Adaptation Committee

Climate Adaptation of the Amazon Forest:

a focus on the guardians of the rainforest

Virgilio Viana
José Marengo
Vanessa Grazziotin
Natalie Unterstell
Avinash Persaud

Belém, November 2025

Author Affiliations

Virgilio Viana
Foundation for Amazon Sustainability (FAS)

José Marengo
National Center for Monitoring and Early Warning of Natural Disasters (CEMADEN)

Vanessa Grazziotin
Amazon Cooperation Treaty Organization (ACTO)

Natalie Unterstell
Talanoa Institute

Avinash Persaud
Inter-American Development Bank

DISCLAIMER

This report does not necessarily reflect the opinion and views of the Presidency of COP30 nor the Government of Brazil. It is a contribution of a group of members of the Adaptation Council to the COP process, in the spirit of the "Mutirão".

ACKNOWLEDGEMENTS

The authors would like to thank all those who supported and provided comments on this paper:

Ademar Cruz (FAS), Bruno de Amorim Maciel (Nave Terra), Charlotte Hoskins (University of Oxford), Daniela de Oliveira (Nave Terra), Enoque Ventura (FAS), Gabriela Sampaio (FAS), Giulia Galebe (FAS), Jasmine Aaron (Amazon Investor Coalition), Lana Donatti (FAS), Letícia Cunha (FAS), Maíra Macedo (FAS), Ronaldo Weigand Júnior (Nave Terra), Rosa dos Anjos (FAS), and Vinícius Mafra (FAS)

Table of contents

1. Presentation

This document is a contribution of members of the Adaptation Council, convened by the Presidency of COP30, with a focus on the Pan-Amazonian region. The document focuses on climate adaptation for the forest peoples of the Amazon. This is the first public version published at COP30 for discussion and dialogue with relevant parties. Since the Council's mandate extends through the end of 2026 (COP31), further work will expand this document as well as consider urban and agricultural landscapes of the Amazon.

This report seeks to contribute to the advancement of regional governance on adaptation, within the framework established by the Presidential Declaration of Belém and other policy instruments of the Amazon Cooperation Treaty Organization (ACTO). This topic will also be addressed in a dedicated section. This initiative is also in line with the Directorate of the Adaptation Program at the UNFCCC, and the Lima Adaptation Knowledge Initiative (LAKI). LAKI is a collaborative effort under the UNFCCC's Nairobi Work Program and United Nations Environment Program (UNEP)'s Global Adaptation Network (GAN), aimed at removing knowledge barriers that hinder climate change adaptation. LAKI identifies and improves specific knowledge gaps for targeted users and catalyzes collaborative actions by improving access to and use of data, information, and knowledge for policymakers and practitioners. LAKI operates across multiple subregions, working with partners to strengthen the effectiveness and scalability of adaptation efforts[1].

This Climate Adaptation Plan is also in tune with Brazil's National Adaptation Plans (NAPs) and policies convened by the Climate Adaptation Directorate of the Ministry of Environment and Climate Change. The preparation of this report was supported by the Foundation for Amazon Sustainability (FAS) and Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ). This work benefits from the findings documented in IPCCC reports as well as those of the Science Panel for the Amazon (SPA 2025)[2].

2. Introduction[1]

The systemic importance of the Amazon for global climate stability is well established in IPCC Reports. The potential tipping point - an ecological collapse - of the Amazon could have devastating consequences for both the region and the planet, seriously undermining the goals of the Paris Agreement.

The region is facing a profound socio-ecological emergency, spanning from both the lowland forests and the high-elevation areas of the Andes. This crisis exposes local communities to one of the clearest examples of climate injustice.Forest peoples and traditional populations of the Amazon have contributed the least to global emissions, yet they are suffering the most from climate change. This underscores the urgent need for decisive action on climate adaptation in the Amazon. Adaptation measures can - and must - be combined with mitigation strategies to safeguard the ecosystem services that are critical for both global and regional climate security. Achieving this requires heightened political attention and coordinated action at the international, national, and subnational levels.

The Amazon is home to more than 48 million people. The 2.2 million Indigenous Peoples of more than 400 ethnicities, as well as Afro-descendent and local traditional communities, are particularly vulnerable to climate change as they live in remote areas and have high poverty rates. These societies face major threats to their livelihoods deriving from climate change and are the focus of this report. Amazon forest people can be divided into two broad categories: (i) Indigenous peoples and (ii) traditional populations (rubber tappers, riverine populations, quilombolas of African descent and 25 other groups). These peoples live in isolated areas as well as near rivers, roads, and cities. Indigenous peoples have suffered the impacts of colonialism through slavery, wars and diseases. Traditional populations have suffered from racism, discrimination, poverty and different types of modern slavery.

The rapid expansion of the agricultural frontier into the Amazon over past decades has led to conflicts and violence over land rights for both Indigenous peoples and traditional populations. Amazon forest peoples suffer from a deficit in political power as they have few votes, and their voices have historically been marginalized in all Amazon countries. However, this scenario has been changing significantly in recent times.

Indigenous peoples have gained political power and have become increasingly vocal in their quest to protect their territories. This has led to annual demon-

1 - Virgilio Viana

strations in Brazil's capital, Brasília, such as "Acampamento Terra Livre" and "Marcha das Mulheres", with over 14,000 participants in 2025. A similar process of empowerment occurred among traditional populations. Activists such as rubber tapper Chico Mendes – who was murdered in 1988 – have highlighted the importance of forest peoples in combating illegal deforestation and logging in the Amazon.

Organizations that represent Indigenous peoples have become stronger because of this process. Representative organizations (COIAB – Coordination of Indigenous Organizations of the Brazilian Amazon; APIB – Articulation of Indigenous Peoples of Brazil; CONAQ – National Coordination for the Articulation of Black Rural Quilombola Communities; and CNS – National Council of Extractive Populations) - as well as local grassroot organizations - have become more structured and active in defending their rights and territories. This has been documented in many films that show their roles in reducing deforestation and forest degradation[2].

The recent proliferation of internet access in the Amazon has reduced historical geographical isolation of forest peoples, allowing their voices to reach a wide range of networks and social media. A network of civil society organizations, "Rede Conexões Povos da Floresta", has over 1,900 internet connections in Brazil[3]. These initiatives have contributed to the empowerment of forest peoples. Forest peoples have a rich ethnoecological knowledge that can play a key role in the design and implementation of nature-based solutions (NBS). The implementation of NBS by forest peoples can play a role in promoting climate justice if appropriate levels of finance are mobilized.

Several NBS, such as agroforestry systems, can produce both mitigation and adaptation outcomes. Solutions for adaptation of forest peoples to climate change in the Amazon work better when designed through participatory methodologies to combine traditional knowledge with modern knowledge and technologies. This conceptual bridge to the future is key to designing efficient solutions for resilience and adaptation of forest peoples in the Amazon.

2 - Films **Somos Guardiões** (available on Netflix) and **The Territory** (available on National Geographic Films).

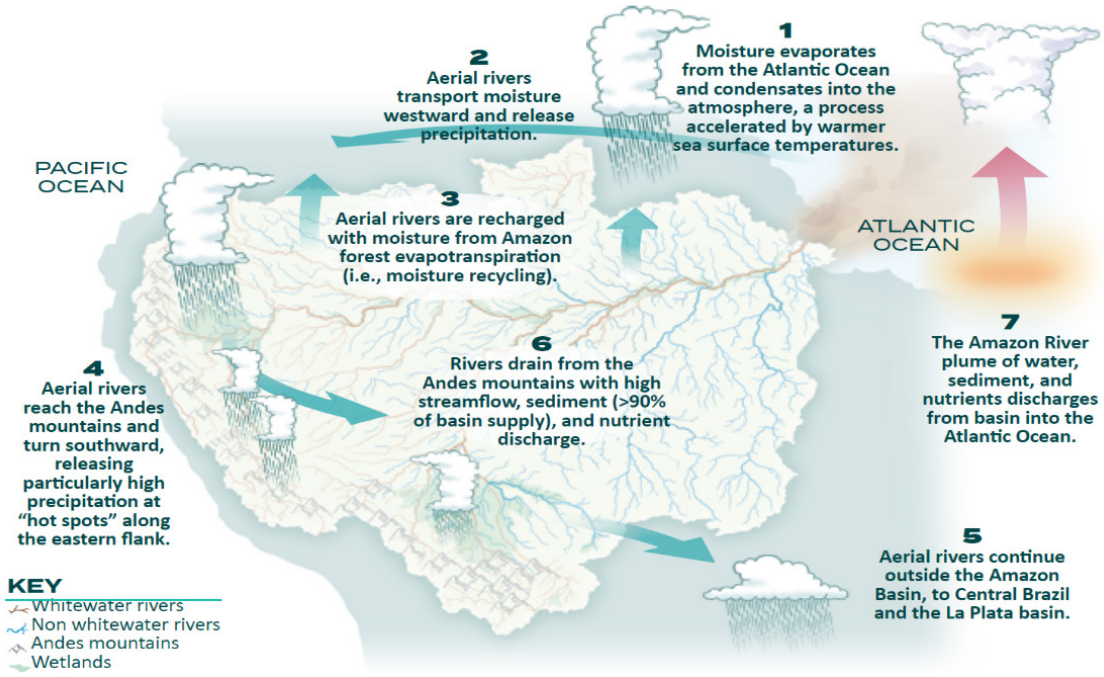
3. Climate change in the Amazon[3]

Scientific research has shown that climate change in the Amazon has implications for people and nature on both regional and global scales. The Amazon River accounts for approximately 17–20 percent of the world's river discharge to the oceans[4]. This region contains more than 10 per cent of the Earth's terrestrial biodiversity and stores an amount of carbon equivalent to 15 – 20 years of global CO2 emissions (150–200 Gt C)[5, 6]. The Amazon also contributes 40 per cent of all riverine sediment entering the Atlantic Ocean, playing a crucial role in maintaining the ocean's nutrient balance, promoting marine biodiversity, and sequestering carbon dioxide[7].

The humidity carried by Amazon atmospheric rivers is responsible for much of the rain that falls in the agricultural regions of west-central, southeastern, and southern Brazil, the La Plata Basin (including Bolivia, Paraguay, Uruguay, south of Brazil, and north of Argentina), as well as parts of Northern South America. The total amount of water released into the atmosphere by the forest is around 20 billion tons daily[8], comparable to the 17 billion tons of water discharged daily by the Amazon River to the ocean. To the north, these moisture corridors transport rainfall to the Orinoco River basin[9] (Figure 1).

Figure 1

Key processes along the Atlantic-Andean-Amazon hydroclimate pathways



Source: Beveridge et al. (2024)

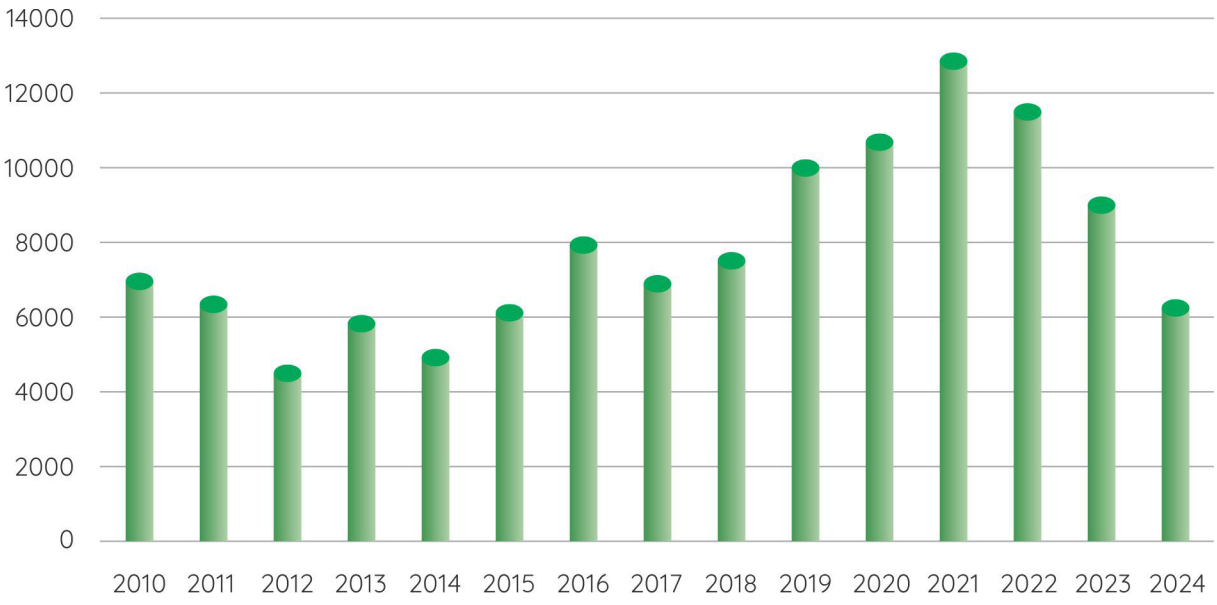
3 - José Marengo e Virgilio Viana

Key processes along the Atlantic-Andean-Amazon (AAA) hydroclimate pathway reflect how the regional water cycle is linked through continental hydrology, moving water vapor by the trade winds from the tropical Atlantic to the Amazon and the Andes (E-W connectivity) and then parallel to the Andes to southern Amazon and the La Plata Basin (N-S connectivity), through regional-scale atmospheric circulation by the aerial rivers east of the Andes. These processes along the AAA pathway underpin social-ecological systems within and beyond the boundaries of the Amazon Basin (Source: Beveridge et al. 2024[2]).

Over the past five decades, the Amazon rainforest has been deforested for agricultural expansion (primarily cattle, soy, and corn), as well as mining and urban expansion, and degraded by illegal logging and fires. According to the Satellite Deforestation Monitoring Project - PRODES of the National Institute for Space Research (INPE), 21.6% of the Brazilian Amazon has been deforested since monitoring began in 1987. The positive news is that the Brazilian government has succeeded in reducing deforestation in the last few years (Figure 2).

Figure 2

Deforestation rate in the Amazon (km²/year)



Source: Data from TerraBrasilis – INPE (2025)[10].

The expansion of cattle ranching and agriculture, combined with various illegal activities such as land grabbing, mining, and logging, are the main drivers of deforestation and forest degradation. These pressures are driving the Amazon region to the edge of a tipping point, putting the landscapes in danger of becoming dominating by degraded vegetation and agricultural land[11]. Deforestation has

emerged as a significant driver of regional climate disruption, as changes in forest cover directly affect rainfall regimes and hydrological cycles.

The intensification of extreme events leading to hydrometeorological disasters such as droughts and floods, in addition to the feedback loops between deforestation and climate change, exacerbate Amazonian ecosystem vulnerability, as documented by Marengo (2024)[12]. The catastrophic consequences of deforestation and global warming, as shown by Fearnside and Leal Filho (2025)[13] underscore both the forest's vulnerability and its crucial role in the carbon cycle.

The interactions between climate change and biodiversity are framed within the "three global emergencies" of health, biodiversity, and climate. This framework illustrates the ways in which Amazon degradation could release new pathogens and worsen the climate crisis have been widely investigated[14, 15]. Lengthening of the dry season and changes in the frequency and intensity of extreme drought episodes are probably the most important threats to society, Amazonian ecosystems, and wildlife[9].

Temperature records show an overall warming of the Amazon in recent decades, especially over eastern Amazon from 2000 to the present. Warming, particularly over the eastern Amazon, is clear and may result from both deforestation and global warming. The warming trend has been evident since 1980, and has accelerated since 2000, with 2015–16 and 2023–24 among the warmest years in the last three decades. Warming in the Amazon is already 2°C above the historical average, with particularly strong impacts on the most deforested sub-regions. Temperature rise has increased the occurrence of forest fires in unprecedented ways. The year 2023 was marked by major heat waves across the globe. Record-breaking air temperatures and prolonged heat waves reached the Amazon region[16].

In 2023, the drought intensified in the Amazon, and six heat waves raised the temperatures by 4˚- 5˚C warmer than average over the region, inducing compound drought-heat events[17]. This rise in temperature has exacerbated extreme droughts, increased the occurrence of forest fires, and altered the hydrological cycle in unprecedented ways. As a result of the drought, the level of the Negro River in Manaus dropped in October 2024 to the lowest level in 122 years of records. In fact, six record droughts and nine record floods have occurred in the Amazon region in the last 25 years, indicating a greater variability and intensity of dry and rainy seasons compared to previous decades[18].

The predictable annual cycle of seasonal flooding has been disrupted by damming rivers and altered climatic conditions. These changes can lead to asynchronous processes among species, such as fruits prematurely ripening and falling

in dry floodplains, and inaccessibility for aquatic organisms which may compromise the overall ecosystem stability and resilience[19,20]. Observations suggest an increase in rainfall extremes and intensification of droughts and floods, with little overall change in mean annual river discharges.

Recent intensification of the Amazon's hydrological extremes is due to the intensification of interannual variability in moisture transport from the tropical Atlantic into the Amazon. The flood return period has increased from 20 years during the first half of the 20th century to four years since 2000[21]; regional discharges have increased in the northwestern Amazon during the high-water season and decreased in the southwestern Amazon during the low-water season[9].

Observed and projected changes in the Amazon show that current climate and hydrology extreme events tend to be differentiated both spatially and temporally, exhibiting two seesaw spatial patterns, one north-south and the other west-east, and an intensification of the wet and dry seasons. In the present, the northwestern Amazon shows increased rainfall and runoff, while the southern part shows the opposite. Current data shows that the dry season has expanded by about 1 month in the southern Amazon since the mid-1970's[9].

The risk of surpassing this "point of no return" increases if global warming rises above 2°C and deforestation exceeds 20 per cent of the basin's total area. Nobre et al. (2016) warned of the proximity of "tipping points" in the Amazon[22]. More recently, Nobre (2025) emphasized the urgency of bringing deforestation to zero and restoring deforested areas to reduce the probability of the Amazon's tipping point[23].

Climate science modelling studies simulating Amazonian deforestation show significant reductions in rainfall and increases in temperature over the Amazon[3], affecting regional hydrology and thus increasing the vulnerability of ecosystem services for the local and regional population in and outside the Amazonian region. Projections show a drier, warmer climate in the eastern Amazon, leading to an increase in evapotranspiration. The western Amazon will also experience warmer conditions, but rainfall is expected to increase due to more intense rainfall events, leading to increasing runoff and decreasing evapotranspiration in the northwestern Amazon. This may increase the risk of floods in the region[2].

This scientific evidence points to the urgent need for adaption to climate change by Amazonian societies. This scenario positions adaptation to climate change as a priority agenda for the region. Adaptation can be combined with mitigation outcomes in a number of nature-based solutions. These solutions can combine both traditional knowledge and modern forestry technologies.

4. Local Adaptation Plans for Amazon Forest Peoples [4]

4.1 Introduction

The work presented in this chapter is the result of a partnership between FAS, CNS, COIAB, APIB and CONAQ[5], with support from the Ministry of Indigenous Affairs and Ministry of Environment and Climate Change of Brazil. This initiative follows the guidance of the COP30 Presidency to focus on the Action Agenda. The goal of this section is to support design, implementation and funding for Local Climate Adaptation Plans of Amazon Forest Peoples.

4.2 Methodology

The methodology used in this report was based on a bottom-up consultation for the development of Local Climate Adaptation Plans in the Amazon. This is a two-stage process: (i) online capacity building for community leaders for 1,900+ villages and (ii) workshops held at the village level.

The participatory methodology was grounded in active listening, fostering dialogue and mutual learning between participants. It emphasizes the integration of traditional knowledge and scientific understanding, ensuring that both perspectives contribute to locally relevant solutions. Practical action was a core goal, with activities designed for real territorial contexts in the Amazon. The training follows a hybrid format, combining asynchronous online video lessons with in-person workshops conducted in the territories by local facilitators; this promotes both accessibility and hands-on experience.

The content of the program included 7 online sessions with the following the structure:

4 - Virgilio Viana, with inputs from the technical staff of FAS and consultants of Naveterra.
5 - COIAB – Coordination of Indigenous Organizations of the Brazilian Amazon; APIB – Articulation of Indigenous Peoples of Brazil; CONAQ – National Coordination for the Articulation of Black Rural Quilombola Communities; and CNS – National Council of Extractive Populations.

Table 1

Basic Training for Developing Local Adaptation Plans in the Amazon

Module	Theme	Content
Introduction		- Course overview; - Our expectations; - Participation of everyone in the process; - Engagement and commitment throughout the process;
1	Methodology of the Pre-COP30 Workshops	- Memories of the Past - Perceptions of Change - Impacts on Ways of Life - Assessment of Change - Strategies and Resilience - Knowledge about Climate Change
2	Orientation and Preparation for COP30	- Context - The structure and process of the Conference of the Parties (COP) - Relevance for Brazil and the Amazon - Step-by-step guide on accreditation - How the conference spaces are divided (Green and Blue Zones) -What is expected to take place over the two weeks of the event - How to organize in advance - Practical strategies for effective participation
3	Climate change in Brazil	- Impacts of climate change on Brazilian biomes - Future scenarios - The strategic importance of the Amazon for global climate balance - Brazil's emission targets - Climate policies
4	Climate injustice in the Amazon	- Who is most affected by climate change? - How do Indigenous villages and traditional communities protect nature? - The importance of youth in environmental activism.
5	Workshop on Developing Adaptation Plans	- Defining the project name, justification, objectives, and benefits - Characteristics, scope and out of scope - Deliverables, stakeholders, assumptions & constraints, investments, risks, and timelines
Guidelines for the Adaptation and Mitigation Plan for Climate Change		- Highlight the step-by-step process for completing the forms - Collective participation by the community - Active listening process - Production and submission

Note. Data compiled and organized by the FAS

These educational videos were accessed through the website of all partner organizations. In addition, COIAB offered a complementary capacity-building program online, following the methodology of Table 1[6]. Village workshops were led by leaders who participated in the capacity building program. The workshops were held in villages as pre-COP events. The goal was to address three questions: (i) What is climate change to your reality? (ii) What are the most relevant problems for your village? (iii) What are the solutions to the challenges you face? The workshops had the structure detailed in table 1 as a reference.

These bottom-up Local Adaptation Plans were analyzed by FAS technical team, with the support of Nave Terra (a consulting firm), funded by GIZ. FAS has had the experience and operational structure to implement adaptation and resilience projects since 2008 across 798 communities in the Amazon, in an area of 14 million hectares. This core database and institutional knowledge guided the design of this section of the report.

4.3 Results

The online capacity building that FAS offered Amazonian communities included 13 recorded video classes which were freely available. These courses reached 1,285 participants in 628 communities, in all (9) states of the Brazilian Amazon. Participants wrote 99 local adaptation plans in indigenous territories (14) and Afrodescendents (Quilombolas – 27) and territories of traditional populations (58).

The communities involved in the Local Climate Adaptation Plans perceive vulnerability not as an abstract or purely climatic notion, but as phenomena that is now part of their livelihoods. According to the analysis by Nave Terra (2025), climate change is understood through concrete transformations in daily life: the loss of rainfall predictability, the lengthening of dry seasons, the reduction of river levels, and the increased frequency of forest fires. These environmental changes are seen as directly connected to social impacts, including reduced availability of fish and forest products, food insecurity, and the erosion of traditional practices and cultural rituals.

Indigenous and traditional populations interpret climate disruptions that demand collective adaptation. Their narratives acknowledge the damage caused by extreme droughts, floods and wind storms, as well as changes in temperature and rainfall distribution. Their responses emphasize mutual aid networks, youth engagement, and the integration of ancestral knowledge to guide new resilience pathways[24].

6 - The video classes can be seen at: Atividades de Jornada de Formação COP30 - Adaptação Climática.

Table 2

Framework for Analyzing Climate Action Plans

Fields	Description of the Analysis Category	Focus of the Analysis	Example
1. Territory (Regional/ State/ Municipality/Group/ Territory)	Identification of the location and traditional group involved.	Enables grouping by geography, community type, and institutional territory.	Manicoré/AM (Indigenous); São Domingos do Capim/PA (Traditional).
2. Priority Impact	Main aspects of community life most affected by climate change.	Highlights the most urgent and recurrent issues (e.g., water, health, farming, transport).	(1) Transportation (Drought); (2) Drinking Water.
3. Traditional Knowledge (Existing Strategies)	Local and ancestral practices used to face climate variability.	Recognizes cultural resilience and existing knowledge that guide adaptation.	Fire-free crop management; Observation of natural cycles.
4. Priority Action (What to Do)	First and second most relevant actions in the Adaptation Plan.	Classifies actions by investment type (infrastructure, production, training) and theme (water, production, education).	(1) Solar-powered well; (2) Drip irrigation.
5. Main Thematic Axis	Categorization of actions into broader strategic areas.	Groups solutions for comparison (e.g., Water Security, Productive Sustainability, Infrastructure).	Water Security: wells, cisterns; Productive: SAFs, reforestation.
6. Nature of the Action (Adaptation/ Mitigation/ Combined)	Defines how the action addresses climate change.	Distinguishes adaptation, mitigation, or combined actions.	Well (Adaptation); SAFs (Combined); Fire Brigades (Combined).
7. Inputs and Implementation Means	Technical, material, and human resources needed.	Identifies feasibility, partnerships, and required capacities.	Solar pumps, pipes, nurseries, training, local support.
8. Financial Resources (Average Cost)	Estimated cost of the priority action.	Defines investment scale — from low-cost (training) to high-cost (infrastructure).	BRL134,000 (Well + Solar); BRL50,000 (Mechanization Kit).

Source: Analysis of adaptation plans by FAS team and Nave Terra (2025)

While the same climate phenomena affect both indigenous and traditional communities, their perceptions and priorities regarding impacts and vulnerabilities

differ significantly. Indigenous peoples often emphasize the direct threats to cultural continuity, biological cycles, and ancestral knowledge systems, as well as challenges to food security. Meanwhile, Traditional Communities (PCTQs) - especially extractivist and riverine groups - tend to focus on the fragility of infrastructure, logistics, and subsistence-based or extractive livelihoods.

Table 3

Main vulnerabilities identified of Indigenous and Traditional Communities

Indigenous Vulnerabilities	Vulnerabilities of Traditional Peoples, Communities, and Quilombolas (PCTQs)
Disruption of Natural Cycles: Changes in temperature and rainfall are affecting native fruiting cycles and the availability of key species for food, income, and cultural use.	Logistics and Market Access: Droughts and poor infrastructure hinder the transport and sale of agricultural and extractive products.
Erosion of Traditional Knowledge: Climate variability makes ancestral knowledge about planting, seasons, and forest management less applicable.	Livelihood Impacts: Droughts delay fishing and reduce raw materials for crafts, such as cauaçu.
Territorial Protection: Indigenous plans prioritize monitoring and protecting territories against invasions, deforestation, and fires.	Flood and River Vulnerability: Extreme floods damage schools and paralyze community activities.
Cultural and Social Losses: Scarcity of fish, game, and fruits weakens traditional celebrations and rituals.	Fires and External Pressure: Expansion of farming and intense fires threaten crops and territories.
Conflict and Migration: Loss of livelihoods pushes youth to cities, weakening community structures.	Production System Transition: Traditional slash-and-burn practices are being replaced by agroforestry systems (SAFs).
Food Insecurity and Dependency: Growing reliance on processed foods affects nutrition and health.	Pollution and Waste: Poor waste management contaminates rivers and threatens health.
Historical Traumas: Past megaprojects and territorial losses amplify current climate vulnerability.	Water Issues: Coastal and riverine areas face salinization and scarcity of drinking water.

Source: Analysis of adaptation plans by FAS team and Nave Terra (2025)

These findings informed the identification of concrete adaptation measures proposed by local communities, summarized below.

Table 4

Priority Actions for Climate Adaptation Plans – consolidated synthesis

Thematic Axis	Group	Sub-Axis / Area	Main Priority Actions
1. Water Security and Basic Infrastructure	& PCTQs	Sustainable Water Supply	Construction of community artesian wells powered by solar energy; community water distribution systems.
	PCTQs & Indigenous	Rainwater Harvesting	Installation of family and community cisterns and rainwater collection systems to address droughts and river salinization.
	PCTQs & Indigenous	Source Protection	Restoration and protection of springs and riparian forests using native species.
2. Food Security, Bioeconomy, and Resilient Production	PCTQs	Sanitation and Health	Improvement of basic sanitation and water treatment systems in rural and riverine communities.
	PCTQs	Structural Adaptation	Construction of elevated walkways, resilient houses, and roads; drip irrigation systems linked to solar-powered wells.
	Indigenous & PCTQs	Agroecological Production	Expansion of Agroforestry Systems (SAFs), fire-free agriculture, and seed banks; creation of community nurseries.
	PCTQs & Indigenous	Productive Infrastructure	Construction or rehabilitation of casas de farinha, community workshops, and small agroindustrial units.
	PCTQs	Innovation and Income	Support for bioeconomy projects (e.g., beekeeping, biojewelry, community crafts).
	PCTQs	Fisheries and Animal Husbandry	Strengthening community fishery management and small livestock or aquaculture.
	Indigenous & PCTQs	Capacity Building	Training in agroecological practices, project management, and sustainable production.
3. Infrastructure, Energy, and Logistics	PCTQs	Transport and Access	Acquisition of aluminum boats, motorized canoes, and agricultural tricycles to improve mobility and production transport.

	PCTQs	Community Infrastructure	Construction of community centers and floating schools to ensure access to education during floods.
	Indigenous & PCTQs	Health Infrastructure	Renovation and climatization of health posts; implementation of Telehealth with solar power and internet access.
	Indigenous	Clean Energy	Solar electrification of homes and community microgrids to replace diesel generators and enable refrigeration and schooling.
	PCTQs	Waste Management	Establishment of community recycling systems, reverse logistics networks, and eco-centers for waste storage.
4. Territorial Protection, Restoration, and Fire Management	Indigenous	Territorial Surveillance	Strengthening monitoring and defense against invasions and deforestation; acquisition of GPS, drones, radios, and safety gear.
	Indigenous & PCTQs	Fire Prevention and Response	Creation and training of community fire brigades; collaboration with PrevFogo; use of participatory fire maps.
	Indigenous & PCTQs	Ecological Restoration	Reforestation of degraded areas and establishment of ecological corridors with native species (e.g., açaí, cacao, andiroba).
	Indigenous & PCTQs	Territorial Recognition	Mapping, georeferencing, and advocacy for official recognition and titling of territories.
5. Culture, Knowledge, Education, and Governance	Indigenous	Intergenerational Education	Development of intercultural workshops on climate and territorial management; inclusion of traditional knowledge in school curricula.
	Indigenous	Cultural Strengthening	Recording and valuing ancestral knowledge (e.g., ecological calendars, traditional management techniques); preservation of native languages and rituals.
	Indigenous	Communication and Engagement	Strengthening Indigenous media and audiovisual collectives for communication and advocacy.

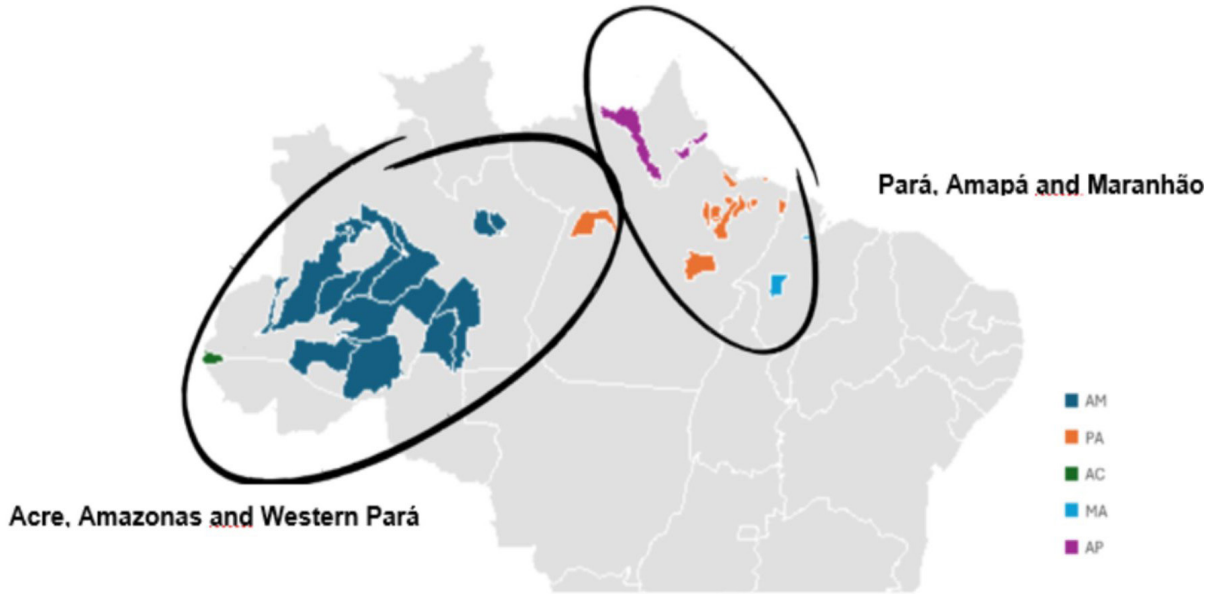
PCTQs &	Climate Education and Community	Action Committees (CCAC); promotion of climate education campaigns and environmental training in schools.
Indigenous PCTQs	Governance and Health	Strengthening local associations and health systems; acquisition of medical equipment, ambulances, and training of community health agents.

Source: Analysis of adaptation plans by FAS team and Nave Terra (2025)

The adaptation plans came from different territories and cover a vast region of the Amazon, as can be more clearly seen in the following map.

Figure 3

Regional climate identity

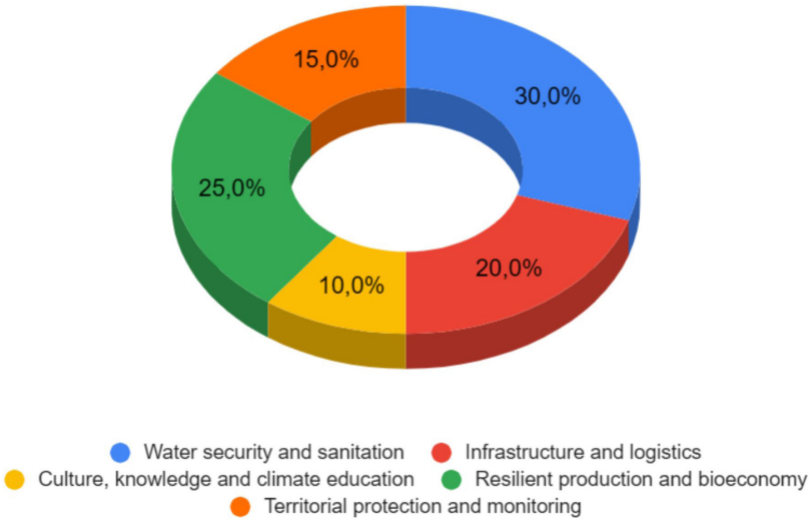


Source: Analysis of adaptation plans by FAS team and Nave Terra (2025)

The study identified five major adaptation components emerging across Indigenous and traditional communities: (i) water security and sanitation; (ii) resilient production and bioeconomy; (iii) logistics and infrastructure; (iv) territorial protection and monitoring; and (v) culture, knowledge, and climate education. As shown in Figure 5, most plans emphasize water access and sanitation (30%) and resilient production (25%), followed by infrastructure (20%), territorial protection (15%), and cultural and educational actions (10%). This confirms that climate adaptation priorities in the Amazon are strongly linked to local wellbeing and territorial management, blending traditional knowledge and practical solutions such as cisterns, agroforestry systems, and community-based monitoring.

Figure 4

Main adaptation components identified in 60 Local Climate Adaptation Plans (Jornada COP30 – Nave Terra 2025)



Sources: Analysis of adaptation plans by FAS team and Nave Terra (2025).

Existing water, production, and infrastructure-related activities demonstrate that communities already prioritize integrated adaptation pathways that link livelihoods, energy, and ecosystem health.

This Amazon climate justice financing Innitiative has produced a first estimate (Table 5) . This estimate considers available data for 5,067 communtiies. This estimate totals 21,7 billion reais, aproximately USD 4 billion. Considering that the total number of communties is around 10 thousand (estimate varies), the total budget can be estimated to be USD 8 Billion. This estimate is for the Brazilian Amazon only and needs to be adjusted in order to incorporate other Amazon countries.

Table 5

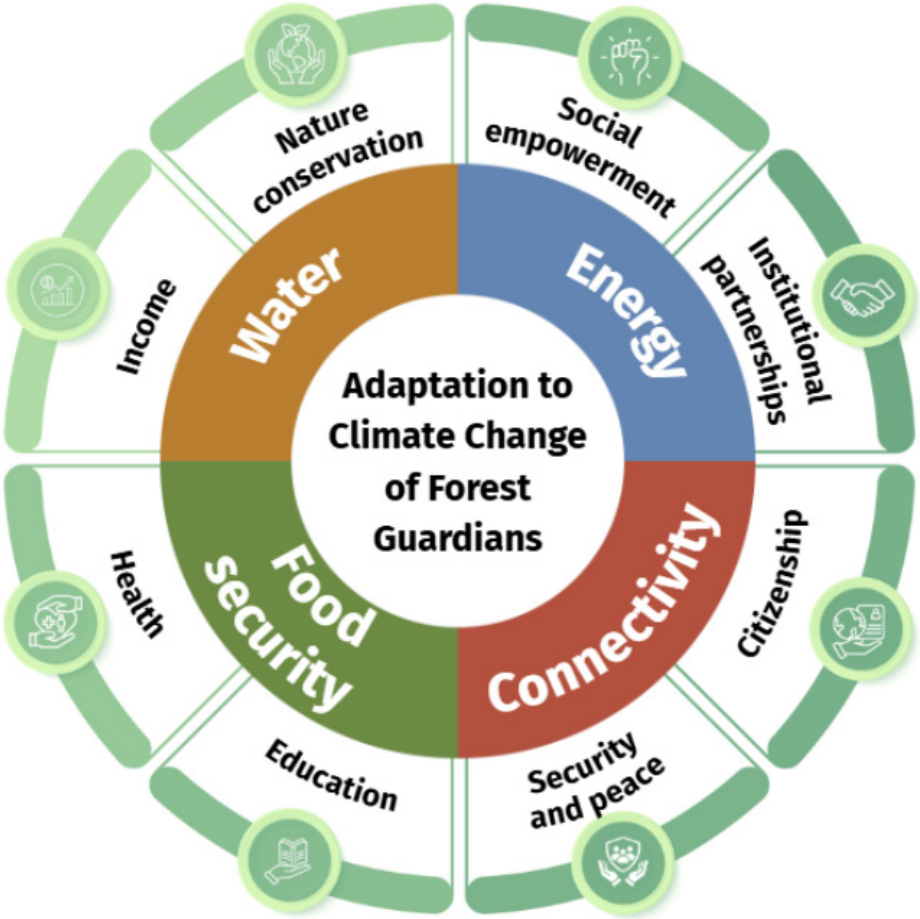
Costs for implementation of Adaptation Plans of Indigenous and Traditional Populations in the Brazilian Amazon (Brazilian reais).

Category	Communities	Average cost	Total (BRL $)
Indigenous	3182	2.588.164	**8.235.536.386**
Traditional East	1556	6.828.049	**10.624.443.521**
Traditional West	329	8.799.960	**2.895.186.893**
Total	**5.067**	**4.293.500**	**21.755.166.800**

This investment takes into account the systemic approach developed by FAS and applied in 798 communities in the Brazilian Amazon (35, 36). Taking into account the results of the process described here, the systemic approach recom-

mended for the adaptation plans is described in Figure 5. At the inner circle are priority areas for investment and in the outer circle are the other areas that need investment in adaptation for climate change of Amazon forest guardians.

Figure 5
Priority areas for investment for adaptation for climate change of Amazon forest guardians.



The methodology developed by this initiative will be documented and shared across Amazonian countries through the Lima Adaptation Knowledge Initiative of UNFCCC and UNEP. The methodology developed for drafting Local Climate Adaptation Plans in the Amazon will be shared at COP30 so that it can be replicated to other tropical forest regions.

5. Climate Adaptation and the Role of ACTO[7]

Amazon countries signed a cooperation treaty in 1978, which includes eight nations (Bolivia, Brazil, Colombia, Ecuador, Guyana, Peru, Suriname, and Venezuela). This treaty led to the creation of the Amazon Countries Treaty Organization ACTO, which is a legal entity based in Brasilia. ACTO plays an important role in setting regional policies and promoting cooperation and collaborative programs among member countries[8].

The Belém Declaration (2023)[25] represents a landmark regional commitment, signed by the eight Amazonian Presidents, linking conservation, sustainable development, and social inclusion. It emphasizes:

- The collective responsibility of Amazonian countries to protect biodiversity, forests, and water resources.
- Strengthened enforcement against illegal deforestation, illegal mining, and trafficking.
- Integration of conservation and sustainable practices, aligned with global frameworks such as the Sustainable Development Goals (SDGs), Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), and United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP).
- Prioritization of vulnerable groups, including Indigenous peoples, traditional communities, and low-income populations.
- Regional cooperation and harmonized policies to implement adaptation strategies.

ACTO already implements and supports a range of concrete actions to address climate change in the Amazon, in strict alignment with the mandate of the Belém Declaration and its related resolutions. Ongoing initiatives include:

- the development of the Joint Amazon Mitigation and Adaptation Mech-

7 - Vanessa Grazziotin
8 - See more at: https://otca.org/en/

anism for the integrated and sustainable management of forests within the framework of Decision 16/CP.21 of the UNFCCC and pursuant to resolution 22;

- the formulation of an Amazon Strategy for Disaster Risk Management, pursuant to resolution 25;
- the development of the project "Rapid Assessment of Climate Change in the Amazon";
- the establishment of a climate change module within the Amazon Regional Observatory (ARO), including the generation of climate models and future projections for the region; and
- ACTO's active participation in international climate negotiations, advocating for the central role of the Amazon rainforest and the need for international support for its protection, among other efforts.

Limited commitments in key sectors such as transport, energy, industry, and mining; as well as oceans and coastal areas; and racial equality, represent notable gaps. The Amazon Regional Adaptation Plan should explicitly incorporate these sectors to ensure alignment with Brazil's 16 sectoral adaptation plans.

Dimensions of adaptation highlighted in the Declaration include:

- Programs tailored to diverse socio-environmental realities.
- Access to international climate finance to support local adaptation.
- Ecosystem-based solutions, including reforestation, agroforestry, and sustainable water and land management.
- Early warning and preparedness mechanisms for climate-related disasters.

6. Opportunities for government and private funding[9]

There are several options available for government and private funding for adaptation and mitigation in the Amazon.

6.1 The Amazon Fund

The Amazon Fund, managed by the Brazilian Development Bank (BNDES), was established in 2008 to mobilize non-reimbursable donations for initiatives aimed at preventing, monitoring, and combating deforestation, as well as promoting the conservation and sustainable use of forests within the Brazilian Legal Amazon[26].

In addition, the Fund supports the development of monitoring and control systems for deforestation in other Brazilian biomes and tropical countries[27].The goal is to support initiatives for prevention, monitoring, and control of deforestation, as well as conservation and the sustainable use of the Legal Amazon. Up to 2025, the Amazon Fund has supported 139 projects with a total funding of USD1,1 billion[28]

6.2 The Tropical Forest Forever Fund

The Tropical Forest Finance Facility (TFFF) is a financial mechanism proposed by the government of Brazil aimed at mobilizing large-scale investments for the protection and sustainable management of tropical forests.

The TFFF fund aims to raise US 125 billion at low interest rates as a low-risk asset[29] to generate annual funds of approximately US$ 4 billion. Those funds would then be distributed to forest countries based on the area of standing tropical forest present. The initiative seeks to value the ecosystem services provided by tropical forests - such as carbon sequestration, biodiversity preservation, and water regulation - by assigning a monetary value to these services and thereby incentivizing long-term investment in forest preservation and sustainability.

9 - Avinash Persaud and Virgilio Viana

6.3 Multilateral funding

6.3.1 IDB – Inter American Development Bank

IDB has played a central role in financing sustainable development initiatives in the Amazon. Through its Amazonia Forever program, the IDB mobilizes resources to promote bioeconomy, sustainable infrastructure, forest conservation, and climate resilience. The Bank also supports public policies and projects that strengthen local governance, enhance environmental monitoring, and create green jobs, aligning economic growth with ecosystem preservation.

6.3.2 The World Bank (IBRD)

IBRD provides critical financing and technical assistance to foster sustainable development in the Amazon region. Its initiatives focus on improving social inclusion, strengthening land and forest governance, and promoting sustainable rural development.

The Bank has also supported large-scale environmental programs that enhance climate adaptation, biodiversity protection, and the transition to low-carbon economies in the Amazon Basin.

6.3.3 Global Environment Facility (GEF)

GEF finances projects that address the root causes of environmental degradation in the Amazon, focusing on biodiversity conservation, sustainable forest management, and climate change mitigation. Through partnerships with governments, NGOs, and local communities, the GEF promotes integrated ecosystem management, supports Indigenous Peoples' rights, and strengthens sustainable value chains that connect conservation with livelihoods.

6.3.4 The Green Climate Fund (GCF)

GCF channels climate finance to enhance resilience and reduce greenhouse gas emissions across the Amazon. The Fund supports transformative projects that integrate renewable energy, sustainable land-use practices, and adaptation strategies for vulnerable populations. By leveraging co-financing and public-private partnerships, the GCF enables countries in the Amazon region to implement large-scale, climate-resilient development pathways.

6.3.5 The Development Bank of Latin America and the Caribbean (CAF)

CAF provides financial and technical support for sustainable development projects that strengthen resilience and connectivity in the Amazon. Its portfolio includes investments in sustainable infrastructure, circular economy, water and sanitation, and conservation of natural capital. CAF prioritizes inclusive development models that integrate local communities, reduce inequalities, and foster green economic transformation in the Amazon region.

6.3.6 The Baku-Belém Roadmap

Adaptation finance remains scarce: only 27% of MDB climate finance in 2024 targeted climate adaptation. Proposals under the Baku–Belém Roadmap:

- Zero-cost Pause Clauses in debt — to be mainstreamed in sovereign and MDB instruments.
- Multilateral Development Banks (MDB) lending target of 50% for adaptation -> scale up resilient infrastructure (ex.: heat-ready schools in Pará).

Debt-for-Resilience Swap Facility -> economies of scale, lower costs, regional public goods (pilot: $400M Barbados swap focused on health). Priorities for allocation:

- Community-driven Adaptation Plans (Pre-COP outcomes).
- Regional cooperation (Amazon Regional Adaptation Plan)
- Cross-cutting priorities: justice, equity, gender

The following paragraphs presents three potential action ideas to make an impact on adaptation finance for COP30:

1. Making the financial system more fit for a world facing increasing climate shocks: This can be achieved by calling for the spread of zero-cost Pause Clauses in all debt instruments, not just for small states or MDB lending. Examples of good international standards include the ICMA (International Capital Markets Association) model, zero-cost clauses, and the recently issued Eurobond with pause clauses. It is necessary to create a wave of adoption by countries and investors. If a core set of governments and investors announced their willingness to lend or borrow with natural-disaster pause clauses We could work with SB COP to recruit asset managers and asset owners in a Pause Clause Alliance.

2. Expanding low-cost finance for resilient public infrastructure: MDBs can raise their target on adaptation/resilience to 50% of climate-related lending. In 2024, MDBs lent approximately $135bn to climate finance (making up a majority of developed countries' contributions), but only 25% was allotted to "climate adaptation." Our ogranizations could work with MDB Climate Heads to offer this solution during COP, andIDB has expressed its willingness to participate. An event at COP30 that showcases the benefits of MDB adaptation loans, such as the loan to finance 25 heat-ready schools in Para State, would strengthen this call to action

3. The Multinational Debt for Resilience Swap Facility launching at COP30 would substantially expand debt swaps for climate resilience. This financial instrument would offer economies of scale, lower costs, and increased efficiency to the ecosystem by standardizing the main features of debt swaps. As a result, the guarantee, trust fund and monitoring structures could generate a commitment that a minimum of 20% of the proceeds of debt swaps from the Facility to direct to regional public goods. To make this action-oriented, IDB/CAF/CDB16, potentially together with the World Bank, will launch the first debt swap Facility , which is a $400 million debt for-social-resilience swap in Barbados that is focused on health resilience, such as the funding of the mobile clinics.

7. Communication and engagement[10]

Climate adaptation has long been treated as a technical afterthought, a secondary pillar to mitigation, activated only when disaster strikes. This framing is outdated and dangerous. In a world already 1.5°C warmer, our inability to adapt to climate change is not a failure to prevent. Rather, our ability to adapt to climate change is the foundation of survival, equity, and legitimacy in climate governance in the Amazon and beyond.

To make climate adaptation the new normal, governments and institutions must reframe adaptation as a strategic pillar of national and global security, communicate adaptation as a vehicle of agency rather than despair, scale finance and governance mechanisms to make resilience investable, and integrate adaptation criteria into every economic and infrastructure decision.

7.1 Communicating adaptation

For decades, climate communication has relied on crisis narratives, grounded on the living realities of melting ice, burning forests, and vanishing futures. These images mobilized due attention but have eroded stakeholders' agency. Research in behavioral psychology and political communication confirms that fear without pathways to action leads to paralysis and disengagement

Effective climate adaptation communication must name the risk in concrete, lived terms rather than as abstraction, and expose accountability by linking the worsening of impacts to political and financial choices. This would highlight agency by identifying who is acting, what solutions works, and how positive systems can scale.

In Ways of Being[30], James Bridle (2022) argues that climate crisis is also a "crisis of imagination." in that we keep seeking technical fixes to political failures. Climate adaptation demands a different narrative, one that recognizes distributed intelligence and multiple forms of leadership, from governments to local communities.

Climate adaptation must be presented as a matter of design and governance, not charity. Arturo Escobar's notion of "pluriversal design" (Designs for the Pluriverse, 2018)[31] offers a relevant lens: resilience emerges when systems are designed to accommodate ecological, social, and epistemic diversity. This principle

10 - Natalie Unterstell

should guide climate communication strategy as well. A plural understanding of climate adaptation connects local knowledge, technological innovation, and policy coherence to ignite meaningful change. Communicating this plurality across languages, sectors, and cultures builds legitimacy. It transforms adaptation from a reactive process into a coordinated public project.

7.2 What must change

The next decade will test whether climate adaptation can move from the margins of climate politics to one of its core tenants. Such a transformation would require confronting several limiting myths about climate adaptation.

The first myth is that climate adaptation means giving up on climate mitigation. The guide emphasizes that emission cuts remain essential, but mitigation itself depends on adaptation. Without heat-and flood-resilient power grids, roads, and housing, the energy transition will collapse.

The second myth claims that we can adapt to any level of global warming. The IPCC[2] shows that the effectiveness of adaptation drops with each fraction of a degree. At 1.5°C, risks can be reduced with speed and scale; at 2°C, costs surge and limits become irreversible. Beyond that, no infrastructure or technology can prevent massive human and economic losses.

The third myth treats adaptation as a license to maintain fossil fuels. This distortion turns adaptation into a justification for delay when, in reality, the opposite is true: the longer emissions remain high, the harder and costlier adaptation becomes. Adaptation is what makes the transition possible, not what replaces it.

Another misconception is that only the most vulnerable populations and territories need to adapt. The Communication Guide for Adaptation[32] stresses that climate impacts are systemic: global supply chains, energy systems, and food security all depend on collective resilience.

The myth that adaptation is too expensive is also false. Evidence from the Global Commission on Adaptation[33] shows that every dollar invested in resilience yields two to ten dollars in benefits, while the cost of inaction already amounts to trillions in global losses.

It is equally wrong to think of adaptation as purely local. Impacts occur in specific territories, but their consequences ripple through interconnected systems requiring coordination across scales.

Finally, it is fundamental to debunk the notion that declining disaster mortality means the world is adapting successfully. Climate vulnerability is rising even in wealthy countries, and in three-quarters of cases studied over 50 years, no real improvement was seen[34].

Together, these myths keep adaptation confined to the logic of emergency and improvisation. Overcoming them means repositioning adaptation as a matter of statecraft, communicating its tangible economic, social, and moral returns, and treating resilience not as a cost but as the essential infrastructure of the future.

Adaptation is not a technical fix. It is a systemic redesign for a world that has already changed. As Bridle reminds us, there are "other modes of intelligence" - ecological, social, collective - that can guide us through uncertainty. Escobar would add that the future will not be built by one worldview, but by plural systems capable of learning and adapting in real time.

Making climate adaptation the new normal is therefore the most consequential political choice of our generation. It is not about reactively surviving change; it is about proactively governing it.

Challenges:

- Bridging global policy debates with community realities
- Ensuring indigenous and local voices are visible in COP processes

Strategies:

- Launch a groundswell/mutirão narrative: adaptation as a necessary part of the transition, not an optional afterthought
- Highlight risks of wrong narrative: focusing only on gaps/failures or "adaptation only" excuses for abandoning mitigation
- Use multi-platform storytelling (media hubs, journalist training, white-label campaigns)
- Tailor messaging: human-centered citizens, materiality for journalists, competitiveness/security for leaders
- Showcase examples (Pre-COP LAPs, Banzeiro da Esperança, resilient schools) as tangible cases

8. Conclusions

Scientific scenarios for the Amazon have resulted in major impacts for forest peoples and thus pointed to the need for concrete action. Local adaptation plans are the basis for planning action by all sectors involved: governments, grassroots and civil society organizations, philanthropists, business, academia, and multilateral organizations.

Current funding for climate adaptation of forest peoples in the Amazon requires new and additional funding. Current funding is far from sufficient to reduce climate injustice. Old and new financial mechanisms need to prioritize adaptation. Climate adaptation investments should prioritize options that combine both adaptation and mitigation outcomes.

Given that the Amazon provides ecosystem services that benefit the planet as a whole, there is an ethical and moral case for global funding. This ethical dimension should especially be considered by countries and industries that have a large historical carbon footprint.

In addition to increasing funding, there is a need to reduce bureaucracy and transaction costs for climate financing. New and more agile funding mechanisms need to be given greater attention to the emergency resulting from climate change in the Amazon.

9. References

[1] Lima Adaptation Knowledge Initiative (LAKI). (2025). Closing gaps to scale adaptation. UNEP Global Adaptation Network

[2] Intergovernmental Panel on Climate Change (IPCC). (2022). Sixth assessment report. IPCC

[3] Iepé. (2025, outubro 22). Rede Conexão Povos da Floresta alcança 2 mil comunidades conectadas na Amazônia Legal. Instituto Iepé.

[4]Beveridge, C. F., et al. (2024). The Andes–Amazon–Atlantic pathway: A foundational hydroclimate system for social–ecological system sustainability. Proceedings of the National Academy of Sciences, 121, e2306229121.

[5]Intergovernmental Panel on Climate Change (IPCC). (2021). Climate change 2021 – The physical science basis. Cambridge University Press.

[6]Intergovernmental Panel on Climate Change (IPCC). (2022). Climate change 2022 – Mitigation of climate change. Cambridge University Press.

[7]Giachini Tosetto, E., Bertrand, A., Neumann-Leitão, S., & Nogueira Júnior, M. (2022). The Amazon River plume: A barrier to animal dispersal in the Western Tropical Atlantic. Scientific Reports, 12, 537.

[8]Nobre, A. D. (2014). The future climate of Amazonia: Scientific assessment report. ARA, CCST-INPE, &INPA.

[9]Morales, J. S., Arias, P. A., Martinez, J. A., & Durán-Quesada, A. M. (2021). The role of low-level circulation on water vapour transport to central and northern South America: Insights from a 2D Lagrangian approach. International Journal of Climatology, 41, E2801–E2819.

[10]Instituto Nacional de Pesquisas Espaciais (INPE). (2025). TerraBrasilis: PRODES – Deforestation increments in the Legal Amazon. https://terrabrasilis.dpi.inpe.br/app/dashboard/deforestation/biomes/legal_amazon/increments

[11]Gatti, L. V., et al. (2021). Amazonia as a carbon source linked to deforestation and climate change. Nature, 595, 388–393.

[12]Marengo, J. A., et al. (2024). Long-term variability, extremes and changes in temperature and hydrometeorology in the Amazon region: A review. Acta Amazonica, 54(Spe 1), 1–18.

[13]Fearnside, P. M., & Leal Filho, W. (2025). COP 30: Brazilian policies must change. Science, 387(6740), 1237.

[14]Artaxo, P. (2020). As três emergências que nossa sociedade enfrenta: saúde, biodiversidade e mudanças climáticas. Estudos Avançados, 34(100), 103–112.

[15]Franco, M. A., et al. (2025). How climate change and deforestation interact in the transformation of the Amazon rainforest. Nature Communications, 16(7944).

[16]Perkins-Kirkpatrick, S. E., et al. (2024). Global heatwaves of 2023: Climate drivers and impacts. Bulletin of the World Meteorological Organization.

[17]World Meteorological Organization (WMO). (2024). State of the global climate 2023. WMO.

[18]Marengo, J. A., Cunha, A. P., Espinoza, J. C., Fu, R., Schöngart, J., Jimenez, J. C., Costa, M. C., Ribeiro, J. M., Wongchuig, S., & Zhao, S. (2024). The drought of Amazonia in 2023–2024. American Journal of Climate Change, 13, 567–597.

[19]Quaresma, A., et al. (2025). Belo Monte Dam impacts: Protagonism of local people in research and monitoring reveals ecosystem service decay in Amazonian flooded vegetation. Perspectives in Ecology and Conservation, 23, 39–50.

[20]Juruna, J. J. P., et al. (2025). Indigenous and ribeirinho's monitoring reveals socioenvironmental impacts of severe Xingu River drought driven by Belo Monte, the world's fifth-largest hydroelectric power plant in the world. Conservation Biology.

[21]Gloor, M., Brienen, R. J. W., Galbraith, D., et al. (2013). Intensification of the Amazon hydrological cycle over the last two decades. Geophysical Research Letters, 40, 1729–1733.

[22]Nobre, C. A., et al. (2016). Land-use and climate change risks in the Amazon and the need for a novel sustainable development paradigm. Proceedings of the National Academy of Sciences, 113(39), 10759–10768.

[23]Nobre, C. A. (2025, March 12). Carlos Nobre on tipping points in the Amazon rainforest. Bulletin of the Atomic Scientists.

[24] Nave Terra. (2025). Sistematização de conteúdos e produção de insumos estratégicos para a incidência dos povos da floresta da Amazônia Legal na COP30: Produto 2 – Revisão bibliográfica e banco de dados consolidado

[25]Organização do Tratado de Cooperação Amazônica. (2023, outubro). Declaração de Belém. https://otca.org/pt/wp-content/uploads/2023/10/Declaracao-de-Belem.pdf

[26]Fundo Amazônia. (n.d.). Fundo Amazônia. Banco Nacional de Desenvolvimento Econômico e Social (BNDES). Retrieved from https://www.fundoamazonia.gov.br/pt/fundo-amazonia/

[27] Fundo Amazônia. (2024). Relatório de Atividades do Fundo Amazônia – RAFA 2024. https://www.fundoamazonia.gov.br/export/sites/default/pt/.galleries/documentos/rafa/RAFA_2024_port.pdf

[28]Banco Nacional de Desenvolvimento Econômico e Social (BNDES). (n.d.). Projetos apoiados – Fundo Amazônia. https://www.fundoamazonia.gov.br/pt/projetos-apoiados

[29]Ministério da Fazenda. (2024). Tropical Forest Forever Facility (TFFF). Governo do Brasil. https://www.gov.br/fazenda/pt-br/acesso-a-informacao/acoes-e-programas/transformacao-ecologica/novo-brasil-ecological-transformation-plan/featured-programs/tropical-forest-forever-facility-tfff

[30]Bridle, James. (2022) Ways of Being: Beyond Human Intelligence. Penguin.

[31]Escobar, A. (2018). Designs for the pluriverse: Radical interdependence, autonomy, and the making of worlds. Duke University Press.

[32]Instituto Talanoa. (2025). Climate adaptation: guide for journalists and newsrooms. Instituto Talanoa.

[33]Global Commission on Adaptation. (2019). Adapt now: A global call for leadership on climate resilience. Global Center on Adaptation.

[34]United Nations Environment Program (UNEP). (2025). Adaptation gap report. UNEP.

[35]VIANA, Virgílio (2021. Abordagem sistêmica para o desenvolvimento sustentável da Amazônia profunda. Revista Tempo do Mundo, Brasília, v. 27, p. 71–98, dez. 2021.

[36]VIANA, Virgílio (2024). Disabilities and forest peoples: challenges to building a culture of inclusion. In: ALFORD, Helen; FERRUCCI, Fabio (ed.). Disability and the human condition: changing the social determinants of disabilities and building a new culture of inclusion: the proceedings of the 24th plenary session, 9–11 April 2024. Vatican City: Libreria Editrice Vaticana. p371