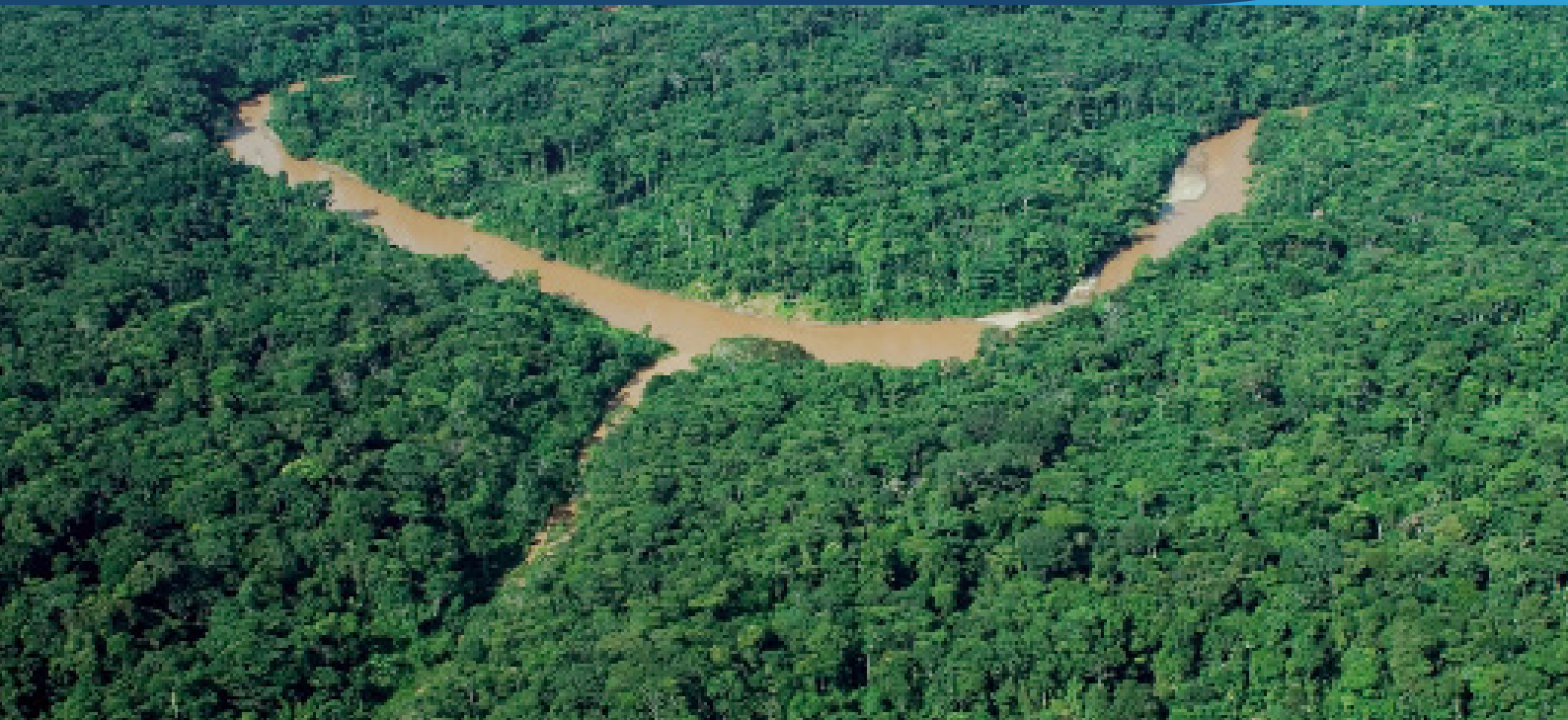


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Assessment of Regional Variations in Disaster Risk Management Strategies Across the Amazon River Basin

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Executive Summary

The Amazon Basin faces escalating risks from climate change, including floods, droughts, and fire hazards, which threaten communities, ecosystems, and regional development. Due to the basin's transboundary hydrological and ecological systems, climate-related hazards often generate cascading impacts across national borders, affecting multiple countries simultaneously.

Our assessment aims to highlight areas where alignment, strengthening, or improved implementation strategies could enhance the capacity of Amazonian countries to reduce disaster risk. To achieve this, the report assesses regional variations in disaster risk reduction (DRR) strategies implemented through disaster risk management (DRM) systems across Amazonian states. These strategies aim to strengthen resilience and address the intensifying hazards and impacts of climate change.

The study is based on qualitative research and a multi-source review of academic literature, government documents, and reports produced by intergovernmental and non-governmental organizations in English, Spanish, and Portuguese. It assesses national policies and institutional arrangements across the eight sovereign Amazon Basin countries while also examining regional cooperation initiatives promoted through organizations such as the Amazon Cooperation Treaty Organization (ACTO), the Organization of American States (OAS), the Andean Community (CAN), and MERCOSUR. The analysis uses the Sendai Framework for Disaster Risk Reduction as the conceptual lens to assess the design and implementation of disaster risk governance (DRG) arrangements across Amazonian countries.

The assessment categorizes national strategies into thematic areas, including flood management, drought resilience, fire risk mitigation, and water resource governance, enabling a comprehensive examination of policy responses to climate-related hazards. It also reflects on how cross-border water conflicts and cooperation in the Amazon Basin present both challenges and opportunities for integrated disaster risk governance. The analysis indicates gradual strengthening of disaster risk governance across the Amazon Basin, although institutional capacity remains uneven. Across the countries reviewed, several have established disaster risk management frameworks and civil protection systems; however, differences in institutional capacity and coordination create uneven levels of preparedness across the region.

Risk knowledge systems are expanding but remain fragmented across national boundaries. Investments in hydrometeorological monitoring and geographic information systems have improved risk knowledge, yet most data platforms remain nationally organized and lack interoperability for monitoring transboundary hazards.

Environmental governance plays a critical role in shaping disaster risk. Policies related to forests, land use, and water resources directly influence exposure and vulnerability to floods, droughts, and ecosystem degradation across the basin.

Disaster risk financing still prioritizes recovery over prevention. Although several countries have developed contingency funds and insurance schemes, investments in preventive resilience measures remain limited.

Stronger regional cooperation and inclusive governance will be essential for improving resilience. Enhancing data sharing, strengthening cross-border coordination, and incorporating Indigenous knowledge systems into governance processes could significantly strengthen disaster risk reduction across the Amazon Basin.

Overall, we emphasize that adopting a more holistic approach—one that addresses critical gaps in understanding and managing climate risks at both regional and basin scales—can significantly strengthen resilience across the Amazon Basin. The policy relevance of these findings is reinforced by recent international developments, particularly the hosting of COP30 in Belém, Brazil - the first United Nations climate conference to take place within the Amazon Basin. The outcomes of COP30 (2025) have highlighted the importance of strengthening links between climate adaptation and disaster risk reduction, expanding climate finance, and improving regional monitoring systems for forests and climate risks. These developments create an important opportunity to advance more coordinated approaches to disaster risk governance in the Amazon Basin.

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Context and Background

Amazon River Basin and its Local and Global Significance

The Amazon Basin spans eight countries in South America: Bolivia, Brazil, Colombia, Ecuador, Guyana, Peru, Suriname, and Venezuela; and also includes French Guiana, an overseas region of France. While French Guiana forms an integral part of the Basin, this report focuses on the eight sovereign Amazonian countries. Brazil accounts for approximately 68% of the Basin's area, while the remaining countries share the balance of 32%. This vast region hosts numerous processes—including biochemical and biophysical cycles, carbon sequestration, hydroclimate, and geohydrological cycles—that interconnect a variety of natural and anthropogenic systems. The Amazon Basin is a geologically, ecologically, and culturally unique and diverse region, characterized by varied landscapes, topographies, and climates that shape the heterogeneous distribution of surface and groundwater flows, as well as its rich biodiversity of flora, fauna, and avifauna (Moraes et al., 2021; Val et al., 2021; see Table 1, Figure 1).

The hydrology of the Amazon Basin is complex, with elevations ranging from sea level at the river's delta in Amapá and Pará (Brazil) to 6,500 m in the Andes (Peru), where atmospheric currents are blocked, and the mountains capture part of the water. This retained humidity creates steep local climatic gradients, fostering a variety of climates, such as cloud forests, Páramos, Yungas, and Punas. The water captured on the eastern flanks of the Peruvian Andes is partially filtered, while the rest flows into the lowlands, forming numerous important tributaries and rivers. The rivers and tributaries of this transboundary basin transport sediments and nutrients downstream (Wittmann et al., 2010; Garziona et al., 2017), forming one of the longest transcontinental drainage systems (Costa et al., 2021; Marengo et al., 2012; Martini et al., 2008).

Table 1: Key Characteristics of the Amazon River Basin

Dimension	Key Features	Source
Geographic & Forest extent	~6 million km ² of tropical rainforest, the largest in the world, across 9 countries.	Zapata-Rios et al., 2021; Naka & Brumfield, 2018
Hydrology	Mean discharge ~209,000 m ³ /s (16–18% of global freshwater discharge), an amount exceeding the combined freshwater discharge of the nine next-largest rivers together.	Latrubesse, 2008; Marengo et al., 2012; Giffard et al., 2019; Molinier et al., 1996; ACTO, 2018
Major tributaries	Madeira, Negro, Japurá (three of the ten most significant rivers in the world besides the Amazon), Marañón, Ucayali.	Costa et al., 2021; Marengo et al., 2012; Martini et al., 2008
Carbon storage	150–200 GtC (~50% tropical forest carbon). key component of the planet's climate-balancing systems	Brienen et al., 2015; Cerri et al., 2006
Biodiversity	Most biologically diverse area on the planet. >50,000 plant species; >2,400 fish species; >1,300 bird species; > 427 amphibian species; > 371 reptile species; and > 426 mammals' species.	Latrubesse, 2008; Marengo et al., 2012; Giffard et al., 2019; Molinier et al., 1996; ACTO, 2018.
Economic and resource base	Major provider of food, transport corridors, freshwater; ~15% of global bauxite reserves; significant iron and steel production ~50 million inhabitants rely on basin resources.	ACTO, 2023
Indigenous presence	~370 Indigenous groups; >300 languages; ~30% of basin under Indigenous territories. One of the world's highest concentrations of linguistic and cultural diversity.	Aikhenvald, A. Y., 2022; Walker et al., 2020.



Figure 1: The Amazon Basin spans Colombia, Ecuador, Bolivia, Brazil, Guyana, Peru, Suriname, and Venezuela, as well as French Guiana (France, overseas region). Orange lines show the whole hydrological network that feeds the Amazon River, represented by the bold blue line running from west to east (data source: NASA open; visualization created using Google Earth Pro).

The Amazon Basin is one of the world's most culturally diverse regions, home to numerous Indigenous peoples and local communities whose livelihoods and cultural practices are closely tied to forest ecosystems. Research shows that Indigenous lands and governance systems play an important role in maintaining large areas of intact ecosystems and conserving biodiversity, reflecting long-standing relationships between communities and their environments (Garnett et al., 2018). At the same time, Amazonian rural populations are socially and culturally diverse, including Indigenous peoples, small farmers, and riverine communities whose livelihoods and adaptive strategies are shaped by their dependence on local ecosystems and environmental conditions (Brondízio & Moran, 2008). Together, these communities form complex socio-ecological systems in which cultural knowledge, land-use practices, and environmental stewardship have co-evolved over long periods of time.

Ultimately, the Amazon Basin constitutes a deeply interconnected socio-ecological system whose ecological integrity, hydrological dynamics, and cultural diversity extend across political boundaries. This transboundary interdependence, combined with increasing climate variability and environmental pressures, underscores the importance of coordinated, multi-level governance approaches capable of addressing shared risks and strengthening disaster resilience across the region.

Climate Extremes and Hazards in the Amazon Basin: Global and Regional Anthropogenic Drivers

Over the last two decades, the hydrological cycle of the Amazon River has become more extreme. For instance, the flood return period has shortened significantly, from 20 years in the first half of the 20th century to just 4 years since 2000. Additionally, regional water discharges have increased in the northwestern Amazon during the high-water season (1974-2009) but have decreased in the southwestern Amazon during the low-water season (1974-2009) (Marengo, 2012, 2018). These changes reflect the intensification of climate extremes, particularly those associated with the El Niño-Southern Oscillation (ENSO) in the tropical Pacific, and the meridional sea surface temperature (SST) gradient in the Tropical North Atlantic (Marengo et al., 2021). Temperature anomalies in the tropical Atlantic due to global warming are linked to the exacerbation of hydroclimatic extremes within the Amazon Basin, including interannual fluctuations in rainfall and river flow (Marengo et al., 2011). These anomalies potentially impact precipitation patterns in the Basin. For instance, during peak SST conditions in the Atlantic in 2005 and 2010, precipitation in the Amazon declined. This reduction may be linked to transient shifts in the Intertropical Convergence Zone (ITCZ). When the ITCZ shifts northward toward the Caribbean, substantial parts of the Amazon, particularly the South, experience drought conditions.

In broader regional climate dynamics, rising humidity levels in the Caribbean contribute to stronger Atlantic hurricanes, while the Amazon experiences intensified wet seasons and prolonged droughts in its southern regions. These trends are influenced not only by high Atlantic temperatures but also by ENSO and La Niña cycles. Typically, ENSO leads to reduced Amazon rainfall, whereas La Niña increases precipitation, triggering floods in 2009, 2012, 2014, and 2021 (Gloor et al., 2013; Marengo & Espinoza, 2015; Barichivich et al., 2018; Espinoza et al., 2022). Overall, this complex interplay of climate factors plays a crucial role in altering Amazon precipitation patterns and reshapes regional climate profiles (Espinoza et al., 2022). Various studies provide evidence of a progressively longer dry season in the Southern Amazon since the 1970s (Costa et al., 2021; Costa et al., 2022; Espinoza et al., 2011; Jimenez et al., 2018). In recent years, this dry season has become more severe, lasting 3-4 weeks longer than usual, with delayed rainfall onset (Nobre et al., 2016).

The prolonged dry season heightens fire risks. For example, during the 2016 drought, fire incidents increased by 36% relative to the preceding twelve years in the region (Aragão et al., 2018). This trend can be related to several factors, including the large influence of meridional SST gradients across the North and South Atlantic, increased evapotranspiration during the dry season due to higher solar radiation, and a poleward shift in the Southern Hemisphere subtropical zone (Marengo et al., 2021, and references therein). The severe droughts of 2005, 2010, and 2016, along with the floods of 2009, 2012, and 2014, illustrate the increasing frequency of climate extremes in the Amazon Basin. These events have created hazardous conditions and triggered disasters across the region, compounding existing challenges and intensifying disaster risk for local populations.

From Droughts to Floods: Impacts of Climatic Extremes Across the Amazon

Climate extremes affect urban settlements in the Basin differently from rural and Indigenous communities living in varying degrees of isolation, depending on factors such as their proximity to floodplains, their location deep within the forest, or whether they reside in the Amazon Delta (Almudi & Sinclair, 2022; Hofmeijer et al., 2013; Torres-Slimming et al., 2020; da Cunha-Ávila et al., 2021; Langill & Abizaid, 2020).

However, common underlying vulnerabilities are important to assess in order to map exposure and understand how communities deploy solutions to build resilience. For example, riverine communities, which include both urban centers and small native or mestizo groups, have developed culturally distinctive adaptation strategies reflecting their unique historical relationships with cyclical environmental changes. Várzea (floodplain) communities practice complex agricultural systems, such as Indigenous chinampa-style raised fields, that mitigate flood impacts while maintaining seed diversity specifically selected for climate resilience. In periods of low water flow, natural pastures emerge along the riverbanks. During high-water phases, the river submerges these lands, facilitating interactions among populations and replenishing nutrient-rich silt. Consequently, communities such as the Warao people of Venezuela construct stilt houses and adjust their way of life to seasonal changes. During dry periods, they cultivate diverse crops in the fertile silt and relocate their livestock to pastures. To safeguard their animals during high water, they corral them onto rafts tethered to their stilt houses and provide them with forage. These types of cyclic adaptation demonstrate their ability to navigate fluctuating river dynamics, showcasing societal resilience and resourcefulness.

However, the increasing unpredictability of climate extremes, including interannual floods and droughts, disrupts these balances between nature and human interactions and challenges traditional adaptation mechanisms that evolved under more stable climatic conditions, especially for Native communities that rely on ecological resources for their survival (Marengo & Espinoza, 2015). Amazonian communities practice both annual and perennial agriculture, with some adopting flood-resistant crop varieties and engaging in agricultural zoning and complex land management systems to preserve their harvests (Arce-Nazario, 2011; Hiraoka, 1985; Pinedo-Vasquez et al., 2011; Valenzuela et al., 2023). Excessive precipitation during La Niña periods intensifies the risk of localized flooding, threatening seeds, crops, and livelihoods. For example, La Niña-induced floods in Ecuador between 2010 and 2011 severely impacted agriculture, reducing crop yields and damaging rice, vegetable, and corn fields. These floods affected approximately 1,165,413 ha (around 3% of the total livestock area), disrupting both crop production and the livestock sector (World Bank Group, 2021). Beyond this economic extreme, climate events can also disrupt social and cultural systems. Cultural knowledge transmission is also disrupted when extreme weather events force displacement or migration, threatening the intergenerational continuity of ecological knowledge. Additionally, culturally significant species used in traditional medicine, crafts, ceremonies, and cuisine face increased vulnerability, potentially undermining cultural practices tied to resource availability and seasonal rhythms.

In recent years (see some examples in Table 2), extreme weather events in the Amazon Basin have caused widespread destruction, devastating numerous households. They have led to the destruction of homes, bridges, and roads, resulting in the tragic loss of life, both directly and through subsequent health complications, including damage to sanitation and drinking water services. For instance, the 2014 floods in Bolivia damaged infrastructure, isolating several communities and compromising access to food and drinking water. According to national authorities, these floods were the worst disaster in 40 years, killing at least 59 people and affecting more than 60,000 households. The Amazonian departments of Beni, La Paz, Cochabamba, and Santa Cruz were the most affected, with a total of 877 casualties (Gouel, 2014; IFRC, 2014). Similarly, Amazonian provinces in Colombia, Ecuador, and Peru have issued warnings regarding river overflows and landslides, which have led to suspension of basic services and road blockages (e.g., the National Disaster Risk System of Colombia [SNGRD], National Center for Disaster Risk Estimation, Prevention and Reduction of Peru-CENEPRED, and the National Risk Management System of Ecuador-SNGRE).

Table 2: Temporal overview of populations affected by extreme precipitation events across Amazonian countries during 1900-2020.*

* Results are influenced by high-impact single events in some countries. Missing values indicate non-reported data rather than zero impact. Source: EM-DAT (2026) and Climate Risk Profile: Brazil (2021) by World Bank Group.

Country	Hazard	No. events	Total deaths	Total affected
Brazil	Drought	18	20	78.812.000
	Flash Flood	11	658	325.931
	Riverine Flood	69	3.106	11.418.683
	Mudslide	10	483	234.569
	Landslide (wet)	15	1.262	4.004.045
Colombia	Drought	2	-	100.000
	Flash Flood	3	146	166.440
	Riverine Flood	46	2.212	10.198.629
	Coastal Flood	2	14	11.050
	Mudslide	5	613	50.550
Ecuador	Landslide (wet)	39	2.930	27.838
	Drought	4	-	744.665
	Riverine Flood	16	277	810.970
	Flash Flood	2	20	11.200
	Mudslide	2	130	6.180
Peru	Landslide (wet)	13	942	75.571
	Drought	8	-	4.226.104
	Riverine Flood	34	897	2.731.451
	Flash Flood	6	378	32.611
	Mudslide	9	523	36.527
Bolivia	Landslide (wet)	23	7.977	755.485
	Drought	13	-	4.637.744
	Riverine Flood	26	694	3.150.419
	Flash Flood	4	300	68.711
	Mudslide	2	72	600

	Landslide (wet)	7	262	181.453
Guyana	Drought	2		607.200
	Riverine Flood	4	34	413.048
	Coastal Flood	1	-	199.000
Venezuela	Drought	1	-	-
	Riverine Flood	20	262	285.203
	Flash Flood	3	30.011	484.635
	Coastal Flood	1	5	59.368
	Mudslide	2	116	21.000
	Landslide (wet)	2	48	518
Suriname	Riverine Flood	2	5	31.548

The repercussions extend beyond immediate losses to agriculture and infrastructure, significantly affecting the lives and well-being of communities in the region (Hofmeijer et al., 2013; Jardim et al., 2020; Sherman et al., 2016). Extreme flooding significantly accelerates the spread of diseases, as standing water and unsanitary conditions create ideal environments for infectious pathogens to thrive. In rapidly growing urban areas, poor sanitation and inadequate water management further contribute to the expansion and persistence of infectious diseases. This situation worsens when water levels rise during extreme flood events (Duarte et al., 2019a; Duarte et al., 2019b). For instance, after the 2014 floods in Bolivia, authorities recorded 360 suspected cases of dengue and Hantavirus (IFRC, 2014). Similarly, leptospirosis – a bacterial infection that affects humans as well as wild and domestic animals – has been widely documented in flood-prone urban populations in Iquitos, Loreto, Peru, where seasonal flooding and environmental exposure create favorable conditions for transmission (Johansson et al., 2004).

From a health standpoint, droughts are equally devastating, ranking among the most severe natural disasters in the Amazon Basin. They primarily cause food and water shortages and increase the prevalence of vector-borne diseases and respiratory illnesses. One of the major consequences of droughts is the rise of wildfires, which release aerosols and other pollutants into the air, causing severe health issues. According to local authorities and the Brazilian Civil Defense, aerosols were the leading cause of increased hospitalizations in municipalities affected by the 2005 drought. In the state of Amazonas, where more than 167,000 inhabitants were impacted, a state of emergency was declared. Hospital admissions for respiratory diseases in children under five increased dramatically, by as much as 267%, in the most drought-affected municipalities in the Brazilian Amazon (Sena et al., 2012; Smith et al., 2014).

During droughts, limited water availability disrupts daily life, livestock farming, and agriculture, often forcing people to abandon their homes and leave behind possessions and livelihoods. As river levels decline, floodplain lakes become isolated from main water channels, trapping fish and organic matter (Junk et al., 1983). This leads to hypoxic conditions (oxygen depletion), further intensified by rising temperatures that affect evaporation and precipitation patterns (Tomasella et al., 2013). The health impacts of climate extremes are entangled with cultural factors that affect vulnerability and resilience.

Drought-induced isolation poses a major challenge to Amazonian communities, as their livelihoods depend on river-based mobility and transportation. Most cities, rural settlements, and Indigenous villages along major Amazon rivers lack alternative road networks, making it difficult to access essential services during prolonged droughts (Espinoza et al., 2022). Extreme floods and droughts in the Amazon Basin have placed significant strain on subsistence livelihoods, particularly agriculture, fishing, and river transport systems, and in some cases have led to the isolation or displacement of riverine and Indigenous communities (Vasconcelos et al., 2022; Pinho & Orlove, 2010; Pinho et al., 2014). These climate events also undermine governments' and communities' capacity to maintain essential services, leading to water scarcity, contamination, health risks, and food insecurity. The cascading effects often escalate into social tensions and conflict, further contributing to the displacement of Amazonian populations. Addressing these complex challenges requires strong and effective disaster risk governance and climate adaptation strategies that emphasize resilience, sustainable land use, and responsible resource management.

Climate Hazards and Disaster Risk Governance in the Amazon Basin

The Amazon Basin is one of the world's most ecologically and culturally diverse regions, yet it is also among the most exposed to the escalating impacts of climate variability and extreme events. Floods, droughts, forest fires, and ecosystem degradation increasingly affect livelihoods, infrastructure, and natural resources across the basin. Due to the transboundary nature of the Amazon's hydrological and ecological systems, these hazards frequently extend beyond national borders, generating cascading

impacts across multiple countries.

Over the past two decades, the frequency and intensity of climate-related hazards in the Amazon Basin have increased, amplifying social, environmental, and economic vulnerabilities. Extreme hydrological events have affected riverine and urban populations, disrupted agricultural production, and contributed to displacement and livelihood loss in several parts of the region. At the same time, rapid land-use change, deforestation, and expanding extractive activities have further altered ecosystem dynamics, potentially intensifying the impacts of floods, droughts, and wildfires. These processes interact with structural challenges such as poverty, limited infrastructure, and uneven access to services, which shape the vulnerability of communities across the basin.

Beyond the increasing frequency of climate hazards, disaster impacts in the Amazon Basin are also shaped by structural vulnerabilities affecting many communities across the region. Limited access to infrastructure, basic services, and economic opportunities constrains the capacity of populations to anticipate, cope with, and recover from climate-related shocks (Walker, 2002; Eakin & Luers, 2006; Birkmann et al., 2022; Pinho et al., 2014). Rapid urban expansion in several Amazonian cities—often characterized by informal settlements and limited spatial planning—has further increased exposure to floods and other hydrological hazards (OAS, 2005; Parry et al., 2010; Mansur et al., 2016).

Environmental transformations also play a significant role in shaping disaster risk dynamics in the basin. Land-use change and deforestation alter ecosystem functions and hydrological processes, potentially intensifying droughts, floods, and forest fires (Lovejoy & Nobre, 2019; Alves et al., 2017; Anderson et al., 2015). Given the interconnected nature of Amazonian ecosystems and river systems, many of these environmental pressures generate transboundary impacts that extend beyond national borders and require coordinated governance responses (Hagenlocher et al., 2023).

This analysis focuses on the eight sovereign Amazonian countries and their disaster risk management frameworks within the Basin. While national governments have progressively strengthened disaster risk governance frameworks through legal reforms, institutional arrangements, and policy initiatives, the extent to which these efforts effectively address the evolving and transboundary nature of disaster risks across the basin remains uncertain. Despite the growing recognition of disaster risks in the Amazon Basin, there is still limited comparative analysis of how national disaster risk reduction strategies respond to the transboundary dynamics of climate hazards across the region. In this context, understanding how disaster risk reduction (DRR) strategies are designed, implemented, and coordinated across Amazonian countries becomes particularly relevant.

Approach

This assessment examines disaster risk management in the Amazon Basin by focusing on the institutional and policy frameworks that shape DRR strategies across national and regional levels. This analysis focuses on the eight sovereign Amazonian countries. It reviews water resource management, land-use planning, advancement in environmental and climate change policy frameworks and transboundary coordination as key antecedents shaping the disaster risk reduction (DRR) strategies in Amazon Basin countries, recognizing that disasters in the region often cross national boundaries and require coordinated governance responses. Building on this contextual overview, the report then maps the progress made by each country in relation to the four priorities of the Sendai Framework for Disaster Risk Reduction, highlighting common trends, differences, and emerging regional patterns in DRR governance. The assessment aims to identify areas where alignment, strengthening, or improved implementation of existing DRR strategies through national DRM plans could enhance the capacity of Amazonian countries to reduce disaster risk. Specifically, it analyzes how governance structures influence vulnerability and resilience, explores existing mechanisms for cooperation and conflict resolution, and identifies opportunities to reinforce collaborative platforms for joint planning and knowledge exchange.

The report adopts a qualitative and multi-source assessment approach. Data were gathered from academic literature, government documents, national disaster risk management plans, climate adaptation policies, and reports produced by intergovernmental and non-governmental organizations (such as the UN, IFRC, ACTO, World Bank, and FAO). Additional information from reputable news sources and independent reports was considered to capture recent developments related to climate impacts and disaster responses in the region.

Analytically, the assessment uses the Sendai Framework for Disaster Risk Reduction (Figure 2) as its primary reference

framework. DRR strategies implemented by Amazonian countries were examined through the lens of the four Sendai priorities for action, enabling a comparative, structured analysis across national contexts. The core elements of each priority were synthesized and translated into simplified analytical categories, presented in reference tables (see Tables I-IV in the Annex) that guided the systematic review of national plans, institutional documents, and policy instruments. This approach allows the report to assess both national and regional dimensions of disaster risk governance, highlighting patterns of convergence and divergence among Amazonian countries.

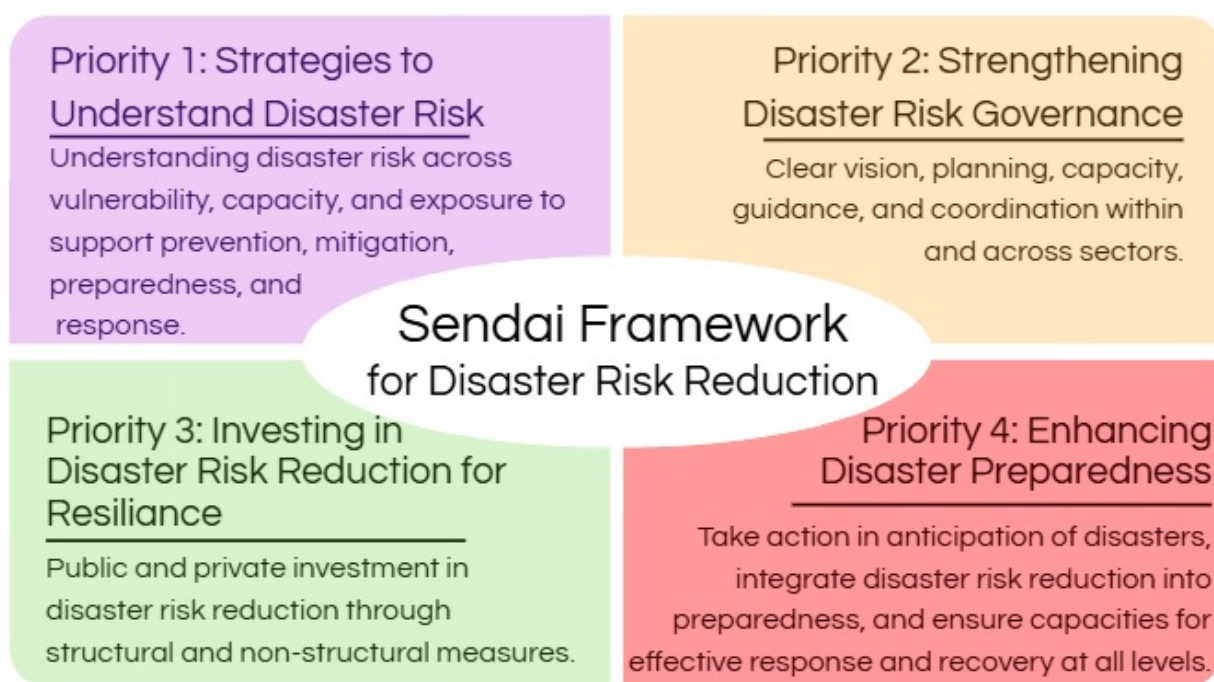


Figure 2: The four priorities for action of the Sendai Framework.

Source: Authors' elaboration based on UNDRR (2015), Sendai Framework for Disaster Risk Reduction 2015–2030.

By combining a policy-oriented analytical framework with qualitative evidence, the assessment seeks to generate practical insights that can support more integrated, inclusive, and regionally coordinated disaster risk governance in the Amazon Basin. To complement this document-based analysis and recognize that the effectiveness of disaster risk management depends on the engagement of a wide range of stakeholders, stakeholder perspectives were incorporated where possible. This was done through interviews with disaster risk management practitioners, which helped validate and complement the literature review and provided contextual insights not always reflected in formal documentation. By incorporating the perspectives of practitioners and institutional actors, the report seeks to ensure that its findings are both analytically grounded and informed on the ground of experience.

Disaster Risk Reduction (DRR) and Key Climate Action Strategies at the National and Regional Levels

The discourse surrounding disasters and their socio-economic repercussions began to take shape in 1975 within the Latin American and Caribbean Economic System (SELA), which comprises Amazonian countries. Early discussions emphasized the need to strengthen cooperation between the public and private sectors to enhance regional disaster risk reduction, with particular focus on ensuring the continuity of governance and business operations during crises. The launch of the International Decade for Natural Disaster Reduction (1990-1999) by the United Nations General Assembly in 1989 marked the first global effort to systematically address disaster risks and reduce human and material losses. Latin American countries, including those in the Amazon Basin, actively engaged in this initiative, supported by regional organizations advocating for collective

preparedness and response. Over the past three decades, Amazonian nations have developed national and joint disaster risk management strategies, often aligning with wider Latin American initiatives, Multilateral Environmental Agreements (MEAs), including transboundary water and biodiversity agreements, as well as some bilateral treaties and cooperation mechanisms (Table 3).

Table 3: Relevant international agreements and bilateral cooperation mechanisms among Amazonian countries.

Agreement	Year	Signatory Amazonian Countries	Influence on Disaster Risk Governance (DRG)
Ramsar Convention	1971	Bolivia, Brazil, Colombia, Ecuador, Peru, Suriname and Venezuela.	Provides a framework for the conservation and wise use of wetlands and their resources
Latin American and Caribbean Economic System (SELA)	1975	Bolivia, Brazil, Colombia, Ecuador, Guyana, Peru, Suriname and Venezuela	Initiated regional dialogue on disaster-related issues, emphasizing public-private cooperation and governance continuity.
Regional transboundary water governance under the agreement of the Amazon Cooperation Treaty (ACT),	1978	Bolivia, Brazil, Colombia, Ecuador, Guyana, Peru, Suriname and Venezuela	Established a framework for regional cooperation on sustainable development and environmental protection in the Amazon Basin. Specifically, they launched a strategic plan about strengthening integrated water resources management (IWRM). Promotes cooperation on water resources, navigation, environmental protection, and scientific research. Encourages coordination on hydrological monitoring and basin management.
Basel Convention	1989	Bolivia, Brazil, Colombia, Ecuador, Guyana, Peru, Suriname and Venezuela.	International environmental treaty regulating the transboundary movement and disposal of hazardous wastes and other wastes.
International Decade for Natural Disaster Reduction (IDNDR)	1990–1999	Bolivia, Brazil, Colombia, Ecuador, Guyana, Peru, Suriname and Venezuela	Marked the first global initiative focused on disaster risk reduction, spurring national planning processes, and coordinating DRG actions.
Convention on Biological Diversity	1992	Bolivia, Brazil, Colombia, Ecuador, Guyana, Peru, Suriname and Venezuela	Convention recognizes that biological diversity is about more than plants, animals and microorganisms and their ecosystems – it is about people and our need for food security, medicines, fresh air and water, shelter, and a clean and healthy environment
The United Nations Framework Convention on Climate Change (UNFCCC)	1992	Bolivia, Brazil, Colombia, Ecuador, Guyana, Peru, Suriname and Venezuela.	Aims to stabilize greenhouse gas concentrations to prevent dangerous human interference with the climate system and is the foundation of global climate governance.
Paris Agreement	2015	Bolivia, Brazil, Colombia, Ecuador, Guyana, Peru, Suriname, Venezuela	Reinforced the integration of climate change adaptation into DRG, highlighting the need for resilient infrastructure and ecosystems.
Strategic Action Program (SAP) for the Amazon Basin	2017	Bolivia, Brazil, Colombia, Ecuador, Guyana, Peru, Suriname, Venezuela	Developed under ACTO, this program aims to ensure integrated and sustainable management of transboundary water resources in the Amazon Basin, considering climate variability and change.

Framework Agreement between ACTO and CIC-Plata	2021	ACTO and CIC-Plata Member States	Enabled strategic actions for the management of water resources in the Plata and Amazon Basins, facilitating exchange of experiences and knowledge on integrated water resources management.
Some Sub-Regional Water Agreements and Cooperation Mechanisms			
Agreement concerning the Cachuela Esperanza hydroelectric plant between the Government of the Federative Republic of Brazil and the Government of the Republic of Bolivia (1984).	1984	Brazil-Bolivia	The Madeira River is one of the largest Amazon tributaries and a major area of hydropower development and flood risk. This agreement focuses on navigation, hydropower development, and river basin cooperation.
Management and Land-Use Planning Plan for the San Miguel and Putumayo River Basins	1985	Ecuador-Colombia	Proposed action aimed at the sustainable development of the border region, which includes part of the Department of Putumayo in Colombia and the Province of Sucumbíos and part of the Province of Napo in Ecuador.
Permanent Joint Commission for Border Inspection (COMPERIF).	1986	Colombia-Peru	Border river monitoring (Leticia-Santa Rosa-Tabatinga river zone), navigation and river channel management, environmental monitoring along the Amazon River.
Agreement for the establishment of the “Peru-Brazil border integration zone”.	2009	Brazil-Peru	Develop and implement policies that promote the conservation and sustainable use of natural resources in border areas, with special emphasis on the protection of biological diversity and the conservation of ecosystems and water resources.

In light of the Paris Agreement, several Amazonian countries have also incorporated discussions on climate change adaptation and the reduction of climate-related risks into their disaster risk agendas. While Amazon Basin countries participate widely in global environmental agreements, their engagement in international conventions specifically governing transboundary watercourses remains limited (i.e., UN Watercourses Convention or other formal UN “navigation & transboundary waters” conventions). However, some bilateral and trilateral cooperation mechanisms exist (Table 3) to manage shared rivers and border basins, although efforts have been fragmented and largely uncoordinated. The creation of the Amazon Cooperation Treaty Organization (ACTO) in 1995 strengthened the institutional framework of the Amazon Cooperation Treaty signed in 1978. ACTO provides a platform for more integrated, basin-wide water management, with the potential to harmonize previously isolated initiatives and strengthen cooperation among all Amazonian countries.

The following section presents the results of our assessment of the strategic national plans developed by Amazonian countries, with a particular focus on their progress in planning and implementing disaster risk reduction (DRR) measures. The analysis is structured around the four priority areas of the Sendai Framework for Disaster Risk Reduction (UNDRR, 2015), using the information summarized in Tables I-IV (See Annex) presented in the methodology section as a guide.

Strategies to Understand Disaster Risk in All Its Dimensions

Most Amazonian countries carry out their DRM activities in collaboration with several institutions that form a system of academic entities, research and monitoring centers, government organizations, and volunteer groups. These institutions are generally coordinated by a government agency specialized in civil defense and DRR. Specifically, Brazil’s actions and strategies to generate knowledge about risk focus on monitoring hydrometeorological conditions, the evolution of river levels during periods

of heavy rain, and mapping risk in areas prone to landslides, lahars, subsidence, and flooding. These actions are coordinated by the National Center for Risk and Disaster Management (CENAD) and executed by the National Center for Monitoring and Alerting of Natural Disasters (CEMADEN). A multidisciplinary team at CEMADEN, composed of technologists and specialists in disaster management, geology, hydrology, and meteorological extremes, monitors drought and flood indicators used by municipal and state stakeholders. In 2020, the Brazilian federal government launched the Climate Change Impact Analysis and Information System (MCTI, n.d.), aiming to integrate and disseminate information on the progress of climate change impact analysis across the national territory. The platform provides access to updated analyses of climate and the impacts of climate change, along with an interactive map that allows users to locate the risks to the Brazilian states' water, food, and energy security, along with current data and future projections. Also, since 2016, with the help of many federal agencies, the Federal Government has proposed a National Plan for Climate Change Adaptation, which includes several actions to expand and disseminate scientific, technical, and traditional knowledge. Mainly through production, management, and dissemination of information on climate risk.

The latest version of the Colombian national DRM plan (2015-2025) with a climate change focus (see Table A in Annex) includes actions to improve disaster risk knowledge, education, and social communication in risk management and emphasizes strengthening science, technology, and innovation in DRM and climate change adaptation (UNGRD 2022). The state seeks to generate risk maps with susceptible zones to threats of hydrometeorological origin (that might affect ecosystems, human populations, agricultural livestock, fishing activities, and heritage areas) as information to support decision-making. Additionally, it envisions building a training center in risk management and articulating sectoral information systems through a National Information System for Disaster Risk Management to make this information accessible for territorial entities and stakeholders.

Bolivia has also directed efforts to improve knowledge in DRR. In the National Program for Risk Management, presented in 2017 by the Vice Ministry of Civil Defense (VIDECI), the importance of training and specialization to strengthen the Institutions devoted to DRM was emphasized. This program includes the creation of spaces for knowledge exchange to promote the communication of best practices and resilience to disaster risk due to natural phenomena among municipalities (see Table B in Annex). In the 2023 National Emergency Plan, it is suggested to implement actions to train the personnel devoted to assisting in emergencies by acquiring specialized software and tools, and organizing workshops to train the military personnel (VIDECI 2023, p. 27).

Ecuador has focused on improving access to and management of public information on DRM. In 2018, the Ecuadorian National Secretariat of Risk Management (SNGRE) proposed to implement a national system of risk and vulnerability evaluation by means of a National Disaster Response Plan and proposed to establish protocols and standards for the generation, storage, use and publication of information for risk management, to generate academic research projects for the evaluation or estimation of threats, vulnerabilities and risks, in coordination with local governments (see Table C in Annex).



Table 4: Assessment of how Amazonian countries understand and disseminate disaster risk knowledge. ♦ = Strong / advanced / institutionalized; ♦ = Moderate / present but uneven; ~ = Limited / emerging / not clearly documented.

Category	Component	BRA	COL	ECU	PER	BOL	VEN	SUR	GUY
Knowledge Production	i. Production of information for DRR	♦	♦	♦	♦	♦	♦	♦	♦
	ii. Evidence-based data	♦	♦		♦	~	~	~	♦
	iii. Real-time data & geospatial tools	♦	♦	♦	♦	~	~	~	♦
Capacity Building and Education	iv. Technical training	♦	♦	♦	♦	♦	♦	♦	♦
	v. Basic education	♦	♦	~	♦	~	♦	~	♦
	vi. Community training	♦	♦	♦	♦	♦	♦	♦	♦
	vii. Training for private sector	~	~	~	~	~	~	~	~
Sharing DRR Knowledge	viii. Sharing information	♦	♦	♦	♦	♦	♦	♦	♦
	ix. Promoting collaboration & dialogue	♦	♦	♦	♦	♦	♦	♦	♦
Inclusion of Local & Indigenous Knowledge	x. Traditional knowledge inclusion	~	~	~	~	~	~	~	~
	xi. Cultural & ethnic context inclusion	♦	♦	♦	♦	♦	♦	♦	♦
Innovation & Technology	xii. Technological innovation for DRR	♦	♦	♦	♦	~	~	~	♦

The Amazonian municipalities of Peru have joined efforts to develop their own plan for flood risk prevention under the supervision of the National Center for Disaster Risk Estimation, Prevention and Reduction (CENEPRED) and the National Civil Defense Institute (INDECI). Currently, the Disaster Risk Prevention and Reduction Plan for the Peruvian Amazon 2023-2030, designed by CENEPRED and the Direction of Strengthening and Technical Assistance (DIFAT), presents initiatives to increase knowledge of risk management and the sustainable use of natural resources. One of its objectives is to improve understanding of disaster risk through the generation of risk studies and access to information on DRM (see Table D in Annex). And through the development of outreach activities and awareness-raising to strengthen knowledge of prevention and disaster risk reduction among social organizations in the department of Amazonas. Some of the strategies already implemented include training personnel from public institutions on climate change and DRR, promoting a prevention culture, training civil defense personnel and regional brigades to deliver awareness talks on environmental matters, and preventing forest fires and promoting flood safety.

Venezuela has also made progress in strengthening knowledge of disaster risks, especially through extensive community-level work. Since 2003, a Community Training Project on Self-Protection, Prevention, Mitigation, and Attention to Adverse Events

has been carried out, providing communities with knowledge, values, attitudes, and skills to reduce existing vulnerability and respond to an eventual disaster (see Table E in Annex). Additionally, Venezuela has implemented a program within the formal Higher Education system that trains university students in Civil Protection and Disaster Management. In line with these objectives, in 2006 the Andean Virtual Library Project was created, with the cooperation of the Regional Disaster Information Center, to provide access to information on disaster prevention and response and to promote the exchange of experiences and lessons learned among participating countries, including Venezuela.

Guyana presented its National Integrated Disaster Risk Management Plan and Implementation Strategy in 2013 and still uses it as a guide to manage recent disasters and catastrophic events. In its updated version, has as objective to identify and quantify the risks and possible consequences of the impacts of floods and droughts in Guyana. The actions carried out to accomplish this objective include the delivery of training to key government staff in the design and use of mapping software and processes. Guyana launched a public online platform that condenses information on DRM. Furthermore, in collaboration with the Department of Education, Youth Division and the National Youth Council, the Civil Defense Commission strives to integrate DRR and DRM education into the curricula of primary schools, secondary schools and youth training programs (see Table F in Annex). In addition, the plan contemplates updating and creating new hazard maps for floods (river overflow), floods on the coastline (storm surge), drought, tropical cyclones, landslide and wildfire. These maps would be used to complement vulnerability assessments of all identified (and potential) vulnerable elements (population, agriculture, infrastructure, floodable areas, and others) to the mentioned impacts.

Suriname is currently developing a national disaster risk reduction strategy, framed as a Country Work Programme that seeks to integrate DRR and climate change adaptation measures. This initiative, supported by the United Nations Office for Disaster Risk Reduction (UNDRR) and its partners, builds on findings from a DRR gap analysis workshop and aims to closely align with the country's National Adaptation Plan (UNDRR, 2023). Furthermore, Suriname has developed strategies to ensure risk understanding is transmitted at the district and community levels. To improve access to risk information and encourage public participation, Suriname has a Communications Unit within the National Coordination Center for Disaster Response. This unit coordinates information, sessions, and awareness campaigns. Moreover, there is literature available at the National Coordination Center for Disaster Aid, although it is specific for the establishment of early warning systems. The NCCDR has also trained disaster response teams in ground search and rescue, to provide assistance at the community level in the ten districts of Suriname, including administrative officials from the respective offices of the District Commissioners, personnel from the Doctors, and other actors in disaster risk management who are part of the National Disaster Response Teams.

Advances in Disaster Risk Governance

DRR Policy Framework

Disaster risk reduction (DRR) in Amazonian countries is primarily governed through national legislation and national DRR plans (Table 5), and most countries do not have legal frameworks specifically designed for DRR in their Amazon regions. Instead, policies targeting the Amazon basin generally focus on environmental protection, forest governance, land use planning, and water management. These sectoral policies play an important indirect role in reducing risk by shaping environmental regulations, regional development programs, and state-level civil defense strategies that apply within Amazonian territories. In practice, this means that disaster risk management in the Amazon often relies on the interaction between national DRR systems and regional environmental governance mechanisms, particularly those addressing deforestation, ecosystem conservation, and water resource management. As many climate-related hazards in the Amazon (such as floods, droughts, and landslides) are closely linked to hydrological and ecological processes, these water, environmental and land management policies at local level become critical components of broader risk reduction strategies.

National DRR systems are constituted by a legal framework (Table G), a lead institution and network institutions responsible for technical data production, sectoral planning and local response (Table 5).

Across Amazon Basin countries, disaster risk reduction legislation generally recognizes the need to coordinate policies across key sectors such as water management, land-use planning, environmental protection, and ecosystem management. Countries with more developed DRM systems and stronger DRG arrangements (such as Brazil, Colombia, Ecuador, and Peru) have adopted legislative instruments that emphasize cross-sectoral coordination and the integration of DRR into development planning.

Table 5: DRM Plans and Institutional Arrangements in Amazon Basin Countries

Country	National Plans	Latest Version	Issuing Institution	Key Lead Institutions
Brazil	National plan of Civil defense and Protection (Plano Nacional de Protecao e Defesa Civil)	2026	Ministry of the Environment and Climate Change/Ministry of Science, Technology and Innovation	SEDEC (Secretaria Nacional de Proteção e Defesa Civil). CEMADEN (Early Warning), SGB (Geological Service), and State/Municipal Civil Defense
Colombia	National Plan of Disaster Risk Management National Response Plan for the Rain Season: La Niña National strategy for comprehensive drought management in Colombia National plan for the management of the effects of “El niño”	2022 2022 2018 2023	UNGRD (National Unit for DRM)	UNGRD (National Unit for DRM). IDEAM (Meteorology), SGC (Geological Service), and CARs (Regional Corporations).
Bolivia	Program for Risk Management (VIDECI, 2017) National Emergency Plan (VIDECI, 2023)	2017 2023	VIDECI (Ministry of Civil Defense)	VIDECI (Ministry of Civil Defense). SENAMHI (Weather), COE (Emergency Operations)
Ecuador	National Disaster Response Plan (SNGR, now SNGRE, 2018)	2018	SNGRE (National Secretariat for Risk Management)	SNGRE (National Secretariat for Risk Management) INAMHI (Meteorology), IG-EPN (Volcanoes/Seismic).
Peru	Plan for disaster prevention and risk reduction of the Amazon region	2023-2030	CENEPRED/DIFAT (National Center for Disaster Risk Estimation, Prevention and Reduction - Directorate of Strengthening and Technical Assistance)	SENAMHI (Weather), IGP (Geophysics). INDECI (Response/Prep) & CENEPRED/DIFAT (Prevention/Risk Est.)
Venezuela	Mentioned in the Law of the national organization for civil protection and disaster management but not found.	-	Vice Ministry for Risk Management and Civil Protection	INAMEH (Meteorology), FUNVISIS (Seismic), and HIDROVEN (Water Infrastructure)
Suriname	Suriname National Adaptation Plan	2019-2029	Government of Suriname / NCCDR (National Coordination Center for Disaster Relief)	Meteorological Service, Ministry of Public Works, and Regional Commissioners.
Guyana	National Integrated Disaster Risk Management Plan and Implementation Strategy	2013	Civil Defense Commission	Hydromet Office, NDIA (Drainage & Irrigation), and Guyana Water Inc.

For example, Brazil’s National Policy on Protection and Civil Defense (Law No. 12.608/2012) explicitly promotes the integration of disaster risk considerations into urban planning and land-use policies. Similarly, Colombia’s Law 1523 of 2012, which established the National Disaster Risk Management System, requires the incorporation of risk analysis into territorial planning instruments and public investment decisions. Ecuador’s Organic Law for Comprehensive Disaster Risk Management (2024) further strengthens this approach by defining disaster risk management as a cross-sectoral public policy integrated into national development planning, encouraging coordination among environmental, infrastructure, and land-management sectors.

Peru has also developed a comprehensive framework through Law No. 29664 creating the National Disaster Risk Management System (SINAGERD) and its associated policy instruments, which promote the integration of disaster risk considerations into environmental management, territorial planning, and sustainable development policies.

In contrast, other countries such as Bolivia and Venezuela have national DRR laws (namely Law No. 602 on Risk Management for Bolivia and the Law of the National System of Civil Protection and Disaster Management for Venezuela) that define institutional coordination and response mechanisms but contain less explicit provisions regarding the harmonization of DRR with sectoral policies such as water management or environment.

In countries where DRR legislation remains less developed, such as Suriname and Guyana, disaster management frameworks tend to rely primarily on institutional arrangements or emergency response agencies, with fewer formal mechanisms linking disaster risk governance to land-use planning, watershed management, or ecosystem-based resilience strategies.

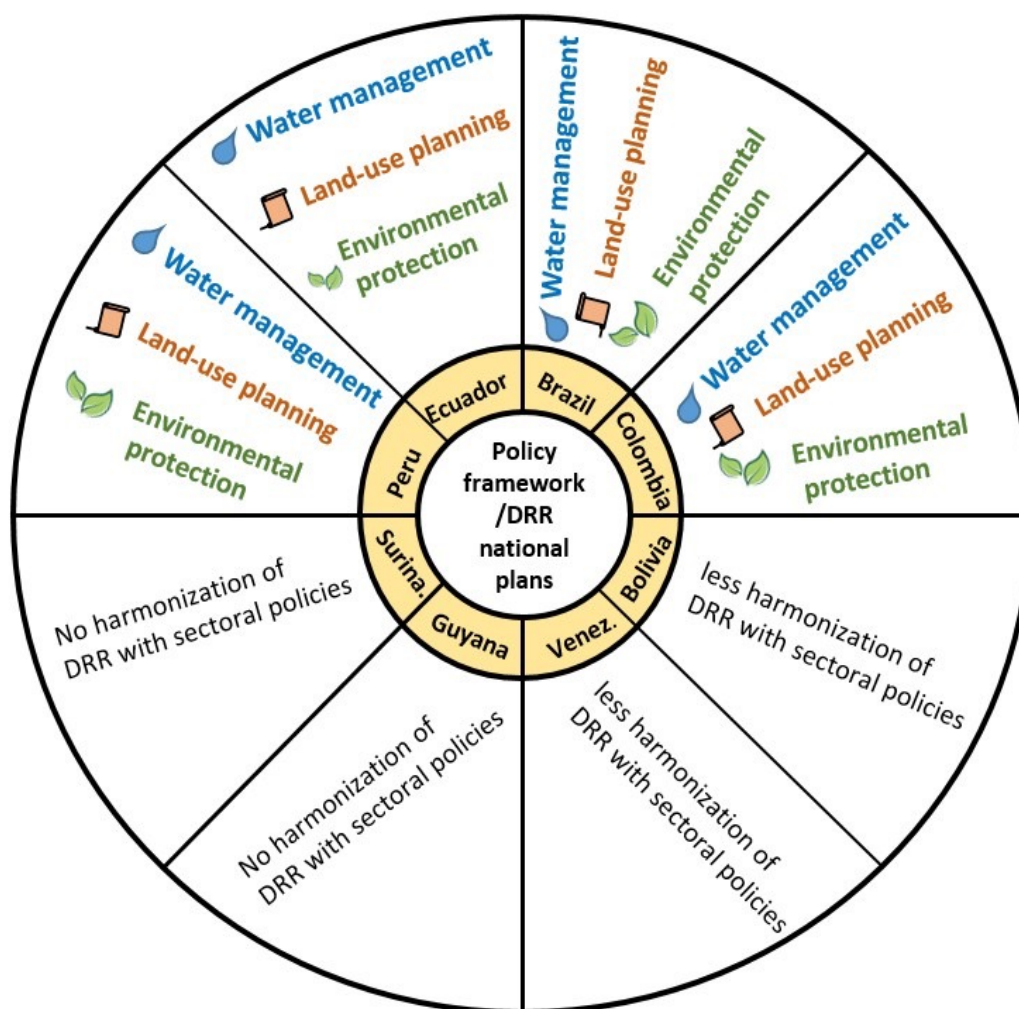


Figure 3: Variability in the adoption of legislative instruments that emphasize cross-sectoral coordination and integration of DRR into development planning for the eight Amazonian countries (source: authors)

Key Sectors for Disaster Risk Reduction in the Amazonian Region

National laws and regulatory instruments related to environment, land planning, water management and climate change are foundational pillars for effective Disaster Risk Governance (DRG) since they regulate the key systems and resources that shape risk exposure and vulnerability. For instance, land management practices, such as deforestation control and sustainable agriculture, influence runoff, soil erosion, and flood dynamics and therefore play a key role in mediating disaster impacts and reducing vulnerability (Costa et al., 2020).

Thus, across Amazonian countries, land-use policies frame disaster risk reduction mostly through environmental conservation, forest governance, and territorial planning instruments.

Among the basin countries, Colombia and Brazil show a strong institutional integration between land-use planning and disaster risk management. Specifically, Colombia, through the Law 1523 of 2012, which created the National System for Disaster Risk Management (SNGRD), established that risk management be integrated into land-use planning instruments, particularly the “Planes de Ordenamiento Territorial” (POT) used by municipalities (Table H). In practice, this means that in land-use planning, hazard zones must be identified, development restrictions can be applied in high-risk areas, and Risk management becomes part of territorial development planning. Municipal governments must therefore incorporate hazard maps and risk zoning when defining urban expansion zones, infrastructure placement, and environmental protection areas. Furthermore, in Colombia, there is recognition of protected areas (Andrade, 2011), such as ecological corridors and indigenous lands (e.g., the sustainable landscapes of the Amazon program, forest conservation and sustainability initiative in the heart of the Amazon - Table H). Within the framework of Peru’s National System for Disaster Risk Management (SINAGERD), the incorporation of risk analysis into territorial planning and development decisions is promoted. Some local land-use planning processes include hazard mapping and vulnerability assessments, particularly in urban planning exercises supported by international organizations. However, weak planning enforcement persists, and large informal settlements often lead to development in hazard-prone areas, such as flood zones or landslide slopes (Calderon, 2019). Peru uses ecological-economic zoning (ZEE) and forest governance instruments to categorize land for conservation, agriculture, or other uses. These tools aim to balance development with environmental protection and prevent land-use conflicts.

Brazil has a national civil protection and disaster risk policy that encourages risk assessment in territorial planning. The country also uses Ecological-Economic Zoning (ZEE) to guide land-use decisions and restrict development in environmentally fragile areas. Brazilian municipalities must prepare master plans (Plano Diretor) that regulate land use, urban expansion, and environmental protection. These plans often incorporate risk assessments for flooding, landslides, and other hazards. Brazil has extensive conservation frameworks, including national parks, sustainable development reserves, and ecological corridors. For instance, the Central Amazon Ecological Corridor connects multiple protected areas to maintain ecological connectivity and guide regional planning.

On the other hand, Ecuador’s territorial planning framework requires local governments to incorporate risk management and climate considerations in development planning. Ecuador integrates protected areas and Indigenous territories within broader environmental planning frameworks in the Amazon, although coordination with land-use planning instruments varies. Bolivia has established disaster risk management legislation and national risk policies; however, the systematic integration of DRR into land-use planning remains more limited than in countries such as Brazil or Colombia. Existing planning instruments tend to focus primarily on development objectives and land tenure. Although risk assessments may be incorporated into development planning processes, limited institutional capacity and technical resources at the municipal level continue to constrain the effective integration of disaster risk reduction into local planning (World Bank, 2022). Bolivia also recognizes extensive Indigenous territories and protected areas across its Amazon region. However, these frameworks function mainly as environmental governance and territorial rights instruments rather than as mechanisms explicitly designed for disaster risk reduction planning. In Suriname and Guyana, governance structures are more fragmented, zoning regulations are limited, and enforcement mechanisms are weaker.

Climate Change Adaptation and Environmental Management Planning and Strategies

There is also a clear difference among Amazonian countries regarding climate change and environmental policies, including laws, strategies, adaptation plans, and institutional frameworks. The differences are evident in the levels of policy development, implementation capacity, and integration with land-use and DRR planning. For instance, some Amazonian countries have comprehensive climate legislation, adaptation strategies, mitigation plans, monitoring systems, and institutional coordination (i.e., Brazil, Peru, and Colombia), while others rely mainly on sectoral policies or international commitments. Under such frameworks, planning is still developing or supported mainly through international cooperation and climate policies often embedded in development plans or environmental policies, rather than in comprehensive climate laws (Suriname, Guyana, and Venezuela).

The institutional architecture responsible for climate policy also varies. Some countries have dedicated climate governance systems (inter-ministerial commissions, monitoring platforms, and national climate councils). A notable example is Colombia, which possesses one of the most structured climate governance frameworks in Latin America. Its model includes a national system for coordinating policy across sectors (SISCLIMA), an Intersectoral Commission on Climate Change (CICC), and regional climate nodes that manage adaptation and mitigation at the subnational level. Others rely on environment ministries or project-based initiatives, which can limit long-term policy continuity. This creates an uneven capacity to address climate-related hazards and risk, particularly floods, droughts, and ecosystem degradation in the Amazon.

Water Governance

The Amazon Basin has long been recognized in hydrological and geographic terms as a single river system; its political and institutional recognition as a shared management unit among Amazonian countries began with the signing of the Amazon Cooperation Treaty (ACT) in 1978. While the ACT initially focused on broader themes such as economic development, navigation, scientific research, and environmental protection, it implicitly recognized the basin as a shared ecological and hydrological space that requires coordinated governance. Another important step was the creation of the Amazon Cooperation Treaty Organization (ACTO) in 1995, which strengthened institutional coordination and provided a platform for joint initiatives, including environmental monitoring and sustainable resource management (Figure 4). Cooperation among Amazonian countries expanded through regional initiatives promoting Integrated Water Resources Management (IWRM) across the basin, notably through the ACTO-UNEP-GEF project “Integrated and Sustainable Management of Transboundary Water Resources in the Amazon River Basin Considering Climate Variability and Climate Change.” This project, implemented by the United Nations Environment Programme (UNEP, 2010) and financed by the Global Environment Facility (GEF), aimed to strengthen water governance coordinated among the eight Amazon Cooperation Treaty countries and to develop a Strategic Action Program for sustainable management of Amazonian water resources.



Figure 4: Institutional architecture linking disaster risk reduction and water governance in the Amazon Basin. Disaster risk management in the region relies on coordination across multiple governance levels, including national institutions, sectoral agencies responsible for water and environmental management, and regional cooperation platforms that support transboundary coordination (Source: authors)

Nevertheless, despite these advances, water governance in the Amazon remains largely organized at the national level, and the basin management continues to rely primarily on cooperative mechanisms rather than binding regional regulations. These cooperative mechanisms depend on each country’s management model, which in turn is shaped by its legal framework and institutional structure (Calhman and da Hora, 2017). Whilst, water governance frameworks across Amazonian countries vary significantly in their legal foundations (Table 6), several nations like Brazil, Peru, Ecuador and Colombia have adopted water laws that explicitly incorporate principles of Integrated Water Resources Management (IWRM), which aims to coordinate the management of water, land, and related resources at the basin level to balance economic, social, and environmental objectives. These same countries implement river basin governance, where water resources are managed according to the natural boundaries of the watershed rather than administrative or political borders. This approach is essential for addressing upstream and downstream interactions that influence issues such as flooding, droughts, sediment flows, and water quality. This requires robust coordination across multiple sectors, including agriculture and irrigation, energy (especially hydropower), urban water supply, environmental protection, transportation, and disaster risk management.

Table 6: Main water legislative instruments from Amazonian countries

Country	Main water policy/law	Institutions	Governance characteristics
Brazil	National Water Resources Policy of Brazil (Law No. 9.433/1997)	National Water and Sanitation Agency (ANA)	Integrated Water Resources Management (IWRM), River basin management system; basin committees; strong monitoring and data systems.
Peru	Water Resources Law of Peru (Law No. 29338)	National Water Authority of Peru (ANA)	Integrated Water Resources Management (IWRM); basin councils; coordination with regional governments.
Colombia	National Water Policy of Colombia	Ministry of Environment and Sustainable Development of Colombia	Colombia has the National Policy for the Integrated Management of Water Resources, which include strategic action lines to develop basin management plans (POMCA) and aquifer management plans and integration with environmental authorities.
Ecuador	Organic Law of Water Resources, Uses and Exploitation of Water (2014)	Secretariat of Water of Ecuador (SENAGUA)	Centralized governance with three basin planning instruments for integrated water management: The Socio-Cultural Water Policy, a Water Dialogue methodology, and a community Bio-Monitoring Guide for the protection of water sources.
Bolivia	National Watershed Plan 2007 (Plan Nacional de Cuencas (PNC). Water Law of Bolivia (1906, still partially applicable).	Ministry of Environment and Water of Bolivia	In the path to an IWRM. Strong role of community and Indigenous water systems. Fragmented governance, due to a lack of subnational policy ownership, insufficient intersectoral coordination at the watershed level, and the exclusion of civil society and the private sector from meaningful decision-making.
Guyana	Water and Sewerage Act of Guyana	Guyana Water Incorporated	Centralized water management; limited basin-level governance.
Suriname	No comprehensive water law yet (sectoral regulation)	Ministry of Public Works of Suriname and water authorities	Water management dispersed across institutions; policy framework is still developing.
Venezuela	Water Law of Venezuela (2007)	Ministry of Ecosocialism of Venezuela	State-centered governance; watershed management provisions in law. Policy-practice gap, the implementation gap in Venezuela is driven by recent executive decrees that override the decentralized of the original legislation.

Brazil established the National Water Resources Policy (Law No. 9.433/1997), introduced river basin management as the basic planning unit, and created a decentralized system involving federal and state institutions, as well as basin committees (OECD, 2015). Similarly, Peru adopted the Water Resources Law of Peru (Law No. 29338), which established the National Water Authority and formalized integrated water resources management through watershed councils and multi-level governance mechanisms (see Figure 4 and Table 6). Ecuador has also advanced a comprehensive framework through the Organic Law of Water Resources, Uses and Exploitation of Water (2014), which recognizes water as a strategic national resource and establishes institutional structures for integrated water management and regulation (FAO, 2016; OECD, 2022; OECD, 2021). In Colombia, water governance is implemented through a decentralized environmental management system (Cardona-Almeida and Suarez, 2024), in which regional environmental authorities are responsible for water regulation and watershed planning. These institutions implement basin management instruments such as the Watershed Management and Planning Plans (POMCA) under the coordination of the Ministry of Environment and Sustainable Development of Colombia.

Figure 5: Comparative components of water governance in Amazonian countries. The figure illustrates the presence and relative strength of key water governance elements relevant to disaster risk reduction, including water legislation, basin-level governance, IWRM frameworks, monitoring systems, and transboundary cooperation.

Country	Water Law	Basin Governance	IWRM Framework	DRR Integration	Monitoring Systems	Transboundary Cooperation
Brazil	●	●	●	●	●	●
Colombia	●	●	●	●	●	●
Peru	●	●	●	●	●	●
Ecuador	●	●	●	●	●	●
Bolivia	●	●	●	●	●	●
Suriname	●	●	●	●	●	●
Guyana	●	●	●	●	●	●

Bolivia’s water governance, relies partly on the historical Bolivian Water Law of 1906, complemented by more recent environmental and water management policies doing significant advances in IWRM through its National Watershed Plan (PNC). The PNC provides a flexible framework for resolving hydro social conflicts and prioritizing strategic investments. This plan has linked various sectors, such as sanitation, irrigation, and hydropower, considering watersheds as interconnected systems rather than isolated water systems. However, water governance remains fragmented (Saavedra, 2021) since national policies are often developed without enough involvement from subnational governments, leading to a lack of local involvement. Furthermore, while PNC provides a technical foundation for coordination, decision-making remains centralized, with civil society and private sector limited to advisory roles. Following the 2025 change in government, Bolivia has shifted toward a more pro-investment mining framework. Policy reforms aimed at attracting foreign capital for lithium and silver have created tensions with existing water governance objectives (Trigo Nagel and Michele, 2025). While the Plan Nacional de Cuencas (PNC) aims for water resilience, there is a tension between these new pro-mining laws and the constitutional “Rights of Mother Earth” leading to continued conflicts at the local level.

In contrast, other Amazonian countries operate under a more fragmented legal framework, where water governance is dispersed across sectoral laws or institutions. Suriname and Guyana similarly lack a comprehensive national water resources law, and water governance responsibilities remain distributed across multiple ministries and sectoral regulations related to infrastructure, agriculture, and environmental management (GWP, 2015; UNEP, 2021).

Venezuela has technically incorporated Integrated Water Resources Management (IWRM) into its legal framework, but its practical implementation remains highly centralized and faces significant operational challenges (Moreno-Pizani, 2021). The

Water Law (Ley de Aguas, 2007) was designed to modernize the system by establishing the river basin as the management unit and creating Basin Councils for stakeholder participation. However, the gap between legislation and practical implementation remains significant. Under Decree No. 5.229, the government restructured the National Water System, further centralizing administration under HIDROVEN. This move contrasts with IWRM principles, which typically favor decentralization and local autonomy. Furthermore, water management is primarily handled as a public utility (pipes and sanitation) through the Hydros (state-run companies), rather than as an integrated natural resource in which the agriculture, energy, and environment sectors collaborate at the basin level.

Despite the adoption of integrated water management principles in several Amazonian countries, differences in legal frameworks and institutional structures create challenges for coordinated water governance across the basin. While countries such as Brazil, Peru, and Colombia have developed basin-based management systems and specialized institutions, the degree of decentralization, regulatory authority, and stakeholder participation varies considerably in the rest of the countries. These institutional divergences can complicate the harmonization of water policies and the implementation of joint management strategies in transboundary watersheds. Thus, effective cooperation depends on regional coordination mechanisms established under the Amazon Cooperation Treaty and operationalized through the Amazon Cooperation Treaty Organization (ACTO), alongside initiatives promoted by other regional organizations. Strengthening institutional coordination and aligning water governance frameworks remain important steps for improving transboundary water management and DRR strategies in the Amazon Basin.

Investing in DRR for Resilience

Brazil's budgetary capabilities for DRR have traditionally focused on post-disaster expenditures related to reconstruction and emergency response. Following disaster events, the federal government provides financial support, subject to compliance with legal and technical requirements by local governments.

Table 7: Advances in Resilience Investment Across Amazonian Countries in alignment with Sendai Framework (collated by authors)

Dimension (Sendai Priority 3)	Brazil	Colombia	Peru	Ecuador	Bolivia	Guyana	Suriname	Venezuela
i. Economic resilience & livelihoods	Strong (insurance, credit, recovery programs)	Moderate–Strong (financial protection instruments)	Strong (FONDES, budget programs)	Strong (AgroSeguro, DRF strategy)	Moderate (agrarian insurance, mostly reactive)	Moderate (agriculture + infrastructure support)	Emerging (donor-supported)	Limited (mainly emergency aid)
ii. DRR in land-use & environmental planning	Strong (ZEE, urban planning integration)	Strong (POT + risk zoning)	Moderate (ZEE, partial enforcement)	Moderate (planning instruments exist)	Limited–Moderate (weak integration)	Limited (planning, developing)	Limited (early stage)	Limited
iii. Ecosystem-based DRR & natural resource management	Strong (protected areas, ecological corridors)	Strong (ecosystem-based adaptation)	Moderate–Strong (forest + watershed tools)	Moderate (environmental integration)	Moderate (watershed plans)	Moderate (coastal/ ecosystem focus)	Emerging	Limited
iv. Disaster-resilient infrastructure	Strong (flood, landslide risk considered)	Strong (urban + relocation strategies)	Moderate (infrastructure + river defenses)	Moderate (risk-informed infrastructure)	Moderate (urban resilience projects)	Strong (drainage, dams, coastal defense)	Emerging	Limited
vi. DRR financing & resource allocation	Strong (diverse financial instruments)	Strong (risk financing strategy)	Strong (multisectoral budget programs)	Strong (DRF strategy, insurance)	Moderate (external funding reliance)	Moderate (project-based, donor support)	Limited–Emerging	Limited
viii. Health systems & disaster capacity	Moderate–Strong	Moderate–Strong	Moderate	Moderate	Limited–Moderate	Limited–Moderate	Limited	Limited
ix. Social protection & safety nets	Strong (cash transfers, insurance)	Moderate–Strong	Strong (targeted programs)	Moderate–Strong	Moderate (targeted aid)	Moderate	Limited	Limited

To ensure transparency and efficiency, Brazil has implemented monitoring systems for disaster-related funds and instruments such as the Civil Defense payment card to facilitate resource allocation. Additionally, a diverse range of financial mechanisms support recovery, including subsidized loans, special programs for economic recovery, and agricultural insurance schemes covering crops, livestock, and forestry activities (Table 7). Temporary cash transfers have also been used to support vulnerable populations affected by disasters.

Since 2016, Colombia has strengthened its approach to disaster risk financing by promoting the mobilization of financial resources for both disaster response and climate adaptation. Its national disaster risk management plan (2015–2030) includes investments in risk-informed urban planning, relocation strategies for high-risk settlements, ecosystem-based adaptation measures, and the development of financial protection instruments co-financed by the State for public and private sectors.

Bolivia has prioritized financial protection for the agricultural sector through the Agrarian Insurance (INSA), which provides compensation for climate-related losses. However, this mechanism remains largely reactive and does not significantly support preventive investments. The country has also relied on international financing to strengthen resilience in urban areas and support vulnerable communities through programs such as DRIPAD, which focused on reducing food insecurity and supporting recovery from disasters.

Ecuador has incorporated disaster risk considerations into public investment planning through instruments such as the National Disaster Response Plan (2018), which promotes risk-informed infrastructure and the development of financial protection mechanisms. In 2021, Ecuador further advanced this approach by adopting a Disaster Risk Financing Strategy, supported by the World Bank, to ensure financial preparedness through instruments such as insurance, contingency funds, and risk transfer mechanisms. The AgroSeguro program also provides agricultural insurance to mitigate climate-related losses.

Peru has developed a more comprehensive financial framework within its National Disaster Risk Management System (SINAGERD), including instruments to ensure financial capacity across all phases of disaster risk management. Key mechanisms include the Fund for Interventions in the Occurrence of Natural Disasters (FONDES), contingency reserves, and multisectoral budget programs such as PREVAED, which focuses on reducing vulnerability and strengthening infrastructure resilience. These instruments aim to integrate DRR into development planning and to prioritize preventive investments, although implementation challenges persist at the subnational level.

Guyana has made progress in integrating DRR into infrastructure investment and risk reduction planning, particularly in response to recurrent flooding. Its National Integrated Disaster Risk Management Plan promotes risk transfer and supports investments in drainage systems, dam rehabilitation, and coastal defenses. These efforts are complemented by international cooperation initiatives, such as the Conservation Adaptation Project, aimed at strengthening resilience in key economic and agricultural regions.

In contrast, Venezuela adopts a more limited, centralized approach to disaster risk financing. Investments are primarily oriented toward emergency response and post-disaster recovery, with limited development of financial protection instruments or preventive investment strategies. Current efforts to strengthen DRR capacities are largely supported through international cooperation and capacity-building initiatives rather than through comprehensive national financing frameworks. Fiscal constraints and institutional centralization further limit the country's ability to implement long-term resilience financing mechanisms.

Suriname is in the early stages of developing its disaster risk financing framework. Current efforts are closely linked to the formulation of a national DRR strategy and are strongly supported by international organizations. Ongoing initiatives aim to integrate DRR and climate adaptation while identifying financing needs and mechanisms, reflecting a transition toward more structured investment planning.

Overall, across the Amazon region, disaster risk financing remains predominantly oriented toward post-disaster response, although some countries have begun to adopt more proactive approaches through financial protection instruments, insurance schemes, and risk-informed public investment. Significant disparities persist in financial capacity, institutional development, and access to funding, which, in turn, affect countries' ability to invest in long-term resilience and preventive risk-reduction strategies.



Strategies to Enhance Disaster Preparedness for Effective Response and to “Build Back Better” in Recovery, Rehabilitation and Reconstruction

Amazon countries have a strong track record of implementing Disaster Response Strategies (Sendai Framework Priority 4), typically carried out by well-established civil protection institutions, volunteer networks, and other institutions dedicated to security. In Brazil, the federal government deployed the National Civil Protection and Defense Plan under the supervision of the National Secretariat of Civil Protection and Defense (SEDEC). The public Civil Protection policy included in said plan is based on five domains: Prevention, Mitigation, Preparation, Response, and Recovery. The execution of the activities that constitute these five domains is in the hands of a network (National Civil Protection System - SINPDEC) composed of academic institutions, federal institutions, State and Municipal civil protection dependencies, and groups of volunteers who work together during and after disasters. In particular, activities for disaster preparedness, effective response and recovery actions at the State and Municipal level of the Brazilian Amazon are executed by the *Civil Defense of the Amazon Department*. Some of the strategic actions organized by this state agency to enhance disaster preparedness, recovery, rehabilitation and reconstruction are: assistance during and post disaster, training of municipal agents for preparation of contingency plans, awareness activities for the public, designs and construction of contingency plans specific for the Brazilian Amazon, management of financial resources for reconstruction, communication of climate forecasts, high river levels and other hazards to stakeholders. They work together with CEMOA (Amazonas Monitoring and Alert Center) - a monitoring and alert center that assists communities during and after disasters, managing an alert system through text messages, the CEMOA webpage, social platforms, and other communication media.

Table 8: Advances in Disaster Preparedness and Response (Sendai Priority 4) in Amazonian Countries. ♦♦ = Strong / advanced / well-institutionalized; ♦ = Moderate / established but uneven; ~ = Limited / emerging / less documented

Category	Component	BRA	COL	ECU	PER	BOL	VEN	SUR	GUY
Preparedness and Early Warning Systems	i. Contingency plans (regular development & updating)	♦♦	♦♦	♦	♦	♦	♦	♦	♦
	ii. Multi-hazard early warning systems & communication	♦♦	♦♦	♦♦	♦	♦	♦	♦	♦
	iii. Local preparedness & evacuation capacity	♦♦	♦♦	♦	♦	♦	♦	♦	♦
Infrastructure and Service Continuity	Community-based preparedness, awareness, emergency supply systems	♦	♦	♦	♦	~	~	♦	♦
Post-Disaster Recovery & Reconstruction	Recovery planning, DRR integration, relocation, “Build Back Better”	♦♦	♦	♦	♦♦	♦	~	♦	♦
Institutional Coordination & Legal Frameworks	Multi-level coordination, legal frameworks, stakeholder cooperation	♦♦	♦♦	♦	♦♦	♦	♦	♦	♦

The National Hydrometeorological Network Agency, created by the Nacional de Águas e Saneamento Básico (ANA, by its acronym in Portuguese) (ANA, 2020), collects fluviometric and pluviometric data, facilitating decision-making for water resources managers and public authorities. ANA is also responsible for generating a hydro-meteorological information network

consolidating real-time data from over 4,500 hydrometeorological stations in operation. Some of them have telemetry, which makes it possible to track, in a short span of time, the data of rainfall and the level of the rivers in places of most significant interest for water resources management. These hydrometeorological services provide a concrete basis for effective early warning systems. They also created tools to support informed decision-making and streamline risk management strategies. One of them is a Flood Vulnerability Atlas. This diagnostic tool identifies the most vulnerable areas, produces risk information, and conceives national civil protection and defense meetings to involve civil society.

Brazil also has a National Center for Risk and Disaster Management (CENAD) and responsible, at the Federal level, for managing information on risks, alerts, and response actions in articulation with the Civil Protection System toward development, testing, and implementation of systems to predict natural disasters in susceptible areas and provide the necessary warnings about hydrological and geomorphological events such as floods, flash floods, and landslides (Alvalá et al. 2019). The agency receives data from different federal government institutions and provides a concrete foundation for effective early warning systems. This agency is part of an alliance with the Brazilian Network on Global Climate Change Research (CLIMA), the System for Monitoring and Observation of Impacts of Climate Change (SISMOI), the National Center for Monitoring and Natural Disaster Alerts (Cemaden) responsible of hydrometeorological forecast, the Brazilian Geological Survey (CPRM), the National Institute of Meteorology (Inmet), the Brazilian Earth System Model (BESM), the Earth System Grid Federation (ESGF), ANA (Agência Nacional de Águas e Saneamento Básico) and the National Secretariat of Civil Defense (SEDEC). All these institutions provide data on weather conditions, risk maps, and environmental variables at different levels and supplement CENAD data (Horita et al., 2018).

In Colombia, disaster preparedness and response strategies in the department of Amazonas are managed by departmental and municipal risk management committees, together with the sectional civil defense of the Colombian Amazon, which operates under the National Disaster Risk Management Unit (UNGRD). The UNGRD is part of the National Disaster Risk Management System (SNGRD), coordinated at the national level and involving multiple institutional actors, including the Environmental Information System of Colombia (SIAC), research institutes, private agencies, government administrative departments, and universities. The Sectional Civil Defense operates within the framework of the National Disaster Risk Management Plan developed by the UNGRD. Its preparation and response strategies consist of carrying out evacuation drills, creating operational manuals for damage counts and housing recovery, creating contingency plans for extreme rains and droughts, creation of manuals for disaster preparation at the municipal and community level, coordination of early warning alerts at the departmental level articulated with the National Crisis Room and National hydro-meteorological alert centers such as the Institute of Hydrology, Meteorology and Environmental Studies (IDEAM). IDEAM is a supporting institutional arrangement to provide daily technical reports on hydrometeorological environmental alerts and issues special communications during extraordinary events. Their climate predictions span the short-, medium-, and long-term for the various regions: Caribbean, Pacific, Andean, Insular, Orinoquia, and Amazonia. Each of them includes the probability of occurrence of microclimatic phenomena (Niña/Niño) and information on river levels (basins of the Magdalena, Cauca, San Jorge, Sinú, Atrato, Meta, Arauca, and Amazon), as well as information on precipitation, landslides, and fires (Domínguez-Calle & Lozano-Báez, 2014).

In 2018, the Colombian government presented its National Strategy for Comprehensive Drought Management, which seeks inter-institutional coordination and strengthening measures to monitor, prevent, and mitigate the effects of drought in the country. This national plan aims to establish a technical advisory group for drought management, strengthen monitoring and early warning systems, and develop innovative projects to prevent, mitigate, and strengthen the economy for comprehensive drought management. In addition to this national system, local early warning systems have been developed in several regions of Colombia. In 2022, through the Presidential Agency for International Cooperation of Colombia (APC Colombia), efforts are directed toward a Fire Detection and Early Warning System in the Amazon Belt.

In the cases of Bolivia, Ecuador, Peru, and Venezuela, the strategies to improve disaster preparation, response, and recovery are centralized in national risk management dependencies (VIDECI, SNGRE, CENEPRED/INDECI, ONPCAD, respectively, Table 7 Annex 1), which assist their respective Amazon states during and after emergencies. The strategies designed by these national entities are executed with the support of volunteer civil protection groups, local firefighter groups, police, and the National Army. In particular, the Bolivian agency VIDECEI has emphasized rehabilitation actions, promoted reconstruction projects, and provided technical advice to municipalities and governorates on the preparation and monitoring of their own reconstruction projects. Moreover, through the General Directorate of Emergencies and Assistance, it coordinates actions during and after disasters. In terms of early warning systems, VIDECEI also develops the communication and information flow system for alerts, using a specialized platform (DEWETRA) and the National Early Warning System for Disasters (SNATD).

In Ecuador, response and preparedness actions are developed by the National Secretariat of Risk and Emergency Management (SNGRE). This institution is in charge of the coordination of the early warning systems, the urban search and rescue teams in collapsed structures, the development of national response drills, the provision of assistance to the establishment of temporary shelters, the installation of route signs, evacuation plans, and the creation of meeting safe points. The SNGRE also provides support to coordinate temporary shelters for catastrophe victims, manages the registration of volunteers for civil protection, and coordinates the delivery of humanitarian assistance goods. Some of the important advances of this government office is the presentation of specific contingency plans for the impacts of the El Niño phenomenon that can be adapted at the state and municipal level by the corresponding actors and civil society. Since 2018, significant progress has been made with the National Disaster Assistance Plan, specifically in the response phase, which requires the coordination of various academic institutions and agencies for weather forecasting. Although there is no SNGRE representative office in the Ecuadorian Amazon, local stakeholders play a key role in the implementation of preparedness and reconstruction actions. The SNGRE provides information on its website, including dissemination tools, to learn about disaster preparedness strategies and actions.

Peru coordinates, facilitates, and supervises the implementation of the national policy and the national risk management plan through two entities: the National Center for Estimation, Prevention, and Risk Reduction (CENEPRED for its acronym in Spanish) and the National Institute of Civil Defense (INDECI for its acronym in Spanish). These two entities issue technical opinions on reconstruction topics, manage the national early warning network and the National Emergency Operations Center (situation room). CENEPRED published a Disaster Risk Prevention and Reduction Plan [2021-2024] specifically for the three Amazonian departments in Peru (Loreto, Ucayali, and Madre de Dios) to be executed by the regional office of National Defense. The main actors involved in this plan, besides CENEPRED, are the local governments of each Amazonian department, representatives from the health and education sectors, and the National Water Authority. The strategic plan aims to reduce vulnerability to floods and forest fires among the Peruvian Amazonian population, enhance awareness of risk management and the sustainable exploitation of natural resources, and strengthen disaster risk management initiatives.

In the case of Venezuela, the Organization for Civil Protection and Disaster Administration (ONPCAD) was created in 2001 to advance this DRM agenda at the national and municipal levels. This organization is composed of national-level agencies (the National Coordinating Committee for Civil Protection and Disaster Administration, the National Directorate of Civil Protection and Disaster Administration, the Fund for Disaster Preparedness and Administration, and Civil Protection Volunteer Groups) and is dedicated to implementing the National Civil Protection and Disaster Management Policy. It focuses mainly on managing the early warning system and coordinating disaster assistance and reconstruction, in conjunction with the National Army, the Red Cross, volunteer groups, and government civil protection groups in the Amazon department. It is the National Directorate of Civil Protection and Administration of Disasters that promotes the participation of the different sectors of the National Organization for Civil Protection and Disaster Administration in disaster preparedness, response, and rehabilitation, as well as the coordination of humanitarian care required by communities affected by catastrophes. Relevant actions of this organization include the creation of a registry of people with training and knowledge specialized to work in areas of civil protection and administration of disasters; the creation of an inventory and record of mobile equipment and construction, as well as warehouses, food suppliers, and vital supplies that can be made available for use in a disaster case. They also contribute to the adequate provision and equipment of the security agencies for primary care and emergency management.

Guyana's DRM is in the hands of a Civil Defense Commission that promotes preparedness and resilience in key economic sectors through training and education to reduce disaster losses. A central strategy is to promote volunteer service as an integral part of DRM and to reinforce international cooperation to ensure humanitarian assistance for recovery and reconstruction (Weeks & Bello, 2019). The DRM plan for Guyana contains four goals: risk identification, prevention and mitigation, financial protection, risk transfer, and preparedness. Some of the projects attached to this plan have focused on building resilience and strengthening disaster risk management, such as the 2019 project on "Capacity and resilience building for sub-national DRM Framework to monitor and respond to Humanitarian Situations" and other projects that commenced in July 2019 and are ongoing such as: Strengthening Disaster Management Capacity of Women in the Cooperative Republic of Guyana & Dominica and Community-Based Early Warning Systems. The project on "Disaster Recovery Interventions for Farmers" affected by the September and October 2019 Spring Tides commenced in November 2019 and is ongoing. The Emergency Flood Relief project was initiated in July 2021 to provide emergency flood relief to hard-hit areas in Guyana during the May-June 2021 floods.

Suriname's progress in disaster preparedness, recovery, and rehabilitation is the responsibility of the National Coordination Center for Disaster Relief (NCCDR), whose activities focus on implementing DRM policy frameworks that aim to minimize material damage, including vital infrastructure, and safeguard the country's intangible resources. The NCCDR coordinates

first aid agencies, such as the Police, Firefighters, Coast Guard, National Army, Medical Services, and NGOs. However, the initial response to disasters is carried out through an Incident Command System that relies on district-level organizations led by a Coordinator and supported by District Commissioners. When a disaster event exceeds the capacity of the District first response organization, the response will then be escalated to the National Coordination Center to Disaster relief that has a crisis team made up of Coordinators from the Ministries of Health, Defense, Justice and Police, representatives of the Agriculture, Livestock and Fishing sectors (Weeks & Bello, 2019). In 2018, the NCCDR via the project on Global Facility for Disaster Risk Reduction “Improving flood risk management in the capital city” developed a strategic flood risk assessment approach, including hydrological and tidal analyses and rainfall and storms estimations for various return periods and river levels in the Saramacca and Suriname Rivers. Based on this assessment, a flood management investment plan was developed for critical flood management infrastructure, flood monitoring, forecasting, and emergency response. Suriname began a National Disaster Preparedness Baseline Assessment in 2023 through the NCCDR to review the nation’s institutional capacities for DRM and to assess multidimensional risk and vulnerability across Suriname’s 10 districts.

Amazon States’ (Regional) Organizations That Support Initiatives to Enhance DRM and Water Management

The Amazon states have, over the years, also formed strategic alliances and created associations and regional organizations, such as the Amazon Cooperation Treaty Organization (ACTO), the Organization of American States (OAS), the Andean Community (CAN), the Caribbean Community (CARICOM), and others. Treaties have been signed, legal instruments and action plans have been developed, and permanent bodies have been created (e.g., the Andean Parliament in 1997, the Caribbean Court of Justice in 2001, and the Permanent Court of Appeals) in order to regulate, supervise, and enforce the statutes defined by each association. In some cases, the permanent bodies of these associations are competent to take decisions at the regional level that may be directly applicable to the national legal systems of the Member States. Through these organizations, bodies of law have also been developed on different aspects of environmental protection and governance (García, 2011).

The following sections describe the DRR and water management initiatives proposed, implemented, or currently being implemented by the various Amazon state associations.

The Amazon Cooperation Treaty Organization (ACTO)

The regional mechanisms governing the protection and management of Amazon’s natural resources stem from a historical network of Friendship and Cooperation Treaties among Amazonian countries that focused on subjects of common interest such as trade, transport, and communications. Examples include the 1976 Treaty of Friendship, Cooperation and Trade between Brazil and Suriname, and the 1977 Treaty of Friendship and Cooperation between Brazil and Venezuela (García, 2011). These agreements have shaped current strategies for resource management, disaster prevention, risk reduction, and resilience measures against climate change-related hazards. Initially centered on common interests such as trade and communication, subsequent bilateral treaties expanded cooperation to include cultural exchange, language dissemination, and technical-scientific collaboration through joint research and information exchange. In the late 1960s, recognizing shared ecosystems led to the 1969 Treaty of the Río de la Plata Basin, which enhanced cooperation on water resources, health, sanitation, and navigation. This treaty paved the way for Brazil’s initiative to convene the Amazonian states to discuss the region’s development, culminating in the 1978 Amazon Cooperation Treaty (ACT). The ACT specifically fosters regional arrangements for environmental protection, sustainable development, and resource management among Amazonian countries (Passos-Gomez & Delgado-Piqueras, 2016; García, 2011).

ACT motivated bilateral agreements between these countries, particularly focusing on cooperation in border areas. Its initial focus was the economic development of the Amazon by connecting the region through transportation and communication networks, commercial shipping, and tourism development. The treaty promoted the exchange of research and information about conservation measures, health, rational use of water resources, wildlife utilization, indigenous culture protection, and ethnological and archaeological treasures (Passos-Gomez & Delgado-Piqueras, 2016). Another milestone was in 1995, when all member nations established the Amazon Cooperation Treaty Organization (ACTO) to strengthen and implement the objectives of the Amazon Cooperation Treaty. The establishment of a formal organization, with a Permanent Secretariat in Brasilia contributes to the strengthening of ACTOs initiatives. In recent years, ACTO witnessed a marked enhancement in its institutional capacity as eight Amazonian member countries intensified efforts towards sustainable land and water resource management and fire control. These nations incorporated climate change and disaster risk reduction (DRR) into their national strategies, shaping regional agendas. ACTO initiated a 2005 project, funded by the Global Environment Facility (GEF) through the UN Environment

Program (UNEP), supported by the Organization of American States (OAS). This project facilitated a comprehensive cross-border assessment from 2012 to 2016, identifying major water management challenges in the Amazon River basin and focusing on understanding the region's society and natural resources. The outcome, the Regional Strategy for Integrated Water Resources Management in ARB (2018), recognized nine key factors affecting water resource management. ACTO's response, outlined in the Strategic Action Plan (SAP), featured three strategies addressing these challenges: bolstering Integrated Water Resources Management (IWRM) implementation, institutional adaptation to climate change and hydroclimatic variability, and enhancing knowledge management for effective water resource stewardship. (details of the three strategies are discussed in Tables 1, 2, and 3).

The preparations for the COP-30, which took place in Belem in November 2025, provided a focal point for further cooperation with a series of initiatives such as the recognition of the role of Indigenous Peoples and local communities in the preservation of the Amazon and the strengthening of their participation in decision-making and governance (Folly & Porto, 2024). Another important initiative is the approval, in March 2026, of an Operational Understanding on Cooperation and Mutual Assistance to strengthen joint preparedness and response to forest fires in the region by the Technical Working Group of the Amazon Network for Integrated Fire Management (RAMIF), composed of authorities specialized in fire management from the Member Countries of the Amazon Cooperation Treaty Organization (ACTO). Also related to fire, the launch of the volume *Frontiers of Fire: An Overview of Fire in the Amazon Region* resulted from cooperation between ACTO and the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) (Rodvalho et al., 2025).

Organization of American States (OAS)

The organization's primary aim is to foster peace, solidarity, and regional cooperation among American States, including the eight Amazon countries, and to safeguard sovereignty and territorial integrity. On the occasion of the ninth International Conference of American States, held in Bogotá in 1948, the Charter of the Organization of American States was signed by 21 American states, which came into effect in December 1951. Current membership includes 34 states. The OAS was preceded by the International Union of American Republics, created in 1890, and renamed the Union of American Republics in 1910. It was under the latter that the first regional environmental protection agreement was adopted, namely the 1940 Convention on Nature Protection and Wildlife Preservation in the Western Hemisphere. In 1976, already under the OAS umbrella, the Convention on the Protection of the Archeological, Historical, and Artistic Heritage of American Nations was signed. It was not until 1996, however, that OAS deepened its engagement with environmental protection and created the Inter-American Committee on Sustainable Development as a subsidiary body of the Inter-American Council for Integral Development, responsible for formulating OAS's sustainable development policy. The OAS Department of Sustainable Development (DSD) oversees, backing diverse country projects encompassing Water Management, Energy and Climate Change Mitigation, Risk Management and Climate Change Adaptation, Biodiversity and Sustainable Land Management, and Environmental Law and Policy. Specifically, the Risk Management and Adaptation to Climate Change division (RISK-MACC) supports OAS Member States in addressing natural disaster risk reduction and adaptation. Their objective is to integrate risk management into development strategies across all government levels and sectors, aligning with regional cooperation ideals.

In 2012, they presented a plan for disaster prevention: the "Interamerican Plan for disaster prevention, care, and coordination of humanitarian assistance". The plan developed three aspects:

1. to strengthen mechanisms and measures for disaster risk reduction in the Member States,
2. to support the development and/or strengthening of national systems of preparation and response to emergencies or disasters, and
3. to strengthen the coordination of existing mechanisms of International Humanitarian Assistance.

Through an inter-American committee for the Natural Disaster Reduction and the inter-American network of Disaster Mitigation, some concrete actions have been achieved, such as the organization of virtual meetings, courses, and standard platforms for knowledge interchange about the lessons learned and good practices in risk management, emergency plans, and good procedures about the standards and guides of international humanitarian assistance. In addition, dialogues have been held with regional financial institutions to promote initiatives to incorporate prevention and mitigation measures into the construction and reconstruction of hospital facilities, education, and water systems. An important part of this organization is its promise to improve early warning systems, which it promotes through bilateral or multinational agreements.

Andean Community (CAN)

The predecessor of the Andean Community (CAN), the Andean Pact, was created in 1969 by Bolivia, Chile, Colombia, Ecuador, and Peru. Venezuela joined in 1973 and withdrew in 2006, while Chile withdrew in 1976. CAN is therefore currently constituted by Bolivia, Colombia, Ecuador, and Peru. CAN initially mainly pursued a trade liberalization and economic development agenda but has broadened its agenda to become a regional organization with the stated aim of promoting the balanced and harmonious development of Member States through integration and economic and social cooperation. The primary permanent institutional bodies comprise the Andean Presidential Council, the highest body responsible for establishing CAN's guidelines and policies; the Andean Council of Foreign Ministers; and the Andean Community Commission. Decisions taken by its political organs are unalterable and directly applicable to the Member States' national legal systems. In the environmental field, CAN legal provisions have addressed various issues, approved several decisions, and created comprehensive subregional regimes in areas such as biodiversity, agriculture, industry, and intellectual property rights. For example, its Ecological Agenda (2020-2030) focuses on biodiversity, climate change, water resources, and disaster risk reduction. Decisions and resolutions in environmental conservation and management have gained prominence over time.

In 2004, the Council of Ministers of the Environment and Sustainable Development was created to assist the Andean Council of Foreign Ministers, the Andean Community Commission, and other bodies in defining, harmonizing, and coordinating community policies on the environment and sustainable development. With the adoption of the Andean Strategy for Disaster Risk Management (EAGRD) and its Implementation Plan for 2030, aligned with the Sendai Framework of Action for Disaster Risk Reduction 2015-2030, Bolivia, Colombia, Ecuador, and Peru have prioritized, through the annual operational plans of the Andean Committee for Disaster Prevention (CAPRADE), joint actions aimed at strengthening their national disaster risk management (DRM) policies and systems. The main objective of this effort is to reduce the risk of emergencies or disasters by executing activities focused on strengthening institutional capacities for preparation, response, rehabilitation, and reconstruction, with a focus on prevention and mitigation.

The key actions developed in the project are the development of the Member States' disaster risk management information platform and the exchange of information on current national and subregional regulations, news, and actions from Bolivia, Colombia, Ecuador, and Peru. Note that these countries are central to Amazon basin management, and CAN's efforts are complementary to developing consultative subregional and regional tools, such as a glossary of terms and concepts of DRM for adoption at the regional level, to facilitate understanding among representatives of technical institutions in coordination and negotiation processes. The Guide for the Coordination of Humanitarian Assistance among the Member Countries of the Andean Community was approved to identify and facilitate joint coordination of responses to emergencies and/or disasters.

Caribbean Community (CARICOM)

CARICOM comprises 15 Member States (among them two Amazonian countries, Suriname and Guyana) and five associate members seeking economic integration, foreign policy coordination, human and social development, and security. It adopted some decisions or agreements in the environmental domain, for example, the Agreement Establishing the Caribbean Fisheries Mechanism and the 2002 Agreement with the Secretariat of the United Nations Convention to Combat Desertification (UNCCD) in countries experiencing drought and desertification. Environmental agreements adopted in the wider Caribbean have often focused on protecting the marine environment. The Caribbean Disaster Emergency Management Agency (CDEMA), a regional intergovernmental agency for disaster management that falls directly under CARICOM, coordinates responses to disasters affecting its Member States. Some of the projects and programs coordinated by CDEMA focused on disaster management, community disaster preparedness, flood preparedness, hazard mitigation, safer building, search and rescue, vulnerability assessments, and Disaster Risk Management. Given the nature and composition of CARICOM, there is no specific focus on the Amazon region in its environmental aspects.

CDEMA has launched a project to strengthen integrated early warning systems for more effective DRR in the Caribbean through knowledge transfer and the provision of tools, and to help strengthen regional, national, and community preparedness capacity, supporting actions for an effective early warning system and improved information management and operational capacity

for response mechanisms. They also established a regional training center (RTC) that sets standards and builds disaster management capacity through multi-stakeholder collaboration and engagement. With financial backing from the Austrian Development Agency (ADA), CDEMA implements the ‘Mainstreaming Climate Change into Disaster Risk Management for the Caribbean Region’ (CCDM) project, which seeks to reinforce regional, national, and community-level capacity for mitigation, management, and coordinated response to natural and technological hazards and climate change impacts targets groups especially vulnerable people using gender-sensitive and participatory methods. In 2011, CDEMA also created a manual for mainstreaming ‘Climate Change Adaptation’ into disaster risk management work programs in Caribbean countries. The manual outlines essential steps: scoping, stakeholder and problem identification, reviewing technical and socio-economic data pertinent to adaptation options, and mainstreaming adaptation strategies. It includes analyzing factors influencing disaster risk reduction and climate change adaptation integration, preparing for multi-stakeholder workshops, developing scenarios, identifying climate change impacts, adaptation options, and implementing workshop outcomes.

Southern Common Market (MERCOSUR)

The Southern Common Market, referred to as MERCOSUR, is a regional integration process and organization initially established by the Treaty of Asunción in 1991, signed by Argentina, Brazil, Paraguay, and Uruguay. Venezuela was admitted as a full member in 2012 but suspended since 2016. Bolivia is in the process of acquiring full membership. Environmental concerns have been voiced in its framework since the 1992 United Nations Conference on Environment and Development. Before this conference, Member States affirmed their desire to take joint action on the environment in the Canela Declaration in 1992. In the same year, MERCOSUR created the Specialized Meeting on the Environment (Reunión Especializada de Medio Ambiente - REMA) to examine the Member States’ environmental laws and propose recommendations to the Common Market Group. REMA elaborated the basic guidelines of Mercosur’s environmental policy in a document entitled ‘Directrices Básicas en Matéria de Política Ambiental’. Later, in 1995, Mercosur’s environment ministers met for the first time in Montevideo and adopted the ‘Declaration of Taranco’, which established the environment as a priority issue in Mercosur’s agenda and institutional structure. After this meeting, REMA was converted into ‘Working Sub-Group No. 6’ on the Environment, one of Mercosur’s technical bodies (García 2011). Within Group No. 6’s work agenda, topics such as sustainable production and consumption, chemical substances and products, soils, environmental emergencies, waste, addressing desertification and drought challenges, biodiversity, and climate change were discussed.

MERCOSUR achieved remarkable milestones, notably establishing the SIAM Environmental Information System, aiding Member States in decision-making, fostering transparency in environmental negotiations, and supporting integrated environmental management and policy formulation. Sub-Group No. 6 notably focused on enhancing the sustainability of the productive sector by curbing pollution, supporting small and medium-sized enterprises in environmental enhancement, and bolstering competitiveness through eco-friendly practices. MERCOSUR’s additional protocol, endorsed on July 7, 2004, addresses environmental emergencies, defining them as situations with the potential for severe ecological damage that require immediate assistance. The protocol encourages Member States to develop cooperative actions based on specified recommendations to tackle such crises effectively.

Other International Cooperative Initiatives on DRR and Climate Action

Other initiatives on DRR and climate action in the region are hybrid in nature and involve international (i.e., extra-regional) cooperation partners, international organizations, and non-governmental partners.

Several initiatives relate to the wider Andes region (Climate Action-LAC, 2024). An example is the Andes Resilient to Climate Change (ARCC), which is promoted by the Global Climate Change and Environment Program of the Swiss Cooperation SDC, and facilitated by the consortium HELVETAS Swiss Intercooperation – Avina Foundation. ARCC is also associated with the International Institute for Sustainable Development (IISD) and the International Fund for Agricultural Development (IFAD). Methodologically and thematically, it is based on the cooperation experience generated in the Pacific Adaptation to Climate



Change (PACC) to understand current and future vulnerabilities, based on historical climate information and climate change scenarios, and their impacts on rural livelihoods, and to support the development of local adaptive practices. The program also steers cooperation with public actors to seek the expansion of DRR and climate action at the national level and to strengthen adaptation capacities from producers to policymakers and investment projects at the sub-national level. Focusing on relevant national programs for the rural population living in poverty is also central to its agenda, as project management units and various entities, such as the ministries of the environment, agriculture, rural development, and economic and social inclusion, are involved in its implementation. Collectively, they identify strategic processes for adaptation to climate change. Resilient Andes contribute to the resilience and capacity to adapt to climate change, specifically among rural populations (women and men) who are most vulnerable, ensuring their food and water security. The association also coordinates strategic liaison between public and private actors to direct rural development efforts, increase access to services (agricultural systems, food security, and water security), and support the climate resilience of vulnerable Andean populations in Bolivia, Ecuador, and Peru.

Analysis of Findings

Overview of Advances in DRM Strategies by Amazonian Nations

The assessment of disaster risk reduction (DRR) strategies across Amazonian countries indicates a gradual yet uneven consolidation of disaster risk governance in the region. In the countries reviewed, disaster risk management frameworks have largely evolved in response to recurrent disasters and have increasingly been incorporated into broader political and institutional agendas. National commitments to disaster risk mitigation build on earlier initiatives implemented at both national and subnational levels. These commitments are reflected in the development of legislative frameworks, the strengthening of disaster management institutions, and the establishment of water governance mechanisms operating at different administrative levels. However, the effectiveness of these institutions varies considerably across countries. Overall, the evolution of disaster risk governance in the Amazon Basin reflects a progressive alignment of policy frameworks with disaster prevention priorities, responding to regional challenges through a combination of legislative mechanisms and institutional development tailored to diverse national contexts. This synthesis reflects broader institutional efforts to align policy frameworks with disaster prevention priorities, an evolution mirrored in the region's political landscape over recent decades.

Understanding Disaster Risk (Sendai Priority 1)

The review of national strategies shows that Amazonian countries have adopted diverse approaches to strengthening disaster risk knowledge under Priority 1 of the Sendai Framework for Disaster Risk Reduction, which calls for improved understanding of hazards, exposure, vulnerability, and capacity to manage disaster risks.

National initiatives across the basin generally focus on strengthening capacities in weather forecasting, developing geographic information resources, mapping physical vulnerability in some cases, and training personnel in DRR (see Figure 11). Particularly Brazil and Colombia, emphasize the development of scientific monitoring systems and national risk information platforms. These initiatives rely on specialized research institutions and monitoring centers that collect hydrometeorological and geological data to support early warning systems and risk mapping.

In contrast, other countries prioritize capacity-building and training programs to strengthen institutional knowledge and local preparedness, as seen in Bolivia and Venezuela.

Furthermore, except for Venezuela, most countries' plans and strategies also emphasize cooperation between national and international institutions, as well as collaboration with multiple stakeholders as a mechanism to expand the knowledge base for disaster risk governance.

However, the depth and institutionalization of these initiatives vary considerably across countries, revealing differences in scientific capacity, technological infrastructure, and availability of environmental data. Another issue relates to the fragmentation of disaster risk information systems across the region. Although several countries have established national platforms for the generation and dissemination of disaster risk data, these systems generally operate within national institutional frameworks

and are rarely designed for cross-border interoperability. This limitation is particularly significant in the Amazon Basin, where many hydrological and climatic hazards (such as floods, droughts, and forest fires) transcend national boundaries and require coordinated monitoring and data exchange. This deficiency is also evident in the need for more initiatives such as establishing dedicated research, acquiring specialized equipment, and bolstering regional and national infrastructure crucial for DRR.

Another limitation concerns the lack of coherence across national strategies and the limited integration of indigenous knowledge systems into formal DRR frameworks. Although the Amazon Basin hosts many indigenous communities with extensive environmental knowledge, evidence of the systematic integration of Indigenous knowledge systems and indigenous peoples perspectives remain limited as a complementary resource to enhance the efficacy of their strategic DRR measures. At the same time, it should be considered that the demographic composition of the Amazon basin countries, including the relative importance of indigenous peoples, varies substantially.

Together, these approaches reflect a gradual strengthening of risk knowledge systems across the Amazon Basin, although important differences remain in terms of institutional capacity, technological resources, and public access to risk information. The analysis indicates a persistent gap between the production of disaster risk knowledge and its integration into territorial planning. While national strategies often promote hazard mapping, vulnerability assessments, and environmental monitoring systems, the mechanisms linking this information to land-use planning, infrastructure development, and settlement policies remain unclear. Consequently, the use of risk information to guide preventive action and long-term risk reduction remains uneven across countries and administrative levels.

Strengthening Disaster Risk Governance (Sendai Priority 2)

The review of disaster risk governance across Amazonian countries reveals a pattern of progressive but uneven integration of DRR into broader policy systems, particularly those related to land-use planning, environmental governance, climate change adaptation, and water management. While all countries have established national disaster risk management (DRM) frameworks (typically composed of legal instruments, lead agencies, and technical support institutions), their level of consolidation, specialization, and cross-sectoral coordination varies significantly. Countries such as Brazil, Colombia, Ecuador, and Peru exhibit more advanced systems, where DRR is increasingly embedded within development planning and sectoral policies, reflecting a shift toward preventive and risk-informed governance.

A key cross-cutting feature of disaster risk governance in the Amazon Basin is the predominantly decentralized institutional architecture, in which national-level policies are implemented through subnational governments, sectoral agencies, and municipal authorities. However, these decentralized systems do not operate uniformly. In countries with more developed governance structures, DRR institutions are supported by networks of specialized entities (including meteorological services, hydrological agencies, geographic institutes, and emergency response systems) enabling more robust risk monitoring, data production, and early warning capacities. In contrast, other countries rely on less specialized institutional arrangements, often centered on civil defense commissions with weaker horizontal coordination and limited technical capacity, particularly in areas such as hydro-meteorological monitoring and risk analysis. These differences highlight that, beyond the existence of formal DRR frameworks, institutional capacity and inter-agency coordination are critical determinants of effective risk governance.

Across the Amazon Basin, DRR is not governed through region-specific legal frameworks but rather through the interaction between national DRR systems and sectoral policies addressing environmental protection, forest governance, land use, and water resources. These policy domains play a central role in shaping exposure and vulnerability, as climate-related hazards in the region (particularly floods, droughts, and landslides) are closely linked to hydrological and ecological dynamics. As a result, disaster risk governance in the Amazon is highly dependent on the degree of integration between DRR and environmental and natural resource governance systems.

Significant differences emerge in the integration of DRR into land-use planning frameworks, which directly influence spatial patterns of risk. Countries such as Colombia and Brazil demonstrate stronger regulatory integration, requiring the incorporation of hazard assessments, risk zoning, and environmental considerations into territorial planning instruments. Peru and Ecuador show intermediate levels of integration, supported by planning tools such as ecological economic zoning and local development plans, but face persistent challenges related to enforcement and informal settlement expansion in high-risk areas. In contrast,

Bolivia, Venezuela, Suriname, and Guyana exhibit more fragmented planning systems, where DRR is less systematically embedded and often secondary to development or land tenure priorities. These differences contribute to uneven exposure to risk across the basin, particularly in rapidly expanding urban and peri-urban areas.

A similar divergence is observed in climate change governance, where countries with more developed institutional frameworks (such as Colombia, Brazil, and Peru) are better positioned to integrate climate adaptation with DRR strategies through coordinated policies, monitoring systems, and multi-level governance mechanisms. In other cases, climate policy remains more sectoral or externally supported, limiting long-term policy coherence and reducing the capacity to address systemic risks such as hydrological variability and ecosystem degradation.

Water governance represents a central but insufficiently integrated dimension of disaster risk governance in the Amazon Basin. While several countries have adopted Integrated Water Resources Management (IWRM) principles and basin-based approaches, these frameworks are typically regulated through separate legal and institutional systems, rather than being fully embedded within DRR governance. Interestingly, the relationship between DRR and water governance does not always follow the same pattern: some countries with less developed DRR institutional structures still maintain relatively established water management frameworks, while others are still strengthening both systems simultaneously, often with support from international cooperation. At the regional scale, the Amazon Basin has been progressively recognized as a shared hydrological system, with cooperation facilitated through the Amazon Cooperation Treaty Organization. Initiatives such as the ACTO–UNEP–GEF Amazon Basin Project have supported the development of a Strategic Action Program (SAP) and promoted Integrated Water Resources Management across the eight basin countries, including the establishment of shared information systems and coordinated responses to climate variability. These efforts have strengthened technical capacity and fostered a common regional vision for water governance. However, cooperation remains largely non-binding and dependent on national implementation, limiting the effectiveness of basin-wide disaster risk management.

Overall, the findings indicate that while Amazonian countries have made important advances in establishing disaster risk governance frameworks, significant structural gaps persist. These include uneven institutional capacity, limited horizontal coordination, fragmented integration between DRR and sectoral policies, and challenges in aligning national governance systems within a transboundary basin context. As a result, improving disaster risk governance in the Amazon requires not only strengthening national systems, but also enhancing cross-sectoral integration and regional coordination, particularly in relation to land-use planning, climate policy, and water resource management.

Investing in Disaster Risk Reduction for Resilience (Sendai Priority 3)

Regarding risk transfer strategies and disaster insurance (Priority 3 of the Sendai Framework), countries such as Ecuador and Guyana demonstrate good practices, having integrated risk transfer mechanisms and disaster insurance into their DRR strategies. These approaches, which promote collaboration between governments, financial institutions, and insurance users, provide useful references for strengthening financial resilience across the region. However, in most Amazonian countries, these instruments remain primarily oriented toward post-disaster compensation rather than preventive risk reduction.

Across the region, well-established disaster response systems (aligned with Priority 4 of the Sendai Framework) are implemented through national DRR institutions, civil protection agencies, and volunteer organizations, often supported by NGOs such as the Red Cross. These systems play a critical role in emergency response and recovery, reflecting a longstanding institutional capacity to manage disaster impacts. In addition, early warning systems are widely recognized as a cornerstone of disaster risk management, supported by meteorological and hydrological institutions responsible for forecasting and risk monitoring. Several Amazonian countries have also developed fiscal mechanisms to manage the economic impacts of disasters, including contingency funds, disaster risk financing strategies, and budgetary programs integrated into national DRM systems. For example, agricultural insurance schemes in countries such as Bolivia, Ecuador, and Brazil contribute to financial resilience in rural sectors, although they remain largely reactive in nature.

At the same time, some countries are increasingly incorporating disaster risk considerations into public investment and infrastructure development, including flood control systems, coastal protection, and territorial planning frameworks aimed at reducing exposure in high-risk areas.

Nevertheless, significant disparities persist across the region. While some countries have established more structured financial instruments and investment strategies, others show limited implementation or documentation, reflecting differences in fiscal capacity, institutional development, and governance priorities.

Enhancing Disaster Preparedness (Sendai Priority 4)

Disaster preparedness systems are widely institutionalized across Amazonian countries, typically anchored by national disaster management authorities and civil protection agencies operating across multiple governance levels. These systems demonstrate a relatively strong and consistent capacity in preparedness, response, and recovery (Sendai Priority 4), supported by decentralized structures that rely on coordination between national, subnational, and local actors. Preparedness and response efforts are reinforced by community-based mechanisms, including volunteer networks, local emergency brigades, and humanitarian organizations, which play a critical role in reaching remote Amazonian populations.

A central pillar of these systems is the development of early warning systems and hydrometeorological monitoring, which are the backbone of disaster preparedness strategies in the region, particularly in addressing flood and drought risks. National agencies such as hydrometeorological institutes and water authorities provide forecasting, risk mapping, and real-time data that support decision-making and emergency response, increasingly complemented by communication platforms designed to disseminate alerts to vulnerable communities. However, despite this progress, significant disparities persist in institutional capacity and technical infrastructure and system integration. Countries such as Brazil and Colombia exhibit more advanced and articulated systems, characterized by strong inter-institutional coordination and robust monitoring networks. In contrast, other countries in the region rely on more centralized or less specialized structures, often with limited technical resources and greater dependence on external support. Preparedness and response rely on community-based mechanisms, including volunteer networks and local emergency brigades. As a result, while disaster response capacities are generally well established, they remain largely reactive, with ongoing challenges in strengthening anticipatory approaches, improving communication at community level, and ensuring consistent implementation across Amazonian territories.

Cooperation Strategies Instituted in Amazon Basin Towards Cross-Border Challenges and Conflicts.

The Amazon region's political, institutional, and technical structure sets the stage for addressing cross-border challenges related to water resources, land use, and DRR through regional cooperation initiatives. Various regional blocs, including CARICOM, CAN, OAS, and ARCC, actively integrate sustainability, climate change, and DRR into their shared agenda-setting frameworks. Regional entities like ACTO exhibit a shared commitment among Amazonian states for resource conservation, which is pivotal for effective DRR policies and actions. Whilst shared water resource management remains a priority outlined by ACTO, it faces complexities due to socio-economic, cultural, and political differences among countries, challenging dialogue, and institutional alignment. As Nagabhatla et al. (2015) argue, such a task is not trivial due to the existing differences, as well as regulatory frameworks on water resources in each country, and the possible difficulties of dialogue since the institutions responsible for water management only sometimes have a comparable set up in the neighboring countries.

Integrating sustainability, climate change, and disaster risk reduction within established regional entities like ACTO represents a deliberate endeavor to address transboundary challenges and advance efficient water resource management. Specific efforts involve amalgamating data on water contamination, flow dynamics across tributaries, and subsurface water quality analysis, demanding significant time and resources. Such endeavors necessitate well-coordinated actions and accessible platforms for shared access. While legal progress recognizes the Amazon Basin as a singular administrative unit, establishing frameworks for collaborative monitoring, research planning, and management strategies remain in nascent stages.

Given the need for institutional strengthening and information exchange at the regional scale to collectively manage Amazon basin, the ACTO strategies emphasize strengthening institutions and exchanging information, be it scientific or technical information. In the implementation of early warning systems or the dissemination of risk information (per Priority 1 of the Sendai Framework), gaps exist in executing these priorities, pointing to unmet needs. Yet, they reveal gaps in implementing effective joint DRR practices. Recent inclusions in ACTO planning, like the emphasis on cooperation for various issues like forest fires, illegal wildlife trade, etc., highlight potential needs for more concrete action plans, revealing gaps in practical implementation and operational strategies. Effective DRR and proper transboundary water resource management would need to bridge the gaps in accountability and the actual execution of practical actions. However, this approach could favor soft law commitments

because it leaves enough room for states to negotiate vague instruments and do little or nothing to deliver practical actions for DRR and the proper management of transboundary water resources. These gaps underscore the need for more focused efforts, clearer strategies, and concrete actions within the ACTO framework in disaster settings.

Furthermore, participation of indigenous communities in Amazon Basin-related decision-making remains limited, and this reflects that the strategies presented by ACTO could benefit from reforms to make it most inclusive and embrace emerging pathways like nature-based solutions or ecosystem-based approaches for disaster risk reduction (Eco-DRR). In support of Eco-DRR, Ranasinghe et al. (2024) point out that it bears the potential to support policy advice at the intersection of natural and social sciences, other areas (culture, education, communication, etc.); and helps boost collaboration with key actors, including governments from national, state, and local level, civil societies, academia, and international organizations.

Strategic Recommendations

The Amazon Basin faces profound challenges due to climate extremes, necessitating a robust regional institutional framework. To comprehensively tackle these issues, we outline five key points to inform regional policy for water governance in the basin.

1. **Reducing Vulnerabilities:** Recent extreme events have surpassed the population's capacity to cope, affecting thousands across the basin each season. Addressing these challenges demands a focus on reducing vulnerabilities arising from inequality, poverty, and limited capacities among communities in the region. Hence, prioritizing alleviating inequality, poverty, and community capacity constraints is pivotal.
2. **Integrated Governance Measures:** Focusing on shared resource management, especially for water security requires effective governance strategies and deliberate disaster risk reduction planning. Regional agreements and national and sub-national governments/agencies should collectively aim to establish a robust institutional framework to effectively combat climate extremes' escalating impact on water availability, access, and management. Integrated governance measures are vital to co-managing shared resources like rivers, wetlands, and forests, and the relevance of regional (basin scale) integrated water resources management remains crucial to planning water security for all.
3. **Customized Measures:** Adapting specific territorial obligations within legal frameworks to regional and sub-regional needs ensures tailored and effective mitigation strategies. However, implementing such measures necessitates effective governance, dedicated financial resources, and strategic distribution of disaster risk reduction (DRR) strategies across the basin. Existing legal frameworks in Amazonian countries prioritize ecosystem protection, forest fire prevention, water and land resource management, civil protection, and healthcare enhancement. Yet, these instruments need more specific territorial obligations tailored to regional and sub-regional needs. Customized measures adapted to each area within these countries remain crucial to mitigate the impact of extreme events effectively. Most of all, DRR plans often need to pay more attention to the multiple dimensions of boundary crossing and the necessity of transboundary and trans-institutional collaboration to address boundary-crossing challenges in a more integrated fashion.
4. **Transboundary Collaboration:** Despite national-level initiatives, a cohesive regional approach remains crucial to combat climate extremes effectively, safeguarding lives, livelihoods, and income. Therefore, collaboration across boundaries and institutions is imperative in cross-border settings to develop more integrated disaster response plans.
5. **Consolidated Efforts:** The water security and disaster risk governance, including core aspects of climate action, can benefit from integrated efforts to establish a regional institutional framework, particularly concerning shared management of transboundary water resources, including dimensions such as socioeconomic dependence on water resources, the impact of the socio-political system on water distribution and allocation rights, including but not limited to rights of indigenous peoples and other socio-cultural aspects (knowledge and value systems) that are relevant to designing and deploying water governance strategies and DRR plans.

Overall, this synthesis stresses the immediate need for a unified regional strategy, highlighting collaborative governance as pivotal for managing the multifaceted challenges posed by climate extremes in the Amazon Basin. Local indigenous knowledge still needs to be incorporated into strategic actions despite the availability of clear evidence about its potential to complement scientific approaches in DRR. Addressing these deficiencies by prioritizing investment in scientific advancements and acknowledging the value of indigenous knowledge within policy frameworks can significantly fortify disaster preparedness and response strategies. We reiterate that a strong regional institutional framework could also help better governance for shared resource management, especially in the case of transboundary water settings and deploying climate action strategies in cross-border settings.



Looking Forward

The hosting of COP30 (2025) in Belém, Brazil, represented a significant moment for the regional international climate efforts. This was the first time a Conference of the Parties under the UNFCCC convened in the Amazon Basin, a region renowned for the planet's largest tropical forest and a global biodiversity hotspot. This choice follows a symbolic pattern, coming after the COP16 on biodiversity, held in Cali, Colombia, next to another global hotspot, the Chocó biogeographic region. The location of COP30 underscores growing international recognition that biodiversity-rich ecosystems are central to addressing the climate crisis.

This recognition occurred at a crucial moment. In 2024, global temperatures exceeded 1.5°C above pre-industrial levels for the first time, a milestone that illustrates the accelerating pace of climate change. Current scientific projections suggest that, if mitigation commitments remain unchanged, global warming could reach around 2.3 -2.5°C by the end of the century (Copernicus Climate Change Service, 2025; UNEP, 2025). This would trigger increasingly severe consequences for ecosystems, human livelihoods, and infrastructure.

This context has also strengthened both national and regional awareness of the urgency of climate action, a sentiment increasingly reflected in political leadership across the region. During COP30, Brazil's President Luiz Inácio Lula da Silva repeatedly stressed that climate action must guide the policies of governments, businesses, and societies alike. Among the outcomes of COP30 (2025) with potential implications for disaster risk governance, the following can be highlighted:

- Recognition of Indigenous territories and traditional knowledge as important components of climate mitigation and adaptation strategies, although policy frameworks adopted during the negotiations do not yet require national climate plans to incorporate territorial demarcation, monitoring systems, and Indigenous governance mechanisms as structural pillars for achieving climate goals (APIB, 2025; COIAB, 2025).
- The “Mutirão Decision” reaffirmed the collective commitment to scale up climate finance for developing countries to at least USD 1.3 trillion annually by 2035 and acknowledged the need to reform the international financial architecture. The decision also established a two-year work programme on climate finance and called on developed countries to increase the trajectory of their financial support for adaptation, including efforts to significantly expand adaptation funding in the coming decade (UNFCCC, 2025a; United Nations, 2025).
- Operationalization of the Global Goal on Adaptation (GGA), COP30 introduced the “Belém Adaptation Indicators,” a voluntary framework for monitoring progress in adaptation efforts. It launched the Baku–Belém Adaptation Road Map (2026–2028), which focuses on implementation, cooperation, knowledge exchange, and access to financial and technical resources (UNFCCC, 2025b). The GGA framework supports several areas closely linked to disaster risk reduction, including early warning systems, climate information services, ecosystem resilience, and risk-informed planning. These areas align with the priorities of the Sendai Framework for Disaster Risk Reduction. They may help improve monitoring and accountability for climate resilience actions at global and national levels.
- Comprehensive Risk Management. Discussions at COP30 (2025) emphasized the need to strengthen connections between climate adaptation and disaster risk reduction. In particular, international actors highlighted the importance of dismantling institutional silos between climate policy and disaster risk management (UNFCCC, 2025c).
- “Call to Action on Integrated Fire Management and Wildfire Resilience.” The declaration recognizes the growing transboundary nature of wildfire risks and calls for a shift from reactive fire suppression to preventive, ecosystem-based fire governance strategies. The initiative promotes integrated approaches covering the entire fire cycle—prevention, preparedness, response, recovery, and ecological fire management—while encouraging interoperability among monitoring systems, early warning platforms, and fire risk classification tools (COP30 Presidency, 2025).
- The Amazon Cooperation Treaty Organization (ACTO), which brings together the eight sovereign Amazonian countries, announced a regional forest monitoring project aimed at strengthening basin-wide monitoring capacities. Financed through Brazil's Amazon Fund and implemented with technological support from Brazil's National Institute for Space Research (INPE), the initiative seeks to harmonize monitoring methodologies, improve detection of deforestation and forest degradation, and strengthen technical capacity across the basin (ACTO, 2025).

The initiatives listed above represent an important starting point for strengthening disaster risk reduction, prevention, and management in the Amazon Basin and the larger region. However, their effectiveness will ultimately depend on whether political commitments translate into concrete actions. And how aspects such as sustained investments, stronger regional coordination, and practical mechanisms for cross-border disaster risk governance are integrated into the agenda. We call for strengthening regional data systems, developing shared protocols, implementing joint initiatives, and reinforcing multilevel governance - including meaningful participation of Indigenous peoples - to enhance climate resilience across the Amazon Basin. Looking ahead, progress will largely depend on the capacity of Amazonian countries to convert political momentum into concrete forms of cooperation.

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Annex

Table I: Synthesized key actions for the Priority 1 of Sendai Framework 2015-2030, the categories used in this work and the corresponding source paragraph from the original document indicated by lowercase characters, not bolded in the third column.

Priority 1. Understanding disaster risk		
Category	Key actions	Paragraphs
Knowledge production: Actions related to generating new data, information, or research (e.g., enhancing disaster risk knowledge). This includes actions that aim to develop new insights, data, and research that can inform governance decisions, policies, and strategies. This is crucial for risk governance as it supports informed decision-making.	i. Production of information for DRR. Producing technical and scientific information about risk and vulnerability, capacity, exposure, hazard characteristics and their possible sequential effects at the relevant social and spatial scale on ecosystems.	a, b,
	ii. Evidence-based data. Statistics on disaster losses and human effects to identify trends (especially disaggregated by sex, age, income, location, etc.), monitoring and evaluation.	D
	iii. Real time data and geospatial tools for risk mapping and climate forecasting. Production of risk maps, data in real time to forecast climate, river water levels, temperature and wildfires geospatial information technology.	c, f
Capacity Building and Education: Actions focused on building the capacity of individuals, communities, and institutions (e.g., training programs, workshops, developing educational materials).	iv. Technical training. Supporting technical training (to governmental institutions including DRR units) about risks, vulnerabilities, capacity, exposure, hazard characteristics and their possible sequential effects at the relevant socio ecosystems.	G
	v. Basic education. Introduction of DRR knowledge in formal education.	l, m
	vi. Community training. Supporting the creation of workshops, talks, outreach educational activities for the community including disaster prevention, mitigation, preparedness, response, recovery and rehabilitation.	G
	vii. Training for the private sector. Promote/create training in DRR for different sectors, enterprises and industry.	G
Sharing DRR knowledge, promoting collaboration, dialog and partnerships: Actions that emphasize collaborative efforts across sectors, organizations and stakeholders. Initiatives for sharing relevant information, data and knowledge to make decisions about risk.	viii. Sharing information. Mechanisms for sharing relevant information, promoting dialog and cooperation among scientific community, technical staff and DRR operational teams, stakeholders and policymakers to make decisions about disaster risk.	H
	ix. Promoting collaboration and dialog. Initiatives to create educational forums, on-line platforms, documents, about disaster risk, prevention and rehabilitation measures for the public and engage community-based organizations.	o, e

Inclusion of Local and Indigenous Knowledge and Context: Actions aimed at incorporating the perspectives and knowledge systems of local and indigenous communities.	x. Traditional knowledge inclusion. To include the use of traditional, indigenous and local knowledge and practices, as appropriate, to complement scientific knowledge in prevention measures, resilience and adaptation. Recognizing traditional ecological knowledge, resiliency actions and adaptation.	I
	xi. Cultural and ethnic context inclusion. Integrating traditional, indigenous, and local social contexts into the implementation of DRR strategies and ensuring the mainstreaming of DRR within these communities by taking into account their social structures, risk perceptions, and cultural differences.	n/a
Innovation, technology advancement and strengthening of technical and scientific capacity: Actions that encourage the development or adoption of new technologies, scientific methodologies, use of artificial intelligence or innovations for disaster risk reduction, investment in infrastructure and equipment for DRR.	xii. Advancing Technological Innovation for Disaster Risk. Promoting the use and advancement of existing and emerging technologies to develop and apply methodologies and models for assessing disaster risks, vulnerabilities, and exposure to climate hazards.	J
	xiii. Investing in Innovation and multihazard research. Promoting investments in innovation and technology development in long-term, multihazard and solution-driven research in disaster risk management, to address gaps, obstacles, interdependencies and social, economic, educational and environmental challenges and disaster risks.	K

Table II: Synthesized key actions for the Priority 2 of Sendai Framework 2015-2030, the categories used in this work and the corresponding source paragraph from the original document indicated by lowercase characters, not bolded in the third column.

Priority 2. Strengthening disaster risk governance to manage disaster risk		
Category	Key actions	Paragraphs
Disaster risk instruments: Mainstreaming disaster risk reduction (DRR) and updating or ensuring compliance with laws and regulations. Encouraging legislative and parliamentary engagement for resources allocation.	i. Laws, policies, mechanisms and roles. To mainstream DRR across sectors, creating or updating laws, and promoting compliance. To mainstream and integrate DRR into all sectors and frameworks through laws, policies, roles and to promote mechanisms to ensure compliance with enhancing-security laws such as land use and building codes. To formulate public policies for prevention or relocation from risk-prone areas.	d, k
	ii. Budget allocation. Encouraging legislative support and budget allocations for DRR initiatives. Laws that mandate regular budget allocations for national, provincial and local disaster authorities. The law also establishes a contingency budget line which can be used for disaster response and recovery.	a

Strategic Planning and implementation: development and assessment of DRR strategies, plans, and capacity.	iii. Plans for DRR. To adopt and implement national and local DRR strategies with timelines and indicators.	b
	iv. Capacity assessment. To assess DRR capacity (technical, financial and administrative).	c
	v. Monitoring and evaluation. To strengthen mechanisms to assess and report progress on DRR plans. Policies that require disaster risk management (DRM) actors to carry out continuous monitoring and evaluation of their programs and activities.	e
Institutional Roles and Coordination: Defining roles for institutions, establishing coordination platforms, and ensuring multi-stakeholder involvement.	vi. Roles and responsibilities. Laws, policies and plans clearly outline the roles and responsibilities of all government and non-government actors in DRM including: different levels of government; sectoral departments and agencies; civil society organizations; the private sector; and community groups. The roles and responsibilities allocated to different actors are commensurate with their capacities and resources.	f, g
Empowering local Governance: To empower local authorities and communities for effective DRR planning and implementation.	vii. Empowerment for effective DRR planning and implementation. To empower local authorities, as appropriate, through regulatory and financial means to work and coordinate with civil society, communities and indigenous peoples and migrants in disaster risk management at the local level.	h
Standards and incentives: To promote the development of quality standards and incentives in DRR, with multi-sectoral participation.	viii. DRR standards and incentives. Laws, policies and/or plans to establish minimum standards for disaster assistance or, alternatively, adopt existing international minimum standards with the participation of the private sector, civil society, professional associations, scientific organizations and the United Nations.	j

Table III: Synthesized key actions for the Priority 3 of Sendai Framework 2015-2030, the categories used in this work and the corresponding source paragraph from the original document indicated by lowercase characters, not bolded in the third column.

Priority 3. Investing in disaster risk reduction for resilience		
Category	Key actions	Paragraphs
Strengthening Economic Resilience and Protecting Livelihoods Actions aimed at reducing the vulnerability of economic systems and securing livelihoods in the face of disaster risks. It emphasizes the integration of disaster risk management into business models and practices. These measures are essential to ensure continuity of services, safeguard income sources, and support long-term recovery and development.	i. Strengthening the protection of productive assets such as livestock, working animals, tools, and seeds, particularly in rural and agricultural contexts as well as ensuring service continuity in broader business operations. Given the critical role of tourism as a key economic driver in many regions, disaster risk reduction approaches should also be embedded within the tourism industry to mitigate disruptions and sustain local economies.	o,p,q

Mainstreaming disaster risk considerations into planning and management of land, natural resources, and ecosystems. Initiatives to systematically integrate awareness of disaster risk, like floods, landslides, droughts, or storms, into how land is used, how natural resources are managed, and how ecosystems are protected or developed.	ii. To promote the mainstreaming of disaster risk assessments in urban and land-use planning, rural and environmental planning, incorporating DRR into development policies and tools, especially for vulnerable housing and changing environmental/ demographic conditions, ecologically sensitive or disaster-prone areas (mountains, rivers, coasts, etc.). Identification of areas that are safe for human settlement, and at the same time preserving ecosystem functions that help to reduce risks.	f, g
	iii. To strengthen the sustainable use and management of ecosystems and implement integrated environmental and natural resource management approaches that incorporate disaster risk reduction.	n
Mainstreaming disaster risk considerations into planning and management of land, natural resources, and ecosystems. Initiatives to systematically integrate awareness of disaster risk, like floods, landslides, droughts, or storms, into how land is used, how natural resources are managed, and how ecosystems are protected or developed.	iv. To invest in the structural and functional safety of buildings, in particular in critical facilities such as schools, hospitals, and infrastructure. This includes promoting resilient design and construction from the outset, retrofitting existing structures, adopting universal design principles, and nurturing a culture of maintenance. Protecting cultural and heritage sites, and updating or developing context-appropriate building codes, especially in informal and marginalized settlements.	c, d ,e, h
Disaster Risk Governance and Financing Mobilization of funds for risk reduction and the creation of financial tools, such as insurance, contingency funds, and risk-sharing mechanisms to manage the economic impact of disasters.	vi. To allocate adequate financial, logistical, and administrative resources across all levels of government and sectors. Integrating disaster risk reduction considerations into financial and fiscal instruments, such as national and local budgets, insurance mechanisms, and tax policies, further strengthens the institutional foundation for resilience.	a, m
	vii. To promote mechanisms for disaster risk transfer and insurance, risk-sharing and retention and financial protection, as appropriate, for both public and private investment in order to reduce the financial impact of disasters on Governments and societies, in urban and rural areas.	b
Health Systems, Social Protection, and Vulnerable Populations Allocating resources to integrate disaster risk reduction strategies into health systems, social policies, and protection mechanisms to safeguard lives and livelihoods before, during, and after disasters.	viii. Allocate resources to enhance the capacity of health workers, promote disaster medicine, and ensure access to essential health services, particularly for marginalized and populations in risk.	i
	ix. To develop inclusive social safety networks and livelihood support mechanisms that safeguard basic needs such as healthcare, nutrition, housing, and education, while also addressing the specific needs of individuals with chronic or life-threatening conditions before, during, and after disasters.	j, k

Table IV: Synthesized key actions for the Priority 4 of Sendai Framework 2015-2030, the categories used in this work and the corresponding source paragraph from the original document indicated by lowercase characters, not bolded in the third column.

Priority 4: Enhancing disaster preparedness for effective response and to “Build Back Better” in recovery, rehabilitation and reconstruction		
Category	Key actions	Paragraphs
Preparedness and Early Warning Systems: Contingency planning, early warning systems, evacuation drills, and training.	i. To regularly develop and update contingency plans with the participation of relevant institutions and stakeholders, taking into account climate change impacts.	a, b, f, h, m
	ii. Investing in people-centered, multi-hazard early warning systems and emergency communication mechanisms that are accessible, culturally appropriate, and inclusive.	
	iii. To improve readiness at all levels, while also building the capacity of local authorities to carry out timely evacuations in disaster-prone areas. By strengthening the technical and logistical capacities of emergency responders, both professional and volunteer. Promotion of regular training, evacuation drills, and support systems.	
Infrastructure and Service Continuity: Ensuring resilience of critical infrastructure and continuity of operations.	To promote the resilience and continuity of critical infrastructure and services before, during, and after disasters, including through strengthening existing systems, planning for uninterrupted basic services, and considering the relocation of public facilities from high-risk areas when necessary.	c, g, l
Community Engagement and Awareness: Community centers, volunteer training, public awareness.	To promote community-based disaster preparedness by establishing local centers for public awareness and emergency supplies, while also strengthening institutional frameworks and public service capacity to coordinate and implement effective relief and post-disaster recovery efforts.	d, e
Post-Disaster Recovery and Reconstruction: Recovery planning, incorporation of DRR in reconstruction, relocation, lessons learned.	To strengthen post-disaster recovery and reconstruction through coordinated multi-stakeholder collaboration, the integration of disaster risk management into recovery planning, and the promotion of sustainable development practices. This includes incorporating land-use planning, structural standards, and lessons learned from past events, while also considering the relocation of critical infrastructure from high-risk areas and ensuring access to psychosocial and mental health support for affected populations.	i, j, k, l, o, n.
Institutional Coordination and Legal Frameworks: Cooperation among stakeholders, national and international coordination, legal review.	To promote coordinated recovery and reconstruction by strengthening collaboration among national authorities, local stakeholders, and international partners, supported by effective legal and institutional frameworks that facilitate both domestic and cross-border disaster assistance.	i, p

Table A: Key objectives and strategies of Colombia's National Plan for Disaster Risk Reduction 2015-2025 (UNGRD (Unidad Nacional para la Gestión de Riesgo de Desastres), 2022).

Objective 1. Improve knowledge of disaster risk in the national territory • Articulate sectoral information systems with National Information System for Disaster Risk Management (SNIGRD). • Strengthening Science, Technology, and Innovation in disaster risk management and climate change issues. • Develop methods to evaluate the threat of flooding, flash floods, and mudslides. • Mapping areas susceptible to risk due to threats of hydrometeorological origin /creating maps of physical vulnerability due to flooding. • Provide basic cartographic information in territorial entities for disaster risk studies. • Carry out disaster risk studies of protected areas and threatened ecosystems, risk maps in the agricultural, livestock and fishing sector. • Carrying out a characterization of risk scenarios due to extreme climate events in productive areas, cultural infrastructure, and places of heritage interest. • Update the national inventory of settlements at risk due to disasters. • Strengthening the hydrometeorological monitoring network connected to early warning systems. • Design and implement National Training on DRR and DRM Training Plan for the public agencies /community. • Create and build a national risk management training center. • Create a national network of training centers for emergency response and basic emergency services such as search and rescue, firefighting, and handling hazardous materials. • Improve the technical competencies of the Departmental and Municipal Councils in their performance to guide disaster management process in their jurisdiction. • Training and training at the institutional level for emergency response.
Objective 2. Reduce risk conditions in territorial development and diverse sectors • Provide technical assistance to environmental authorities to incorporate risk management in territorial planning. • Introduce disaster risk management in the development planning instruments of indigenous territories based on the dialogue of knowledge and the ethnic perspective. • Establish guidelines for adapting settlements in areas of high mitigable risk and evaluate settlements at non-mitigable risk that require relocation. • Develop and implement a master plan for coastal erosion based on ecosystem-based adaptation measures. • Development of early warning systems and community monitoring systems. • Generate connectivity between territorial entities, national entities, and the UNGRD through various telecommunications networks. • Creation of each state's crisis rooms and radio rooms equipped and functioning. • Incorporation of risk management and adaptation to climate change in public investment, within the food security network programs, in the planning and development instruments of the transportation sector, watershed planning, tourism activity, industrial and business activity, Mining-Energy sector, agricultural, forestry, fishing and rural development sector, industrial and business activity, and health sector. • Design financial protection instruments against the risk of disasters co-financed by the State, intended for the public, private, and community sectors. • Optimize emergency response coordination by creating crisis rooms and radio rooms and providing equipment and technical support. • Technical assistance to territorial entities in disaster management and monitoring of territorial projects.
Objective 3. Strengthen risk management governance, education, and social communication with a differential, gender, and cultural diversity approach. • Identify and prioritize strategies for international cooperation in Disaster Risk Management to strengthen public, private, and community entities' institutional, technical, and operational capacities and promote exchanging experiences and capacities with other countries to contribute to their development processes. • Create workshops to strengthen water governance against the risks associated with the supply/ availability of water • Create strategies to instill social responsibility in the fight against forest fires. • Design and implement a strategic plan for developing the disaster risk management museum that facilitates communities' approach to the knowledge of risk with territorial projection.

Table B: Strategies to meet the objectives of the Bolivian National Disaster Risk Management Program.

Objective 1. • Institutional Strengthening through equipment, training, and specialization. • Implement a communication strategy in disaster risk management. • Deploy risk management implementation activities with various strategic actors. • Strengthen first response teams to respond to emergencies or disasters. • Promote spaces for knowledge exchange for resilience against disaster risk.

Objective 2.

- Implement and strengthen the Risk Management Unit in at least 90 high-risk municipalities.
- Strengthen community development for risk management and adaptation to climate change.
- Prepare guidelines and directives for the implementation of risk management standards.
- Develop methodological guidelines on risk management for public investment.

Objective 3.

- Implementation of methodologies (risk maps) to identify disaster risk.
- Develop and implement guidelines for the integration of the early warning system.
- Strengthen the SINAGER - SAT (platform update, specialized personnel, software management).

Table C: Disaster Risk Reduction Strategies of Ecuador.

Objectives	Strategies
Improve knowledge of disaster risk at the local level and the conditions of access and management of public information.	• Conceptualize, design, and implement a national system of evaluation of the risk and vulnerability due to disasters. • Establish protocols and standards for the generation, storage, use, and publication of information for risk management. • Generate academic research projects for evaluating or estimating threats, vulnerabilities, and risks in coordination with local governments. • Incorporate disaster risk issues in investment projects and studies for territorial development. • Establish a national surveillance network and monitor dangerous events that articulate scientific, technical organizations, and Autonomous Governments. • Establish a national multi-threat early warning system.
Strengthen the governance of SNGRE actors and civil society to assume their competencies and roles in disaster risk management.	• Include the disaster risk management approach in planning, territorial ordering, land use, and management. • Generate regulations to comply with public disaster risk reduction policies in their different territorial areas. • Establish regulations and protocols for compliance with disaster risk prevention and mitigation actions in the public and private sectors. • Promote the development of safe, resilient, and sustainable cities in the face of disaster risk.
Promote the implementation of risk reduction strategies and adaptation to climate variability in the public and private sector	• Regulate the construction of mitigation and prevention works in investment projects carried out in areas of mitigated risk. • Implement institutional plans to reduce physical vulnerability. • Implement public policies and mechanisms for risk transfer at the public and private levels. • Strengthen the population's participation to develop a culture of prevention and reduction of population vulnerability.
Improve preparedness actions for response and early recovery against disaster situations.	• Implement guidelines for the development of drills, which allow validation of the capabilities and processes for decision-making by those responsible for emergency and disaster management. • Form sectoral technical teams for damage assessment and needs analysis. • Consolidate a national accreditation process for urban search and rescue teams in collapsed structures (USAR). • Strategy to strengthen the national and local structure to manage situations of emergencies, disasters, and catastrophes.
Implement public policies for recovery planning post-disaster.	• Form sectoral technical teams to evaluate post-disaster damages and losses and provide technical training for teams. • Integrate post-disaster damage and loss information into a national registration system for planning post-disaster recovery actions.

Promote implementing public policies and mechanisms for risk transfer at public and private levels.	• Involve the country's productive sector in the assurance processes. • Transfer the payment of disaster losses to insurance companies.
Manage international cooperation for disaster risk management.	• Define and consolidate the inter-institutional processes and protocols necessary to properly manage the different types of international humanitarian assistance. • Promote inter-institutional strengthening in applying processes and protocols for managing different types of international humanitarian assistance. • Develop a strategic plan with guidelines for preparation and response, risk reduction, and the management and analysis of risk information with international cooperation.

Table D: Objectives and main strategies of the Disaster Risk Prevention and Reduction Plan 2023-2030 for the Peruvian Amazon

Objective	Strategies
Reduce the conditions of vulnerability in the Peruvian Amazon population in the event of disaster risk, mainly due to floods and forest fires.	• Disaster risk assessment studies at the territorial level in critical areas identified by flooding, erosion, and forest fires. • Identification of safe areas against floods. • Generate regulations that prevent population occupation of areas declared at non-mitigatable risk due to flooding. • Relocate the vulnerable population. • Develop techniques to build adequate housing in safe areas (housing on wooden stilts). • Cleaning of channels. • Improved access to river transportation at several river ports. • Maintenance and cleaning, implementation of solid waste management. • Maintenance of bridges and protection works. • Investment to improve and protect basic public services, as well as construct river defenses in the main rivers of the Amazon with containers.
Increase of knowledge about risk management and sustainable use of natural resources.	• Creation and monitoring of a regional strategy against climate change • Assess post-disaster damage. • Training in disaster risk management and adaptation to climate change for public institutions. • Strengthen and promote the culture of prevention, the participation of the rural population and holders of qualifying titles and the increase in resilience for the sustainable development of the region. • Train civil defense personnel and regional brigades. • Hold awareness talks on environmental matters to properly manage solid waste, avoid forest fires, and ensure flood safety. • Create safe practices programs for resilience. • Train and inform the population on risk, disaster management issues, and adaptation to climate change.
Improvement of disaster risk management.	• Manage, control, and supervise the regional warehouse of humanitarian aid goods for emergency care. • Provide direct aid to victims and the rehabilitation of affected populations. • Promote, install, and update early warning systems through emergency dissemination and communication media. • Promote the financing of investment projects linked to sustainable development.

Table E: Venezuela's achievements in DRR.

a.	In 2006, the Andean Virtual Library Project for Disaster Prevention and Response was created with cooperation in the technical execution of the Regional Disaster Information Center, framed within the lines of CENAPRAD. The project aims to provide access to information on disaster prevention and response to promote the exchange of experiences and lessons learned between participating countries.
b.	Since 2003, Community Training Project in Self-Protection, Prevention, Mitigation, and Attention to Adverse Events (CAPCOME) has been carried out, which provides communities with knowledge, values, attitudes, and skills to implement local risk management that allows reducing the existing vulnerability and face an eventual disaster.
c.	The National Civil Protection Program for Higher Education was created within the formal educational system. It trained university students in Civil Protection and Disaster Management, making it a mandatory subject in the study plan.
d.	Early Warning System, fire risk maps, river monitoring, climate, supported by the National Risk Management System, Adverse Events Monitoring Room, National Institute of Meteorology and Hydrology (Inameh).
e.	Ideas and proposals regarding climate change and risk management included in the National Plan 2019-2030: designing a national adaptation plan that allows the country to prepare for climate scenarios and impacts.
f.	Developing policy for creating and recovering green spaces in urban areas.
g.	Increasing conservation and preservation of hydrographic basins, courses, and bodies of water.
h.	The National Directorate has developed the National Disaster Prevention and Attention Center Project (CENAPRAD), which is the Technical-Scientific component of the National Organization for Civil Protection and Disaster Administration that will allow the collection, processing, analysis, registration, and dissemination of information related to risks and disasters to contribute to their reduction and at the same time exercise Command and Control of operations during an event with adverse effects.
i.	National Historical Registry Project of Disasters that occurred in Venezuela from 1498 to 2008, whose objective is to inventory all extraordinary events of natural origin or induced by human action that have caused disasters in the country.
j.	Creation of the Simón Bolívar Humanitarian Task Force, defined as an interdisciplinary team of professionals with capabilities in the management and attention of adverse events, to provide humanitarian assistance at the national level. They are involved in educational actions, risk management, search and rescue, care of affected or injured people, medical aid (Physical and mental), and logistics.

Table F: National Integrated Disaster Risk Management Plan and Implementation Strategy of Guyana

Objective	Strategies
To be able to identify and quantify the risks and possible consequences of the impacts of floods and droughts in Guyana.	• Design and implement a National Hazard, Vulnerability, and Risk Mapping Plan. • Create and/or update hazard maps for floods (river overflow), floods on the coastline (storm surge), drought, earthquakes, tropical cyclones, landslides, and wildfires. • Conduct vulnerability assessments of all identified (and potential) vulnerable elements (population, agriculture, infrastructure, floodable areas, etc.) to floods and droughts. • Develop/update a baseline database of vulnerable and at-risk areas and elements (population, infrastructure, environment, etc.), including prioritization. • Deliver training to key government staff in designing and using mapping software and processes, including analysis.

To reduce the risks of floods and droughts in Guyana through structural and nonstructural measures, thereby reducing the vulnerability of society and the environment to the impacts and consequences of floods and droughts.	• Creation of two national sub-committees: one for sea defenses and sea walls and one for assessing vulnerability and mitigation measures for all other buildings/infrastructure. • Conduct diagnosis of structural reliability and a geotechnical and hydraulic assessment of all conservancy dams and drainage and irrigation systems. • Plan and implement mitigation/repair works for conservancy dams, drainage, and irrigation systems based on vulnerability assessments. • Design emergency plans for breaches or overflow in conservancy dams and sea defenses. • Conduct risk assessment studies to determine the feasibility of relocating specific human settlements in high-risk areas. • Conduct assessment studies to identify agricultural activities to reduce risk during flooding season. • Water management during and after disasters • Design/revise, and enact the Building Code for Guyana, including specific mandatory building measures against floods.
To promote risk transfer to reduce direct losses due to the impacts of floods and droughts affecting Guyana's government, private sector, and society.	• Establish mandatory insurance for housing, agricultural activities, and essential/critical infrastructure in the DRM Bill. • Identify risk transfer financing mechanisms and their requirements for Guyana in coordination with regional and international organizations, insurance companies, and farmers. • Design and deliver workshops to train government officials and communities in risk transfer financial mechanisms. • Develop and disseminate guidelines for best-building practices to facilitate access to insurance. • Develop and disseminate guidelines for best practices to ensure access to insurance for crops and animals.
Ensuring a consistent, adequate level of preparedness and response capacity for responding to floods and droughts through the ongoing improvement of contingency planning and emergency resources at all levels.	• Enabling environment of laws and policies, Planning, including exercises and simulations, training, public awareness and education, and early warning. • Establishment and integration of the volunteer corps into the national DRM structure, preparedness initiatives, emergency response planning, and relevant plans. • Design and implement a national simulation exercise program for testing and updating plans and ensuring they are well-known, practiced, and up to date. • Design and implementation of a national DRM training program (including identification of DRM training needs at national, regional, and local levels, creation of new training courses adapted to Guyana's specific needs and conditions, based on areas identified, and including allocation of budget for the implementation of training.)

Table G: Main legal and regulatory instruments of the Amazon countries for disaster Risk Reduction Management and Lead DRR institutions

	DRR policy instruments
Brazil	Legislative Decree relative to Paris Agreement (2015), No. 140/2016, promulgated domestically through Presidential Decree No. 9.073/2017. National Policy on Protection and Civil Defense (Law No. 12.608/2012). This law created the National System for Protection and Civil Defense (SINPDEC) and introduced key DRR governance elements: integration of DRR into urban planning and land-use policies, responsibilities across federal, state, and municipal governments, risk mapping and prevention measures, early warning systems.
Colombia	Law 1523 of 2012. Establishment of the National Disaster Risk Management Policy and the National Disaster Risk Management System.
Ecuador	Organic Law for Comprehensive Disaster Risk Management 2024. The law establishes a legal framework for disaster risk management at the national level, focusing on prevention, mitigation, preparedness, response, and recovery. It formalizes disaster risk management as a cross-sectoral public policy integrated into national development planning.

Peru	Decision 529 of the Andean Council of Ministers of Foreign Affairs, 2002. Creation of the Andean Committee for Disaster Prevention and Attention (CAPRADE). The objective is to contribute to the reduction of risk and the impact of disasters that may occur in the territory of the Andean subregion. National policy N°32 Disaster risk management, 2010. To protect the life, health and integrity of people as well as public and private assets, promoting and ensuring the location of the population and its facilities in the most secure areas, reducing vulnerabilities, with equity and social inclusion. Supreme Decree No. 054-2011-PCM, Approves the Strategic National Development Plan called Bicentennial Plan: Peru towards 2021, (updated in 2015). Refers to the Environment, Biological Diversity and Disaster Risk Management, within which one of the priorities is proactive disaster prevention management. LAW N° 29664 and Supreme, Law that creates the National Disaster Risk Management System (SINAGERD) and Decree No. 048-2011-PCM that approves it. Supreme Decree No. 111-2012-PCM of 2012, which provides for the approval of the National Policy of Disaster Risk Management as a Mandatory Compliance Policy for the National Government entities. Supreme Decree No. 034-2014-PCM of 2014, which provides for the approval of the National Plan Disaster Risk Management – PLANAGERD 2014-2021. Supreme decree N° 038-2021-PCM, 2021. The National Management Policy was approved of Disaster Risk, the same one that, considering the current norms that regulate national policies, has been updated in order to reorient its strategy with a horizon to 2050, taking into account the current legal framework, its consistency with international commitments and agreements such as the Sendai Framework for the Reduction of Disaster Risk (MSRRD) 2015 - 2030, in each of its priorities, as well as the 2030 Agenda for Sustainable Development.
Bolivia	Law No. 602 on Risk Management (2014). Establishes the national system for disaster risk management and defines prevention, preparedness, response, and recovery mechanisms. It also created the National Council for Risk Reduction and Disaster Response (CONARADE) and strengthened the National System for Risk Reduction and Disaster Response (SISRADE).
Venezuela	Presidential Decree No. 1,557 (2001). Law of the National System of Civil Protection and Disaster Management. This decree created the National Civil Protection and Disaster Management System, defining institutional roles at national, state, and municipal levels, and establishing coordination mechanisms for disaster preparedness, response, and recovery. The Venezuelan Constitution (1999) also recognizes the state's responsibility to protect citizens from hazards and risks, reinforcing the legal basis for disaster management.
Suriname	Suriname currently does not yet have a fully formalized national DRR law, but it is developing a national DRR strategy.
Guyana	Guyana does not yet have a comprehensive modern DRR law, but it has a national disaster management system, named the Civil Defense Commission (CDC).

Table H: Key laws and regulatory instruments for Environment, Climate change and Land use for the Amazonian countries.

Country	Environment	Climate change	Land use
Brazil	Article 225 of the Brazilian Federal Constitution 1988, Chapter VI (Environment). Establishes the right to an ecologically balanced environment for all, Government and community shall have the duty to defend and preserve it for present and future generations. Federal Law No. 9.638/1981 statutes the Environmental National Policy. Establishes the National Environmental Policy, its purposes and mechanisms for formulation and application, constitutes the National Environmental System (SISNAMA) and establishes the Environmental Defense Registry.	Federal Law No. 12.187/2009. Integrates climate mitigation and adaptation into development planning.	National Policy on Regional Development (PNDR). Promotes balanced territorial development, including the Amazon region. The Forest Code (Law no. 12.651/2012). Known as the “Forest Code” protects Brazil’s watercourses and strips of land along their edges, which are designated as Permanent Preservation Areas. Ecological-Economic Zoning (ZEE). Action Plan for the Prevention and Control of Deforestation in the Legal Amazon (Plano de Ação para Prevenção e Controle do Desmatamento da Amazônia Legal – PPCDAM) Project for Satellite Monitoring of Deforestation in the Legal Amazon (Projeto de Monitoramento do Desmatamento na Amazônia Legal por Satélite – PRODES) System for Detection of Deforestation (Detecção do Desmatamento em Tempo Real – DETER) in 2004.

Colombia	1991 Constitution (Arts. 79–80). Recognizes the right to a healthy environment and mandates sustainable development and environmental planning. Decree 1076, 2015. Single Regulatory Decree of the Environment and Sustainable Development Sector. This regulatory decree compiles and simultaneously repeals the regulatory decrees on environmental issues issued up to 2015 (with modifications registered up to 2025). Resolution 1023, 2005. Emitted by the Ministry of Environment, housing and territorial development, whereby environmental guidelines are adopted as an instrument of self-management and self-regulation. Law 99 of 1993 Created the National Environmental System (SINA) and the Ministry of Environment. Introduced decentralized environmental governance via Regional Autonomous Corporations. Amazon Vision Program (Visión Amazonía). The goal of the Amazon Vision Program is to reduce net deforestation in the Colombian Amazon to zero. National Development Plans (updated every 4 years) integrate sustainability principles.	Law 164 OF 1994. By means of which the "United Nations Framework Convention on Climate Change" is approved, held in New York on May 9, 1992. Conpes 3700 of 2011 Institutional Strategy for the articulation of policies and actions regarding climate change in Colombia. Law 1819 of 2016 Establishment of the national carbon tax. Law 1753 of 2015 Formulation and implementation of sectoral plans for adaptation to climate change and sectoral action plans for mitigation of the Colombian Low Carbon Development Strategy. Law 1844 of 2017 Approval of the Paris Agreement adopted on December 12, 2015 in Paris (France). National Climate Change Policy 2017. Law 1931 of 2018. Guidelines for the management of Climate Change.	Decree Law 2811 of 1974 states that land use must be carried out in accordance with their conditions and constitutive factors and that the potential use and classification of soils must be determined according to the physical, ecological, and socioeconomic factors of the region. Law 461 of 1998 approves the United Nations Convention to Combat Desertification in Countries Affected by Severe Drought or Desertification. Law 23/73, Code of Natural Resources and Environmental Protection lists the factors that deteriorate the soil resource such as pollution, degradation, erosion and collapse of soils and lands. Law 99 of 1993, defines within the functions of the Ministry of the Environment to issue and update national regulations on land use, regulate the use of chemical and biological substances in agricultural activities, and make recommendations to reduce geospheric and landscape pollution. Law 1523 of 2012. DRR must be incorporated into territorial planning. Territorial Planning Plans (POT-Plan de Ordenamiento Territorial). Sustainable landscapes of the amazon program forest conservation and sustainability initiative in the heart of the amazon (p144271, p158003).
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Ecuador	Law No. 37, 1999. Legal framework for environmental protection defines the roles and responsibilities of the government, industries, and citizens in environmental conservation. Constitution of 2008, art. 71-74. Recognition of the right to a healthy and ecologically balanced environment. Obligation of the State to apply precautionary and preventive principles. Promotion of sustainable development under the concept of Buen Vivir. The Organic Code of the Environment 2017 and its regulations. This is the main framework law regulating environmental management, biodiversity conservation, climate change mitigation and adaptation, environmental liability and restoration.	Art. 414 of the Constitution of the Republic of Ecuador. The State will adopt measures to respond to climate change and protect populations at risk. 2008. Executive Decree No. 1815 of 2009. Declared adaptation to climate change as a state policy. Ecuador signed the Paris Agreement and ratified it in July 2017. In 2018, adopted the 2030 Agenda for Sustainable Development as a State policy and committed to contributing to the fulfillment of its objectives. Art. 14 of the Organic Administrative Code. The exercise of environmental issues related to climate change includes the powers of stewardship, planning, regulation, control and management; and article 23 states that the Ministry of the Environment and Water (MAAE), as the National Environmental Authority to exercise these powers. 2017.	Organic law of territorial organization, use and management of floor, 2016. Municipal land-use plans must incorporate environmental risk and climate adaptation.
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Peru	1993 Constitution (Art. 66 to 69). Establishes that natural resources are patrimony of the nation, exploitation is regulated by organic law, promotes the sustainable use of natural resources, conserve biological diversity and protected natural areas, and promotes sustainable development in the Amazon region. General law of the environment n° 28611, 2005. It establishes the basic principles and standards to ensure the effective exercise of the right to a healthy, balanced and adequate environment. Framework law of the national management system environmental - law n° 28245, 2005. Ensuring compliance with the environmental objectives of public entities; strengthening the mechanisms in environmental management, the role of the National Environmental Council - CONAM, and the sectoral, regional and local entities. Regulation of the system framework law national environmental management-decree supreme n° 008, 2005. Legislative decree n° 1013. Law of creation, organization and functions from the ministry of the environment, 2005. Law N° 29968. Creation of the national environmental certification service for sustainable investments (SENACE).	Framework Law on Climate Change of Peru (Law No. 30754), 2018. Aims to establish the principles, approaches and general dispositions to coordinate, articulate, design, execute, report, monitor, evaluate and disseminate the public policies for integral, participatory and transparent management of climate change adaptation and mitigation measures, with the purpose of reducing the country's vulnerability to climate change. National Strategy on Climate Change of Peru (ENCC) – updated 2015 / aligned with Paris Agreement. Aims to strengthen climate adaptation capacity, reduce greenhouse gas emissions, promote climate-resilient development, protect forests and ecosystems, especially in the Amazon. National Adaptation Plan of Peru 2021. National Adaptation Plan of Peru is Peru's main medium- to long-term policy instrument for adapting to climate change. Priority sectors include water resources, agriculture, forests, fisheries, infrastructure and health. Climate Change Regulation of the Framework Law (Supreme Decree No. 013-2019-MINAM). Defines institutional responsibilities, establishes monitoring systems for mitigation and adaptation, requires regional and local governments to incorporate climate change into planning instruments. National Forest Conservation Program for Climate Change Mitigation. Is a long-term government program of Peru's Ministry of Environment. It aims to conserve tropical forests—especially in the Amazon—as a central pillar of the country's climate change mitigation	State Policy No. 34 of the same National Agreement refers to Territorial Planning and Management, and establishes the commitment to promote a strategic, integrated, effective and efficient process of territorial planning and management that ensures human development throughout the national territory. in an environment of peace. With this objective, the State will: Reduce the population's vulnerabilities to disaster risks through the identification of urban and rural risk areas, inspection and execution of prevention plans. Law No. 31313, 2021. Sustainable Urban Development Law. Aim to regulate the principles, guidelines, instruments and standards that govern territorial conditioning, urban planning, as well as the use and management of urban land, for the purposes of achieving urban development. Forestry and Wildlife Law, No 29763 Every person has the right to access the use, exploitation and enjoyment of the forestry and wildlife heritage of the Nation in accordance with the procedures established by the national and regional authority and the planning and management instruments of the territory; in addition to participating in its management. On January 11, 2024, Law 31973 was published, through which articles 29 and 33 of Law 29763, Forestry and Wildlife Law, were modified. It promotes deforestation by eliminating the land classification procedure based on its capacity for greater use without including a technical alternative to prioritize the best use of the land and protect forests.
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Bolivia	2009 Constitution (Arts. 33–34, 342–347). Recognizes the right to a healthy environment and incorporates the concept of “Vivir Bien” (Buen Vivir) as a development paradigm. Law No. 1333 on the Environment (1992). Promotes sustainable development with social equity. The law regulates environmental management instruments, environmental impact assessments, and the rational use of natural resources. Law 071, 2010. Recognize the rights of Mother Earth, as well as the obligations and duties of the State and society to guarantee respect for these rights. Law 300, 2012. To establish the vision and foundations of integral development in harmony and balance with Mother Earth for Living Well. Law No. 777, 2016. Comprehensive Planning System from the state of Bolivia. Is a law that organized and articulated set of norms, subsystems, processes, methodologies, mechanisms, and procedures for the comprehensive long-, medium-, and short-term planning of the Plurinational State, which allows the achievement of the objectives of Living Well through integral development in harmony and balance with Mother Earth.	Law No. 071 (2010) – Law of the Rights of Mother Earth, which recognizes nature as a subject of rights and establishes principles for environmental protection and ecological balance. Law No. 300 (2012) – Framework Law of Mother Earth and Integral Development for Living Well, which operationalizes climate mitigation and adaptation within a broader development framework. It establishes institutional mechanisms for climate policy and promotes integrated management of natural systems. Supreme Decree No. 5264 (2023), which establishes institutional guidelines for climate finance management and implementation of Bolivia’s Nationally Determined Contributions (NDCs) under the Paris Agreement.	Law No. 1700 (1996) – Forest Law, which establishes regulatory mechanisms for sustainable forest management, conservation, and prevention of land degradation. The Environmental Law (1333) also includes provisions for ecological land-use planning and territorial zoning.
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Venezuela	Constitution of the Bolivarian Republic of Venezuela Article 127. Recognizes a constitutional right to a healthy and ecologically balanced environment, establishing that each generation has both the right and the duty to protect the environment for itself and future generations. Recognizes environmental rights and mandates that the state promotes sustainable use of resources as part of development goals. Organic Law of the Environment No. 5833, 2006. Provides a comprehensive legal framework for environmental protection and sustainable development, including provisions on environmental protection, natural resource management and integration of sustainability principles across sectors.	Organic Environmental Law 2006. Provides an environmental policy basis but does not explicitly regulate mitigation or adaptation measures in a comprehensive way	Law of Land and Agricultural Development, 2001. Aims at sustainable rural development, equitable land distribution, elimination of latifundios (large estates), and planning for land use based on agro-productive vocation and food security needs.
Suriname	Environmental Framework Act No. 97, 2020. Establishes a national legal basis for environmental management and sustainable development. Defines roles and mandates for environmental governance, including standards, monitoring, and identifying polluting activities. Creates a National Environment Authority to coordinate policy and implementation.	National Climate Change Policy, Strategy and Action Plan (2014–2021). Establishes a comprehensive policy framework for mitigation and adaptation planning. Integrates climate change into national planning and development, guiding sectoral approaches including coastal resilience, water resources, land use, and disaster risk management. National Adaptation Plan 2019–2029. Linked to the NCCPSAP and UNFCCC obligations, Suriname’s NAP sets medium- and long-term adaptation strategies, mainstreaming adaptation across key sectors like water, energy, agriculture, health, and infrastructure. Environmental Framework Act 2020. Provides a legal base for environmental protection and sustainable management, which supports climate policy implementation.	Suriname does not have a single comprehensive “land use law” like some countries, but land use and spatial planning are regulated through several laws, decrees, and development plans.

Guyana	Environmental Protection Act (1996). Establishes the Environmental Protection Agency (EPA) as the central body for environmental management, conservation, and protection. Sets out procedures for Environmental Impact Assessments (EIAs), pollution control, natural resource use, and integration of environmental concerns into development planning. Green State Development Strategy-Vision 2040. Outlines national sustainable development goals, including inclusive growth, natural resource conservation, and climate-friendly development, though this is policy rather than formal law.	National Climate Change Policy and Action Plans and Climate Resilience Strategies. Outlining mitigation and adaptation objectives, institutional roles, vulnerability assessment, and sectoral priorities. These plans are aimed at strengthening national greenhouse gas inventories, adaptation measures, and mitigation strategies in line with UNFCCC commitments. Low Carbon Development Strategy (LCDS). Guides climate action, integrating climate resilience with economic development, forest protection, and avoided deforestation incentives.	Guiana National Land Use Plan, 2013. It guides land development at the national and regional levels, offering options and spatial logic to inform investment, resource allocation, and decision-making.
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