threatens the very resource base that underpins the strategic importance of these regions. Reversing this trend begins with a clear understanding of the core drivers of environmental erosion and coordinated action at every level.

Figure 7: Key drivers of deforestation in tropical countries



3.1.1 Unsustainable economic models are accelerating land conversion and forest loss

The first and most visible phase of degradation is the physical transformation of landscapes and seascapes. Forests, peatlands, mangroves, and coral reefs are being cleared or destroyed to make way for economic activities. Without sustainable management this is stripping ecosystems of their structure, function, and carbon storage capacity.

Food and land-use systems account for over one-quarter of global GHG emissions and have driven 90% of direct tropical deforestation. The vast majority of this deforestation stems from large-scale agricultural expansion for seven globally traded commodities: palm oil, soy, cattle, wood fibre, cocoa, coffee, and rubber.

Importantly, these are not local effects but the consequence of global value chains that extend over ever larger areas of deforestation, with the bulk of the profits captured by multi-national corporations instead of local stakeholders.

- **Food:** Unsustainable food production is the leading driver of nature loss, yet it underpins human survival and security. Without transforming how we produce food, efforts to protect climate, biodiversity, and livelihoods will fail.

In Indonesia, more than 80% of recent deforestation is tied to agricultural expansion, including within designated concessions. High-carbon biomes such as peatlands, mangroves, and coral reefs are being rapidly degraded to meet growing demand for food commodities. Peat drainage for plantations releases massive emissions and increases fire risk while mangrove clearance for aquaculture (notably shrimp) strips away coastal protection and carbon storage. Over 95% of coral reefs are now at risk from warming, acidification, destructive fishing, and pollution, jeopardising marine biodiversity, fisheries, and food security.

- In the Amazon, cattle ranching drove more than 60% of deforestation between 2001 and 2013, with soy cultivation, smallholder farming, fires, and logging making up most of the rest.⁶¹
- **Forestry:** Wood-fibre plantations are a major driver in Southeast Asia. In a 2000 to 2015 study of ten tropical countries where forest loss was caused by conversion to wood-fibre plantations, Indonesia alone accounted for 90%.³⁹

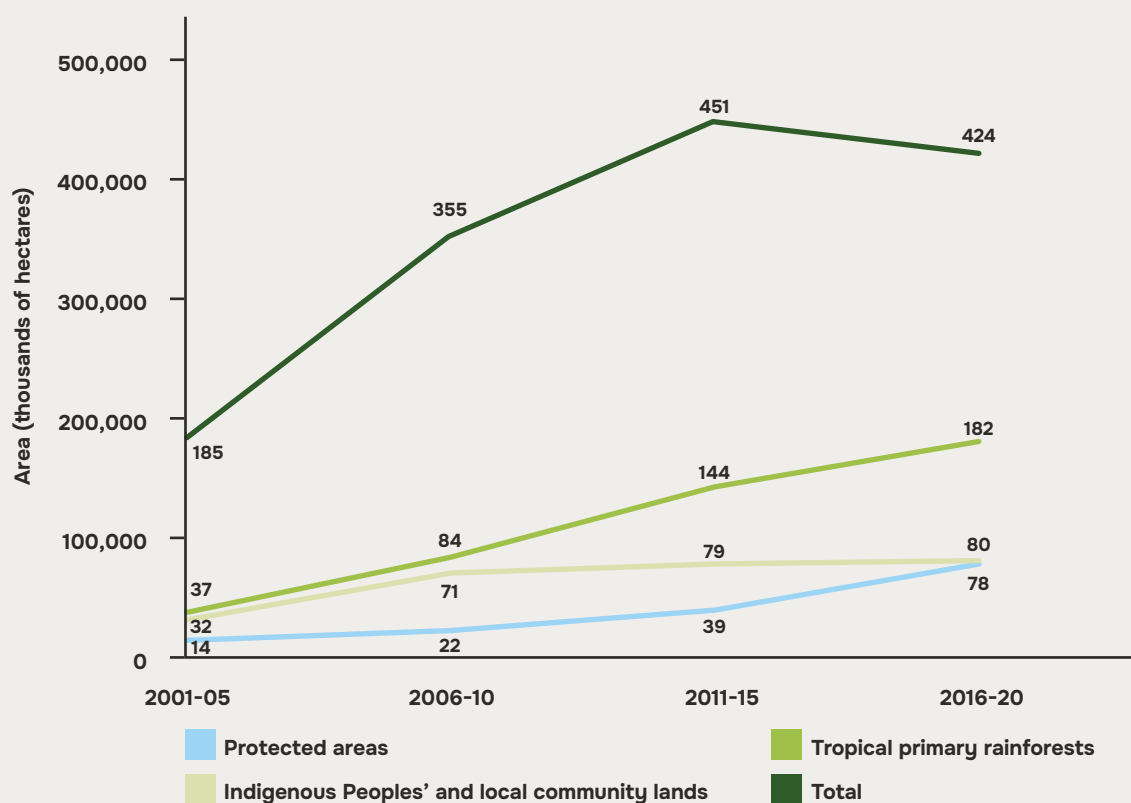
Large-scale and artisanal mining (both legal and illegal) pose serious ecological and human risks. Since the turn of the century, global mining activity has surged by 52%, driven by rising demand for coal, iron, industrial minerals, and other metals. In many cases, this expansion has come at the expense of forests and the livelihoods of the communities who depend on them.

- Between 2001 and 2020, nearly 1.4 million hectares of forest, largely in tropical primary rainforest and protected areas, were lost to mining worldwide, releasing an estimated 36 million tonnes of CO₂ each year. Gold, copper, and coal extraction have long scarred forest landscapes to fuel commodity cycles and energy needs. The most pronounced impacts occurred in Indonesia and Brazil, with a disproportionate share affecting Indigenous Peoples' and local community lands.⁶³
- Today, the accelerating global race for critical minerals such as nickel, cobalt, and lithium which are essential for clean technologies, AI, and defence, is pushing extraction deeper into intact ecosystems. In countries like Indonesia and the Democratic Republic of Congo, this is unleashing a new wave of ecological disruption.
- Continued fossil fuel extraction contributes to the pressure. For example, the DRC has opened 124 million hectares of rainforest, including peatlands and biodiversity hotspots, for oil exploration, overlapping conservation corridors such as the Kivu–Kinshasa Green Corridor.⁶⁴

*Our very survival depends on
humanity collectively investing in
the Three Basins*



Figure 8: Tree cover loss linked to mining from 2001 to 2020⁶⁵



Source: World Resources Institute, Mining Is Increasingly Pushing into Critical Rainforests and Protected Areas (2024)

Urbanisation accounts for less than 1% of global forest loss, but its impacts at local and regional scales can be severe, especially where development intersects with forest fringes, freshwater and ocean biomes.⁶⁶

Urban sprawl, industrial corridors, and transport networks fragment forest landscapes and open access to remote, vulnerable areas. Beyond housing and buildings, associated infrastructure (roads, dams, and utilities) drives land-use pressure and increases pollution. In addition, urban development drives pollution, for example through plastic waste in water systems. In Indonesia alone, an estimated 0.35 million tonnes of plastic enter rivers and oceans each year.

High-profile development projects illustrate the risks. For example, in Indonesia the government is planning to convert up to 20 million hectares of forest, including 2.3 million hectares of protected land, into plantations for sugarcane bioethanol, rice, and other crops. The Merauke Integrated Food and Energy Estate alone covers over 3 million hectares, with CO₂ emissions from clearing potentially exceeding 315 million tonnes.

These sectors are central to economic growth, yet when infrastructure and industrial expansion are managed unsustainably, they trigger cascading impacts accelerating forest loss, amplifying emissions, and undermining conservation. Transitioning them toward more sustainable models is essential to secure long-term prosperity.

3.1.2 Socio-economic realities reinforce mismanagement

Beneath these visible and direct drivers of land conversion and deforestation lie deeper structural norms and conditions that shape both business and human behaviour toward forest exploitation. These forces are often invisible, but they determine why decisions are made, how laws are enforced, who benefits, and why environmental degradation persists despite widespread awareness of the risks and causes of forest erasure. These deep structural pressures on rainforests are:

1. **Short-term thinking:** Political cycles, market pressures, and narratives around food and energy security often frame ecosystem conversion as a necessary trade-off for economic growth. This drives policymakers and business leaders to excuse short-term exploitation, land-clearing and expansion of extractive practices, at the expense of long-term ecological resilience, security and community wellbeing.

Harmful subsidies often aggravate this further, as they frequently favour extensive practices with immediate returns over investment in higher productivity that supports long-term outcomes with less harm to nature. Phasing out and recalibrating these subsidies to explicitly meet social objectives without the cost to rainforests will be key.

2. **Poverty and vulnerability:** In areas of high rural poverty and livelihood insecurity, “monetising” nature becomes both a safety net and a pressure valve. Additionally, undiversified economies often ride the boom-and-bust cycles of global commodity markets. Without viable economic alternatives, communities may be pushed toward unsustainable resource use, such as overharvesting timber, clearing forest for agriculture, or engaging in illegal trade, especially during downturns in volatile commodity markets.

3. **Weak governance and enforcement:** Even where environmental laws exist, they are often undermined by fragmented governance, competing development priorities, and limited institutional capacity. Monitoring and enforcement are especially weak in remote frontier regions such as Papua, the Congo Basin, or the western Amazon, where illegal logging, mining, and land conversion can proceed unchecked.

Illegal Economies at the Amazon's Frontiers: A Rising Threat to the Rainforest

The Amazon is under intensifying pressure from a web of illegal activities that converge most dangerously in poorly governed border regions, forest fringes, and areas with weak monitoring. These are places where criminal enterprises exploit national jurisdictional divides, porous frontiers, and low state presence to operate with near impunity.

Brazil, which accounted for **42% of global primary forest loss in 2024**, has faced one of the worst drought and fire seasons on record. Of forest lost in the Brazilian Amazon, the vast majority – 91% – is linked to land clearing for cattle pasture, industrial-scale agriculture, and illegal activity like artisanal gold mining, and timber trafficking. Fires, often started by arson, accompany these activities to prepare land or mask illicit operations.

The tri-border area between Brazil, Colombia, and Peru illustrates how illegal economies reinforce one another. While clearing for coca cultivation is not as extensive as agricultural deforestation elsewhere in the Amazon, it is locally significant and strategically important. The infrastructure built for cocaine production (transport routes, clandestine airstrips, and networks of corrupt officials) has increasingly been repurposed to facilitate illegal logging, gold mining, and broader forest clearing. These networks use intimidation and violence to suppress local opposition and evade law enforcement.

Additionally, driven by a surge in global prices, **illegal gold mining has become a US\$30 billion annual economy in the Amazon** – now generating greater profits than cocaine in some areas. In the tri-border region and beyond, mining operations clear forests, dredge riverbeds, and poison waterways with mercury, a potent neurotoxin. Mercury contamination harms not just miners but entire ecosystems, affecting trees, birds, and fish far beyond the mining sites. Rivers like the Puré and Cotuhé, which flow through protected areas in Colombia, are already showing signs of ecosystem degradation.

Nature crime thrives in thinly governed borderlands where criminals cross into neighbouring countries to avoid capture, exploiting siloed legal systems and gaps in enforcement. This lack of coordinated response increases the risk of “savannisation” where large swathes of rainforest lose their moisture-regulating capacity, turning into drier, more fire-prone ecosystems. Poorly monitored regions are particularly vulnerable, as deforestation here can progress unnoticed until ecological thresholds are breached.

There are signs of political will to close these gaps. In August 2023, the eight member states of the **Amazon Cooperation Treaty Organization (ACTO)** issued the **Declaration of Belém**, pledging to improve intelligence sharing and policy coordination to combat environmental crimes. In 2024, Brazil established an **international policing and security centre in Manaus**, which will host officers from all ACTO countries to coordinate cross-border enforcement. These steps, if followed through with sustained resources and political backing, could begin to disrupt the criminal networks that are accelerating Amazon deforestation. Unless these illegal economies are dismantled, the Amazon will continue to edge toward irreversible ecological change.

Source: WRI. Organized Crime in The Amazon: A Growing Threat to the World's Greatest Tropical Rainforest

3.1.3 Insufficient international support and action stalls meaningful change at scale

The Three Basins function as a “global common”, delivering valuable ecosystem services that benefit every country on the planet. Yet, this planetary infrastructure is often treated as if its value were limitless and freely available, rather than recognised as an asset requiring collective stewardship and sustained maintenance. This challenge stems from three important factors:

- Globally, living nature is not valued adequately under the current economic system.
- In the Anthropocene, what really matters has shifted: nature’s limits have been revealed, and humanity has breached seven of the nine Planetary Boundaries.
- People around the world benefit from the global commons; however, there are no international mechanics to govern it: no reward for good actions nor penalties for bad deeds.

Without adequate valuation and coordinated action, the result is a persistent investment gap and the risk of a global-scale tragedy of the commons. Furthermore, the high cost of capital that international investors demand from sovereign and private companies in the rainforest economies is making domestic investment more difficult. The cost of debt is often disproportionate to the risk differential and hampers the ability to invest in long-term, more sustainable solutions within these economies.

What is worse, currently the rest of the world is actively contributing to the deepening erosion through consumption patterns and corporate profit models. These allow supply chains to eat into natural capital without compensating for the damage. International finance and trade patterns currently reward short-term extraction, instead of rewarding rainforest economies for the public goods that they provide to the global economy.

3.1.4 Ecological feedback loops are amplifying negative impacts

The breaching of Planetary Boundaries is no longer just a consequence of deforestation. It is now a driver. Intensifying droughts and wildfires, fuelled by rising global temperatures, are increasingly destroying tropical forests. This loss of forest cover in turn amplifies regional and global warming, disrupts rainfall patterns, and drives more extreme weather. Hotter, drier conditions cause more forest loss, which releases vast amounts of carbon and further accelerates climate change and warming, which leads to more forest fires and further land change. Planetary Boundaries are interconnected, with climate change and land change intertwined in dangerous feedback loops.

- In 2024, tropical regions lost a record-shattering 6.7 million hectares of primary rainforest, nearly the size of Panama, the highest loss in over two decades. For the first time on record, fires, not agriculture, were the leading cause of tropical primary forest loss, responsible for nearly half of all destruction, compared to an average of just 20% in recent years. Global forest fires in 2024 released more than four times the emissions of all air travel in 2023.

→ The Amazon Basin offers a stark example of this spiral. Extreme drought in 2024, intensified by a warming climate, fuelled the worst fire season since 2005. Many fires were also suspected to be deliberately set to clear land for cattle grazing, further compounding deforestation. The drought reached such severity that the Amazon River and key tributaries dropped to their lowest recorded levels, forcing emergency food and water distributions and halting river transport in some areas.

This shift marks a critical threshold where changes in forests are now driving more extreme heat, altered rainfall, and intensified droughts and wildfires, undermining ecosystems, destabilising the climate and weakening economic resilience instead of helping to balance these impacts.

3.2 REAL SOLUTIONS TO FIGHT OVERSHOOT

Halting and reversing ecological overshoot in the economies of the Three Basins is achievable. While the drivers are deeply entrenched, proven solutions have already slowed, halted, and in some cases even reversed ecological degradation. The core issue is that the immense economic value of these forests is not properly priced or rewarded, hence insufficient capital flows into protecting them. The challenge now is a step change in both domestic and international investment into governance and land-use reform, sustainable production and value chains, and alternative revenue streams such as ecotourism. This often will include gathering inspiration and giving ownership to the Indigenous Peoples and local communities that have inhabited these places for centuries or longer and found a harmonious balance with living nature.

Systemic economic transformations that embed forest stewardship into fiscal policy, market incentives, and development planning deliver gains in natural capital, climate stability, and long-term economic resilience, making such investments both essential and highly worthwhile.





3.2.1 Governance and land-use reform

The single most powerful lever is effective forest governance. Brazil's 2004–2012 Amazon deforestation decline of ~80%, avoiding hundreds of millions of tonnes of CO₂ emissions, came from satellite-based monitoring, swift enforcement, designation of new protected areas, and recognition of Indigenous Peoples' territories. GDP grew in parallel, disproving the idea that conservation hinders growth. Conditioning rural credit on environmental compliance cut deforestation 15% in targeted municipalities, showing how fiscal tools can drive behavioural change.

Indonesia's permanent moratorium on clearing primary forests and peatlands reduced deforestation in protected areas by nearly half. Stronger fire and peat management, backed by monitoring, helped drive national forest loss to record lows in 2020–2022. These reforms reduced haze disasters, protected agricultural productivity, and preserved peat carbon stocks, as well as delivering macroeconomic gains in avoided health costs, stable yields, and energy reliability.

In the Congo Basin, upholding the Democratic Republic of Congo's moratorium on new industrial logging concessions, alongside stricter enforcement and community forest management, can safeguard rainfall systems vital to regional agriculture and hydropower. Forest loss here risks destabilising food systems as far afield as the Sahel, triggering fiscal and humanitarian stress.

Land tenure and indigenous Peoples' and local community rights as a proven conservation tool

Indigenous Peoples, Afro-descendant communities, and other local groups manage more than half of the world's land. These areas usually have less deforestation, more biodiversity, and greater carbon storage than lands managed by governments or private owners, and they cost less to protect.

Indigenous Peoples alone hold a quarter of the world's land. In the Amazon, home to about 1.5 million Indigenous Peoples, their territories are among the most effective forest conservation areas. Between 2017 and 2021, Indigenous Peoples' territories in Brazil lost just 0.14 percent of primary forest per year, far less than unprotected lands.

In Brazil, the Coordination of Indigenous Organizations of the Brazilian Amazon (COIAB) brings together 75 member groups across all nine Amazonian states, representing 160 Indigenous Peoples and 110 million hectares. They work to secure land rights, improve health services, and shape policy.

These territories face growing threats. From 2013 to 2021, deforestation within demarcated Indigenous Peoples' lands rose by 129%, mainly from illegal mining, logging, and land grabs. Supporting Indigenous Peoples' leadership is not only the right thing to do, it is a smart strategy. Stronger legal protection, better cross-border cooperation, and investment in Indigenous Peoples-led monitoring can keep the Amazon's forests standing and avoid dangerous impacts.

Source: WRI Protecting Biodiversity Hinges on Securing Indigenous and Community Land Rights



3.2.2 Shifting growth from expansion to productivity

The World Bank estimates that unchecked Amazon deforestation could cost Brazil ~ US\$317 billion per year in lost ecosystem services and climate damages, dwarfing the profits from clearing.⁶⁹ The alternative is raising productivity in agriculture, forestry, and industry so GDP can grow without expanding the deforestation frontier.

In Brazil, intensifying cattle and crop yields on degraded pastures could meet demand without new clearing. Even during the low-deforestation decade, soy and beef output grew through efficiency gains and better use of existing farmland. Today, 28 million hectares of degraded pastures could be restored for crops or grazing, equal to a 35% increase in the 2022–2023 planted area.⁷⁰ This shows vast potential to boost production without converting new land or requiring new technology. Indonesia's palm oil sector offers a similar opportunity: higher yields on existing plantations can sustain growth without forest loss or conversion.

The Congo Basin's Gabon offers a model in forestry: reduced-impact logging and mandatory local processing increase the value per cubic metre harvested while cutting emissions by up to 50%. By making each hectare more economically productive, these models reduce pressure to clear new areas and diversify revenue streams beyond raw extraction.

International business, investors and trade partners also have a role to play. They should reward high productivity practices that help preserve and build natural capital in the Three Basins with preferential access and green premia to further incentivise their adoption. Economic valuation around the world should create mechanisms to address global commons, and thus link back to local actions.

Deforestation regulations are one instrument that policymakers in importing countries can use, but they should take care that these regulations are closely calibrated with the needs of rainforest countries. Bilateral partnerships, for example through bioeconomy deals, can foster trade integration around more sustainable value chains and include investment from trade partners in a way that responsibilities are shared equitably between supplier and consumer economies. Consumer countries which restrict imports from deforestation should also provide rewards to producers in exporting countries who safeguard nature on the ground.

Bioeconomy Entrepreneurs in Action

Strong bioeconomy models already show how forest-friendly growth can create jobs, empower communities, and generate competitive, high-quality products without driving deforestation. Across the Three Basins, local enterprises are proving that value-added, regenerative business models can outcompete extractive ones.

- ➔ **Agradaya** – This women-led enterprise empowers smallholder farmers to shift from selling raw herbs to producing processed teas, spices, and herbal blends. By training and financing women farmers, Agradaya multiplies value creation from local produce while strengthening community livelihoods and stewardship of surrounding forests.
- ➔ **SukkhaCitta** – Operating “from farm to closet to compost”, this fashion brand is redefining what sustainable clothing means. It sources regenerative cotton and natural dyes from smallholder farmers, revives traditional craft techniques with rural artisans, and designs elegant, high-quality garments that return to the soil at end-of-life.
- ➔ **MYCL** – Founded by a group of university students inspired by the power of mushrooms, Mycotech Lab turns agricultural waste into innovative mycelium-based materials. Sustainable alternatives to leather, plastic, and synthetic foams are now used in fashion, construction, and packaging industries.

These case studies from Indonesia illustrate that shifting growth from land expansion to productivity and innovation is possible. With the right policy incentives, trade access, and investment, such bioeconomy champions could scale from local initiatives into scaled bioeconomies.

Source: Company websites



3.2.3 Aligning markets and finance with stewardship

Private supply-chain agreements have reshaped deforestation economics. Brazil's Soy Moratorium cut soy-driven Amazon deforestation to ~1% of expansion, proving agricultural growth can occur on already-cleared land. Indonesia's No Deforestation, No Peat, No Exploitation (NDPE) commitments cover most palm oil exports, reinforcing national deforestation declines.

Trade policy now amplifies these shifts. The EU Deforestation Regulation will restrict imports linked to recent forest loss, while investors and credit rating agencies increasingly flag nature risk as a factor in sovereign borrowing costs. Countries that control deforestation stand to gain in market access and lower capital costs; those that do not may face trade and investment penalties.

Carbon markets should be a powerful mechanism for compensating Three Basin countries for the climate services that their forests provide, but actual carbon finance flows are woefully low. We know how to ensure high-quality carbon removal credits or other instruments, so the real issues are on the demand side. Finance ministers outside the Three Basins need to consider practical ways to increase government demand for high-quality carbon removals and avoided deforestation. But they must also consider pragmatic ways to increase corporate demand for high-quality credits without undermining climate integrity. Such payments, as seen in Gabon and Indonesia, can provide fiscal space for reinvestment in conservation and local development.

While significant, the promise of carbon markets has so far not been fulfilled. Other tools are needed. Debt-for-nature swaps, under discussion in the Congo Basin, can both reduce debt burdens and fund forest protection. The TFFF proposed by the government of Brazil offers an innovative mechanism for mobilising long-term, predictable financing for protecting the forests in the Three Basins and beyond.

Nationally, integrating natural capital into fiscal and financial planning ensures forests are valued as economic assets. Brazil's central bank now incorporates environmental risk into financial stability assessments, and Indonesia is piloting "green GDP" accounting to inform policy. Such measures help shift public investment toward prevention, protecting forests before disaster recovery costs mount.

Through rainforest funds public investment can play innovative roles. These funds can be set up to aggregate the financial resources from international reforestation programmes, natural resource rents and other national revenues streams and funnel them directly into regenerative practices across both agriculture and forestry. This can help build the financial infrastructure below sustainable rainforest economies that are strengthened for the long term. These funds should build on explicitly green mandates with success linked to rainforest outcomes.

It is essential that these programmes ensure direct benefit-sharing with Indigenous Peoples and local communities for legitimacy and impact. Not only will they be the stewards of these sustainable rainforest economies, but they also contribute much of the knowledge towards building more sustainable value chains. In addition, such funds can also contribute towards the fiscal buffers against climate-related shocks (crop failures, floods) that explicitly incorporate rainforest degradation risks.

These could be supported by international institutions as part of macro-prudential stability frameworks.

These shifts bring measurable macroeconomic returns: stable food and energy supplies, reduced disaster-related fiscal shocks, and improved creditworthiness while keeping the Amazon, Congo Basin, and Southeast Asia forests intact as the planetary infrastructure they are.

4.2.4 Sustainable tourism can drive development and conservation

Tourism can benefit forests, communities and economic development alike. However, it needs to be well-planned and involve local communities in planning decisions. When managed sustainably, ecotourism can generate revenue that supports conservation efforts, create jobs, and strengthen cultural heritage.

- • In Indonesia and elsewhere, community-led ecotourism has both supported livelihoods and incentivised forest and habitat restoration. For example, in North Kalimantan, a mangrove-focused ecotourism pilot restored 14 hectares and plans to scale up to ~33,000 hectares of degraded mangroves through a mix of tourism income and external funding.⁷¹
- • Similarly, in Brazil, protected-area networks such as ARPA, many of which integrate tourism, have reduced deforestation by ~21% between 2008 and 2020, although these gains are primarily due to protection and management measures rather than tourism alone.⁷²

Indonesia's Social Forestry Programme

When government programmes empower communities to manage natural resources, businesses can thrive while safeguarding rainforests. Indonesia's **Social Forestry Programme**, for example, grants local and Indigenous Peoples' communities legal rights to manage state forest areas to enable both forest conservation and livelihood benefits.

In **Taram Nagari, West Sumatra**, a 2017 social forestry licence allowed the community to manage 800 hectares of forest. They built an **agroforestry and ecotourism venture** combining conservation with income generation by developing walking paths, food stalls, and attractions such as pine forests and waterfalls.

The results show the potential of well-designed policy incentives:

- Visitor numbers rose from **70,000 in 2018 to 260,000 in 2021**.
- Peak season income reportedly reaches **IDR 50 million (~US \$3,200) per day**.
- Forest cover is maintained, and local jobs are created in tourism, food, and guiding services.

Source: The Economics of the Amazon – Mariana Mazzucato et al. (2023)

4. BRAZIL: SAFEGUARDING THE AMAZON AS AN ECONOMIC AND HUMAN IMPERATIVE

The Three Basins stretch three continents and many countries. All have a direct stake in their preservation but face different national contexts and challenges. This chapter illustrates key dimensions of the Three Basins' economic and social importance and the policy agenda within a Brazilian context. With the upcoming COP30 in Belém and Brazil's leadership in the Tropical Forest Forever Facility, Brazil has a unique opportunity to raise its voice for the Three Basins.

4.1 Why the amazon matters for brazil's economy

The Amazon is core economic infrastructure for Brazil. This vast rainforest generates “flying rivers” that irrigate Brazil's fertile heartlands, sustaining agriculture, energy, and urban water supplies. Rainfall recycled by the Amazon provides about 80% of the water for Brazil's farms, underpinning an estimated R\$338 billion (57% of national agricultural output).⁷³ This supports Brazil's commodity exports and food security alike. Conversely, Amazon degradation directly threatens these value chains: reduced forest cover means less rain in the south and centre-west, endangering soy, beef, and sugar production. Major droughts linked to deforestation have already withered crops and pastures, driving up food prices and forcing costly government interventions.

The Amazon also stabilises Brazil's energy sector. Hydropower plants supply about 60% of Brazil's electricity, and many large dams rely on rainfall generated by the Amazon's hydrological cycle. Forest loss has measurably reduced water flows to key reservoirs: in one cluster, river flow dropped 37% from 2013–2021 as deforestation climbed, leading to power shortages and expensive emergency fossil-fuel generation.⁷⁴

Beyond climate regulation, the Amazon Basin supports livelihoods and industry in myriad ways. Millions of Brazilians live in the Amazon region, and a growing bioeconomy is beckoning – from açai and Brazil nuts to pharmaceutical compounds. Ending deforestation and investing in forest-friendly businesses could add R\$40 billion (~US\$8 billion) to annual GDP and over 300,000 jobs by 2050.⁷⁵

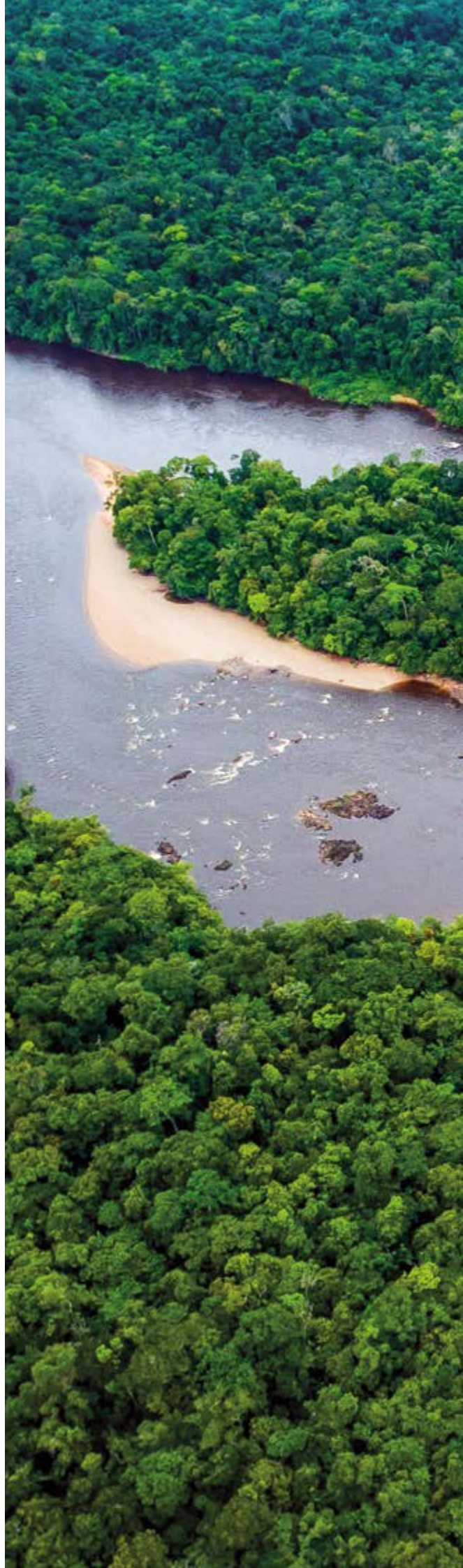
In short, when the Amazon's rainfall engine falters, Brazil's farms and lights suffer – a macroeconomic ripple felt in inflation, trade balances, and fiscal outlays for disaster relief. The Amazon, and particularly Indigenous territories, act as economic infrastructure. Protecting these forests protects Brazil's own food and water security. There is no future for Brazil's economy without the Amazon: its forests ensure rain-fed agricultural exports, buffer the country against climate shocks, and harbour natural wealth for innovation. Crucially, maintaining this “natural capital” is far cheaper than the economic losses that would result from an Amazon collapse or dieback.

4.2 The tropical forest forever facility and other mechanisms

Brazil is spearheading new mechanisms to finance its protection. A flagship initiative is the Tropical Forests Forever Facility (TFFF) – a proposed US\$125 billion blended finance endowment to reward tropical countries for keeping forests standing. It envisions a permanent fund to invest capital and use the returns to pay governments for measurable conservation outcomes. If fully capitalised, it would dwarf existing forest funds. The plans set strict eligibility (deforestation below 0.5% p.a.) and earmark a share of payments directly for Indigenous Peoples and local communities. The TFFF would integrate forest conservation into economic planning by providing predictable, long-term financial incentives for keeping the tropical forests standing at global level – effectively treating the forest as a global public infrastructure that merits investment. For Brazil, which has already driven Amazon and Atlantic forest loss down in 2023–2024, TFFF payments could support sustainable development programmes in Brazilian forest-rich states, bolster forest monitoring and enforcement budgets, and finance green jobs for local communities. Next to the TFFF, many other initiatives also contribute to valuing the Amazon as living nature:

- The Action Plan for Deforestation Prevention and Control (PPCDAm) activates the playbook of enforcement and land-use planning that famously slashed Amazon deforestation by ~83% between 2004 and 2012.
- Environmental agencies like IBAMA and ICMBio are empowered, and recent operations have shut down illegal mines and sawmills.⁷⁶
- The Amazon Fund was relaunched, attracting new pledges from Norway, Germany, and others to funnel grants into forest conservation and sustainable income projects.

These efforts are echoed by international trade measures: for instance, the EU's new deforestation regulation will soon bar imports of beef, soy, and other commodities linked to forest clearing, pressing Brazilian exporters to clean up supply chains. Meanwhile, global investors are starting to factor forest risk into decisions – but progress is uneven.





Notably, banks and asset managers worldwide poured an estimated US\$8.9 trillion into the “deforestation economy” in 2024 alone.⁷⁷ Addressing this, Brazil is advocating stronger due-diligence laws. At a regional level, Brazil convened Amazon countries in 2023 to coordinate efforts. The Belém Amazon Summit produced a pact on combatting environmental crimes and fostering a “bioeconomy of the forest”.

4.3 Policy coordination for a forest-safe economy

Brazilian policymakers face a challenging task: aligning policies across sectors to protect the Amazon as macro-critical infrastructure. This means that ministries of finance, agriculture, energy, and planning must work in concert rather than at cross purposes. This kind of whole-of-government approach – treating a stable Amazon as foundational to Brazil’s competitiveness – will help synchronise economic and environmental policies.

- ➔ **Financial and fiscal policy:** Integrate forest risks into fiscal planning, credit policy, and investment decisions. Brazil’s Central Bank and commercial lenders can expand green credit and deny financing linked with illegal deforestation. Internationally, sponsor countries of TFFF must also enact regulations so that global banks stop financing Amazon destruction. Closing these finance loopholes (for example, through laws requiring banks to perform deforestation risk checks) will reinforce the impact of conservation funding.⁷⁸
- ➔ **Agriculture and land use policy:** Coordinate agricultural development with forest protection. This entails scaling up sustainable intensification on cleared lands, enforcing the Forest Code (which requires landowners in the Amazon to keep 80% of forests intact), and providing alternatives for smallholders. Policies like subsidies for pasture rehabilitation, support for agroforestry, and rural extension services in lieu of slash-and-burn can help decouple productivity from new deforestation. Critically, soy and beef supply chains need full traceability and accountability – a coordinated effort by federal and state governments with

industry can ensure that Brazil's exports are deforestation-free, preserving access to high-value markets and improving the country's green reputation.

→ **Regional and climate policy:** Because the Amazon spans nine countries, Brazil must continue leading on regional coordination (through the Amazon Cooperation Treaty Organization) to share intelligence on illegal logging/mining and to present a united front in climate negotiations. Amazon protection should be embedded in Brazil's climate strategy and its long-term development plans. The Ecological Transformation Plan explicitly links Brazil's economic growth strategy with climate and nature goals, including protecting the Amazon to ensure water, energy, and food security for decades ahead.

Effective coordination means forest considerations are not siloed but integrated across core policy decisions. The creation of a dedicated Climate and Green Economy secretariat in the Finance Ministry is a positive sign, as is the involvement of economic authorities in Amazon initiatives.

4.4 Indigenous peoples and local communities

A successful strategy must put Indigenous Peoples and local communities up front as guardians and beneficiaries of the Amazon. They manage about one-third of Brazil's Amazon, with better long-term outcomes for the rainforest. Between 2019 and 2023, only about 3% of Amazon deforestation occurred inside Indigenous territories, vastly lower clearing rates than surrounding areas. The rainfall generated over Amazonian Indigenous lands alone supports more than half of Brazil's agricultural GDP. In protecting their ancestral forests, these communities are providing an enormous service to the nation's economy.⁷⁹

Indigenous People and local communities must be empowered as decision-makers and rewarded for their stewardship. This starts with securing land rights and strengthening environmental governance on those lands. A landmark 2023 Supreme Court ruling struck down the Marco Temporal rule that would have limited Indigenous land claims. Such steps bolster the legal shield against land grabs, mining, and deforestation. Communities also need direct economic opportunities. Initiatives are expanding, from harvesting forest products (like açai, oils, and medicinal plants) to community-based tourism and solar energy projects. Under the TFFF and Amazon Fund provisions are being made for direct funding, with at least 20% of TFFF benefits earmarked for IPLCs.⁸⁰

Crucially, Indigenous Peoples and local communities should be regarded as leaders in Amazon protection. Their traditional knowledge about climate, biodiversity, and land management can enhance scientific and policy strategies. Indigenous brigades assist in firefighting and monitoring, and community associations engage in policy forums. Including Indigenous representatives in the governance of funds like the TFFF (as advisors or board members) will improve transparency and effectiveness. It is also a matter of climate and environmental justice, as these communities bear the risks of enforcement actions and retaliations against illegal actors.

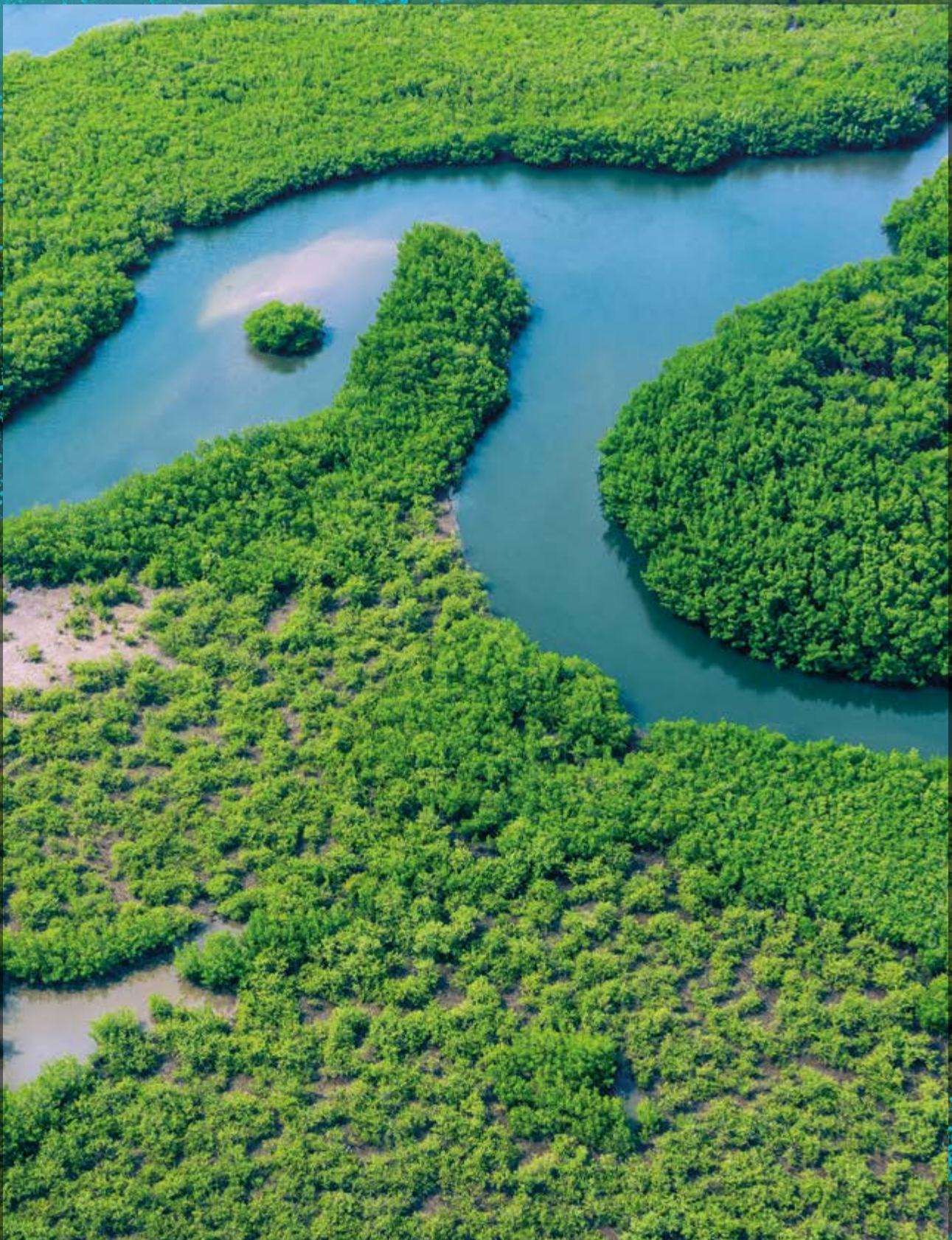
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