

The Systems Behind the Solutions

INDIGENOUS
PEOPLES' RESPONSES
TO CLIMATE-RELATED
ENVIRONMENTAL
DISASTERS

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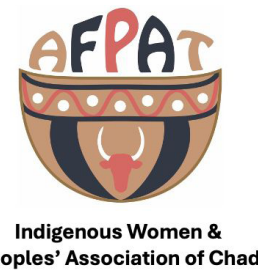
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Headlines

Headlines

01

What is happening in Indigenous Peoples' territories?

Hazards are not isolated; they are compounded. They interact and reinforce one another within the same territory: 81.9% of respondents face two or more at once, and 93.1% report rising frequency, with flood, drought, and wildfire the most common combination. **This produces cascading impacts.** One hazard triggers effects across other components of the territory: ecosystem degradation and biodiversity loss (66.7%); impacts on agriculture, fishing, or hunting (45.4%); and food insecurity (43.1%) reinforce one another.

02

How are Indigenous Peoples responding?

Indigenous Peoples are already responding by restoring the most threatened areas of their territory, thereby strengthening the protection across the whole region. Because Indigenous Peoples and their territories form one interconnected system rather than separate sectors, responses combine an average of 2.5 strategies per case, principally ecosystem protection and restoration (57.4%), agricultural and productive adaptation (44.9%), and community land and forest management (33.8%).

03

Why are these responses effective?

Indigenous Peoples' responses are effective because governance and knowledge systems work together. Strengthening territorial governance appears in a third of responses (33.8%) across all six ecosystems, providing the recognized authority to act quickly, without needing external enforcement. That authority draws on diverse knowledge holders, elders, women, and youth, who continuously test and renew the knowledge that guides decisions.

04

What enables or constrains these responses?

Three identified conditions (legal security, finance, and partnerships) determine whether Indigenous Peoples' responses can be sustained over time. Finance is the most cited enabler (51.4%), yet 48.1% of respondents reported receiving none at all. Legal recognition of Indigenous Peoples (47.2%) and their territorial rights (36.1%) enables governance to be exercised in practice. Participation in decision-making (42.6%) and support from civil society (39.4%) are equally important; however, they must reinforce governance rather than substitute for Indigenous Peoples' own authority.

05

What needs to change?

Strengthen the conditions for Indigenous Peoples' governance. Three areas where external actors can remove barriers and strengthen the conditions under which Indigenous Peoples' governance operates: (1) secure Indigenous Peoples' rights and protect territories from external pressures, (2) redirect climate finance toward direct, flexible, and long-term support for Indigenous Peoples' governance, and (3) ensure that partnerships strengthens Indigenous Peoples' governance and decision-making rather than substitute for them.



Foreword

Foreword

Last year, I met the Kankanaey Indigenous Peoples' community in Am-am, in the Philippines' Mountain Province, where water had become a daily struggle. Years of scarcity were taking a particular toll on Indigenous women and threatening their food systems. With support from Land is Life and other partners, they turned this challenge into a locally led response, installing a new well and building a water system that now serves 80 households, with capacity for more than 250. What stayed with me was not the infrastructure itself, but what happened around it. They organized its own management team, drew on its knowledge systems and established its own rules for contributions.

Stories like this began reaching us with increasing frequency from partners across the Land is Life coalition. Climate-related disasters were becoming more frequent and their impacts more complex, but so too were the responses. Again and again, we saw Indigenous Peoples responding not by waiting for outside solutions, but by mobilizing to protect their territories and recover from the crisis. We began to ask a larger question: was what we were seeing case by case part of a broader pattern? And could we demonstrate it with enough evidence to change how climate finance is designed?

This report confirms what we already see: Indigenous Peoples are not waiting for climate solutions to arrive. By bringing together quantitative and qualitative evidence, the report shows evidence that Indigenous Peoples' governance and knowledge systems sustain effective responses to climate-related environmental disasters. It also raises a critical question for governments, donors, and institutions: if this is already working, why is it still not financed as such?

It also confirms that hazards do not arrive one at a time. A flood is rarely just a flood. It interacts with drought, ecosystem degradation, shifting rainfall, and cascading impacts across the territory. Indigenous Peoples' responses are similarly interconnected. Regenerating the whole territory is therefore not an ambitious extra step, but the logical response to a cosmovision in which the wellbeing of a people and the health of their land cannot be treated as separate problems.

This is a call to donors, to governments, and to climate negotiators: the evidence is in front of you. Fund Indigenous Peoples' governance directly, provide legal security, and build partnerships that strengthen governance rather than substitute for it.

Luisa Castañeda Quintana

Executive Director
Land is Life



Voices from the territories

These voices from the Congo Basin, the Ryukyu Islands, and the Brazilian Amazon, speak directly to the findings of this report: that Indigenous Peoples’ own governance, knowledge systems, and institutions are what make climate resilience possible.

Africa, Congo Basin

“Strengthening innovative and flexible funding mechanisms for Indigenous Peoples and their civil society allies at national level, would enhance governance, enabling effective and timely responses to natural disasters linked to climate change, and would reinforce the ecological and economic resilience we need.”

Josue Aruna

Country Director of the Congo Basin Conservation Society CBCS-Network & President of the environmental civil society focal points.

Asia, Ryukyu Islands

“Climate justice cannot be achieved without Indigenous Peoples. In the Ryukyu Islands, climate change, biodiversity loss, militarization, and language loss are deeply interconnected. Protecting Indigenous Peoples’ knowledge systems and our right to self-determination is essential not only for our communities, but for the future of our planet.”

Shinako Oyakawa

representative of the Association of Comprehensive Studies for Independence of the Lew Chewan Peoples (ACSILS).

Americas, Brazilian Amazon

“For many years, Indigenous Peoples have affirmed that our responses to environmental disasters related to climate change already exist. This report not only confirms what we have advocated for over decades, but demonstrates it with evidence from Indigenous Peoples on three continents. It also shows that what makes these responses effective is our own governance, exercised through our own institutions and knowledge systems. For this reason, climate finance needs to move beyond funding only projects and start directly strengthening Indigenous Peoples’ own institutions and financial architectures. Experiences like the Podáali Fund demonstrate how Indigenous Peoples’ financial architectures can strengthen the knowledge systems that sustain territorial protection, and support responses led by Indigenous Peoples themselves, such as the Indigenous brigades that acted during the fires in the Amazon. Only in this way will it be possible to scale up the solutions that Indigenous Peoples are already implementing to protect our territories, strengthen our capacity to adapt to climate change, and conserve biodiversity.”

Elcio Manchineri

Coordinator of the Coordination of Indigenous Organizations of the Brazilian Amazon (COIAB).



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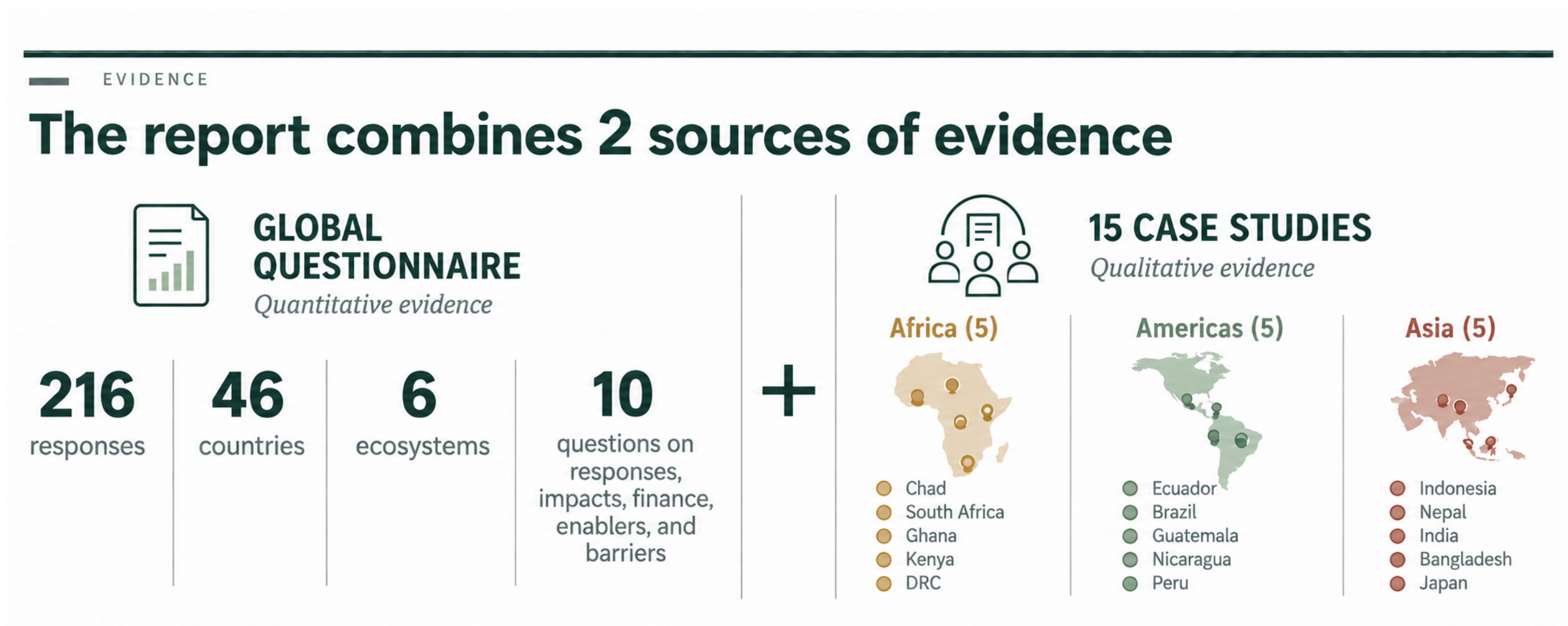
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Executive summary

Indigenous Peoples across six ecosystems (forests, mountains, drylands, freshwater systems, grasslands, and coastal) are experiencing increasingly frequent, severe, and interconnected hazards, generating cascading impacts affecting biodiversity, water, food systems, livelihoods, health, cultural practices, and the environmental relationships through which Indigenous Peoples observe and anticipate environmental change. **At the same time, Indigenous Peoples are already responding through integrated territorial systems rather than isolated measures.**

This report examines what makes these responses effective and what enables or constrains them over time. It draws on **two complementary sources of evidence**: a global questionnaire and fifteen case studies.



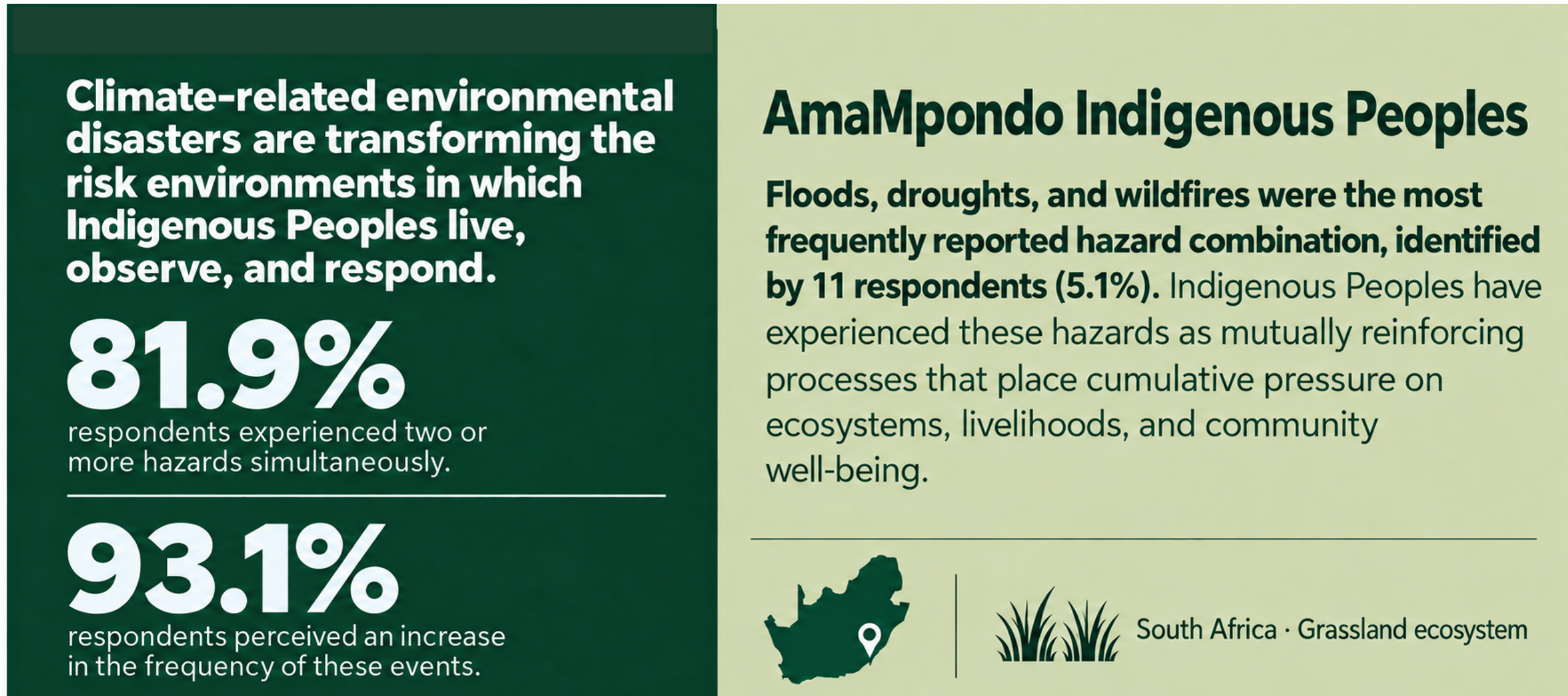
Together, this evidence points to four findings that explain what is happening, how Indigenous Peoples are responding, why these responses work, and the conditions that enable or constrain them.



Finding 1 |

Climate-related environmental disasters are transforming the risk environments in which Indigenous Peoples live, observe, and respond.

Climate-related environmental disasters are increasingly experienced as interacting processes rather than isolated hazardous events. These compound hazards interact and reinforce one another within the same territory, producing cascading impacts across ecological, social, cultural, and economic systems.

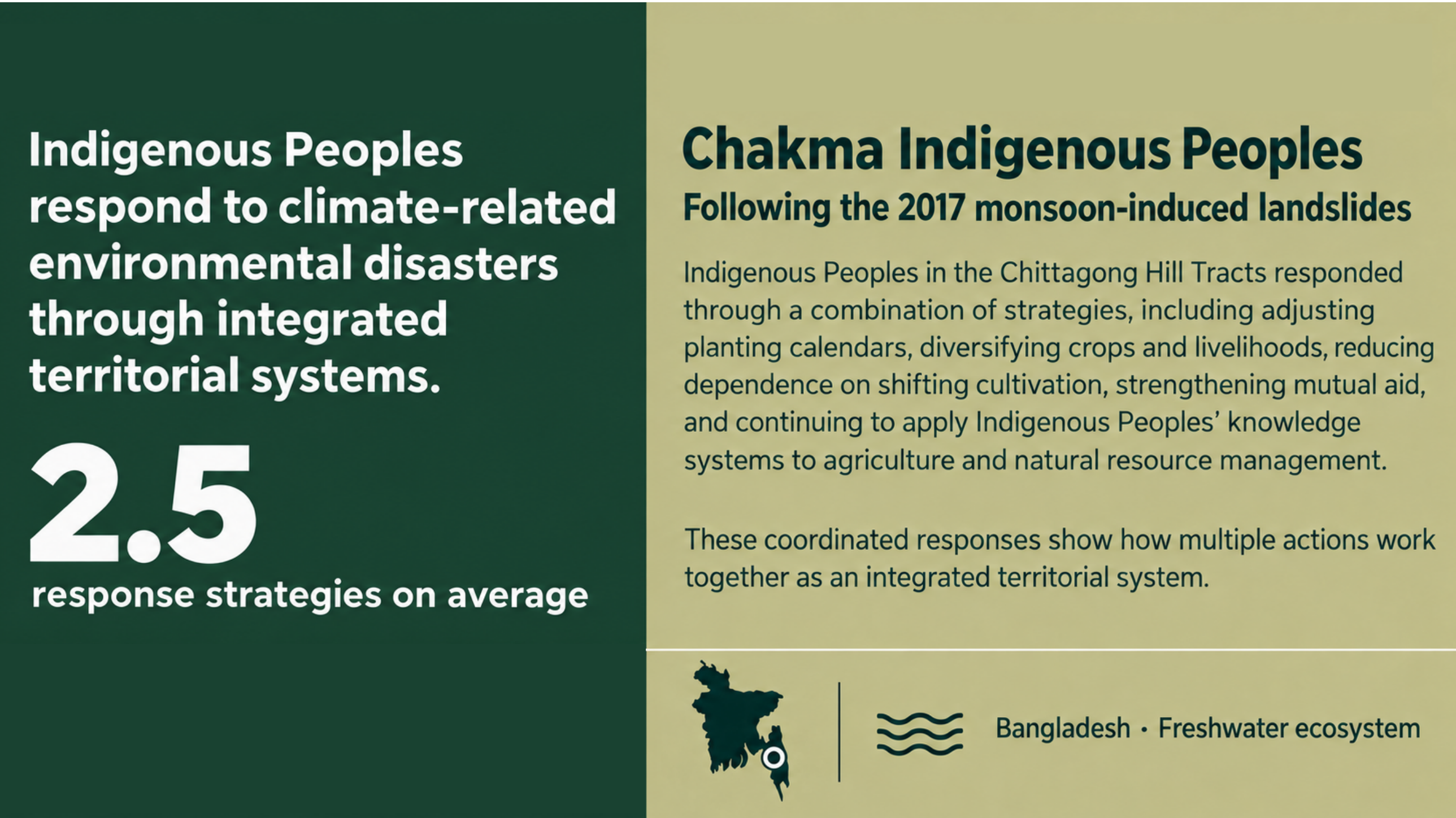


Climate-related environmental disasters are also altering the environmental relationships that sustain Indigenous Peoples’ environmental indicators and forecasting systems. Indigenous Peoples reported that changes in rainfall patterns, snow cover, animal behavior, vegetation, river flows, and other ecological signals are making long-established environmental relationships less predictable. At the same time, Indigenous Peoples continue observing, testing, and reinterpreting these indicators, demonstrating that their knowledge systems remain dynamic and adaptive.

Finding 2 |

Indigenous Peoples respond to climate-related environmental disasters through integrated territorial systems.

Indigenous Peoples rarely respond through isolated adaptation measures. Instead, they mobilize integrated territorial systems that combine ecosystem protection and restoration (57.4%), agricultural and productive adaptation (44.9%), territorial governance and community land and forest management (33.8% each), territorial defense (25.5%), disaster preparedness (21.3%), and early warning systems (19.0%).



These responses target the territorial component under greatest climate pressure, whether a forest, watershed, rangeland, mangrove, wetland, or agricultural landscape, because restoring it strengthens multiple interconnected ecological and social relationships at once, including biodiversity, water security, livelihoods, food production, and cultural continuity. Disaster risk reduction is therefore embedded within long-term territorial stewardship rather than treated as a separate emergency function.

Finding 3 |

Indigenous Peoples’ governance and knowledge systems, and collective action sustain effective territorial responses.

The effectiveness of Indigenous Peoples’ responses is explained by the continuous interaction between Indigenous Peoples’ governance and knowledge systems. Governance provides legitimate institutions for collective decision-making and action, while knowledge systems provide the accumulated environmental experience that informs those decisions. Diverse knowledge holders (elders, women, and youth) contribute complementary knowledge and sustains its transmission across generations.



Intergenerational transmission is what keeps Indigenous Peoples’ knowledge systems adaptive rather than static. However, several cases show this transmission is under strain, as migration, changing livelihoods, and disrupted access to territory reduce the everyday opportunities through which this knowledge is traditionally learned. Indigenous Peoples are responding by deliberately institutionalizing this learning, engaging youth directly in governance and monitoring, so that the testing and regeneration of indicators continues to be transmitted across generations.

Finding 4 |

Legal, financial, institutional, and political conditions determine whether Indigenous Peoples’ governance can sustain effective responses.

Indigenous Peoples’ governance is the institutional foundation of effective adaptation, but whether that governance can be exercised fully depends on the external conditions surrounding it. Secure recognition of Indigenous Peoples (47.2%) and their territorial rights (36.1%) provides the legal foundation for governance, yet legal recognition alone is insufficient if governments fail to protect Indigenous Peoples’ rights and territories from external pressures such as extractive industries, infrastructure development, land grabbing, illegal economies, or conflict.

Access to climate finance is the most frequently cited enabling condition (51.4%), and limited finance is the barrier cited most often (36.1%), pointing to a clear need for more resources. With developing countries facing adaptation costs of US\$310 billion to US\$365 billion annually by 2035¹, compared with only US\$26 billion in international adaptation finance in 2023, scarce climate finance must be allocated effectively to those already implementing the solutions. Similarly, partnerships must strengthen Indigenous Peoples’ Indigenous Peoples’ governance, leadership, and decision-making rather than substituting for it.

Legal, financial, institutional, and political conditions determine whether Indigenous Peoples’ governance can sustain effective responses.



Quechua Indigenous Peoples

The *Quechua Indigenous Peoples* of the Ausangate Regional Conservation Area have long managed water through ancestral practices such as *qochas* (water reservoirs) and community institutions. With external support, including finance and technical expertise, they have strengthened their territorial response through water management, monitoring and wetland restoration, enhancing resilience in the high Andes.



Peru



Mountain ecosystem

Recommendations: Strengthening Indigenous Peoples’ governance and knowledge systems

The recommendations address the external conditions that enable or constrain Indigenous Peoples’ governance from operating fully.

1. Strengthening the legal conditions for Indigenous Peoples’ governance, by recognizing and effectively implementing Indigenous Peoples’ rights, land security, customary law, and protection from external pressures.
2. Strengthening the financial conditions for Indigenous Peoples’ governance, through direct, flexible, culturally appropriate, and long-term climate finance that support Indigenous Peoples’ own governance institutions and financial architectures.
3. Strengthening partnerships that reinforce Indigenous Peoples’ governance, by ensuring that governments, philanthropy, civil society organizations, research institutions, and other partners provide complementary support without substituting for Indigenous Peoples’ authority and priorities.

Conclusion

At a time when climate-related environmental disasters are becoming more complex and adaptation resources remain profoundly insufficient, effective adaptation does not always require designing new interventions. Indigenous Peoples are already responding. The priority for governments, climate funds, philanthropy, international institutions, and other external actors, is to strengthen the legal, financial, and institutional conditions for Indigenous Peoples’ governance and knowledge systems to sustain and adapt over time. This means moving beyond treating Indigenous Peoples primarily as beneficiaries of adaptation and recognizing them as actors already implementing the solutions.

¹ UNEP (United Nations Environment Programme). 2025. *Adaptation Gap Report 2025: Running on Empty. The World is Gearing Up for Climate Resilience - Without the Money to Get There*. Neufeldt, H., Hammill, A., Leiter, T., Magnan, A., Watkiss, P., Bakhtiari, F., Bueno Rubial, P., Butera, B., Canales, N., Chapagain, D., Christiansen, L., Dale, T., Milford, F., Niles, K., Njuguna, L., Pauw, P., Singh, C. and Yang, G. Nairobi. <https://wedocs.unep.org/20.500.11822/48798>.



I. Introduction

Climate-related environmental disasters are placing growing pressure on ecosystems and societies worldwide, leaving governments and international organizations facing scarce adaptation resources and an urgent need to invest them where they will have the greatest impact. According to UNEP’s Adaptation Gap Report 2025, developing countries face estimated adaptation costs and financing needs of US\$310 billion to US\$365 billion annually by 2035, while actual international public adaptation finance flows were tracked at only around US\$26 billion in 2023. This means projected 2035 needs are roughly 12 to 14 times current international public finance flows, leaving an annual adaptation finance gap of approximately US\$284 billion to US\$339 billion¹. At the same time, climate-related environmental disasters continue to become more frequent, severe, and interconnected, placing growing pressure on biodiversity, water resources, food systems, livelihoods, infrastructure, economies, and human well-being. Closing this gap will require more finance, but it will also require investing what exists more effectively, toward solutions that are already working.

This report shows that **Indigenous Peoples are already implementing responses to climate-related environmental disasters**, often with little or no external finance. Across forests, mountains, drylands, freshwater systems, grasslands, and coastal ecosystems, Indigenous Peoples are responding to increasingly complex climate-related environmental disasters through the interaction of governance and knowledge systems, which enable Indigenous Peoples to observe environmental change, make collective decisions, coordinate territorial action, and adapt as conditions change.

Indigenous Peoples’ territories are exposed to a wide range of climate-related hazards², including prolonged droughts, floods, wildfires, sea-level rise, glacier retreat, and changing rainfall patterns. Through their interaction with conditions of exposure, vulnerability, and capacity, these hazards can generate climate-related environmental disasters

¹ **UNEP (United Nations Environment Programme)**. 2025. *Adaptation Gap Report 2025: Running on Empty. The World is Gearing Up for Climate Resilience - Without the Money to Get There*. Neufeldt, H., Hammill, A., Leiter, T., Magnan, A., Watkiss, P., Bakhtiari, F., Bueno Rubial, P., Butera, B., Canales, N., Chapagain, D., Christiansen, L., Dale, T., Milford, F., Niles, K., Njuguna, L., Pauw, P., Singh, C. and Yang, G. Nairobi. <https://wedocs.unep.org/20.500.11822/48798>.

² See glossary for the definition of hazards and hazardous events.

that affect biodiversity, water resources, food systems, livelihoods, cultural heritage, and the exercise of Indigenous Peoples' collective rights. Over the past decade, international climate, biodiversity, and disaster risk reduction frameworks, including the Paris Agreement³, the Convention on Biological Diversity (CBD)⁴, the Kunming-Montreal Global Biodiversity Framework (KMGBF)⁵, the Sendai Framework for Disaster Risk Reduction⁶, the Intergovernmental Panel on Climate Change (IPCC)⁷, and the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES)⁸ have progressively recognized Indigenous Peoples and their knowledge systems in adaptation action. However, comparatively less attention has been given to understanding how Indigenous Peoples' governance and knowledge systems interact to organize and sustain these responses, and the conditions that enable or constrain them over time.

This report asks not only how climate change affects Indigenous Peoples, but how Indigenous Peoples are already responding, what enables those responses to emerge and endure, and what lessons they offer for strengthening climate adaptation policy. The report combines comparative evidence from case studies across six ecosystems in Africa, Asia, and the Americas with 216 questionnaire responses from Indigenous Peoples' organizations worldwide. Its central premise is that Indigenous Peoples-led climate adaptation cannot be understood through individual adaptation practices or isolated interventions alone. Instead, it is best understood as the product of mutually reinforcing governance and knowledge systems that enable Indigenous Peoples' communities to observe environmental change, make legitimate collective decisions, coordinate territorial action, learn from experience, and continuously adapt over time.

This report's four findings follow that logic in sequence: what Indigenous Peoples are experiencing and how they are already responding, why those responses work, and what would allow them to work more fully. Building on these findings, the report closes with a set of recommendations for strengthening Indigenous Peoples' governance for climate adaptation and disaster risk reduction, organized around the legal, financial, and institutional conditions this report identifies as determining whether that governance can be exercised fully.

In a world where adaptation needs continue to grow while financial resources remain constrained, the evidence presented here suggests that one of the most effective investments may not be financing more individual adaptation projects, but strengthening the Indigenous Peoples' governance systems that already make adaptation possible.

3 **UNFCCC (United Nations Framework Convention on Climate Change).** 2015. *Paris Agreement*. FCCC/CP/2015/L.9/Rev.1. Bonn, Germany: UNFCCC. https://treaties.un.org/doc/Treaties/2016/02/20160215%2006-03%20PM/Ch_XXVII-7-d.pdf. The Paris Agreement recognizes the importance of respecting, promoting, and considering the rights of Indigenous Peoples, as well as Indigenous Peoples' knowledge systems, when taking action to address climate change.

4 **CBD (Convention on Biological Diversity).** 1992. *Convention on Biological Diversity*. Article 8(j). Montreal: CBD Secretariat. <https://www.cbd.int/convention/text>. The CBD recognizes the importance of respecting, preserving, and maintaining the knowledge, innovations, and practices of Indigenous Peoples and local communities relevant for the conservation and sustainable use of biological diversity, and promotes their wider application with the approval and involvement of the knowledge holders.

5 **CBD (Convention on Biological Diversity).** 2022. *Kunming-Montreal Global Biodiversity Framework (KMGBF)*. Decision 15/4, Section C, para. 7; Target 22. Montreal: CBD Secretariat. <https://www.cbd.int/gbf>. The KMGBF recognizes the important roles and contributions of Indigenous Peoples in biodiversity and as partners in its conservation, restoration, and sustainable use. It further calls for their full, equitable, inclusive, effective, and gender-responsive participation in biodiversity governance and decision-making, while respecting their rights, cultures, and traditional knowledge.

6 **UNDRR (United Nations Office for Disaster Risk Reduction).** 2015. *Sendai Framework for Disaster Risk Reduction 2015–2030*. Paragraphs 7, 19(d), 24(i), 27(f), and 36(a). Geneva: UNDRR. <https://www.undrr.org/publication/sendai-framework-disaster-risk-reduction-2015-2030>. **The Sendai Framework for Disaster Risk Reduction** recognizes the important role of Indigenous Peoples and their knowledge in understanding disaster risk, strengthening preparedness, early warning systems, resilience, and disaster risk governance. It further emphasizes the importance of inclusive decision-making, community participation, and strengthening local governance capacities to reduce disaster risk and build resilience.

7 **Intergovernmental Panel on Climate Change (IPCC).** (2022). *Climate Change 2022: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change*. Pörtner, H.-O., Roberts, D.C., Tignor, M., Poloczanska, E.S., Minterbeck, K., Alegría, A. et al. (eds.). Chapter 1, Section 1.4, and Summary for Policymakers. Cambridge, UK and New York: Cambridge University Press. <https://www.ipcc.ch/report/ar6/wg2/>. IPCC recognizes that *Indigenous Peoples' knowledge* are essential complements to scientific knowledge for understanding climate risks, informing adaptation, and strengthening resilience.

8 **IPBES (Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services).** 2019. *Summary for Policymakers of the Global Assessment Report on Biodiversity and Ecosystem Services*. Findings B6 and D5. Bonn: IPBES Secretariat. <https://www.ipbes.net/global-assessment>. IPBES recognizes that nature managed by Indigenous Peoples and local communities is under increasing pressure, but generally declines less rapidly than in other lands. It further finds that recognizing the knowledge, innovations, practices, institutions, and values of Indigenous Peoples and local communities, and including them in environmental governance, often enhances both their quality of life and the conservation, restoration, and sustainable use of nature.



II. Methodological overview

Methodological overview

This report examines how Indigenous Peoples respond to climate-related environmental disasters across diverse ecosystems and regions. It adopts a rights-based⁹ and Indigenous Peoples-led research approach¹⁰ that recognizes Indigenous Peoples not merely as populations affected by climate-related environmental disasters, but as rights holders, knowledge holders, and active agents exercising governance and implementing territorially grounded responses.

The assessment combines quantitative and qualitative sources of evidence to identify recurring patterns while recognizing that Indigenous Peoples' responses remain rooted in their own ecological, cultural, and institutional contexts. Rather than evaluating responses against standardized technical indicators, the assessment documents Indigenous Peoples-defined responses and examines the governance systems, Indigenous Peoples' knowledge systems, and enabling conditions that sustain them over time.

1

Sources of evidence

This study draws on two complementary sources of evidence. The first is a global questionnaire distributed through Indigenous Peoples' organizations and networks in English, Spanish, French, and Portuguese. The questionnaire collected information on hazards, impacts, Indigenous Peoples' responses, governance, enabling conditions, barriers, and climate finance. A total of 216 responses were received from Indigenous Peoples, representing **four regions, six ecosystems, and 46 countries**.

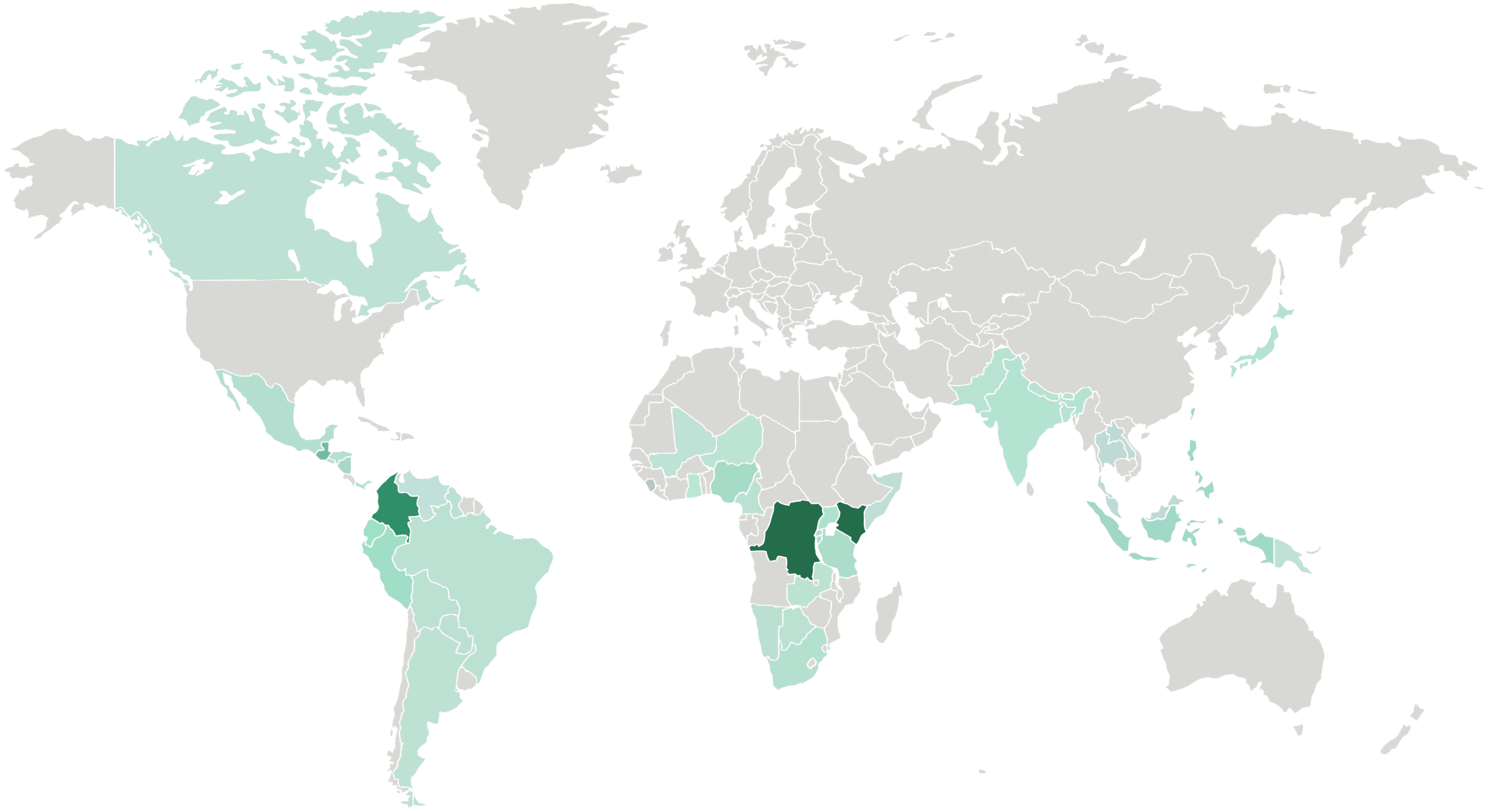
9 **UNGA (United Nations General Assembly)**. 2007. United Nations Declaration on the Rights of Indigenous Peoples. A/RES/61/295. New York: United Nations. <https://social.desa.un.org/issues/indigenous-peoples/united-nations-declaration-on-the-rights-of-indigenous-people>. **OHCHR (Office of the United Nations High Commissioner for Human Rights)**. 2006. Frequently Asked Questions on a Human Rights-Based Approach to Development Cooperation. Geneva: OHCHR. <https://www.ohchr.org>.

10 **UNESCO (United Nations Educational, Scientific and Cultural Organization)**. n.d. Local and Indigenous Knowledge Systems (LINKS) Programme. Paris: UNESCO. <https://www.unesco.org/en/links>

Figure 01: Number of questionnaire responses by country and region

Region	Countries listed	Number
Africa	Botswana, Burundi, Cameroon, Democratic Republic of the Congo, Ghana, Kenya, Malawi, Mali, Namibia, Niger, Nigeria, Rwanda, Sierra Leone, Somalia, South Africa, Tanzania, Uganda, Zambia.	100
Asia	Bangladesh, Cambodia, India, Indonesia, Japan, Malaysia, Nepal, Pakistan, Philippines, Taiwan, Thailand.	39
Americas	Argentina, Bolivia, Brazil, Canada, Colombia, Ecuador, El Salvador, Guatemala, Honduras, Mexico, Nicaragua, Panama, Paraguay, Peru, Venezuela.	75
Pacific	Papua New Guinea.	1
-	Not classified	1
TOTAL	46	216

Figure 02: Geographic distribution of questionnaire responses by country



The second source is a comparative analysis of case studies from Africa, Asia, and the Americas. Each case documents one Indigenous Peoples' response to a specific climate-related environmental disaster using a standardized analytical matrix applied consistently across all cases. The use of a common analytical matrix ensured that all case studies were examined through the same analytical framework, facilitating systematic comparison while respecting differences in ecological, cultural, and institutional contexts. The information was collected between February and June 2026, through two to four calls, combining interviews, workshops, and consultations directly with Indigenous Peoples' organizations. Where language barriers or limited direct access made this impossible, information was instead gathered through regional Indigenous Peoples' organizations or NGOs with longstanding working relationships with the communities in question. Finally, in two cases, the case studies were made through secondary evidence.

These two sources were intentionally designed to provide complementary forms of evidence, combining broad comparative patterns with in-depth contextual analysis.

2

Comparative analytical framework

A common analytical framework was applied across both the questionnaire and the case studies to enable systematic comparison while respecting the diversity of Indigenous Peoples' territorial contexts. The framework examines four interconnected dimensions: (1) Climate-related environmental disasters; (2) Impacts across Indigenous Peoples' territories and communities; (3) Indigenous Peoples' responses; and (4) The enabling conditions and barriers that influence those responses.

Rather than analyzing these dimensions as separate stages of adaptation, the assessment examines the relationships among them to understand how Indigenous Peoples develop and sustain adaptation within their territories. This integrated approach makes it possible to identify recurring patterns across regions while recognizing that Indigenous Peoples' responses remain place-based and inseparable from their ecological, cultural, and institutional contexts. Patterns were considered analytically significant when they recurred across multiple questionnaire responses and were corroborated by evidence from comparative case studies.

3 Case study selection

The comparative case studies were purposely selected to maximize analytical diversity rather than statistical representativeness. Cases were chosen to represent different geographic regions and ecosystem types, including forests, mountains, freshwater ecosystems, coastal and marine ecosystems, grasslands and savannas, and drylands. Each case documents a climate-related environmental disaster affecting an Indigenous Peoples' territory and provides evidence of an Indigenous Peoples-led response grounded in governance systems, Indigenous Peoples' knowledge systems, institutions, or collective territorial action.

4 Scope and interpretation

The findings presented in this report are based primarily on the experiences, observations, and analyses of Indigenous Peoples and their organizations who participated in the questionnaire and case studies. Because participation was voluntary and reached through Indigenous Peoples' organizations and networks rather than through random sampling, the findings should be interpreted as recurring analytical patterns among the Indigenous Peoples and organizations who responded, rather than as statistically representative estimates for the global Indigenous Peoples population. Within this sample, the quantitative results are calculated and reported with methodological rigor, but the assessment does not claim to capture the full diversity of Indigenous Peoples or of Indigenous Peoples' responses to climate change worldwide.

The methodological approach described above provides the foundation for the four findings presented in this report¹¹. By integrating global questionnaire responses with comparative case studies through a common analytical framework, the assessment identifies recurring patterns in how Indigenous Peoples experience climate-related environmental disasters, organize territorial responses, sustain them through governance and knowledge systems, and navigate the enabling conditions that shape their effectiveness.

¹¹ Additional information on the assessment design, analytical framework, data collection methods, case study selection criteria, coding procedures, and research limitations is provided in **the annex: Detailed Methodology**.



III. Findings

Findings

The analysis of the global questionnaire and comparative case studies identified four overarching findings that recur consistently across regions, ecosystems, and Indigenous Peoples' contexts. Although Indigenous Peoples' communities experience diverse climatic conditions, ecosystems, governance systems, and cultural traditions, the evidence reveals common patterns in how Indigenous Peoples experience climate-related environmental disasters, organize collective responses, sustain those responses through governance and Indigenous Peoples' knowledge systems, and navigate the legal, financial, and institutional conditions that shape their effectiveness. Together, these findings show that Indigenous Peoples' responses are best understood not as isolated adaptation measures, but as integrated territorial systems in which hazards, responses, governance, knowledge systems, and enabling conditions are fundamentally interconnected.

The findings are organized as a progressive analytical framework. **Finding 1** examines how climate-related environmental disasters are present across Indigenous Peoples' territories. **Finding 2** examines how Indigenous Peoples respond to these changes through integrated territorial systems. **Finding 3** explains how Indigenous Peoples' governance and Indigenous Peoples' knowledge systems are the core of these responses. **Finding 4** identifies the legal, financial, and institutional conditions that determine whether these responses can be exercised. Together, these findings provide the analytical foundation for the recommendations presented in the final chapter of the report.

Finding 1 |

Climate-related environmental disasters are transforming the risk environments in which Indigenous Peoples live, observe, and respond

KEY MESSAGE

Climate hazards no longer arrive one at a time. **81.9% of Indigenous Peoples’ respondents now face two or more hazards simultaneously, and 93.1% report rising frequency.** These compound hazards cause cascading impacts across ecosystems, livelihoods, and food systems, and are even eroding the environmental indicators Indigenous Peoples have long relied on to anticipate them.

The IPCC’s Sixth Assessment Report states that, with further warming, climate change risks are becoming increasingly complex and difficult to manage, as multiple climatic and non-climatic risk drivers interact, resulting in compound risks and cascading impacts¹². Building on this assessment, international jurisprudence, specifically recent Advisory Opinions, have recognized that these compound and cascading risks translate into concrete threats to human rights, territorial integrity, and self-determination, particularly for Indigenous Peoples¹³. Rather than experiencing climate-related environmental disasters as isolated events, Indigenous Peoples confirmed, through the questionnaire and case studies, that they are experiencing them as increasingly interconnected processes that generate cascading impacts across ecological, social, cultural, and territorial systems. Climate change is affecting not only the hazardous events themselves, but also the environmental indicators and relationships through which Indigenous Peoples have long observed, interpreted, and anticipated environmental change, a dimension that remains less studied in the international climate literature.

Climate change, in other words, is not only reshaping how Indigenous Peoples experience individual hazards, such as floods, cyclones, and droughts, as these hazards increasingly compound one another; it is also placing growing pressure on Indigenous Peoples’ knowledge systems through which communities understand environmental variability, anticipate hazards, and guide collective decision-making.

This finding is developed through three complementary dimensions. The first examines how climate-related hazardous events increasingly interact and reinforce one another within Indigenous Peoples’ territories. The second shows how these interacting hazards generate cascading impacts across territorial systems. The third demonstrates how climate-related environmental disasters are altering the environmental indicators and ecological relationships that Indigenous Peoples have long relied upon to observe, interpret, and anticipate environmental change.

12 **IPCC (Intergovernmental Panel on Climate Change). 2022.** *Climate Change 2022: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change*. Annex II: Glossary. Cambridge, UK and New York: Cambridge University Press. <https://www.ipcc.ch/report/ar6/wg2/chapter/technical-summary/>.

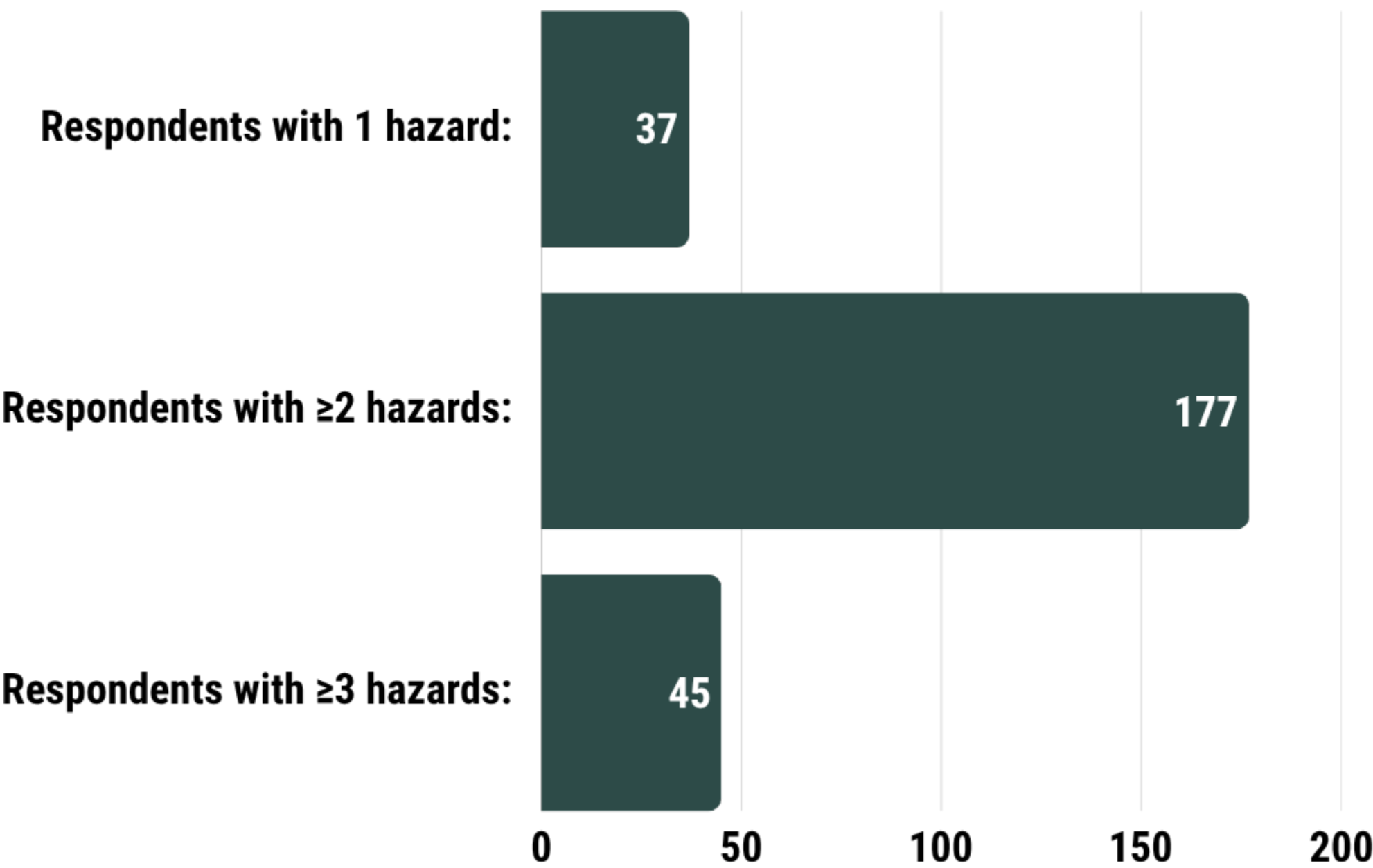
13 International Court of Justice, *Obligations of States in respect of Climate Change*, Advisory Opinion, 23 July 2025. <https://www.icj-cij.org/sites/default/files/case-related/187/187-20250723-adv-01-00-en.pdf>; Inter-American Court of Human Rights, *Climate Emergency and Human Rights*, Advisory Opinion OC-32/25, 29 May 2025 (published 3 July 2025). https://www.corteidh.or.cr/docs/opiniones/seriea_32_en.pdf.

A. Climate-related hazardous events increasingly interact and reinforce one another within Indigenous Peoples’ territories

Recognizing that recent climate assessments increasingly describe climate-related environmental disasters as compound events with cascading impacts, the questionnaire asked respondents to identify up to three climate-related hazards affecting their territories rather than a single dominant hazard. The responses indicate that Indigenous Peoples are increasingly experiencing multiple interacting hazards rather than isolated climatic events.

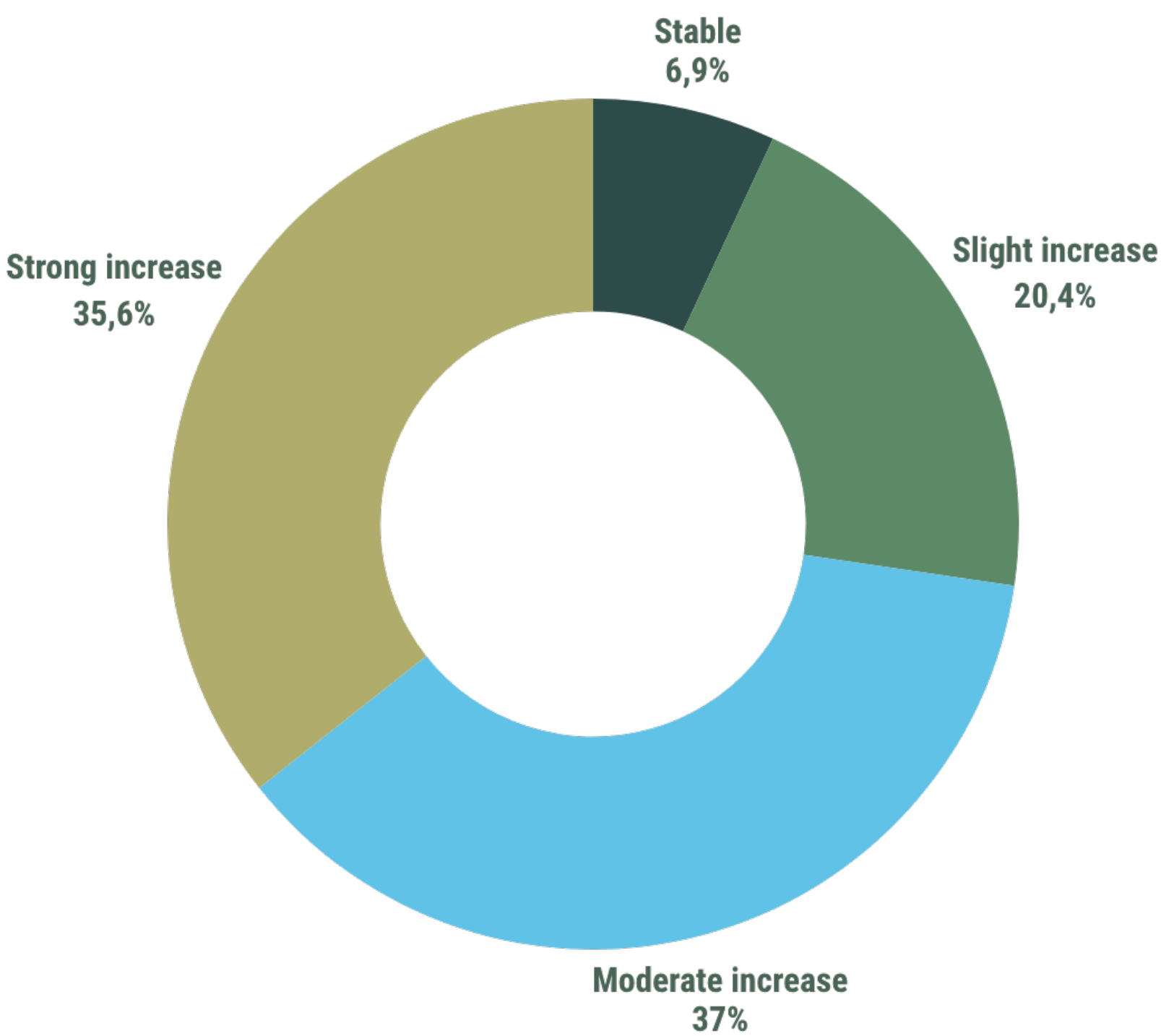
Of the 216 responses, a total of 567 climate-related hazards were reported, averaging 2.63 hazards per response. Only 37 respondents (17.3%) reported experiencing a single hazard, while 177 (81.9%) experienced two or more hazards, 150 (70.1%) experienced three or more hazards, and 149 (69.0%) reported experiencing both rapid-onset and slow-onset hazards. These findings indicate that compound hazards have become a recurring characteristic of climate-related environmental disasters across Indigenous Peoples’ territories.

. **Figure 03:** Number of Respondents by hazard exposure count



The questionnaire responses further indicate that Indigenous Peoples perceive climate-related hazards as becoming increasingly frequent and severe. Across the 216 responses, 201 respondents (93.1%) reported that climate-related hazards had increased in frequency over time. Of these, 77 respondents (35.6%) described a **strong increase**, 80 (37.0%) reported a **moderate increase**, and 44 (20.4%) identified a **slight increase**, while only 15 respondents (6.9%) considered that hazards had remained relatively stable. These findings suggest that Indigenous Peoples are experiencing not only a growing diversity of hazards, but also an acceleration in the pace at which climate-related environmental disasters are affecting their territories.

Figure 04: Perceived change in frequency of climate-related hazards over the last 10 years



The questionnaire data also allow us to identify which hazards predominate within each ecosystem. Flooding and drought remain the two most frequently reported hazards overall, but their distribution varies: flooding leads in forest (54.0%), freshwater (68.0%), and coastal and marine territories (64.3%), while drought predominates in grassland and savanna (62.1%) and, most starkly, in drylands, where it accounts for every reported case (100.0%). Mountain ecosystems stand apart from this pattern: rather than flooding or drought, irregular rainfall and seasonal disruption are the leading hazards (58.3%), reflecting a more gradual and diffuse set of pressures rather than a single acute event. Coastal and marine territories also show a distinctive profile, with severe storms, irregular rainfall, and sea-level rise clustering closely behind flooding (each at 42.9%), consistent with the compounding, multi-hazard exposure these territories face.

Figure 05: Percentage of respondents reporting climate-related hazards, by ecosystem type

Hazard	Forest	Grassland and savanna	Freshwater	Coastal and marine	Dryland	Mountain	Other
Flood	54.0%	44.8%	68.0%	64.3%	55.6%	33.3%	66.7%
Drought	46.8%	62.1%	32.0%	28.6%	100.0%	41.7%	100.0%
Severe storm	22.6%	13.8%	20.0%	42.9%	11.1%	8.3%	33.3%
Wildfire	20.2%	20.7%	20.0%	0.0%	11.1%	16.7%	33.3%
Heatwave / Rising temperature	25.0%	34.5%	20.0%	21.4%	77.8%	33.3%	33.3%
Irregular rainfall / seasonal disruption	39.5%	27.6%	32.0%	42.9%	55.6%	58.3%	33.3%
Desertification / Land degradation	15.3%	24.1%	28.0%	7.1%	44.4%	16.7%	33.3%
Sea-level rise	2.4%	3.4%	24.0%	42.9%	0.0%	0.0%	0.0%
Glacier retreat	1.6%	0.0%	0.0%	7.1%	0.0%	25.0%	0.0%
Erosion	26.6%	13.8%	32.0%	14.3%	11.1%	25.0%	0.0%

However, these climate-related hazards were rarely reported in isolation. Instead, respondents consistently described them as interacting processes that reinforce one another within the same territory.

Figure 06: Most frequently reported combinations of compounding hazards

Compound hazards	Number of responses	Percentage
Flood, Drought, Wildfire	11	5.1%
Flood, Drought, Heatwaves	10	4.6%
Drought, Heatwaves, Irregular rainfall	10	4.6%
Flood, Drought, Severe storms	9	4.2%
Flood, Heatwaves, Irregular rainfall	6	2.8%
Flood, Drought, Irregular rainfall	6	2.8%
Flood, Drought	6	2.8%
Flood, Irregular rainfall, Erosion	5	2.3%
Flood, Wildfire, Erosion	5	2.3%
Drought, Irregular rainfall, Desertification	5	2.3%

Floods, droughts, and wildfires were the most frequently reported hazard combination, identified by **11 respondents (5.1%)**. This pattern is reflected among the AmaMpondo Indigenous Peoples along South Africa’s Wild Coast (grassland), **South Africa**, where prolonged drought has reduced water availability, the spread of invasive alien vegetation has increased wildfire risk, and increasingly frequent floods have damaged settlements, roads, and agricultural lands. Rather than experiencing these as separate events, communities described them as mutually reinforcing processes that place cumulative pressure on ecosystems, livelihoods, and community well-being.

| **Box 1.a.**

Hazards do not arrive alone; they compound each other:

the case of the *AmaMpondo Indigenous Peoples* (South Africa) shows how drought, invasive vegetation driving wildfire risk, and increasingly frequent floods reinforce one another within the same territory, forming a single interlocking crisis rather than three separate events.

Floods, droughts, and heatwaves were reported together by **10 respondents (4.6%)**. A similar interaction emerged among the *Chakma Indigenous Peoples* in the Chittagong Hill Tracts (freshwater), **Bangladesh**, where prolonged dry periods and rising temperatures reduce soil moisture and weaken slope stability before increasingly intense monsoon rainfall triggers floods and landslides. The *Chakma Indigenous Peoples* identified the deadly 2017 landslides as a turning point, demonstrating how the interaction of multiple climate hazards has transformed seasonal variability into recurrent disaster risk.

Droughts, heatwaves, and irregular rainfall were also reported by **10 respondents (4.6%)**. This pattern is illustrated by the *Maya Achi Indigenous Peoples* in Rabinal (drylands), **Guatemala**, where prolonged droughts, increasing temperatures, longer canículas, and increasingly irregular rainfall interact to reduce agricultural production, diminish water availability, and undermine food security. Rather than isolated climatic anomalies, the *Maya Achi Indigenous Peoples* described these changes as reinforcing one another across successive seasons.

Floods, droughts, and severe storms were reported by **9 respondents (4.2%)**. A comparable pattern emerged among the *Miskitu Indigenous Peoples* in the Karatá Indigenous Peoples' territory (coastal and marine), **Nicaragua**, where Hurricanes Felix, Eta, and Iota brought destructive storm surges, coastal flooding, and strong winds, while increasingly unpredictable rainfall and recurrent dry periods complicated agricultural production and freshwater availability. Rather than recovering from one event before another occurred, the *Miskitu Indigenous Peoples* described living with overlapping climatic pressures that continually reshape their territory.

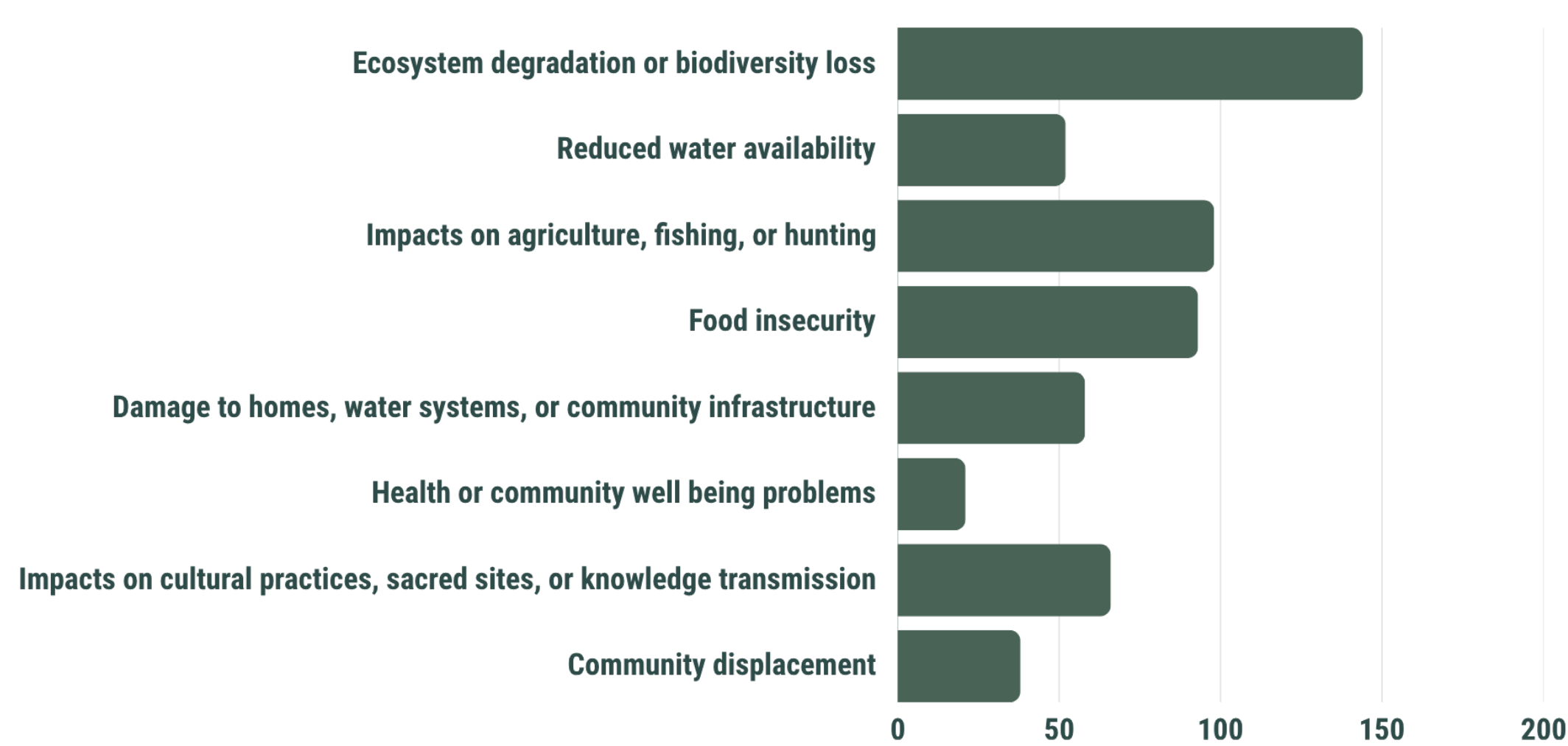
Although the specific hazard combinations differ across ecosystems, the comparative evidence reveals a consistent pattern: **climate-related environmental disasters are increasingly experienced as interacting processes rather than isolated hazardous events**. As hazards increasingly interact, they generate cascading impacts that propagate through the interconnected ecological, social, cultural, and economic relationships that sustain Indigenous Peoples' territories. The following subsection examines how these cascading impacts unfold across territorial systems.

B. Climate-related compound hazards generate cascading impacts across interconnected territorial systems

Similarly to the previous section, recognizing that compound hazards rarely produce a single, isolated consequence, the questionnaire also asked respondents to identify up to three impacts affecting their territories, rather than selecting one. Respondents reported a total of **570 impacts**, equivalent to an average of **2.64 reported impacts per respondent**, illustrating that climate-related environmental disasters simultaneously affect multiple dimensions of territorial life.

Ecosystem degradation and biodiversity loss were the most frequently reported impacts, identified by **144 respondents (66.7%)**, followed by impacts on agriculture, fishing and hunting by **98 respondents (45.4%)**, food insecurity by **93 respondents (43.1%)**, cultural practices, sacred sites, and Indigenous Peoples' knowledge systems by **66 respondents (30.6%)**, damage to homes and community infrastructure by **58 respondents (26.9%)**, reduced water availability by **52 respondents (24.1%)**, displacement and migration by **38 respondents (17.6%)**, and health and well-being by **21 respondents (9.7%)**. Rather than affecting a single sector, respondents consistently described climate-related environmental disasters as generating simultaneous disruptions across multiple territorial systems.

Figure 07: Reported Figure impacts of hazards



The IPCC’s Sixth Assessment Report recognizes that compound climate risks generate cascading impacts that spread across interconnected natural and human systems¹⁴. Similarly, the IPBES Global Assessment emphasizes the reciprocal relationships linking biodiversity, ecosystem functioning, nature’s contributions to people, and Indigenous Peoples’ knowledge systems. It further documents that biodiversity loss and ecosystem degradation simultaneously affect food security, livelihoods, health, cultural values, and Indigenous Peoples’ knowledge systems, illustrating the close interconnection between ecological and social systems¹⁵. The evidence presented here confirms and extends these perspectives by showing how Indigenous Peoples experience cascading impacts through their territories. Rather than remaining confined to a single ecosystem or sector, these impacts propagate through the relationships connecting ecosystems, livelihoods, food systems, water security, governance, mobility, cultural practices, and collective well-being.

The questionnaire showed that **ecosystem degradation and biodiversity loss** are the most frequently reported impacts, reported by **144 (66.7%)** respondents. It illustrates how ecological disruption rapidly cascades across multiple dimensions of territorial life. This dynamic is reflected by the *Tano Tano Batak Indigenous Peoples* in North Sumatra (forest), **Indonesia**, where flash floods and landslides fundamentally altered the ecological integrity of customary forests, watersheds, springs, agricultural land, and Indigenous Peoples’ settlements. Respondents explained that degraded forests and disrupted hydrological functions reduced the territory’s capacity to regulate water, stabilize slopes, and sustain Indigenous Peoples’ livelihoods. Areas previously used for farming, forest harvesting, and water collection became unsafe or inaccessible, forcing changes in land use and access to natural resources. What began as ecosystem degradation therefore cascaded across water systems, livelihoods, food production, and the ecological relationships that sustain Indigenous Peoples’ territories.

¹⁴ **IPCC (Intergovernmental Panel on Climate Change)**. 2022. *Climate Change 2022: Impacts, Adaptation and Vulnerability*. Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change, Geneva, Switzerland, IPCC. https://www.ipcc.ch/report/ar6/wg2/downloads/report/IPCC_AR6_WGII_Annex-II.pdf.
¹⁵ **IPBES (Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services)**. 2019. *Global Assessment Report on Biodiversity and Ecosystem Services*. Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services. Bonn, Germany. <https://ipbes.net/global-assessment>

The *Mising Indigenous Peoples* of Assam (freshwater), **India**, illustrate how recurrent flooding can generate cascading impacts across a riverine territorial system. Annual flooding and changes in the course of the Brahmaputra and its tributaries damage homes and household property, cause losses of livestock and agricultural production, and disrupt water and sanitation systems. As river channels shift and erosion makes settlements increasingly unsafe, these impacts extend beyond immediate flood damage, requiring families to relocate and making mobility between settlements part of longer-term adaptation to a continually changing riverine landscape.

| Box 1.b.

One flooding event caused cascading impacts:

the *Tano Tano Batak Indigenous Peoples* (Indonesia) shows how a single hazard event (flash floods and landslides occurred in 2025) cascaded through customary forests, watersheds, springs, agricultural land, and settlements, turning ecosystem degradation into a chain reaction affecting water regulation, livelihoods, and access to land.

Impacts on agriculture (fishing and hunting) were reported by **98 respondents (45.4%)**. This pattern is reflected among the *Quechua Indigenous Peoples* in the Ausangate Regional Conservation Area (mountains), **Peru**, where glacier retreat, changing precipitation patterns, and the degradation of wetlands (bofedales) and native grasslands (pajonales) have reduced water availability and pasture quality for alpaca herding. Respondents explained that deteriorating pasture conditions reduced herd productivity and household incomes, undermining the economic viability of pastoral livelihoods. As herding became increasingly difficult, many community members, particularly younger generations, migrated to nearby cities in search of alternative sources of income. What began as environmental change in high-mountain ecosystems therefore cascaded through pastoral livelihoods, local economies, migration patterns, and the intergenerational continuity of Indigenous Peoples' knowledge systems.

Food insecurity was identified by **93 respondents (43.1%)**. This pattern is illustrated by the *Anlo Ewe Indigenous Peoples* along the Volta coast (coastal and marine), **Ghana**, where sea-level rise, coastal erosion, and recurrent flooding have progressively reduced agricultural land and undermined local food production. Respondents explained that declining agricultural productivity weakened livelihoods and contributed to the relocation of coastal communities, disrupting community cohesion and reducing opportunities to transmit Indigenous Peoples' languages, cultural practices, and place-based knowledge across generations. Food insecurity therefore emerged not as an isolated outcome but as part of a broader cascade affecting livelihoods, displacement, and cultural continuity.

Impacts on cultural practices, sacred sites, and Indigenous Peoples' knowledge systems were reported by **66 respondents (30.6%)**. This pattern is reflected among the *Ryukyuan Indigenous Peoples* in the Ryukyu Islands (coastal and marine), **Japan**, where stronger typhoons, warming seas, coral bleaching, irregular rainfall, and sea-level rise simultaneously affect fisheries, freshwater resources, agriculture, biodiversity, and sacred places. Respondents explained that ecological knowledge is embedded within Indigenous Peoples' languages and place-based cultural practices; consequently, environmental degradation and language loss reinforce one another, reducing opportunities to transmit ecological knowledge across generations. What begins as ecological change therefore extends beyond biodiversity to affect the cultural institutions and knowledge systems that sustain long-term territorial adaptation.

The questionnaire and case studies demonstrate that climate-related environmental disasters are experienced not as isolated impacts but as cascading disruptions across interconnected territorial systems. The impacts of climate-related environmental disasters rarely remain confined to the ecosystem where they originate. Instead, they propagate through the ecological, productive, social, cultural, and governance relationships that sustain Indigenous Peoples' territories as integrated systems. The following subsection shows that these same cascading disruptions are increasingly affecting the environmental indicators through which Indigenous Peoples observe, interpret, and anticipate environmental change.

C. Climate change is altering the environmental relationships that sustain Indigenous Peoples' environmental indicators and forecasting

International assessments, including the IPBES Global Assessment¹⁶, the IPBES-IPCC Co-Sponsored Workshop Report, the IPCC's Sixth Assessment Report¹⁷, and the UNFCCC's¹⁸ Local Communities and Indigenous Peoples Platform (LCIPP)¹⁹, have each recognized the importance of Indigenous Peoples' knowledge systems for biodiversity conservation, sustainable management, understanding interactions between biodiversity and climate change, and observing and interpreting environmental change²⁰. Building on these assessments, the evidence presented here demonstrates that Indigenous Peoples' knowledge systems also function as sophisticated systems of environmental observation through which Indigenous Peoples' communities continuously interpret environmental change and anticipate climate-related environmental disasters.

¹⁶ **IPBES (Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services)**. 2019. *Global Assessment Report on Biodiversity and Ecosystem Services*. Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services. Bonn, Germany. <https://ipbes.net/global-assessment>.

¹⁷ **IPBES (Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services)**. 2021. *Scientific Outcome of the IPBES-IPCC Co-Sponsored Workshop on Biodiversity and Climate Change*. Bonn, Germany. <https://www.ipbes.net/events/ipbes-ipcc-co-sponsored-workshop-biodiversity-and-climate-change>.

¹⁸ **IPCC (Intergovernmental Panel on Climate Change)**. 2022. *Climate Change 2022: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change*. Geneva, Switzerland. <https://www.ipcc.ch/report/ar6/wg2/>

¹⁹ **UNFCCC (United Nations Framework Convention on Climate Change)**. 2024. *Third Annual Gathering of Knowledge Holders: Co-Leads Summary Report*. Local Communities and Indigenous Peoples Platform (LCIPP). <https://lcipp.unfccc.int/sites/default/files/2024-11/Third%20Annual%20Gathering%20of%20Knowledge%20Holders%20at%20COP%2028-Co-Leads%20Summary%20Report.pdf> **UNFCCC (United Nations Framework Convention on Climate Change)**. 2025. *Fourth Annual Gathering of Knowledge Holders: Informal Summary Report*. Local Communities and Indigenous Peoples Platform (LCIPP). https://lcipp.unfccc.int/sites/default/files/2025-06/LCIPP%20Fourth%20Annual%20Gathering%20of%20Knowledge%20Holders_Informal%20Summary%20Report%20.pdf

²⁰ **Reyes-García, V., Fernández-Llamazares, Á., Guèze, M., Garcés, A., Mallo, M., Vila-Gómez, M.** & Vilasenor, M. 2016. "Local Indicators of Climate Change: The Potential Contribution of Local Knowledge to Climate Research." *WIREs Climate Change*, 7(1): 109–124. <https://wires.onlinelibrary.wiley.com/doi/10.1002/wcc.374>.

Figure 08: Environmental indicators used by Indigenous Peoples to monitor climate-related environmental change across case studies²¹

 FOREST	 FRESHWATER
➤ Timing of flowering and fruiting ➤ Forest regeneration ➤ Canopy and vegetation condition ➤ Presence, abundance, disappearance, and movement of plant and animal species ➤ Bird and insect reproductive and migratory cycles ➤ Forest humidity and dryness ➤ Soil moisture and condition ➤ Rainfall timing and intensity ➤ River and lake levels ➤ Wind patterns	➤ River and lake levels ➤ River color, flow, and current ➤ Stream and spring discharge ➤ Water temperature and quality ➤ Flooding extent and recurrence ➤ Fish abundance, movement, and migration ➤ Soil moisture and water seepage ➤ Condition of wetlands and floodplains

 GRASSLAND AND SAVANNA	 COASTAL AND MARINE
➤ Pasture condition and availability ➤ Flowering and fruiting of grasses, trees, and other plants ➤ Availability of fodder and wild foods ➤ Livestock body condition, health, and behavior ➤ Distance travelled by livestock to find pasture or water ➤ Movement and behavior of wildlife, birds, and insects ➤ Condition of water points ➤ Soil texture and moisture ➤ Seasonal winds ➤ Celestial observations	➤ Tides ➤ Lunar cycles ➤ Currents and wave behavior ➤ Shoreline position and erosion ➤ Water temperature and salinity ➤ Marine and coastal water conditions ➤ Mangrove condition and regeneration ➤ Coral and seagrass condition ➤ Fish abundance, distribution, movement, and spawning periods ➤ Seaweed condition ➤ Coastal winds and clouds

²¹ The indicators synthesize environmental observations documented across the questionnaire's open-ended responses and the case studies. They illustrate the diversity of indicators used by Indigenous Peoples across ecosystems rather than constituting a universal or exhaustive set. Indicators are interpreted within specific Indigenous Peoples' knowledge systems and territorial contexts, and their meaning and reliability vary accordingly.

 MOUNTAIN	 DRYLAND
➤ Glacier retreat ➤ Snow cover and snowfall patterns ➤ Spring discharge ➤ River color and flow ➤ Wetland and high-altitude pasture condition ➤ Soil moisture and slope stability ➤ Cracks, seepage, and historically unstable slopes ➤ Flowering and fruiting of plants ➤ Animal behavior ➤ Cloud formations and wind patterns ➤ Celestial observations	➤ Duration, onset, and quality of seasons and dry periods ➤ Rainfall timing and intensity ➤ Soil cracking, texture, and moisture ➤ Condition of drought-resistant vegetation ➤ Pasture and fodder availability ➤ Water-point condition and distance to water ➤ Livestock health, body condition, behavior, and milk characteristics ➤ Bird migration and insect appearance ➤ Cloud formations and wind direction ➤ Temperature ➤ Moon and star positions

For generations, Indigenous Peoples have relied on interconnected environmental indicators, including the flowering and fruiting of plants, animal behavior, river levels, winds, ocean currents, cloud formations, stars, and other signals, to guide agricultural, pastoral, fishing, hunting, and cultural activities. These indicators are not interpreted independently. Rather, they derive meaning through the ecological relationships that connect atmospheric conditions, hydrological cycles, plant phenology, animal behavior, and seasonal processes across Indigenous Peoples’ territories. A substantial body of research has documented the environmental indicators used by Indigenous Peoples to understand seasonal variability and environmental change. However, less attention has been given to how climate change is altering the ecological relationships among these indicators themselves, affecting their predictability and the ways they are interpreted by Indigenous Peoples²².

The case studies provide consistent evidence that climate change is altering the environmental indicators and ecological relationships through which Indigenous Peoples observe, interpret, and anticipate climate-related environmental disasters. Although these changes were not captured through the structured questionnaire, they emerged repeatedly across geographically and culturally distinct case studies, suggesting a common pattern across diverse ecosystems.

22 **IPCC** (Intergovernmental Panel on Climate Change). 2022. *Climate Change 2022: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change*. Geneva, Switzerland. <https://www.ipcc.ch/report/ar6/wg2/>; **Reyes-García, V., Fernández-Llamazares, Á., Guèze, M., Garcés, A., Mallo, M., Vila-Gómez, M. & Vilasenor, M.** 2016. “Local Indicators of Climate Change: The Potential Contribution of Local Knowledge to Climate Research.” *WIREs Climate Change*, 7(1): 109–124. <https://wires.onlinelibrary.wiley.com/doi/10.1002/wcc.374>; **Fernández-Llamazares, Á., Díaz-Reviriego, I., Luz, A.C., Cabeza, M., Pyhälä, A. & Reyes-García, V.** 2015. “Rapid Ecosystem Change Challenges the Adaptive Capacity of Local Environmental Knowledge.” *Global Environmental Change*, 31: 272–284. <https://doi.org/10.1016/j.gloenvcha.2015.02.001>; and **LCIPP (Local Communities and Indigenous Peoples Platform)** Facilitative Working Group. 2024. *Report of the Facilitative Working Group of the Local Communities and Indigenous Peoples Platform*. United Nations Framework Convention on Climate Change (UNFCCC). <https://lcipp.unfccc.int/>.

The *Endorois* and Tugen Indigenous Peoples in Baringo County (grasslands), **Kenya**, explained that the position of the Pleiades constellation (*Kimwaret*) has historically been used to anticipate the onset of seasonal rainfall and guide planting and pastoral movements. These astronomical observations are interpreted alongside changes in vegetation, the behavior of bees and other animals, and local water conditions to forecast seasonal change. Elders reported that rainfall no longer consistently follows the patterns previously associated with these observations. Rather than the constellation itself changing, it is the long-established relationship between astronomical observations, rainfall, and seasonal environmental conditions that has become less reliable.

Similarly, the *Maya Achi Indigenous Peoples* in Rabinal (drylands), **Guatemala**, described a rich system of environmental observation based on the flowering of trees, bird songs, insect behavior, river and spring flows, rainfall, and wind patterns. Rather than relying on any single indicator, Indigenous Peoples interpret how these observations reinforce one another to anticipate the timing and intensity of seasonal rains and guide agricultural activities. Respondents explained that these relationships have become increasingly unpredictable, reducing confidence in long-established seasonal forecasts.

| **Box 1.C.**

Sky signs no longer match the rains:

the case of the *Maya Achi Indigenous Peoples* (Guatemala) shows how a rich system of indicators, including flowering trees, bird songs, insect behavior, and river flows, once reinforced one another to anticipate the timing of seasonal rains, but has become increasingly unpredictable, reducing confidence in forecasts communities have relied on for generations.

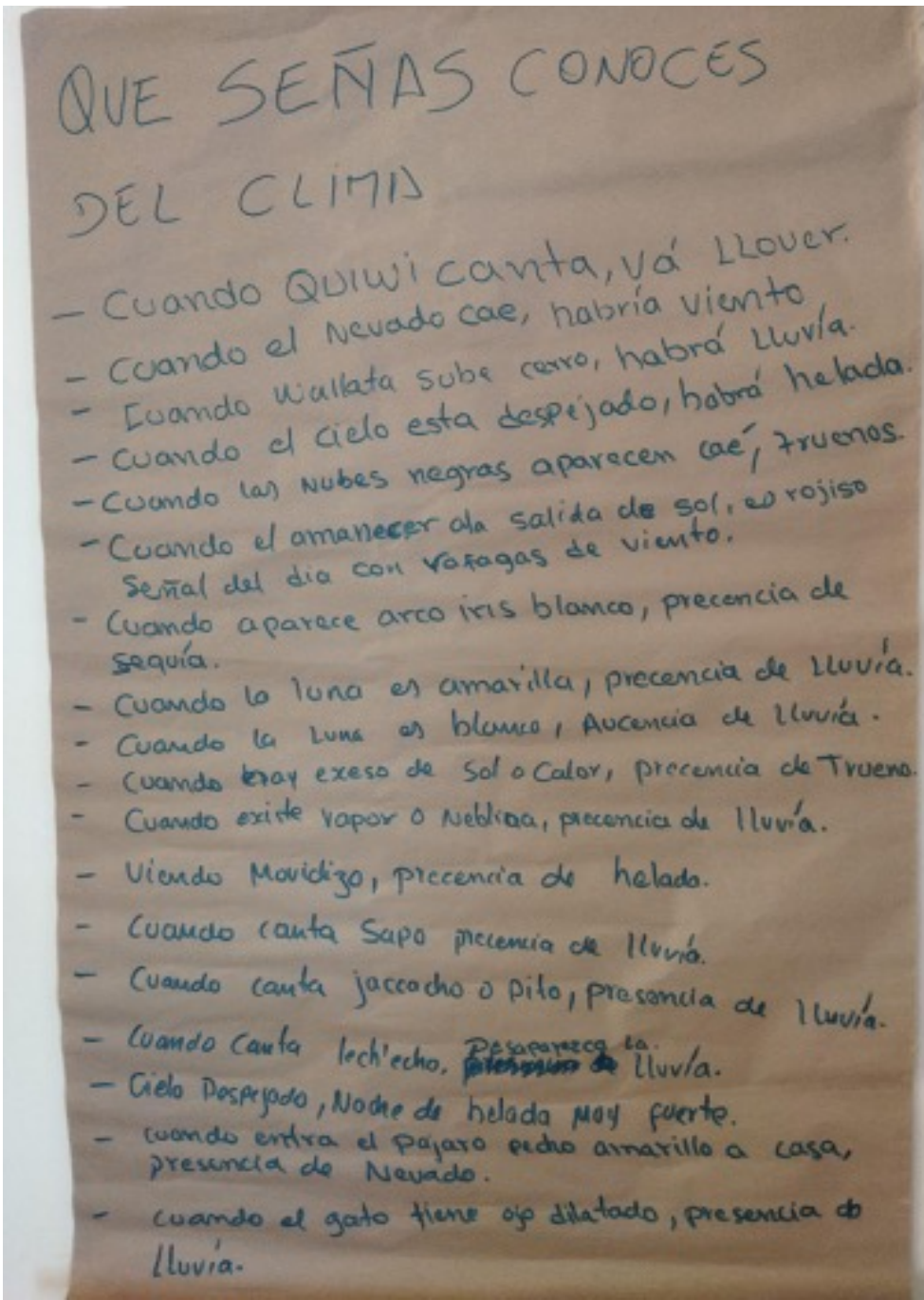


The *Mbororo Fulani Indigenous Peoples* of Chad provide a particularly extensive example of how climate change is affecting environmental forecasting. Across Lake **Chad**, Chari-Baguirmi, and Mayo-Kebbi, Mbororo knowledge systems draw on hundreds of indicators to anticipate rainfall, drought, and pasture conditions, including bird migration, plant flowering, insect and livestock behavior, clouds, winds, temperature, rainfall, the Moon and stars, bodily sensations, and changes in cattle milk. These indicators are interpreted in relation to distinct seasons and local ecological conditions rather than individually. As weather and seasonal patterns become increasingly variable, however, some of these relationships are becoming less reliable, requiring Indigenous Peoples to continually interpret changing signals rather than rely on fixed seasonal expectations.

The *Quechua Indigenous Peoples* in the Ausangate Regional Conservation Area (mountains and glaciers), **Peru**, likewise reported that pastoral life has long been guided by observing the position of the stars, the flowering of particular plants, the howling of the Andean fox, and the extent of snow cover on surrounding mountains. Elders interpret these environmental indicators collectively to anticipate snowfall, rainfall, water availability, pasture conditions, and the seasonal movements of alpaca and llama herds. Respondents explained that glacier retreat, declining snow cover, and increasingly irregular precipitation are altering the ecological relationships among these indicators. Environmental signals that historically reinforced one another no longer correspond as consistently as they once did, making seasonal forecasting increasingly uncertain. Respondents also noted that these ecological changes coincide with a widening generational gap in environmental observation. As fewer young people remain engaged in pastoral livelihoods, opportunities to learn how environmental indicators are interpreted through everyday practice have diminished, making it increasingly difficult to maintain the continuous observation on which Indigenous Peoples’ environmental knowledge depends.

Across these diverse ecosystems, the evidence suggests that climate change is not simply changing individual environmental indicators. Rather, it is altering the ecological relationships that give those indicators their predictive value. As these relationships become less stable, Indigenous Peoples face increasing uncertainty in interpreting seasonal and environmental change through long-established patterns of observation. Yet the case studies also demonstrate that Indigenous Peoples’ knowledge systems are not static. Rather than abandoning environmental indicators whose reliability has changed, Indigenous Peoples continuously observe, test, reinterpret, and regenerate them in response to changing environmental conditions.

The following finding examines how these dynamic knowledge systems are translated into integrated territorial responses that reduce disaster risk and support adaptation to climate-related environmental disasters.



Diversity of environmental indicators identified by Quechua communities during the participatory workshop in Ausangate Regional Conservation Area, Peru. Credits: Conservación Amazónica - ACCA.²³

23 Participatory exercise documenting the diverse environmental indicators traditionally used by Quechua communities to anticipate rainfall, snowfall, frost, drought, wind, and thunderstorms. Source: ⁴² Participatory workshop conducted with Quechua communities in the Ausangate Regional Conservation Area, Peru. Facilitated by the organization Conservación Amazónica – ACCA.

| Finding 2

Indigenous Peoples respond to climate-related environmental disasters through integrated territorial systems

KEY MESSAGE

Indigenous Peoples rarely respond with only one adaptation response to climate-related environmental disasters. **Respondents reported an average of 2.5 response strategies**, led by ecosystem protection or restoration (57.4%), agricultural and productive adaptation (44.9%), and community land and forest management (33.8%), directed at the territorial component under greatest pressure, because restoring it strengthens water, food, biodiversity, and culture all at once.

The global questionnaire and case studies demonstrate that Indigenous Peoples rarely respond to climate-related environmental disasters through isolated adaptation measures. Instead, they mobilize multiple, interconnected responses that reinforce one another within broader territorial systems. Across regions and ecosystems, respondents consistently described adaptation as combining ecosystem stewardship, productive adaptation, territorial governance, disaster preparedness, Indigenous Peoples’ knowledge systems, and collective action.

This section demonstrates that these responses function as integrated territorial adaptation systems in three parts. First, it shows that Indigenous Peoples combine multiple strategies simultaneously within coordinated territorial responses, rather than relying on isolated measures. Second, it shows that these responses are designed to stabilize interconnected social-ecological systems rather than individual sectors or resources. Finally, it argues that because these responses are continuous, territorial, and adaptive, they function as ongoing disaster risk reduction, lowering vulnerability before hazardous events become disasters.

A. Indigenous Peoples combine multiple adaptation strategies simultaneously

The integration of strategies is increasingly recognized within international policy frameworks. The Convention on Biological Diversity’s Ecosystem Approach defines the approach as a strategy for the integrated management of land, water, and living resources and recognizes the interdependence of ecological processes, social and economic considerations, participatory governance, conservation, and sustainable use.²⁴ The UNFCCC’s Nairobi Work Programme supports adaptation knowledge and action across interconnected areas, including ecosystems, Indigenous Peoples’ knowledge systems, water resources, and forests, and seeks to translate diverse forms of knowledge into informed adaptation planning and practical action.²⁵ The IPCC’s Sixth Assessment Report similarly recognizes the interdependence of climate,

²⁴ CBD (Convention on Biological Diversity). 2000. *Decision V/6: Ecosystem Approach*. Nairobi, Kenya. <https://www.cbd.int/decision/cop/?id=7148>

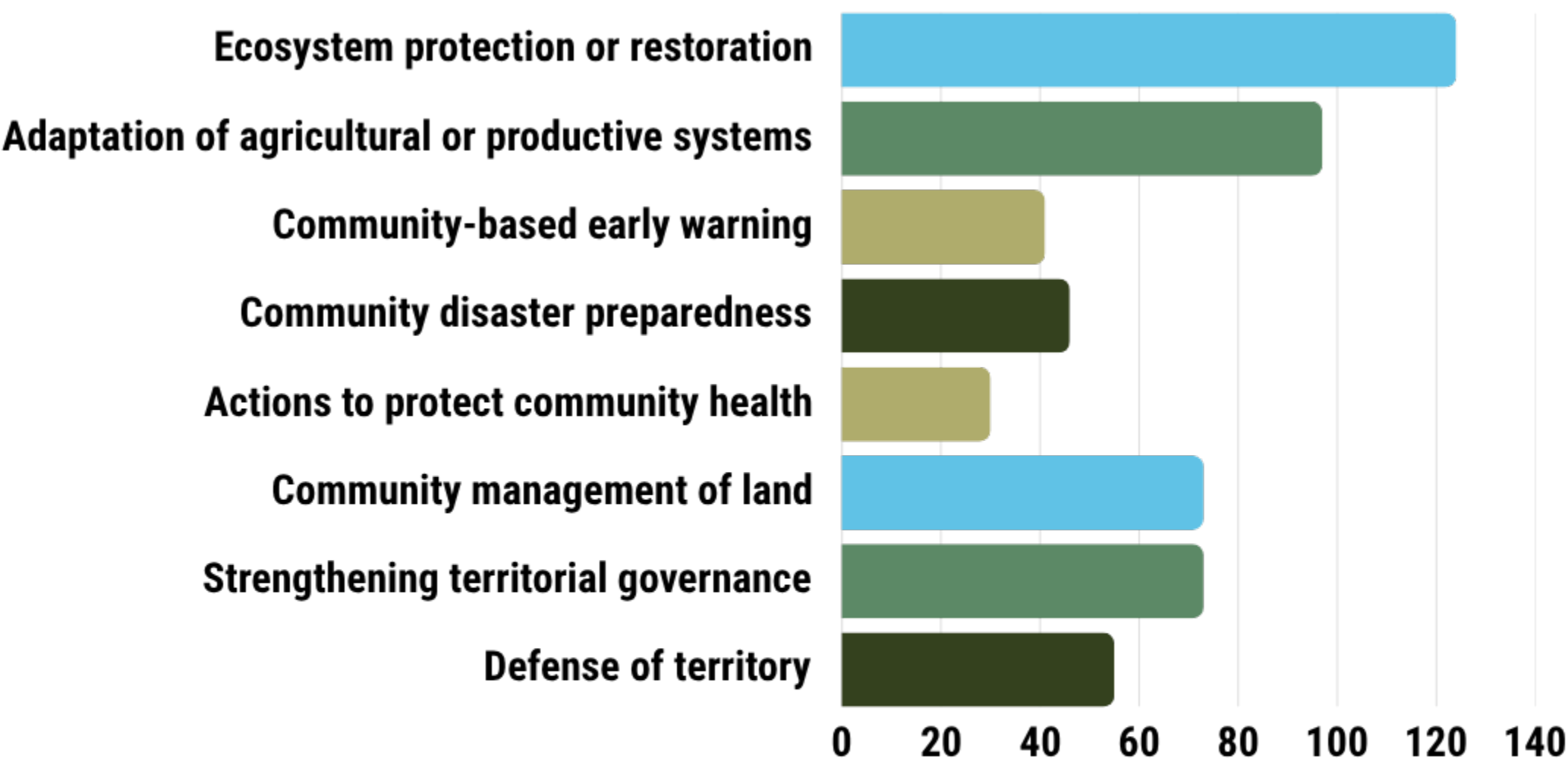
²⁵ UNFCCC (United Nations Framework Convention on Climate Change). n.d. *Nairobi Work Programme on Impacts, Vulnerability and Adaptation to Climate Change*. Bonn, Germany. <https://unfccc.int/topics/NWP/workstreams/AKP>.

ecosystems and biodiversity, and human societies, as well as the close linkages among adaptation, ecosystem health, human well-being, and sustainable development.²⁶

In practice, however, adaptation is often implemented through sector-specific institutions, thematic programs, funding windows, and project categories.²⁷ While these approaches can facilitate implementation, they often treat ecosystem restoration, agriculture, disaster preparedness, governance, or knowledge generation as separate interventions. The evidence presented here suggests a different organizational logic. Indigenous Peoples do not simply coordinate multiple adaptation activities across sectors. Instead, they organize diverse adaptation measures as complementary components of a single territorial response, in which governance, ecosystem stewardship, productive activities, disaster preparedness, territorial defense, and Indigenous Peoples’ knowledge systems reinforce one another to reduce risk across the territory as a whole.

The questionnaire was deliberately designed to allow respondents to identify multiple responses to a single climate-related environmental disaster, making it possible to examine not only which responses were implemented but also how they are combined in practice. Respondents reported **539 adaptation responses**, averaging **2.5 responses per respondent**, indicating that communities rarely rely on a single intervention. Ecosystem protection and restoration was the most frequently reported response with **124 respondents (57.4%)**, followed by adaptation of agricultural and productive practices by **97 respondents (44.9%)**, community management of land and forests and strengthening territorial governance by **73 respondents each (33.8%)**, territorial defense by **55 respondents (25.5%)**, community disaster preparedness **46 (21.3%)**, community-based early warning systems by 41 respondents (19.0%), and community health protection by **30 respondents (13.9%)**. Rather than functioning as independent interventions, these practices form integrated territorial systems of adaptation capable of addressing increasingly interconnected climate-related hazards.

Figure 09: Reported adaptation strategies by Indigenous People



26 IPCC (Intergovernmental Panel on Climate Change). 2022. *Climate Change 2022: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change*. Cambridge, UK and New York, USA: Cambridge University Press. <https://www.ipcc.ch/report/ar6/wg2/>.
27 IPCC (Intergovernmental Panel on Climate Change). 2023. *Climate Change 2023: Synthesis Report. Summary for Policymakers. Contribution of Working Groups I, II and III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change*. Geneva, Switzerland. https://www.ipcc.ch/report/ar6/syr/downloads/report/IPCC_AR6_SYR_SPM.pdf

The case studies demonstrate that Indigenous Peoples organize adaptation around the territory as the primary unit of governance and action, rather than around individual sectors, projects, or institutions.

The *Chakma Indigenous Peoples* in the Chittagong Hill Tracts (freshwater ecosystems), **Bangladesh**, illustrate how Indigenous Peoples’ adaptation combines changes in livelihoods, ecosystem management, and collective governance. After the 2017 monsoon-induced landslides, instead of relying on a single adaptation measure, communities have adjusted planting calendars, diversified crops and livelihoods, reduced dependence on shifting cultivation where conditions have become less reliable, strengthened mutual aid during disasters, and continued to apply Indigenous Peoples’ knowledge systems to agriculture and natural resource management. These responses are guided through customary decision-making involving elders, traditional leaders, women, and community members, demonstrating how agricultural adaptation, ecosystem stewardship, social solidarity, and governance operate as complementary components of a single territorial response.

| **Box 2.a.**

One response, many strategies at once:

the case of the *Chakma Indigenous Peoples* (Bangladesh) shows how adjusted planting calendars, crop diversification, mutual aid, and customary governance are deployed together as a single coordinated response rather than as separate, disconnected programs.

The *Batwa Indigenous Peoples* in eastern **Democratic Republic of the Congo** (forest ecosystems) similarly respond through multiple mutually reinforcing strategies. In Kalehe, landslides and flooding occurred in 2023 and 2024. In the aftermath, responses include local disaster-management committee and dialogue mechanisms, mutual-support networks, self-managed savings and credit associations to support livelihood recovery and displaced families, and agroforestry and reforestation initiatives. The *Batwa Indigenous Peoples* have combined disaster preparedness and recovery, livelihood support, ecosystem restoration, and collective action rather than addressing each dimension in isolation.



Landslide and flood damage in Kalehe, Democratic Republic of the Congo, where torrential rains buried homes and farmland in mud. Residents, including members of the Batwa Indigenous Peoples, survey the wreckage amid destroyed shelters. Credits: Josue Aruna, Congo Basin Conservation Society (CBCS-Network).



A member of the Brigada Cana Brava faces an active wildfire at night, equipped with a backpack water pump, on the Cana Brava and Araribóia Indigenous Lands, Maranhão, Brazil. Credits: Brigada Cana Brava.

The *Tano Batak Indigenous Peoples* in North Sumatra (forest ecosystems), **Indonesia**, responded to the 2025 floods and landslides by integrating customary governance, Indigenous Peoples’ knowledge systems, collective solidarity, ecosystem restoration, and Indigenous Peoples-led emergency response. Recovery extended beyond rebuilding damaged infrastructure and agricultural land to restoring customary forests, watersheds, springs, and other ecological functions that sustain livelihoods and food systems. At the same time, customary institutions coordinated emergency assistance, collective action, and recovery across affected communities, illustrating how ecosystem restoration, disaster response, and governance were implemented as interconnected components of a single territorial response.

The Guajajara Indigenous People in the Cana Brava and Araribóia Indigenous Lands (forest), **Brazil**, combine territorial protection, wildfire prevention, firefighting, environmental education, and forest restoration in response to intensifying drought, fires, deforestation, and territorial invasions. In Araribóia, the autonomous Guardiões da Floresta (Guardians of the Forest) patrol the territory in response to illegal incursions, while volunteer and federally recognized Indigenous Peoples brigades undertake fire prevention and control. Communities map fire-prone areas, establish firebreaks using ancestral land-clearing practices called *aceiros*, alongside contemporary techniques, conduct prescribed burning, and coordinate support between brigades from different territories. Indigenous Women’s groups called *viveiras* lead reforestation and environmental education, including efforts to restore tree cover around a lake that had dried up. Together, these actions connect territorial defense, disaster preparedness, fire management, forest restoration, and community organization within a coordinated response.

Indigenous Peoples do not respond to climate-related environmental disasters through isolated adaptation measures. Instead, they combine complementary strategies that simultaneously strengthen ecosystems, livelihoods, governance, disaster preparedness, and collective action. The specific combination of responses varies according to local environmental conditions, hazards, and cultural contexts, but all four case studies demonstrate that adaptation is organized as an integrated territorial process in which different strategies reinforce one another. This integrated character enables Indigenous Peoples’ communities to address the multiple and interacting impacts of climate-related environmental disasters more effectively than would be possible through single-sector interventions. The following subsection examines how these responses are directed not toward individual sectors, but toward maintaining the functioning of interconnected territorial systems.

B. Indigenous Peoples’ responses strengthen the territory as an interconnected whole

Climate-related environmental disasters often place the greatest pressure on a particular territorial component, such as a watershed, rangeland, mangrove, forest, or agricultural landscape. Indigenous Peoples therefore begin by restoring or strengthening that part of the territory because it supports many of the ecological and social relationships upon which the wider territorial system depends. Restoring a watershed improves water security, biodiversity, food production, and livelihoods simultaneously. Protecting mangroves sustains fisheries, reduces coastal erosion, safeguards settlements, and maintains cultural practices. Restoring rangelands enhances water retention, livestock production, biodiversity, and the environmental indicators Indigenous Peoples rely upon to anticipate seasonal change. In this way, adaptation is directed toward the territorial component under greatest climate pressure, but its purpose is to strengthen the wider territorial system that depends upon its ecological functions.

The questionnaire shows that **ecosystem protection or restoration, adaptation of agricultural or productive practices, and community land and forest management** occur consistently across forests, grasslands, freshwater, coastal, mountain, and dryland ecosystems. Although the ecosystem under greatest pressure differs, Indigenous Peoples consistently focus on restoring the ecological functions that sustain multiple dimensions of territorial life.

Figure 10: Indigenous Peoples’ strategies across ecosystems

Response	Forest	Grassland and savanna	Freshwater	Coastal and marine	Dryland	Mountain	Other
Ecosystem protection or restoration	59.7%	44.8%	56.0%	57.1%	55.6%	66.7%	66.7%
Adaptation of agricultural or productive practices	37.1%	62.1%	44.0%	50.0%	77.8%	50.0%	66.7%
Community land or forest management	36.3%	24.1%	63.6%	50.0%	44.4%	16.7%	33.3%
Strengthening territorial governance	33.9%	31.0%	32.0%	35.7%	44.4%	33.3%	33.3%
Defense of territory	29.8%	13.8%	20.0%	7.1%	33.3%	33.3%	33.3%
Community disaster preparedness	19.4%	37.9%	8.0%	35.7%	22.2%	16.7%	0.0%
Actions to protect community health	13.7%	10.3%	16.0%	7.1%	33.3%	16.7%	0.0%
Community-based early warning systems	12.9%	27.6%	24.0%	28.6%	66.7%	8.3%	0.0%

The case studies illustrate how this territorial logic operates across different environmental contexts.

The *Endorois and Tugen Indigenous Peoples* in Baringo County (grassland and rangeland ecosystems), **Kenya**, restore rangelands through agroforestry, Indigenous Peoples’ seed banking, food forests, community nurseries, watershed restoration, and collective rangeland management. These actions respond to drought-driven degradation while simultaneously improving water retention, biodiversity, livestock production, food security, and the environmental indicators communities use to anticipate seasonal change. The response begins with the rangeland under greatest pressure but strengthens the wider territorial system that depends upon it.

| **Box 2.b.**

Restoring one part of the territory strengthens the whole:

the case of the Endorois and Tugen Indigenous Peoples (Kenya) shows how rangeland restoration, agroforestry, seed banking, and watershed work simultaneously improve water retention, livestock production, food security, and the reliability of environmental forecasting.

The *Anlo Ewe Indigenous Peoples* in the Volta Region, **Ghana**, likewise demonstrate how Indigenous Peoples respond by strengthening the territorial component under greatest pressure. As recurrent coastal erosion, flooding, and changing shoreline dynamics increasingly affect settlements and livelihoods, the Anlo Ewe Indigenous Peoples combine coastal ecosystem stewardship, livelihood adaptation, community organization, and local planning to protect fisheries, safeguard food security, reduce exposure to hazards, and sustain cultural relationships with the coast. Actions directed toward the coastline therefore reinforce multiple interconnected ecological and social functions across the wider territorial system rather than addressing a single impact in isolation.



For the *Mbororo Fulani Indigenous Peoples*, **Chad**, adaptation depends on maintaining relationships across ecosystems and microclimates rather than managing any single resource or location in isolation. Mobility and transhumance allow Indigenous Peoples to adjust the use of water and pasture according to seasonal and territorial conditions, with different mobility strategies used across Lake Chad, Chari-Baguirmi, and Mayo-Kebbi. Indigenous Peoples also store livestock feed and send scouts ahead to assess water availability, grazing conditions, and conflict-free staging areas before larger groups move. In this context, mobility itself functions as a territorial adaptation strategy, allowing changing conditions in one part of the territory to be addressed through access to resources and ecological conditions elsewhere.

Unlike the other response categories, **strengthening territorial governance** appears consistently across every ecosystem. Rather than concentrating in particular ecosystems, it appears with notable regularity, accounting for roughly a third of responses across every ecosystem category. This consistency reflects governance's role not as one response among others, but as the institutional foundation that allows Indigenous Peoples' responses to function as a coordinated system rather than as a set of separate interventions. Finding 3 examines this coordinating role in greater depth.

By contrast, the questionnaire also reveals clear patterns in the distribution of **territorial defense, community disaster preparedness, actions to protect community health, and community-based early warning systems**, suggesting that Indigenous Peoples tailor these responses to the environmental conditions and pressures they face.

Territorial defense is reported most frequently in forest and mountain ecosystems, with forests accounting for the largest number of reported cases and mountains the highest proportional share (50% of mountain responses). This pattern reflects the concentration of external pressures on Indigenous Peoples' territories in these ecosystems, including logging, mining, infrastructure development, agricultural expansion, and fossil fuel extraction. Climate-related hazards intensify these existing pressures, making territorial defense an integral component of adaptation. The Guajajara Indigenous People in the Cana Brava and Araribóia Indigenous Peoples' lands, Brazil, illustrate this dynamic by combining territorial patrols, wildfire prevention, firefighting, forest restoration, and community organization to respond simultaneously to increasing wildfire risk and illegal incursions. As discussed further in Finding 4, territorial defense often responds as much to land-tenure insecurity as to climate-related hazards themselves.

Community disaster preparedness appears most frequently in grassland and coastal ecosystems (37.9% and 35.7% of responses, respectively), where communities experience recurring severe storms and other rapid-onset hazards. The *Ryukyuan Indigenous Peoples* in the Ryukyu Islands, **Japan**, illustrate this approach. Community organizations, cultural institutions, and Indigenous Peoples' knowledge systems support preparedness for typhoons and flooding by combining environmental observation, collective planning, and mutual assistance



Adaptation strategy to deter blind moles from sweet potato crop fields, using a raised soil barrier along a wooden stake fence, Sigidi village, Mpondoland. Credits: Sinegugu Zukulu, Sustaining the Wild Coast (SWC).

before, during, and after disasters. Preparedness therefore extends beyond emergency response to maintaining the community institutions and knowledge systems that enable coordinated action.

Community health protection is the least frequently reported response category. Across the case studies, health is generally not addressed through independent interventions but emerges as a co-benefit of ecosystem restoration, water management, food security, and disaster preparedness. The **Kichwa Indigenous People** of Sarayaku, **Ecuador**, illustrate this relationship. Community responses to recurrent flooding of the Bobonaza River included actions to improve ecosystem and water management, which also reduced conditions favorable to mosquito-borne diseases. Health therefore emerges as an outcome of broader territorial responses rather than as a separate adaptation strategy.

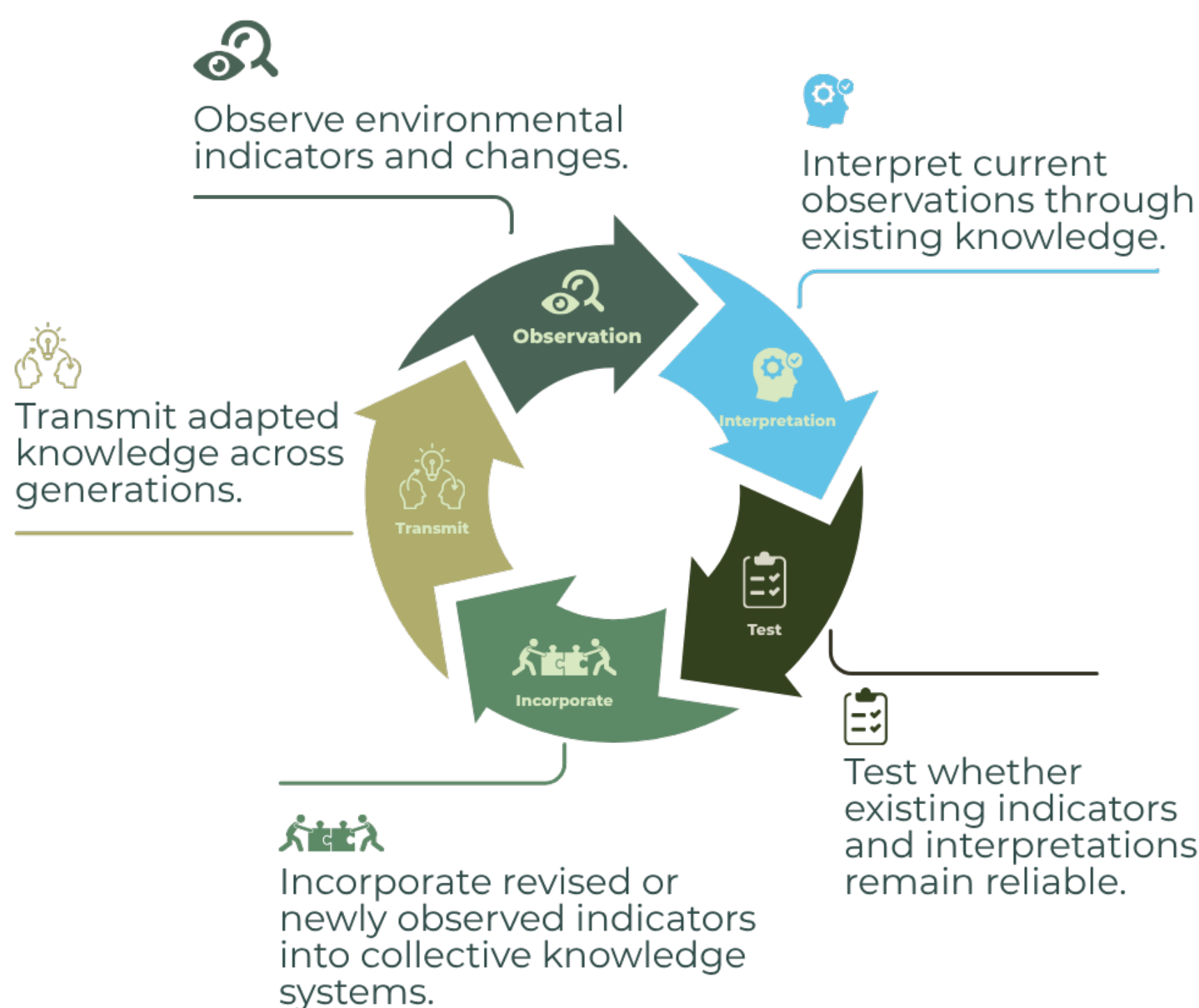
Early warning systems are reported most frequently in dryland ecosystems (55.6%), followed by coastal and marine, grassland and savanna, and freshwater ecosystems. The *Maya Achi Indigenous Peoples* in the Dry Corridor, **Guatemala**, continually observe river flows, flowering cycles, bird and insect behavior, rainfall, and wind patterns to anticipate drought and rainfall variability, guiding agricultural and water management decisions. This case illustrates that Indigenous early warning systems rely on Indigenous Peoples' knowledge systems to interpret environmental change and support collective decision-making before hazards intensify.

Indigenous Peoples direct adaptation toward the territorial component experiencing the greatest climate pressure because its recovery strengthens the wider territory to which it is connected. Whether restoring rangelands, mangroves, mountain slopes, forests, or watersheds, communities reinforce the interconnected systems that sustain water, biodiversity, food production, livelihoods, governance, culture, and collective well-being. For Indigenous Peoples, these dimensions are not separate from the territory or from one another, but form part of an interconnected whole. These responses depend upon Indigenous Peoples' ability to observe, interpret, and anticipate environmental change through their knowledge systems. As climate-related environmental disasters increasingly alter the environmental indicators that have long guided these observations, Indigenous Peoples continuously test, revise, and regenerate those indicators to ensure they remain relevant under changing conditions. The following subsection examines this adaptive capacity of Indigenous Peoples' knowledge systems.

C. Indigenous Peoples' knowledge systems continuously test, revise, and regenerate environmental indicators

As previously stated, climate-related environmental disasters are altering the environmental indicators through which Indigenous Peoples observe and anticipate environmental change. The case studies demonstrate, however, that Indigenous Peoples' knowledge systems are not based on fixed sets of indicators whose value depends on environmental stability. Instead, they function as dynamic systems of observation, interpretation, testing, and incorporation into the collective system. As climate change alters frequencies and impacts, Indigenous Peoples continually observe, interpret, test, and incorporate knowledge by transmitting across generations. This adaptive capacity enables Indigenous Peoples' knowledge systems to continue guiding territorial responses under changing climatic conditions.

Figure 11: How Indigenous Peoples’ knowledge systems adapt to changing environmental conditions



The *Quechua Indigenous Peoples* in the Ausangate Regional Conservation Area, **Peru**, demonstrate how Indigenous Peoples’ knowledge systems adapt through continuous collective observation and interpretation. Elders, herders, and other knowledge holders regularly assess changes in snow cover, glacier conditions, plant flowering, animal behavior, and astronomical observations to evaluate whether long-established environmental indicators continue to provide reliable guidance. As glacier retreat and changing precipitation patterns alter ecological relationships, the Quechua Indigenous Peoples compare current observations with accumulated experience, assess the reliability of long-established indicators, reinterpret their meaning under changing climatic conditions, and adapt seasonal decision-making accordingly. In this way, Indigenous Peoples’ knowledge systems are continually renewed while maintaining their role in guiding pastoral livelihoods and territorial management.

The *Miskitu Indigenous Peoples* in Karata, **Nicaragua**, demonstrate how Indigenous Peoples’ knowledge systems are continually strengthened through collective experience. Community members described how environmental indicators traditionally used to anticipate hurricanes, including observations that the sea was not deep enough before Hurricane Felix (2007), were not consistently followed, contributing to significant losses. This experience reinforced the importance of Indigenous Peoples’ knowledge systems and the observations of Elders and other knowledge holders. Before Hurricanes Eta and Iota (2020), these environmental indicators informed community evacuation and preparedness decisions, contributing to the protection of lives. The case illustrates how Indigenous Peoples’ knowledge systems are continually reinforced through observation, collective reflection, and practical experience, strengthening community confidence in the knowledge that guides territorial responses.

| Box 2.c.

Indigenous Peoples' knowledge systems are also adapting:

the case of the *Miskitu Indigenous Peoples* (Nicaragua) shows how environmental indicators (*the sea was not deep enough*) were overlooked before Hurricane Felix in 2007, contributing to the loss of lives. Through collective reflection, those same indicators were later heeded, and years afterward they guided successful evacuations ahead of Hurricanes Eta and Iota in 2020.

The *Ryukyuan Indigenous Peoples* in the Ryukyu Islands, **Japan**, demonstrate how Indigenous Peoples' knowledge systems adapt as long-established environmental relationships become less predictable. Respondents described how traditional observations embedded in Indigenous Peoples' language, local sayings, and cultural practices have long connected environmental phenomena with seasonal change. For example, abundant flowering of the *deigo* tree has traditionally been associated with active typhoon seasons, while the sounding of the *Hārii* (dragon boat festival) bell has signaled the end of the rainy season. As climate change alters seasonal weather patterns, these relationships have become less reliable, requiring communities to continually reassess how seasonal knowledge is interpreted. The case demonstrates that Indigenous Peoples' knowledge systems are not static collections of environmental observations, but living cultural systems that preserve accumulated experience while adapting their interpretation to changing environmental conditions.

The **Mising Indigenous Peoples** of Assam demonstrate how accumulated environmental observation is translated into adaptive practice. Families retain collective memory of previous flood levels and use these observations to anticipate the height of future floods and determine the elevation of their *Chang ghor*, traditional stilt houses adapted to recurrent inundation. Rather than reproducing a fixed architectural model, house height is adjusted according to local flood history and changing river conditions. This continuous relationship between observation, accumulated experience, and practical adjustment illustrates how Indigenous Peoples' knowledge systems are tested and recalibrated as environmental conditions change.

The *Tano Batak Indigenous Peoples* in North Sumatra, **Indonesia**, illustrate another way in which Indigenous Peoples' knowledge systems adapt to increasing climatic uncertainty. Respondents described how Indigenous Peoples continue relying on environmental observations, customary knowledge, and collective decision-making while also incorporating meteorological information and government early warning systems into disaster preparedness. Rather than replacing Indigenous Peoples' knowledge systems, these external sources of information are interpreted alongside Indigenous Peoples' observations and evaluated through customary governance processes before informing community decisions. This complementary approach enables Indigenous Peoples' knowledge systems to integrate new forms of evidence while maintaining Indigenous Peoples' authority over how environmental information is interpreted and applied in responding to climate-related environmental disasters.

Indigenous Peoples' knowledge systems are continually renewed through observation, collective interpretation, experimentation, and intergenerational learning. Their effectiveness therefore depends not on preserving fixed environmental indicators, but on maintaining the social processes through which environmental knowledge is continuously tested, revised, and regenerated. This adaptive capacity enables Indigenous Peoples' knowledge systems to continue guiding territorial responses despite increasing climatic uncertainty and provides an essential foundation for the governance systems examined in the following finding.

These responses, however, are not sustained by knowledge systems alone. They depend equally on Indigenous Peoples' governance that organizes collective decision-making, recognizes legitimate authority, mobilizes knowledge holders, and coordinates collective action across territories. Understanding why Indigenous Peoples' responses are consistently effective therefore requires examining the interaction between Indigenous Peoples' governance and knowledge systems. The following finding explores how these mutually reinforcing systems enable rapid, legitimate, and territorially grounded responses to climate-related environmental disasters.

| Finding 3

Indigenous Peoples’ governance, knowledge systems, and collective action sustain effective territorial responses

KEY MESSAGE

The interaction between Indigenous Peoples’ governance and knowledge systems is the mechanism for effective adaptation. Indigenous Peoples’ governance provides the institutions and authority through which Indigenous Peoples’ knowledge systems are interpreted and translated into collective decisions. Diverse knowledge holders (elders, women, youth) contribute complementary observations that enable those decisions to adapt to changing environmental conditions.

The previous finding demonstrated that Indigenous Peoples respond to climate-related environmental disasters through integrated territorial systems that combine multiple adaptation strategies, address interconnected social-ecological systems, and continually regenerate the knowledge systems that guide territorial decision-making. The case studies further demonstrate that the effectiveness of these responses is explained by the continuous interaction between Indigenous Peoples’ governance and knowledge systems.

While international policy increasingly recognizes the value of Indigenous Peoples’ governance and knowledge systems separately, less attention has gone to how they function together²⁸, especially in the context of climate-related environmental disasters. Governance provides the institutions, authority, and collective decision-making processes through which communities organize responses to climate change. Indigenous Peoples’ knowledge systems provide the environmental observations, accumulated experience, and collective learning that inform those decisions. Together, these mutually reinforcing systems enable Indigenous Peoples to observe environmental change, mobilize collective action, adapt knowledge to changing conditions, and implement responses that remain legitimate, coordinated, and grounded in the ecological and cultural realities of their territories.

This section examines these relationships through three dimensions. The first examines how Indigenous Peoples’ governance and knowledge systems function through continuous interaction. The second demonstrates how legitimate Indigenous Peoples’ authority enables rapid and collectively accepted responses to climate-related environmental disasters. The third shows how diverse knowledge holders sustain and continually renew Indigenous Peoples’ knowledge systems through observation, collective learning, and intergenerational transmission.

28 UNFCCC (United Nations Framework Convention on Climate Change). 2018. *Decision 2/CP.24: Local Communities and Indigenous Peoples Platform*. FCCC/CP/2018/10/Add.1. Bonn, Germany. <https://unfccc.int/sites/default/files/resource/10a1.pdf>; UNFCCC. 2023. *Glasgow-Sharm el-Sheikh Work Programme on the Global Goal on Adaptation*. Bonn, Germany. <https://unfccc.int/topics/adaptation-and-resilience/workstreams/gga>; CBD (Convention on Biological Diversity). 1992. *Convention on Biological Diversity, Article 8(j)*. Montreal, Canada. <https://www.cbd.int/convention/text>; CBD (Convention on Biological Diversity). 2022. *Kunming-Montreal Global Biodiversity Framework*. Montreal, Canada. <https://www.cbd.int/gbf>; UNDRR (United Nations Office for Disaster Risk Reduction). 2015. *Sendai Framework for Disaster Risk Reduction 2015–2030*. Geneva, Switzerland. <https://www.undrr.org/publication/sendai-framework-disaster-risk-reduction-2015-2030>.

A. Indigenous Peoples’ governance and knowledge systems function through continuous interaction

The qualitative analysis of responses to the questionnaire indicates that governance plays a central role in climate-related environmental disasters. Respondents described governance systems while explaining how Indigenous Peoples organized and implemented responses. Customary authorities, territorial assemblies, community consultations, and collective decision-making mechanisms appeared repeatedly across ecosystems and hazard types, even when respondents had not explicitly identified governance as a response category.

Figure 12: Dimensions of Indigenous Peoples’ governance identified in the questionnaire

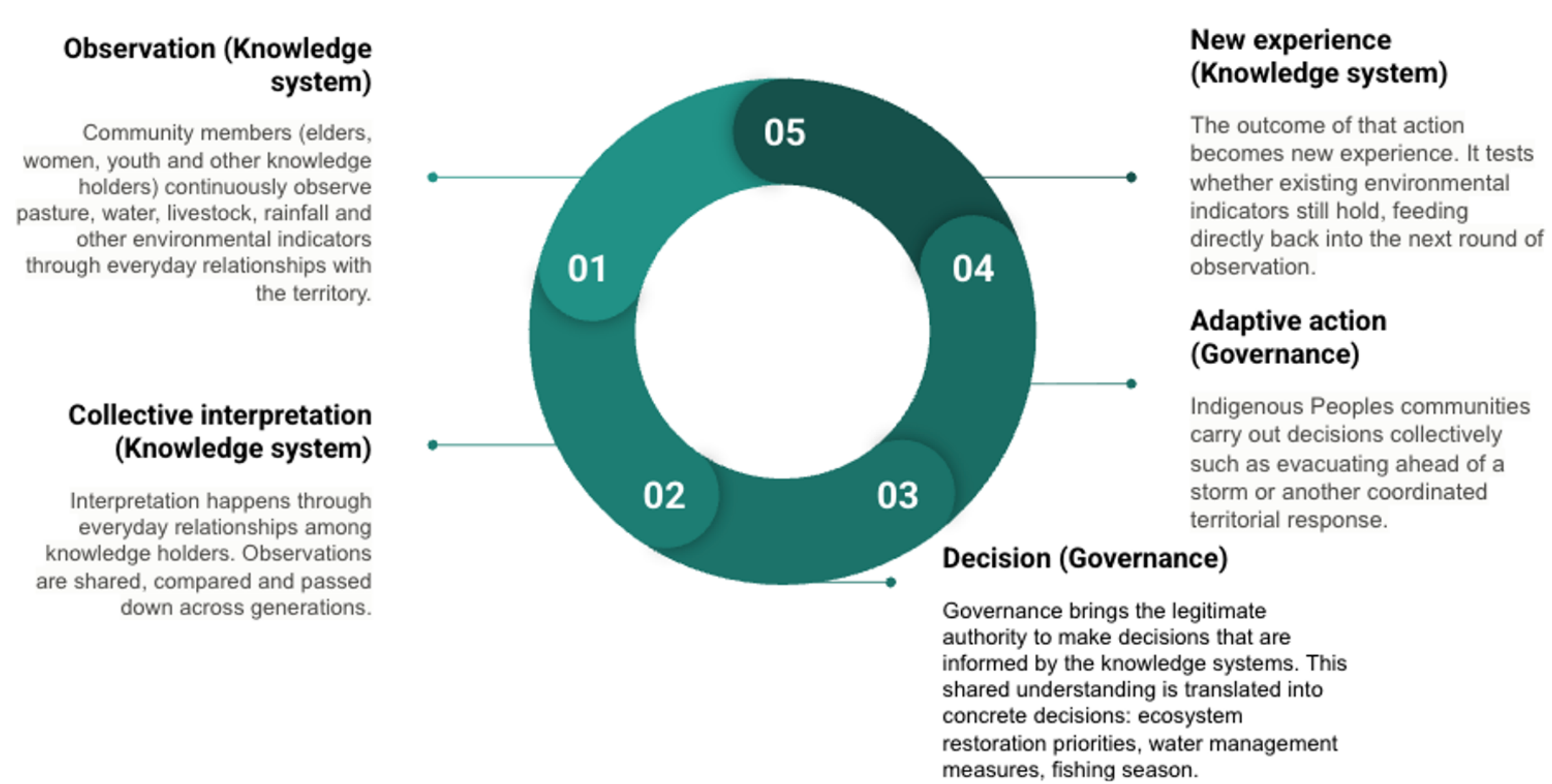
Governance dimension	How it operates	Number of mentions	Examples
Recognized authority	References to elders, chiefs, traditional or customary leaders, Indigenous Peoples’ leaders, councils, customary institutions, spiritual authorities, leadership forums, or established Indigenous Peoples’ governance structures.	47	Maasai (Tanzania) Rendille, Endorois, Ogiek and Borana (Kenya) Ewe (Ghana) Batwa (DRC/Burundi/Rwanda) Ryukyu (Japan) Igorot (Philippines) Kalasha (Pakistan) Wayuu (Colombia) Mbororo-Fulani (Cameroon) Maya Achí (Guatemala)
Collective deliberation	References to assemblies, meetings, consultations, dialogue, discussions, consensus, participatory processes, collective decision-making, or other processes through which decisions are discussed collectively.	55	AmaMpondo (South Africa) Newa (Nepal) Ilchamus, Maasai, Endorois, Ogiek and Borana (Kenya) Ryukyu (Japan) Tripura (Bangladesh) Kasepuhan Cisungsang and Ngata Toro (Indonesia) Wayuu (Colombia) Taokas (Taiwan) Maya Achí (Guatemala)

Governance dimension	How it operates	Number of mentions	Examples
Collective implementation	References to collective or community-led implementation, mobilization, committees, associations, working groups, brigades, patrols, community organizations, or other forms of organized collective action.	57	AmaMpondo (South Africa) Newa (Nepal) Ilchamus, Rendille, Samburu, Endorois and Ogiek (Kenya) Batwa (Burundi/DRC/Rwanda) Ryukyu (Japan) Igorot (Philippines) Ngata Toro (Indonesia) Chakma (Bangladesh) Lahu (Thailand) Maya Kaqchikel (Guatemala)
External coordination	References to coordination, collaboration, partnerships, or support involving governments, NGOs or civil society, Indigenous Peoples' organizations, public institutions, technical agencies, universities, donors, or other external actors.	48	AmaMpondo (South Africa) Newa (Nepal) Ilchamus, Rendille, Samburu, Endorois and Ogiek (Kenya) Ewe (Ghana) Batwa (Burundi/DRC) Ryukyu (Japan) Tripura (Bangladesh) Ngata Toro (Indonesia) Wayuu (Colombia) Miskitu (Nicaragua)

A component of governance was described in 207 responses to the questionnaire. Governance was expressed through four interrelated components: **recognized authority** that provide legitimate leadership and organize territorial affairs; **collective deliberation and decision-making** through assemblies, councils, meetings, consultations, and other customary processes; **collective implementation** through which decisions are translated into coordinated action; and **external coordination** with other actors through which Indigenous Peoples’ authorities and organizations engage with governments, civil society organizations, funders, and other external actors. These components often operated together rather than independently.

This suggests that governance is not simply one response alongside ecosystem restoration or livelihood adaptation, but the institutional process through which many of the other responses are organized, coordinated, and sustained. Furthermore, across the case studies, respondents mentioned an interaction between Indigenous Peoples’ governance and knowledge systems.

Figure 13: Interaction between Indigenous Peoples’ governance and knowledge systems



Indeed, climate-related environmental disasters require decisions that are both legitimate and informed. Indigenous Peoples’ governance provides the institutions through which decisions are discussed, negotiated, and implemented, while Indigenous Peoples’ knowledge systems provide the environmental observations, accumulated experience, and territorial understanding that guide those decisions. Rather than functioning independently, governance and knowledge systems continuously reinforce one another through an iterative process in which environmental observations inform collective decisions, decisions generate new experience, and that experience continually strengthens both Indigenous Peoples’ governance and knowledge systems.

The *Endorois and Tugen Indigenous Peoples* in Baringo County, **Kenya**, illustrate this interaction through the *Kokwo*, a customary council of elders that convenes to deliberate on grazing rotation, water-point management, seasonal livestock movements, and conflict resolution. These deliberations are informed by continuous observations of pasture conditions, water availability, livestock health, rainfall patterns, and other environmental indicators contributed by community members with different territorial responsibilities. Rather than applying predetermined rules, the *Kokwo* collectively interprets these observations to determine when grazing areas should be opened or rested, when livestock should move, and how scarce resources should be shared. Governance therefore functions not simply as an authority that makes decisions, but as the institutional process through which Indigenous Peoples’ knowledge systems are collectively interpreted and translated into coordinated territorial action.

A similar interaction is evident among the *Thami Indigenous Peoples* in Dolakha District (mountain), **Nepal**. Community organizations and local leaders draw upon Indigenous Peoples’ knowledge of slope stability, water flows, soils, and native vegetation to identify areas at greatest risk and collectively organize bioengineering measures such as bamboo planting, deep-rooted vegetation, terracing, and stone barriers. These interventions are not implemented as isolated technical measures, but as collectively planned territorial responses in which Indigenous Peoples’ knowledge systems guide both the selection of interventions and their location across the landscape. Although external organizations have provided technical and financial support, the

Thami Indigenous Peoples continue to emphasize that effective adaptation depends upon strengthening Indigenous Peoples' governance and decision-making rather than substituting for them.

Among the Chakma Indigenous Peoples in **Bangladesh**, their governance combines Bangladesh's formal administrative system with the Chakma customary governance structure led by the *Chakma Circle Chief (Raja)*, together with *Headmen* at the *mouza* level and *Karbaris* at the village level, who oversee customary land management, dispute resolution, and community affairs. Collective decisions are made through community consultations involving Elders, traditional authorities, women, and other community members, guided by customary rules governing forests, freshwater systems, and agricultural lands. As increasingly erratic monsoon rainfall, flash floods, landslides, prolonged droughts, and water scarcity affect the territory; these governance institutions draw upon Indigenous Peoples' observations of seasonal rainfall, stream and spring water levels, soil moisture, slope cracks, leaning trees, water seepage, crop performance, and the flowering and fruiting of trees to assess changing environmental conditions. Although the *Chakma Indigenous Peoples* report that some traditional indicators have become less reliable as rainfall patterns grow increasingly unpredictable, governance continues to provide the institutional process through which these observations are collectively interpreted and translated into coordinated territorial responses.

The *Anlo Ewe Indigenous Peoples* in **Ghana** further illustrate how Indigenous Peoples' governance and knowledge systems continually interact through ecosystem management. Each community is led by a *chief*, supported by *subchiefs* and household heads, who guide community affairs and represent community interests in negotiations with the government, including decisions concerning the relocation of settlements threatened by coastal erosion and sea-level rise. As the progressive encroachment of the sea, flooding, saltwater intrusion, and the loss of farmland increasingly affect the territory, communities continue to rely on Indigenous Peoples' knowledge systems to interpret changing conditions. In particular, the appearance of certain fish species is understood as an indicator that flooding is approaching, informing community awareness of emerging risks. These observations are considered alongside the community's experience of ongoing coastal change as customary authorities make decisions regarding relocation and territorial management. Governance therefore provides the institutional framework through which Indigenous Peoples' environmental observations continue to inform collective decisions as communities confront the progressive transformation of their coastal territory.

| Box 3.a.

A governance decision is informed by fishing observation:

the case of the *Anlo Ewe Indigenous Peoples* (Ghana) shows how chiefs, subchiefs, and household heads rely on the appearance of certain fish species as a signal that flooding is approaching, turning an everyday ecological observation directly into community decisions about relocation and coastal management.

The cases presented above show how Indigenous Peoples’ governance and knowledge systems interact to produce informed collective decisions. Their effectiveness, however, depends not only on this interaction but also on the authority of the institutions through which those decisions are made. Across the case studies, Indigenous Peoples’ communities consistently mobilized around decisions because they were taken through governance systems recognized as legitimate, enabling collective action to be organized rapidly and implemented across the territory. The following section examines how this legitimacy constitutes a second foundation of effective Indigenous Peoples’ responses to climate-related environmental disasters.

B. Recognized authority enables decisions that are accepted, coordinated, and implemented

Producing informed decisions is only one condition for responding effectively to climate-related environmental disasters. Those decisions must also be accepted quickly enough to mobilize collective action across the territory. Legitimate authority and leadership become particularly important during climate-related environmental disasters. Floods, droughts, landslides, wildfires, storms, and other rapid-onset hazards often compress the time available for collective decision-making while simultaneously increasing uncertainty. Communities must rapidly determine how to allocate water, protect livelihoods, restore damaged ecosystems, organize evacuations, or mobilize collective labor.

Across the case studies, Indigenous Peoples’ governance systems were effective because the authorities responsible for making collective decisions were recognized by their communities as legitimate. This recognized authority enabled communities to organize collective action rapidly, regulate access to natural resources, coordinate disaster responses, and incorporate new information without requiring external enforcement. Although governance institutions differ across Indigenous Peoples, their effectiveness consistently depended on the confidence communities placed in those institutions and their authority to guide collective action under changing environmental conditions.

Figure 14: How recognition of authority shapes the effectiveness of responses

Recognized authority	Externally imposed or unrecognized authority
✓ Decisions are made through institutions recognized as legitimate ✓ Decisions can be acted upon without requiring external enforcement ✓ Recognized roles and responsibilities facilitate coordinated implementation	x Decisions are made by actors or institutions that lack recognized legitimacy x Decisions may be contested, disregarded, or depend on external enforcement x Unclear or contested authority can impede coordination and implementation
Enables rapid, coordinated collective response	Slower, uncoordinated response

The *Kichwa Indigenous People* of Sarayaku, **Ecuador**, demonstrate how recognized authority enables rapid and coordinated responses to climate-related environmental disasters. Territorial governance is organized through a Congress as the highest authority, a General Assembly, and a Governing Council composed of seven *kurakas* representing the community's territorial subdivisions, together with a women's organization, a youth organization, and a Council of Elders responsible for social oversight. When the unprecedented flooding of the *Bobonaza* River in 2019 affected homes, agroecosystems, and community infrastructure, these institutions coordinated impact assessments, organized evacuations and recovery efforts, mobilized support from Indigenous Peoples' organizations and allies, and maintained communication with community members both within and beyond the territory. Because these governance institutions were widely recognized as the legitimate authorities responsible for collective decision-making, their decisions were accepted and implemented rapidly across the community. Their authority is further reinforced by *Kawsak Sacha* (Living Forest), Sarayaku's territorial vision that understands the territory as a living entity governed according to Indigenous Peoples' values and responsibilities. The effectiveness of the response therefore depended not only on the information available, but also on the legitimacy of the institutions responsible for transforming that knowledge into collective action.

| Box 3.b.

Legitimate authority turned crisis into coordinated action:

the case of the *Kichwa Indigenous People* of Sarayaku (Ecuador) shows how governance institutions already recognized by the community organized flood assessments, evacuations, financial flow distribution, and recovery after the 2019 *Bobonaza* River flood. The governance body was in charge of coordination with external actors for support.

The *AmaMpondo Indigenous Peoples* in the Eastern Cape, **South Africa**, likewise illustrate how recognized authority enables coordinated territorial responses. Governance combines elected political institutions with a long-standing customary system organized through Sub-Headmen, Headmen, Chiefs, and the King of Mpondoland, each supported by traditional councils responsible for land and community governance. As heavy rainfall, flooding, drought, and increasingly destructive fires affect the territory, these customary authorities continue to organize collective decisions regarding land management and community responses alongside the formal state system. The continued acceptance of these institutions allows communities to coordinate collective action through governance structures that remain socially recognized despite the coexistence of formal political institutions.

A similar pattern is evident among the Tano Batak Indigenous Peoples in North Sumatra, **Indonesia**, where customary authority provides the institutional foundation for collective disaster response. Governance is organized through the *Dalihan Na Tolu* customary system, with decisions taken in *Tonggo Raja* assemblies led by the Raja Huta (customary village leader). When severe floods and landslides struck Indigenous territories in 2025,

emergency coordination was carried out through these existing customary institutions. The Indigenous Peoples Alliance of the Archipelago (AMAN), Indonesia's national Indigenous Peoples' organization, played a complementary role by mobilizing humanitarian assistance, coordinating support across Indigenous Peoples' networks, and facilitating engagement with external actors while deliberately respecting and reinforcing the authority of local customary institutions. Rather than assuming decision-making functions, AMAN worked through the *Raja Huta* and *Tonggo Raja* assemblies, allowing relief and recovery efforts to remain grounded in locally recognized governance. The effectiveness of the response therefore depended not simply on external assistance, but on the legitimacy of the Indigenous Peoples' institutions responsible for coordinating collective action.

The experience of the *Mbororo Fulani Indigenous Peoples* in the Sahel (arid, semi-arid, and agro-pastoral ecosystems), **Chad**, further demonstrates that legitimacy is essential for collective decision-making under environmental uncertainty. Community leaders, elders, chiefs, and religious leaders, including the *Modibo*, who hold specialized knowledge of celestial observations, guide decisions on transhumance and resource management through collective community meetings. Environmental observations are shared and interpreted collectively before decisions are taken regarding seasonal livestock movements and the management of grazing resources. Because these authorities are recognized by the community, their decisions are widely accepted and implemented, allowing pastoral mobility and resource management to adapt continuously to changing climatic conditions.

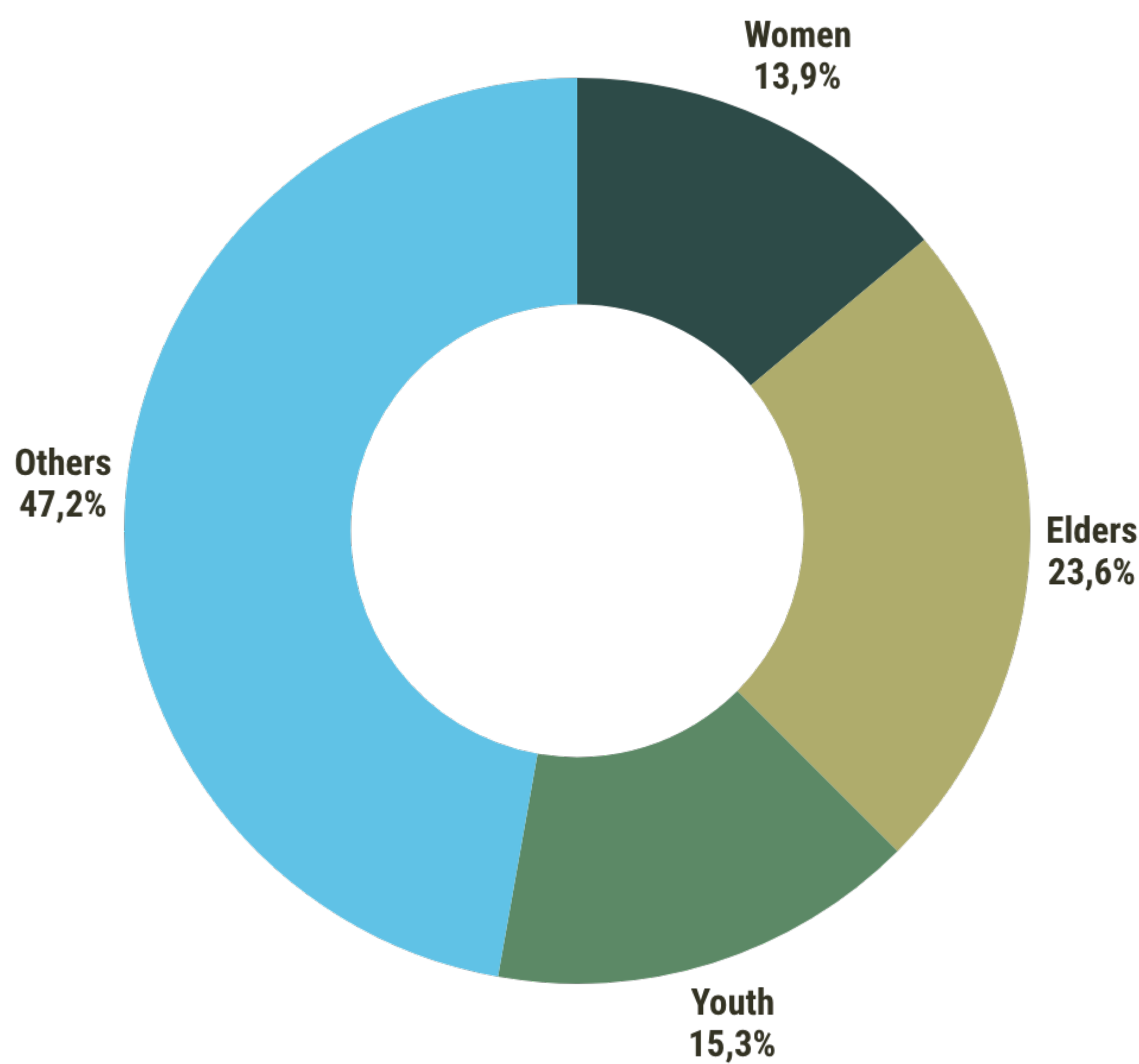
The cases presented above demonstrate that recognized authority enables Indigenous Peoples to organize collective action quickly and effectively during climate-related environmental disasters. Legitimacy emerges not as a symbolic characteristic of Indigenous Peoples' governance but as an operational condition for effective disaster response. Indigenous Peoples are able to mobilize rapidly because collective decisions are taken through institutions whose authority is already recognized and trusted. However, legitimacy alone does not explain its long-term effectiveness. Across the case studies, governance remains adaptive because it draws upon knowledge systems of diverse groups: elders, women, youth, and other community members, while continually renewing that knowledge through observation, practice, and intergenerational learning. It is this continuous regeneration of Indigenous Peoples' knowledge systems that enables governance institutions to respond to changing environmental conditions without losing their legitimacy or effectiveness.

C. Diverse knowledge holders and intergenerational learning sustain adaptive Indigenous Peoples' governance

The effectiveness of Indigenous Peoples' governance depends not only on recognized authority but also on the diversity of knowledge that informs collective decision-making. The questionnaire demonstrates that Indigenous Peoples' responses rely on multiple knowledge holders rather than a single source of expertise. Respondents referred to the contributions of **Elders (51 mentions), youth (33 mentions), women (30 mentions), and other community members** when describing how decisions were made and responses were organized. Rather than concentrating knowledge within particular individuals or institutions, Indigenous Peoples' governance mobilizes

complementary expertise distributed across the community. This diversity becomes increasingly important as climate-related environmental disasters grow more complex and uncertain, requiring communities to interpret multiple, interacting environmental changes simultaneously, a task that no single knowledge holder or institution could accomplish alone.

Figure 15: Different Indigenous Peoples’ knowledge holders identified in questionnaire responses



Indigenous Peoples continuously observe environmental change through their everyday relationships with forests, rivers, grazing lands, agricultural fields, fisheries, and other ecosystems. These relationships generate different but complementary forms of knowledge. Elders contribute long-term environmental memory that helps distinguish unprecedented environmental change from normal variability; Indigenous Peoples’ women hold knowledge associated with water sources, seeds, food systems, medicinal plants, and ecosystem restoration; and younger generations increasingly contribute environmental monitoring, technological tools, and engagement with external institutions. Importantly, contributing knowledge does not necessarily imply formal participation in governance structures. Some case studies show that women, youth, or other knowledge holders may have limited access to particular decision-making institutions while their observations, practices, and knowledge nevertheless inform territorial responses. The relationship between Indigenous Peoples’ governance and knowledge systems therefore extends beyond who formally participates in decision-making. Recognized authorities, collective deliberation, collective implementation, and external coordination are all informed, in different ways, by knowledge generated across the territory and among different knowledge holders. Indigenous Peoples’ governance and knowledge systems thus interact continuously: diverse

environmental observations and accumulated experience inform collective responses, while the implementation of those responses generates new experience through which knowledge is tested, adapted, and renewed.

Figure 16: Contributions of diverse knowledge holders to Indigenous Peoples’ collective decision-making

Knowledge holders	Examples of knowledge and perspectives contributed	Contribution to collective decision-making
Elders	Long-term ecological memory; historical droughts, floods, species changes, seasonal variability, customary practices, sacred sites	Provide historical baselines, distinguish unprecedented environmental change from normal variability, and guide long-term adaptation strategies.
Indigenous Women	Household water sources, food systems, seed diversity, medicinal plants, forest products, family wellbeing	Provides observations and practical knowledge that inform water management, food security, biodiversity conservation, ecosystem restoration, preparedness, and responses to changing environmental conditions, including where women are not formally represented in particular governance structures.
Indigenous Youth	Environmental monitoring, documentation, new technologies, formal education, communication with external institutions, knowledge transmission	Contributes new forms of observation, monitoring, documentation, and communication; connects Indigenous Peoples’ knowledge systems with new tools and external information; supports adaptation and intergenerational knowledge transmission, including beyond formal decision-making roles.
Other community knowledge holders	Daily observations derived from livelihoods and relationships with the territory; ecosystem conditions; seasonal variability; specialized knowledge associated with farming, herding, fishing, hunting, forests, and other territorial practices	Provides place-based and specialized observations that inform collective assessments of environmental change and the design and implementation of territorial responses.

Among the *Thami Indigenous People* of the Dolakha District, **Nepal**, Elders play a fundamental role as custodians of long-term environmental memory. Their knowledge extends beyond observing present environmental conditions to recalling previous landslides, river changes, snowfall patterns, and other historical events that provide an essential temporal perspective for understanding current climatic changes. This accumulated experience is shared through everyday participation in farming, livestock management, ceremonies, and community decision-making, allowing younger generations to interpret present environmental changes within a longer history of territorial adaptation. As climate-related hazards become increasingly unpredictable, this long-term environmental memory enables communities to distinguish unprecedented changes from the natural variability they have experienced over generations, strengthening collective decisions regarding settlement, agriculture, and disaster preparedness.

| **Box 3.c.**

Indigenous Peoples’ knowledge systems keep moving between generations despite challenges

the case of the *Thami Indigenous People* (Nepal) shows how elders’ long-term knowledge, recalling past landslides, river changes, and snowfall patterns, is transmitted through everyday participation in farming, ceremonies, and decision-making, allowing younger generations to interpret today’s changes within a longer history of adaptation.



A member of a women’s fire brigade waters tree seedlings as part of reforestation efforts in the Cana Brava and Araribóia Indigenous Lands, Maranhão, Brazil. Credits: Brigada Cana Brava.

The case studies likewise demonstrate that Indigenous women contribute distinct forms of knowledge that are indispensable for territorial adaptation. Among the *Endorois and Tugen Indigenous Peoples* in Baringo County, **Kenya**, women contribute detailed knowledge of water availability, medicinal plants, household food security, and the daily management of natural resources, complementing the observations of pastoralists and community Elders. Similarly, among the *Guajajara Indigenous Peoples* in the Amazon, **Brazil**, women called *viveiras* have assumed increasingly important leadership roles in territorial monitoring, fire management, ecological restoration, and community organization. Their participation not only strengthens responses to increasingly frequent fires and forest degradation but also expands the knowledge available for collective decision-making. Among the *Mising Indigenous Peoples*, **India**, women play an important role in translating accumulated knowledge of flooding into household preparedness and adaptation. Women participate in decisions concerning shelter and preparation for the monsoon, including stockpiling bamboo for emergency repairs, while knowledge of previous flood levels informs decisions about the height and organization of stilt houses. These practices show how knowledge held and applied through everyday responsibilities contributes directly to preparedness and enables households to continually adapt to recurrent flooding.

Indigenous women emerge not as supporting actors but as central knowledge holders whose everyday territorial practices contribute essential information for responding to climate-related environmental disasters.

The continuity of Indigenous Peoples' knowledge systems, however, increasingly faces pressures that extend beyond the loss of cultural practices alone. The *Quechua Indigenous Peoples* of the Ausangate Regional Conservation Area, **Peru**, *Ryukyuan Indigenous Peoples* of the Ryukyu Islands, **Japan**, and the *Anlo Ewe Indigenous Peoples* of the Volta Region, **Ghana**, all described how climate-related environmental change is disrupting the conditions through which younger generations traditionally acquire Indigenous Peoples' knowledge. In **Peru**, changing snow-fall patterns, glacier retreat, shifting pasture conditions, increasingly unpredictable seasonal cycles, and migration to the cities reduce opportunities for young pastoralists to learn environmental indicators through everyday herding practices. In Japan, demographic change, modernization, and changing livelihoods have reduced opportunities for younger generations to participate in the cultural and ecological practices through which Indigenous Peoples' knowledge has traditionally been transmitted, prompting communities to establish deliberate initiatives to strengthen intergenerational learning. In **Ghana**, coastal erosion, recurrent flooding, changing coastal livelihoods, and migration to the cities similarly reduce opportunities for young people to acquire Indigenous Peoples' knowledge through direct engagement with their territory. Across these cases, climate-related environmental disasters affect not only the ecological indicators that Indigenous Peoples observe but also the social and ecological relationships through which those indicators are learned and transmitted, making the strengthening of intergenerational learning an increasingly important component of adaptive Indigenous governance.



The experience of the *Tano Batak Indigenous Peoples* in North Sumatra, **Indonesia**, further demonstrates that Indigenous Peoples' knowledge systems are not only transmitted but continually renewed. Following the severe floods and landslides that affected Indigenous Peoples' territories in 2025, communities reflected collectively on the changing behavior of hazards, strengthened preparedness measures, documented lessons from the disaster, and incorporated new observations into customary decision-making. Supported by exchanges facilitated through the Indigenous Peoples Alliance of the Archipelago (AMAN), these processes reinforced local learning while remaining grounded in customary governance institutions. Rather than treating Indigenous Peoples' knowledge as a fixed body of inherited information, the case illustrates how Indigenous Peoples' governance is intentionally creating spaces for younger generations to participate in decision-making, contribute new knowledge, and progressively assume leadership.

The deliberate inclusion of younger generations within Indigenous Peoples' governance institutions further demonstrates that intergenerational learning is not left to informal transmission alone but is increasingly being strengthened through institutional arrangements. Among the *Guajajara Indigenous People* in the Amazon, **Brazil**, the Brazilian Amazon Coordination (COIAB) has intentionally engaged young Indigenous Peoples' leaders in territorial monitoring and environmental governance through its Monitoring Management Unit (*Gerência de Monitoramento*). Young Indigenous monitors combine digital technologies, satellite imagery, drones, GPS applications, and other monitoring tools with Indigenous Peoples' knowledge systems shared by community Elders and local authorities. Information generated by community-based monitors is coordinated across Indigenous Peoples' territories through COIAB's Indigenous Peoples' network, allowing local observations to inform regional, national, and international advocacy while ensuring that monitoring remains grounded in Indigenous Peoples' governance. Rather than replacing Indigenous Peoples' knowledge, these technologies expand the capacity of younger generations to apply and strengthen it under contemporary environmental conditions.

Indigenous Peoples' knowledge systems remain adaptive because they combine the complementary contributions of diverse knowledge holders with continuous processes of intergenerational learning and collective innovation. Elders contribute historical environmental memory, Indigenous women contribute knowledge grounded in everyday territorial management, youth ensure continuity through participation and learning, and communities collectively generate new knowledge in response to unprecedented climatic conditions. Strengthening Indigenous Peoples' responses to climate-related environmental disasters therefore requires supporting the social institutions and governance processes that sustain this diversity of knowledge and enable its continual renewal, rather than treating Indigenous Peoples' knowledge systems as a static body of information to be documented or preserved.

| Finding 4

Enabling legal, financial, and institutional conditions determine whether Indigenous Peoples' governance can sustain effective responses to climate-related environmental disasters

KEY MESSAGE

Indigenous Peoples' governance and knowledge systems are the mechanism for organizing and sustaining responses to climate-related environmental disasters. The extent of the effective response, however, is conditioned by external factors. Analysis of the questionnaire and case study data identifies three conditions: (1) the effective exercise of Indigenous Peoples' rights, including protection from external pressures on their territories; (2) access to adequate, timely, and appropriate climate finance, in particular for adaptation; and (3) the establishment of partnerships that strengthen, rather than substitute for, Indigenous Peoples' own governance systems.

The previous findings demonstrate that Indigenous Peoples already possess effective governance and knowledge systems for responding to climate-related environmental disasters. Across diverse ecosystems and governance arrangements, Indigenous Peoples consistently mobilize integrated territorial responses grounded in recognized institutions, diverse knowledge holders, and long-standing relationships with their territories. The comparative evidence presented in this finding shows that the principal constraints to these responses do not originate within Indigenous Peoples' governance themselves. Rather, they arise from the legal, financial, and institutional conditions within which those systems operate.

Across both the questionnaire and the case studies, respondents consistently identified secure rights, access to finance, and meaningful partnerships as the conditions most critical for sustaining Indigenous Peoples' responses. These findings demonstrate that Indigenous Peoples' governance does not require replacement or redesign. Instead, it requires an enabling environment that allows Indigenous Peoples to exercise governance over their territories, mobilize adequate financial resources, and collaborate with external actors on equitable terms while maintaining authority over their own institutions and decision-making processes.

Together, the comparative evidence identifies three interrelated enabling conditions that determine whether Indigenous Peoples can sustain effective territorial governance. First, Indigenous Peoples' rights provide the legal foundation for governing territories, but their effectiveness depends on whether they can be exercised under external pressures. Second, direct, flexible, culturally appropriate, and long-term finance provides the resources required to sustain territorial governance over time. Third, partnerships strengthen Indigenous Peoples' governance when they reinforce Indigenous Peoples' institutions, leadership, and decision-making rather than substituting for them.

A. The effective exercise of Indigenous Peoples’ rights provides the legal conditions for territorial governance

Indigenous Peoples’ governance is the institutional foundation of effective responses to climate-related environmental disasters. However, its effectiveness depends on Indigenous Peoples being able to exercise governance securely over their territories. Across the questionnaire and case studies, respondents consistently identified the recognition of Indigenous Peoples and their territorial rights as among the most important enabling conditions for sustaining their responses, with 102 (47.2%) respondents identifying legal recognition of Indigenous Peoples and 78 (36.1%) identifying recognition of territorial rights. The comparative evidence demonstrates that recognizing these rights does not create Indigenous Peoples’ governance. It provides the legal foundation that enables Indigenous Peoples to exercise governance over their territories, sustain Indigenous Peoples’ knowledge systems, protect access to resources, mobilize collective action, and implement long-term responses to climate-related environmental disasters.

International legal and policy frameworks already recognize these conditions. The United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP)²⁹, ILO Convention No. 169³⁰, the Convention on Biological Diversity (CBD)³¹, the United Nations Framework Convention on Climate Change (UNFCCC)³², and the Paris Agreement³³ recognize Indigenous Peoples’ rights to self-determination, participation, lands, territories and resources, and traditional knowledge as fundamental to environmental governance and climate action. Yet legal recognition alone does not determine whether Indigenous Peoples are able to govern their territories effectively. Across all case studies, Indigenous Peoples faced external pressures including extractive industries, infrastructure development, militarization, illegal economies, commercial agriculture, and other externally driven interventions. What differed was not the existence of these pressures, but the legal and institutional capacity of Indigenous Peoples to govern their territories in the face of them.

A qualitative analysis of the case studies identifies **three broad legal contexts that shape the extent to which territorial governance can be exercised in practice**: the absence of formal recognition, an incomplete legal framework, and a strong but unenforced legal framework. These are not strictly sequential stages but distinct configurations of legal risk, each of which leaves Indigenous Peoples’ governance exposed differently.

29 **UNGA (United Nations General Assembly)**. 2007. *United Nations Declaration on the Rights of Indigenous Peoples*. A/RES/61/295. New York: United Nations. <https://social.desa.un.org/issues/indigenous-peoples/united-nations-declaration-on-the-rights-of-indigenous-people>. The Declaration recognizes Indigenous Peoples’ rights to self-determination; participation in decision-making; lands, territories and resources; and the maintenance, control and protection of their cultural heritage and knowledge.

30 **ILO (International Labour Organization)**. 1989. *Indigenous and Tribal Peoples Convention, 1989 (No. 169)*. Geneva, Switzerland. https://normlex.ilo.org/dyn/nrmlx_en/f?p=NORMLEXPUB:12100:0::NO::P12100_ILO_CODE:C169. The Convention recognizes Indigenous Peoples’ rights to consultation and participation, to determine their own development priorities, and to ownership, possession, use, management and conservation of lands, territories and natural resources.

31 **CBD (Convention on Biological Diversity)**. 2022. *Kunming–Montreal Global Biodiversity Framework*. Decision 15/4. Montreal, Canada. <https://www.cbd.int/gbf/>. The Framework requires respect for Indigenous Peoples’ rights, knowledge, worldviews and practices and their full and effective participation in decision-making; recognizes Indigenous and traditional territories; and expressly addresses rights over lands, territories, resources and traditional knowledge.

32 **UNFCCC (United Nations Framework Convention on Climate Change)**. 2018. *Decision 2/CP.24: Local Communities and Indigenous Peoples Platform*. FCCC/CP/2018/10/Add.1. Bonn, Germany. <https://unfccc.int/sites/default/files/resource/10a1.pdf>. The Platform promotes the exchange of Indigenous Peoples’ knowledge and practices for addressing climate change and strengthening Indigenous Peoples’ engagement in the UNFCCC process, within a framework that recognizes safeguards concerning Indigenous Peoples’ knowledge and participation.

33 **UNFCCC (United Nations Framework Convention on Climate Change)**. 2015. *Paris Agreement*. FCCC/CP/2015/10/Add.1, preamble and Article 7(5). Bonn, Germany. https://treaties.un.org/doc/Treaties/2016/02/20160215%2006-03%20PM/Ch_XXVII-7-d.pdf. The Agreement recognizes that Parties should respect, promote and consider their obligations concerning the rights of Indigenous Peoples when taking action to address climate change and provides that adaptation action should be guided, as appropriate, by traditional knowledge and Indigenous Peoples’ knowledge systems.

Figure 17: Legal contexts that shape the exercise of Indigenous Peoples’ governance

Context 1 No recognition	Context 2 Incomplete framewor	Context 3 Unenforced framework
Governance lacks formal legal recognition Indigenous Peoples are not legally recognized as collective rights holders.	Collective rights are recognized, but the legal protection framework remains incomplete. Indigenous Peoples are recognized, but land tenure, FPIC, or participation protections remain incomplete.	Collective rights are recognized; there is a legal framework, but it is not effectively implemented Strong legal protections exist, but governments fail to enforce them in practice.

The first context is characterized by the **absence of formal legal recognition**. The *Ryukyuan Indigenous Peoples* of the Ryukyu Islands, **Japan**, illustrate a context in which governance continues in practice but lacks the formal legal recognition needed to protect it. Japan formally recognized the Ainu Indigenous Peoples in 2008, codified through the 2019 Ainu Policy Promotion Act, showing that a national pathway to recognition exists³⁴. Although *Ryukyuan Indigenous Peoples* described maintaining distinct governance institutions, Indigenous Peoples’ knowledge systems, and longstanding relationships with their ancestral territories, the Japanese government has not extended this same recognition to them. Consequently, even though they are Indigenous Peoples, they cannot fully exercise the collective rights recognized under international instruments such as the United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP), including self-determination and Free, Prior, and Informed Consent (FPIC). Respondents further described how the absence of recognition has facilitated the continued expansion of military installations and other externally imposed developments within their ancestral territories, despite longstanding community opposition. The Ryukyuan Indigenous Peoples case therefore shows that the problem is not a gap in international law, but a gap at the national level: the government’s unwillingness to recognize them as Indigenous Peoples prevents already-recognized rights from being exercised.

| Box 4.a.

Indigenous Peoples exist and are implementing effective adaptation despite lack of recognition of their governments:

the *Ryukyuan Indigenous Peoples* (Japan) are implementing adaptation responses despite the absence of formal recognition. This lack of recognition has enabled continued military expansion in their territories and limits their ability to protect their territories from external pressures.

34 Japan. 2019. Act on Promoting Measures to Achieve a Society in which the Pride of Ainu People is Respected, Law No. 16 of 2019. Tokyo: Japanese Law Translation. <https://www.japaneselawtranslation.go.jp/en/laws/view/4538>.

The *Anlo Ewe Indigenous Peoples* along the Volta coast, **Ghana**, illustrate a related but structurally distinct form of non-recognition. Ghana has no domestic legal category of “Indigenous Peoples” at all, for any group. Respondents self-identified as Indigenous Peoples and described functioning customary governance through chiefs and subchiefs, with at least one chief also holding a seat in Ghana’s Parliament. Yet in the absence of any national pathway for Indigenous Peoples’ recognition, self-identification does not translate into differentiated state action: respondents explained that when government responds to climate impacts, Indigenous Peoples are treated simply as part of the wider region rather than needing differentiated measures, despite their dependence on the sea and disproportionate exposure to flooding. Government engagement was described as depending heavily on the level of pressure or advocacy Indigenous Peoples themselves could generate, with political representation, such as a chief holding a parliamentary seat, identified as a significant advantage unevenly available across different Indigenous Peoples in the region.

A third form of non-recognition emerges among the *Chakma Indigenous Peoples* of the Chittagong Hill Tracts, **Bangladesh**, where customary governance continues to operate through the Chakma Circle Chief (Raja), *Headmen*, and village *Karbaris*, alongside Bangladesh’s formal administrative system. Bangladesh legally recognizes these institutions, but not as a separate sovereign government; their authority exists within and alongside the state’s statutory administrative system, regulating forests, freshwater resources, and agricultural lands through community consultations involving elders, women, and other community members. However, despite this recognition, the state actively contests their designation as Indigenous Peoples. Bangladesh’s Constitution refers to the Chakma and other Chittagong Hill Tracts peoples only as “tribes,” “minor races,” and “ethnic sects and communities,” and a 2017 government directive ordered the term “Indigenous” removed from all national laws, policies, and official documents.³⁵ Bangladesh has ratified ILO Convention No. 107, the earlier and more assimilationist framework, but not Convention No. 169, which recognize self-identification and Indigenous Peoples’ status.³⁶ Respondents identified insecure land tenure, deforestation, hill cutting, infrastructure development, commercial pressure on Indigenous Peoples’ lands, and long-standing land conflicts as major barriers to adaptation. These pressures reduce forest cover, increase slope instability, restrict access to customary territories, and undermine the capacity of Indigenous Peoples’ institutions to govern the territory according to their own rules.

These three cases show that **non-recognition does not prevent Indigenous Peoples from governing their territories or responding to climate-related environmental disasters, but it leaves their governance without the legal protection needed to withstand external pressures.** Indigenous Peoples continue to exercise authority, mobilize knowledge systems, and implement territorial responses, but without formal recognition their ability to defend those responses against competing state or private interests is significantly constrained.

³⁵ **Bangladesh.** 1972. *The Constitution of the People’s Republic of Bangladesh*, as amended by the Constitution (Fifteenth Amendment) Act, 2011. Dhaka, Bangladesh; and **Ministry of Chittagong Hill Tracts Affairs.** 2017. Circular on the Use of Terminology for Ethnic Communities in Official Documents, 23 October 2017. Dhaka, Bangladesh. As reported in Parbatta News. 2025. “Bangladesh’s Position: Ethnic Communities Are Not Indigenous.” <https://en.parbattanews.com/bangladeshs-position-ethnic-communities-are-not-indigenous/>

³⁶ **ILO (International Labour Organization).** n.d. *Ratifications for Bangladesh*. NORMLEX Information System on International Labour Standards. Geneva, Switzerland. https://normlex.ilo.org/dyn/nrmlx_en/f?p=NORMLEXPUB:11300:0::NO::P11300_INSTRUMENT_ID:312314.

Yet recognition alone is not sufficient. Even where Indigenous Peoples’ status is formally acknowledged by the State, recognition does not necessarily provide the legal protections required to secure their lands, resources, and institutions in practice.

The second context occurs where **Indigenous Peoples are formally recognized, but the broader legal framework remains insufficient** to secure the effective exercise of territorial governance. The *Batwa Indigenous Peoples* of the **Democratic Republic of the Congo** illustrate this situation. In 2022, the Democratic Republic of the Congo adopted Law No. 22/030 on the Protection and Promotion of the Rights of Indigenous Pygmy Peoples, the country’s first legislation to formally recognize Indigenous Peoples’ status, land rights, and right to Free, Prior, and Informed Consent (FPIC)³⁷. Signed into law in November 2022 and entering into force in early 2023, the law represents an important step forward, though its recency means implementation remains at an early stage; the Democratic Republic of the Congo has also not ratified ILO Convention No. 169.³⁸ Respondents explained that legal protections for secure access to ancestral forests, customary governance, and meaningful participation in decisions affecting Indigenous Peoples’ territories remain incomplete in practice. At the same time, Indigenous Peoples continue to face armed conflict, displacement, illegal mining, forest degradation, and conservation policies that frequently exclude Indigenous Peoples’ institutions from governing ancestral territories. Respondents contrasted areas where customary governance continues regulating forest access and biodiversity with territories where customary institutions have been displaced, noting that the latter experience greater environmental degradation and weaker capacity to respond to increasingly irregular rainfall, flooding, and other climate-related environmental disasters.

The *Endorois and Tugen Indigenous Peoples* in Baringo County, **Kenya**, illustrate a related situation in which recognition through a regional human rights organization has not yet resulted in the full realization of territorial rights. The African Commission on Human and Peoples’ Rights recognized the *Endorois* as an Indigenous People and found violations arising from their displacement from their ancestral lands around Lake Bogoria. The Commission recommended that Kenya recognize the *Endorois*’ rights and restitute their ancestral lands, among other measures.³⁹ However, the African Commission has subsequently continued to call on Kenya to fully and effectively implement the decision, demonstrating the continuing gap between legal recognition and effective territorial protection.⁴⁰ Respondents stated that formal state institutions coexist with Indigenous Peoples’ governance: among the *Endorois* and Tugen, customary institutions continue to regulate land tenure, water, grazing, conflict resolution, and environmental knowledge, while the *Endorois* Welfare Council represents *Endorois* interests. These governance systems remain central to responses to drought, increasingly erratic rainfall, pasture degradation, and water scarcity, yet their capacity to govern adaptation is constrained where territorial rights and participation in formal decision-making remain incomplete.

The *Thami Indigenous Peoples* of **Nepal** demonstrate a similar gap between formal recognition and the effective exercise of territorial rights. Nepal formally recognizes Indigenous Peoples’ nationalities (*Adivasi Janajati*) under

37 **DRC (Democratic Republic of the Congo)**. 2022. *Law No. 22/030 on the Protection and Promotion of the Rights of Indigenous Pygmy Peoples*. Kinshasa, Democratic Republic of the Congo. Official Gazette, 14 November 2022. <https://www.leganet.cd/Legislation/Droit%20Public/DH/Loi%2022.030%20du%2015%20juillet%202022.html>

38 **ILO (International Labour Organization)**. 1989. *Ratifications of C169 - Indigenous and Tribal Peoples Convention, 1989 (No. 169)*. NORMLEX Information System on International Labour Standards. Geneva, Switzerland. https://normlex.ilo.org/dyn/nrmlex_en/f?p=NORMLEXPUB:11300:0::NO::P11300_INSTRUMENT_ID:312314.

39 **African Commission on Human and Peoples’ Rights**. 2010. *Centre for Minority Rights Development (Kenya) and Minority Rights Group International on behalf of Endorois Welfare Council v. Kenya*, Communication No. 276/2003. Banjul, The Gambia. <https://www.refworld.org/jurisprudence/caselaw/achpr/2010/71724>

40 **ESCR-Net (International Network for Economic, Social and Cultural Rights)**. 2024. *The Endorois Case*. <https://www.escr-net.org/resources/the-endo-rois-case/>

the National Foundation for Development of Indigenous Nationalities Act of 2002⁴¹, which identified 59 Indigenous nationalities, and Nepal ratified ILO Convention No. 169 in 2007⁴². Despite this comparatively stronger recognition framework, the case study documents insecure land tenure, lack of secure collective land rights, long-standing dispossession, restrictive conservation policies around the *Gaurishankar* Conservation Area, weak political representation, and exclusion from decisions affecting ancestral lands. At the same time, *Thami* governance continues through elders, shamans, and the *Bigu Thami Bhume Samaj*, which coordinates collective action on land, climate adaptation, and cultural rights. Indigenous Peoples' knowledge systems guide the identification of unstable slopes, river conditions, plant and animal indicators, and appropriate settlement and farming practices, while elders and youth jointly implement slope stabilization and ecosystem restoration.

Indigenous Peoples' governance continues to function despite legal and institutional frameworks that remain insufficient to protect Indigenous Peoples' territorial authority from competing external interests. These cases demonstrate that legal recognition alone is not enough if it is not accompanied by the legal safeguards and institutional conditions necessary to exercise governance effectively. At the same time, they also suggest that strengthening these protections can substantially reinforce Indigenous Peoples' capacity to govern their territories, reduce the influence of external actors, and sustain effective responses to climate-related environmental disasters.

The third context occurs where **Indigenous Peoples' rights and territories are formally recognized and supported by comparatively strong legal frameworks, yet governments continue to face challenges** in ensuring that those rights can be exercised effectively under persistent external pressures. In these situations, the principal challenge is no longer the absence of legal recognition or legal safeguards, but the State's capacity and political commitment to enforce them consistently in practice.

The *Guajajara Indigenous People* of the Cana Brava and Araribóia Indigenous Lands, **Brazil**. Their territories have been formally demarcated and are protected under the Brazilian Constitution, providing strong legal frameworks for Indigenous Peoples' territorial rights. Nevertheless, respondents described how illegal logging, cattle ranching, land grabbing, and associated commercial networks continue to generate repeated incursions into Indigenous Peoples' territories. In the absence of effective buffer zones, surrounding ranches and timber operations place continuous pressure on Indigenous Peoples' lands. Illegal occupiers open clandestine roads, clear forests to establish pasture, introduce cattle, and deliberately use fire to expand occupied areas illegally. These activities not only violate Indigenous Peoples' territorial rights but also intensify climate-related environmental disasters by accelerating deforestation, increasing wildfire risk, degrading biodiversity, reducing ecosystem resilience, and damaging the forest resources upon which Indigenous Peoples' communities depend for food, water,

41 **Nepal**. 2002. *National Foundation for Development of Indigenous Nationalities Act, 2058 (2002)*. Kathmandu, Nepal. Nepal Gazette, 7 February 2002. <https://faolex.fao.org/docs/pdf/nep202216.pdf>

42 **ILO (International Labour Organization)**. 2007. *Nepal Ratifies ILO Convention on Indigenous and Tribal Peoples' Rights*. Geneva, Switzerland. <https://www.ilo.org/resource/news/nepal-ratifies-ilo-convention-indigenous-and-tribal-peoples-rights>

livelihoods, and cultural practices. Respondents further described how these pressures have generated violence and threats against Indigenous Peoples' leaders and autonomous territorial protection groups, including the *Guardiões da Floresta* (Guardians of the Forest), while repeated federal operations to remove illegal occupiers have struggled to keep pace with well-organized commercial networks driving these invasions. Indigenous Peoples' organizations, including the Coordination of Indigenous Organizations of the Brazilian Amazon (COIAB), therefore emphasized that securing Indigenous Peoples' territories requires not only constitutional recognition and territorial demarcation but also sustained enforcement capable of preventing illegal incursions and ensuring that Indigenous Peoples' governance can be exercised fully and effectively in practice.

The *Quechua Indigenous Peoples* of the Ausangate Regional Conservation Area, **Peru**, illustrate a related dynamic at the level of a specific, narrower legal protection. Established by the Peruvian government in December 2019 under Supreme Decree N° 12-2019-MINAM, the Ausangate Regional Conservation Area (ACR Ausangate) spans roughly 66,000 hectares of high-Andean puna ecosystem, explicitly protecting the glaciers, wetlands (*bofedales*), and water sources that supply over 150,000 people downstream.⁴³ The area's governing legislation permits Indigenous Peoples to continue traditional land-use practices, including alpaca pastoralism, while expressly prohibiting activities incompatible with conservation objectives, including mining. However, with this explicit legal prohibition, respondents reported that illegal miners from a neighbouring district have entered the conservation area. While the mining operation is located beneath the glacier and its wastewater discharges into a separate watershed, such that it does not directly affect the water supply of the conservation area itself, its presence within a legally protected area under an explicit extractive prohibition exemplifies the enforcement gap documented throughout this section. The case further reveals an additional dimension of this gap: because of the lack of opportunities, young Indigenous Peoples have been drawn into the same illegal mining operations, despite severe high-altitude working conditions and uncertain income, illustrating how weak enforcement of territorial protections can generate economic pressures that erode the very customary livelihoods, alpaca pastoralism, water management, and transmission of ecological knowledge, that such protections were intended to safeguard.

These cases demonstrate that strengthening the legal conditions for Indigenous Peoples' governance progressively increases Indigenous Peoples' capacity to respond to climate-related environmental disasters. They also show, however, that legal recognition, secure territorial rights, and robust legal frameworks depend upon governments protecting Indigenous Peoples' territories from external actors whose activities undermine both governance and knowledge systems. The exercise of Indigenous Peoples' rights therefore requires not only recognition in law but also continuous State action to ensure that those rights remain effective in practice.

Yet legal conditions alone are insufficient to sustain Indigenous Peoples' governance over time. Across the questionnaire and case studies, respondents consistently emphasized that governing territories, restoring ecosystems, maintaining Indigenous Peoples' knowledge systems,

⁴³ **Peru.** 2019. *Decreto Supremo N° 012-2019-MINAM, que establece el Área de Conservación Regional Ausangate*. Lima, Peru. El Peruano, 12 December 2019. <https://vlex.com.pe/vid/829563805>.

monitoring environmental change, preparing for disasters, and coordinating collective responses all require sustained financial resources. The effectiveness of Indigenous Peoples’ governance also depends on access to finance that allow those rights to be translated into continuous territorial action. The following section examines how different financing arrangements influence Indigenous Peoples’ capacity to sustain territorial governance and demonstrates that finance is most effective when it strengthens Indigenous Peoples’ institutions rather than substituting for them.

B. Direct, flexible, culturally appropriate, and long-term finance strengthens Indigenous Peoples’ governance

Evidence presented in this report indicates that Indigenous Peoples are already implementing effective responses to climate-related environmental disasters through their own governance and knowledge systems. Financing for adaptation, however, rarely reaches these institutions, and where it does, it does not consistently reflect Indigenous Peoples’ own priorities. This is not an incidental gap but an outcome of the current international finance architecture, which, as presently designed, treats Indigenous Peoples primarily as beneficiaries of adaptation projects rather than as agents already implementing adaptation responses through their own governance and knowledge systems.

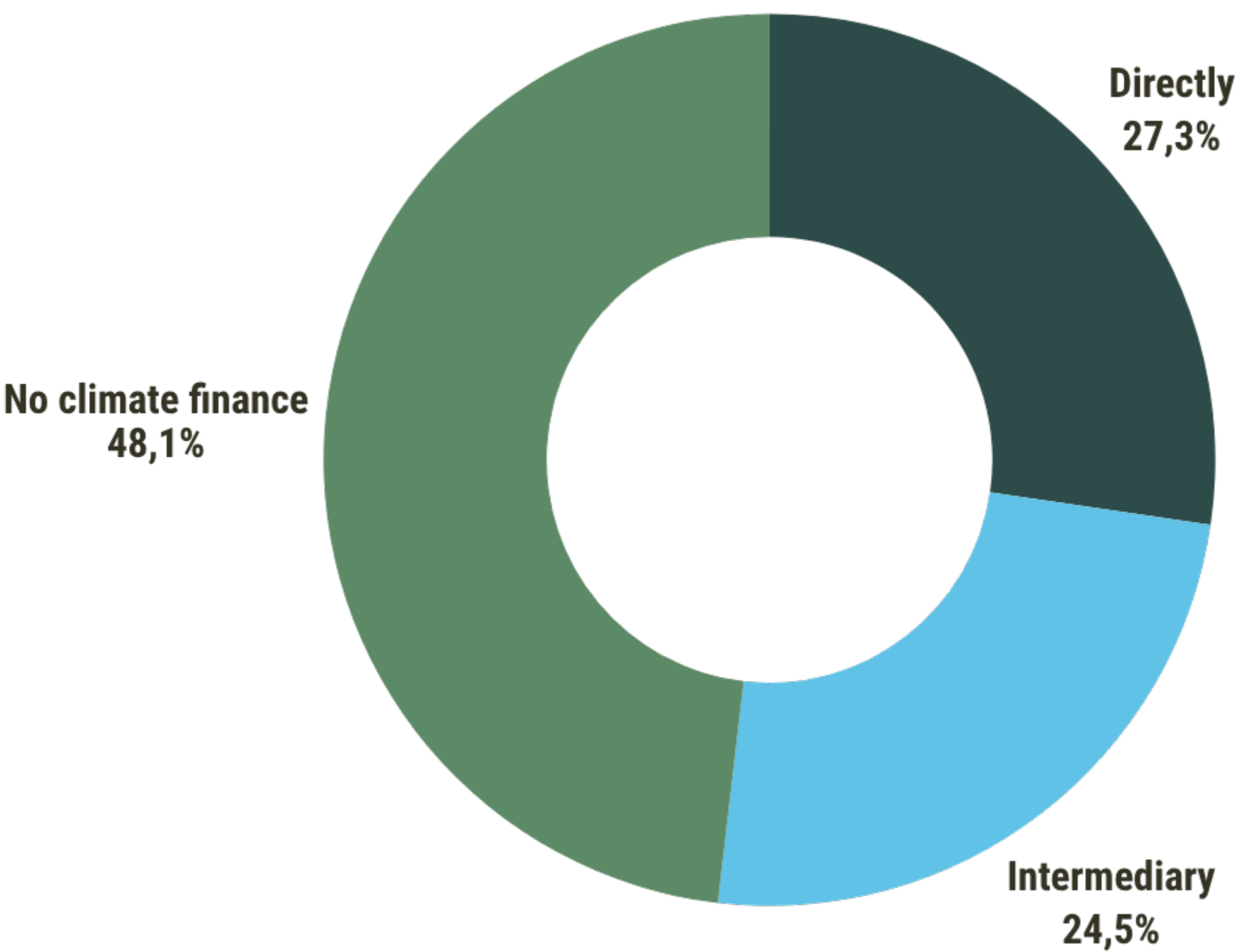
A 2021 study by Rainforest Foundation Norway, cited in a 2024 report to the United Nations Permanent Forum on Indigenous Issues, estimates that only about 1% of international climate finance reached Indigenous Peoples and local communities on the ground between 2011 and 2020, despite their central role in climate adaptation and biodiversity conservation.⁴⁴ In addition, a 2025 report by the International Funders for Indigenous Peoples found that of USD 28.5 billion in grants disbursed globally between 2016 and 2020 to support women and girls, only 1.4 % (USD 392 million) went to organizations benefiting Indigenous women specifically.⁴⁵

This assessment is reflected in the responses to the questionnaire, where, nearly half of respondents (48.1%) reported receiving no climate finance at all, yet the case studies consistently show Indigenous Peoples organizing fire brigades, restoring forests, protecting springs, and coordinating disaster response through their own governance institutions regardless.

⁴⁴ **Rainforest Foundation Norway**. 2021. *Falling Short: Donor Funding for Indigenous Peoples and Local Communities to Secure Tenure Rights and Manage Forests in Tropical Countries (2011–2020)*. Oslo, Norway. <https://cwis.org/wp-content/uploads/2021/06/rainforestmanagement.pdf>

⁴⁵ **IFIP (International Funders for Indigenous Peoples)**. 2024. *Leaders and Stewards: Global Analysis of Funding to Indigenous Women*. San Francisco, CA. https://internationalfunders.org/wp-content/uploads/2024/07/Leaders-and-Stewards-Global-Analysis-of-Funding-to-Indigenous-Women-_compressed.pdf

Figure 18: Responses of type of climate finance accessed by Indigenous Peoples



In **Brazil**, the *Guajajara Indigenous People* of the Cana Brava and Araribóia lands organize Indigenous Peoples’ fire brigades through their own territorial governance structures to prevent and combat increasingly severe wildfires. In **Guatemala**, the *Maya Achí Indigenous Peoples* in Rabina continue restoring forests, protecting springs, conserving native seeds, strengthening agroecological production, and organizing community risk management through their own community organizations and Indigenous authorities. Similarly, in **Kenya**, among the *Endorois and Tugen Indigenous Peoples* in Baringo County, *Kokwo* councils continue coordinating decisions on grazing, water, and ecosystem restoration during prolonged droughts through customary institutions that remain the principal authority over territorial management. In **Indonesia**, the *Tano Batak Indigenous Peoples* in North Sumatra coordinated emergency response to the 2025 floods and landslides through *Tonggo Raja* customary assemblies led by *Raja Huta* before external assistance arrived, mobilizing collective action through existing institutions.

| **Box 4.b.**

Adaptation is happening in Indigenous Peoples’ territories despite low to no finance:

Despite short-term, poorly aligned external funding, the *Maya Achí Indigenous Peoples* of Rabinal, Guatemala, continue to adapt through their own institutions: building stone contour terraces and infiltration ditches to conserve soil and restore water recharge zones, protecting springs, conserving native seeds, and organizing community-based risk management through *Asociación de Comités de Producción Comunitaria (ACPC)* and traditional authorities. As one local leader put it, with or without a budget, the organization continues driving local development.



Stone contour terraces and water infiltration ditches built by Maya Achí Indigenous Peoples' community members in Rabinal, Baja Verapaz, Guatemala, as part of soil conservation and water recharge restoration efforts led by ACPC. Credits: Alfredo Cortez Galiego, Asociación de Comités de Producción Comunitaria (ACPC)

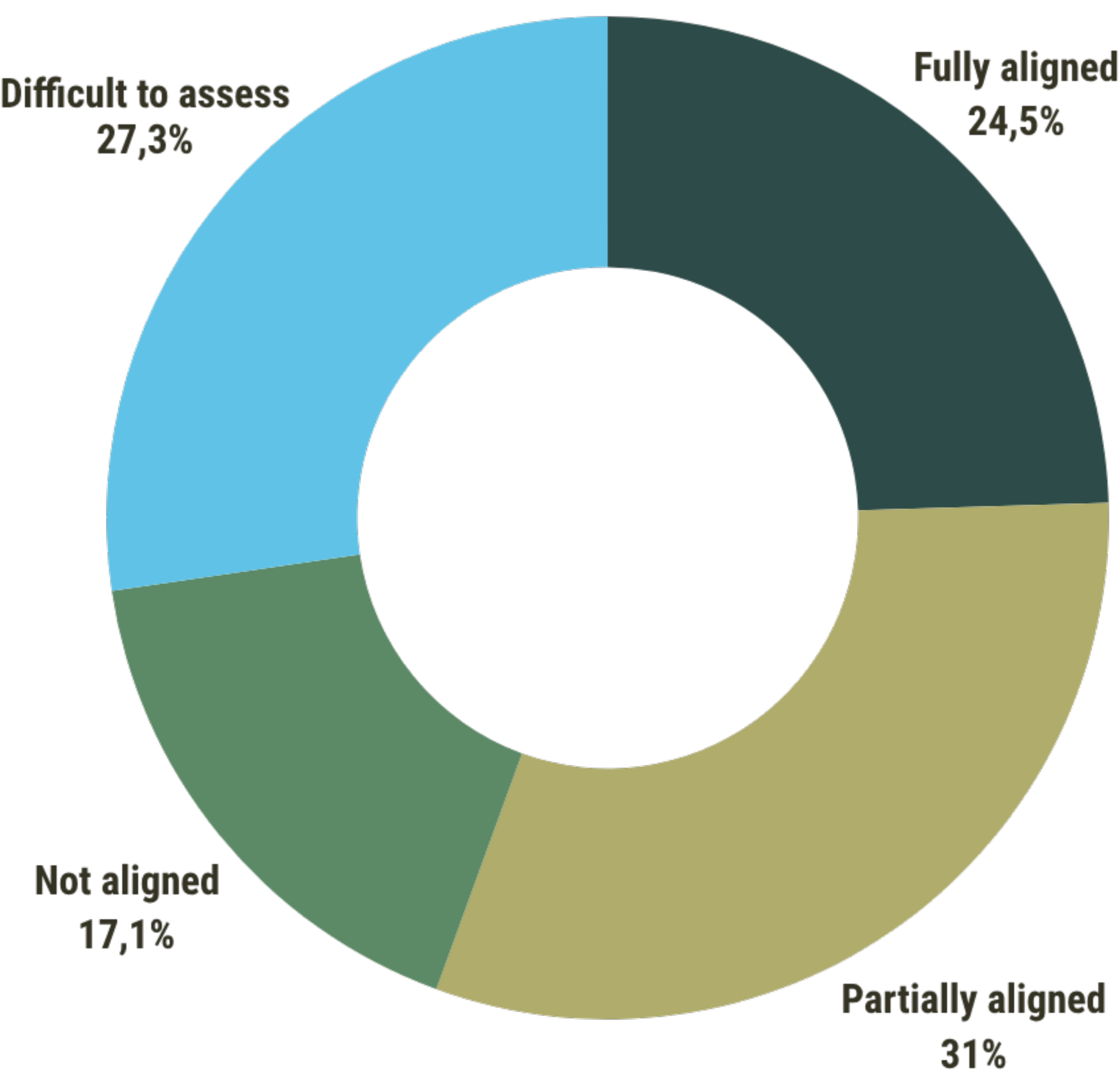
Where financing does reach Indigenous Peoples, the case studies show that it functions to strengthen, extend, or accelerate responses that Indigenous Peoples' institutions had already initiated, rather than to originate them. The *Quechua Indigenous Peoples* in the Ausangate Regional Conservation Area (mountains), **Peru**, support provided through *Conservación Amazónica* – ACCA enabled communities to expand community-led water management, strengthen environmental monitoring, document Indigenous Peoples' knowledge, and restore high-altitude wetlands. The knowledge underlying the construction of *qochas* (water reservoirs), the collective institutions responsible for managing them, and the broader adaptation strategy already existed; external support contributed technical expertise and resources that accelerated and strengthened an ongoing community-led response.

This climate finance reached Indigenous Peoples' organizations through two different pathways: 59 (27.3%) respondents reported receiving climate finance directly, meaning the funds reached the Indigenous Peoples' organizations itself; while 53 (24.5%) received it through an intermediary organization or institution such as a government agency, NGO, or implementing partner, rather than managing the funds themselves. In both cases, financing originated from similar sources, what varied was that we Indigenous Peoples' organizations directly managed the resources or received support administered on their behalf.

Across both pathways, climate finance functioned as an enabling condition that strengthened Indigenous Peoples' governance institutions and increased their capacity to organize, coordinate, and sustain adaptation responses over time. However, even where financing reached Indigenous Peoples, it did not consistently reflect their own priorities. Among questionnaire respondents who had received climate finance, either directly or through an intermediary, only 24.5% reported that support was fully aligned with their priorities, while

31.0% described it as only partially aligned and 17.1% reported no alignment at all, indicating that a substantial share of climate finance reaching Indigenous Peoples does not correspond to priorities identified by their own governance institutions.

Figure 19: Alignment of climate finance with Indigenous Peoples’ priorities



This misalignment reflects a structural characteristic of the current climate finance architecture. Most climate finance continues to be organized around externally designed projects. Resources typically flow from climate funds, philanthropic organizations, or bilateral donors through international organizations, multilateral development banks, government agencies, non-governmental organizations, or other implementing entities before reaching Indigenous Peoples’ organizations. At each stage, priorities, eligibility criteria, project objectives, implementation plans, reporting requirements, indicators, and timelines are progressively defined. By the time financing reaches Indigenous Peoples, many of the fundamental decisions about what will be financed, how it will be implemented, and how success will be measured have already been made elsewhere. Indigenous Peoples therefore often participate primarily as project beneficiaries or implementing partners rather than as the institutions responsible for determining how adaptation should be organized within their own territories.

It is for these reasons that Indigenous Peoples have, for many years, strongly advocated for direct, flexible, and culturally appropriate access to climate finance. The evidence presented here indicates that the central question is not only how much climate finance is made available to support Indigenous Peoples-led action, but how much of that finance actually reaches Indigenous Peoples’ own governance institutions, that is, institutions with the authority to determine priorities, allocate resources, and govern implementation according to their own territorial priorities and decision-making systems.

More finance is urgently needed: UNEP’s 2025 Adaptation Gap Report estimates that developing countries face adaptation finance needs of US\$310–365 billion annually by 2035, against actual international public adaptation finance flows of only US\$26 billion in 2023.⁴⁶ Precisely because finance is this scarce relative to what is needed, how the available resources are allocated matters more. The evidence in this report points to a clear answer: finance is most effective when it strengthens the governance institutions that already organize Indigenous Peoples-led adaptation, ongoing ecosystem stewardship, environmental monitoring, collective decision-making, knowledge transmission, and disaster preparedness, rather than when it funds discrete, externally designed activities around them.

International climate finance mechanisms have started moving beyond treating Indigenous Peoples solely as beneficiaries and increasingly recognizing Indigenous Peoples-led action. The Green Climate Fund adopted its Indigenous Peoples Policy in 2018. Its 2025 Independent Evaluation concluded that, while the Policy has strengthened safeguards and institutional engagement with Indigenous Peoples, existing information remains insufficient to determine whether climate finance effectively reaches Indigenous Peoples or delivers culturally appropriate benefits. The evaluation further found that the Fund lacks portfolio-level indicators to assess outcomes for Indigenous Peoples.⁴⁷

Similarly, the Global Environment Facility has progressively expanded its policy framework to recognize actions by Indigenous Peoples. The Global Biodiversity Framework Fund Guidelines on *Actions by Indigenous Peoples and Local Communities* and the GEF-9 Policy Directions introduce specific provisions and targets to support actions by Indigenous Peoples. However, supporting actions by Indigenous Peoples is conceptually distinct from ensuring that climate finance is ultimately disbursed to **Indigenous Peoples’ own representative institutions, organizations, and Indigenous Peoples-led funding mechanisms**, enabling Indigenous Peoples to govern financial resources through their own governance systems.⁴⁸

This conclusion carries particular weight given the scale of unmet need. Developing countries face an overall adaptation finance gap estimated at between US\$310 billion and US\$365 billion per year, against international public adaptation finance flows of approximately US\$26 billion.⁴⁹ Precisely because so little financing is available relative to what is needed, how that limited financing is allocated matters more. Every dollar that reaches an Indigenous Peoples structure will be more effective for adaptation actions.

⁴⁶ **UNEP (United Nations Environment Programme).** 2025. *Adaptation Gap Report 2025*. Glossary. Nairobi, UNEP. <https://www.unep.org/resources/adaptation-gap-report-2025>.

⁴⁷ **Green Climate Fund, Independent Evaluation Unit.** 2025. *Independent Evaluation of the Green Climate Fund’s Approach to Indigenous Peoples*. Evaluation Report No. 22. Songdo, South Korea. <https://ieu.greenclimate.fund/evaluation/IP2024>. **Green Climate Fund.** 2018. **Indigenous Peoples Policy**. Songdo, South Korea. <https://www.greenclimate.fund/document/indigenous-peoples-policy>.

⁴⁸ **GEF (Global Environment Facility).** 2026. *GEF-9 Programming Directions*. GEF/R.9.18. Washington, D.C. https://www.thegef.org/sites/default/files/documents/2026-04/GEF_R.9.18_GEF-9%20Programming%20Directions.pdf; **GEF (Global Environment Facility).** n.d. *Indigenous Peoples*. Washington, D.C. <https://www.thegef.org/what-we-do/topics/indigenous-peoples>

⁴⁹ **UNEP (United Nations Environment Programme).** 2025. *Adaptation Gap Report 2025*. Glossary. Nairobi, UNEP. <https://www.unep.org/resources/adaptation-gap-report-2025>.

The evidence points to a clear conclusion: financing that reaches and strengthens Indigenous Peoples' governance institutions is the most effective use of resources, because it builds on adaptation responses that are already functioning. As the following section discusses, such organizations continue to play a role, provided that their support could strengthen Indigenous Peoples' governance rather than replacing it, contributing technical, administrative, and other forms of support while decision-making authority remains with Indigenous Peoples themselves. The following section turns to this question, examining what distinguishes partnerships that reinforce Indigenous Peoples' governance from those that, in practice, come to substitute for the territorial institutions upon which effective climate adaptation depends.

C. Partnerships strengthen Indigenous Peoples' governance when they reinforce, rather than substitute for, Indigenous Peoples' authority

The previous sections demonstrated that secure rights, protection from external pressures, and financing create the legal, political, and financial conditions under which Indigenous Peoples' governance can operate effectively. Partnerships constitute another enabling condition. As climate-related environmental disasters become increasingly complex, Indigenous Peoples frequently collaborate with governments, Indigenous Peoples' organizations, civil society organizations, philanthropic foundations, research institutions, and international agencies. The comparative evidence indicates that these collaborations strengthen territorial responses when they reinforce Indigenous Peoples' governance rather than substituting for it.

The questionnaire shows that among the enabling conditions identified by respondents, legal recognition of rights and climate finance were cited most frequently, followed by participation in decision-making (92 responses), and support from Indigenous Peoples' organizations and civil society organizations (85 responses); and among the barriers identified, externally designed interventions not aligned with Indigenous Peoples' priorities (31 responses) exclusion from decision-making (25 responses), and weak government institutional support (22 responses), followed the lack of recognition of rights and climate finance. This indicates that for Indigenous Peoples, their participation in decision-making is central to the effectiveness of partnerships, and that its absence constitutes a recurring barrier to effective responses to climate-related disasters.

Across the case studies, governments, civil society organizations, philanthropic institutions, universities, research institutions, humanitarian agencies, and donors contributed complementary forms of support, including technical expertise, scientific collaboration, legal advocacy, financial resources, emergency assistance, policy engagement, capacity strengthening, and knowledge documentation. What determined the effectiveness of these partnerships was not the identity of the actor involved, but whether its contribution reinforced Indigenous Peoples' governance or assumed functions belonging to it. This section presents different forms of partnership documented in the case studies.

Technical and scientific partnerships proved most effective where they strengthened Indigenous Peoples’ decision-making rather than substituting for Indigenous Peoples’ knowledge systems. Among the *Quechua Indigenous Peoples* of the Ausangate Regional Conservation Area, Peru, the organization *Conservación Amazónica – ACCA* collaborated with Indigenous Peoples’ communities to document environmental indicators, strengthen participatory monitoring, restore *bofedales*, and expand community water management, with scientific methods complementing Indigenous Peoples’ knowledge systems while decisions on territorial management, restoration priorities, and pastoral adaptation remained under the Indigenous Peoples’ community governance. A comparable pattern is observed among the *Ryukyuan Indigenous Peoples* of **Japan**, where researchers collaborated with communities to document Indigenous Peoples’ environmental indicators, seasonal calendars, and knowledge systems threatened by climate change and language loss. Rather than extracting knowledge for external purposes, these collaborations contributed to strengthening Indigenous Peoples’ knowledge systems that continue to inform community decision-making.

Legal advocacy and political support constitute another form through which partnerships strengthened Indigenous Peoples’ governance. Among the *Kichwa Indigenous Peoples of Sarayaku*, Ecuador, allied NGOs and co-operation partners helped raise international visibility for the situation and provided support following the 2019 *Bobonaza* river flooding. Also, the Catholic mission network, including the Vatican, contributed resources, funding the reconstruction of a destroyed bridge, the largest single cost of the recovery. Sarayaku’s own joint internal-external outreach team, combining community members in the territory with those studying abroad, led the international awareness and crowdfunding campaign that mobilized most recovery resources. These partnerships strengthened the capacity of Sarayaku’s own Governing Council to manage recovery according to its own priorities, while decisions remained under the authority of the People’s Assembly, the *Tayjasaruta*, and traditional authorities.

Figure 20: Distinction of partnerships that strengthen Indigenous Peoples’ governance

Partnership strengthens Indigenous Peoples’ governance	Partnership replaces Indigenous Peoples’ governance
✓ Priorities are set by the Indigenous Peoples’ own institutions ✓ External expertise complements Indigenous Peoples’ knowledge systems ✓ Governance capacity remains after the partnership ends	x Priorities are designed externally, then presented to the Indigenous Peoples’ organizations x Parallel structures bypass existing institutions x Indigenous Peoples are treated as beneficiaries, not as decision-makers
Technical support complements Indigenous Peoples’ governance	Imposed external support weakens Indigenous Peoples’ governance

Effective partnerships depend on support for Indigenous Peoples’ governance and knowledge systems. External actors contributed technical expertise, advocacy, and logistical capacity that Indigenous Peoples’ institutions themselves identified as complementary to their responses. Partnerships functioned as enabling conditions for climate adaptation precisely when they strengthened governance while leaving authority over territorial priorities, collective decision-making, implementation, and accountability in Indigenous Peoples’

hands. Rather than replacing Indigenous Peoples’ institutions, the most effective partnerships increased their capacity to govern increasingly complex responses to climate-related environmental disasters.

Box Summary of findings

Therefore, **the recommendations that follow do not prescribe how Indigenous Peoples should exercise governance, organize their knowledge systems, or design their adaptation responses**, as Findings 1–3 demonstrate that Indigenous Peoples are already doing so. Instead, they address the external enabling conditions and barriers identified in Finding 4 that can be acted upon by governments, climate finance institutions, philanthropy, civil society, and other external actors. The recommendations are therefore organized around the three areas identified by the evidence: legal conditions, financial conditions, and institutional partnerships.

01 FINDING

WHAT IS HAPPENING IN INDIGENOUS PEOPLES’ TERRITORIES?

Climate-related environmental disasters are increasingly compound and cascading. Hazards interact across Indigenous Peoples’ territories, generating interconnected impacts on ecosystems, livelihoods, food and water systems, health, and collective well-being.

02 FINDING

HOW ARE INDIGENOUS PEOPLES RESPONDING?

Indigenous Peoples are already responding through integrated territorial systems. Rather than isolated adaptation measures, responses combine ecosystem management, livelihoods, preparedness, territorial defense, and other strategies according to the relationships and priorities of each territory.

03 FINDING

WHY ARE THESE RESPONSES EFFECTIVE?

Indigenous Peoples’ governance and knowledge systems make these responses effective. Legitimate institutions organize decision-making, while elders, women, youth, and other knowledge holders continually observe, test, revise, and transmit the knowledge that informs those decisions.

04 FINDING

WHAT ENABLES OR CONSTRAINS THESE RESPONSES?

Whether these responses can be exercised fully and sustained depends in part on the external conditions surrounding Indigenous Peoples’ governance. The evidence identifies three principal sets of conditions: legal conditions, financial conditions, and institutional partnerships.

The challenge is not to design adaptation responses for Indigenous Peoples, but to strengthen the conditions under which Indigenous Peoples’ own governance and knowledge systems can continue to organize adaptation as climate change accelerates.



IV. Recommendations

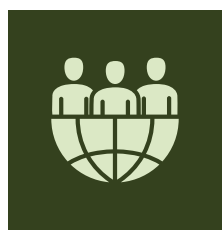
Building on the findings of this report, the following recommendations identify actions that different actors can take to strengthen Indigenous Peoples' governance in responding to climate-related environmental disasters. They are organized around the three enabling conditions examined in Finding 4: legal, financial, and partnerships.⁵⁰

Recommendation 1

Strengthening the legal and policy conditions for Indigenous Peoples' governance

The findings show that formal recognition of Indigenous Peoples and their territorial rights is a necessary but insufficient condition for effective responses to climate-related environmental disasters. Where rights remain unrecognized, weakly implemented, or undermined by extraction, encroachment, and other external pressures, Indigenous Peoples' capacity to govern their territories and sustain their responses is constrained. Strengthening Indigenous Peoples' governance therefore requires both recognition of rights and the legal and institutional conditions necessary for those rights to be exercised in practice. In that sense, the recommendations that follow are addressed primarily to the actors with the authority to strengthen these legal conditions: the Conference of the Parties to the Rio Conventions, national governments, and international and regional human rights bodies.

⁵⁰ These recommendations are formulated at a general level, without prejudice to their further adaptation and specification according to the relevant institutional context, process or forum, including Conferences of the Parties, intersessional and preparatory meetings, and other relevant processes.

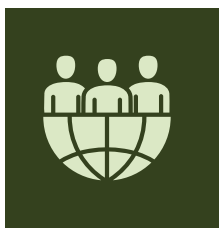


Conference of the Parties to the Rio Conventions (the United Nations Framework Convention on Climate Change – UNFCCC; the Convention on Biological Diversity – CBD; and the United Nations Convention to Combat Desertification – UNCCD): Recognize Indigenous Peoples’ governance and knowledge systems as a substantive component of effective adaptation. While recent decisions increasingly recognize land tenure, participation, and governance more broadly as preconditions for effective conservation, land restoration, and adaptation, none of the Rio Conventions and their subsequent decisions specifically recognize Indigenous Peoples’ governance strengthening as a determinant of adaptation effectiveness. In this sense, this recognition should be reflected in the content of COP decisions and related mechanisms:

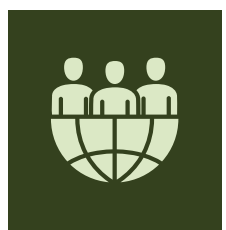
UNFCCC Recognize Indigenous Peoples’ governance strengthening as a cross-cutting enabling condition for adaptation, comparable to means of implementation, rather than confining recognition to indicators tied to cultural heritage and planning targets that treat Indigenous Peoples primarily as sources of knowledge rather than as governance actors.

CBD Ensure that the indicators and guidance developed under the Kunming-Montreal Global Biodiversity Framework’s Target 22 and the Subsidiary Body on Article 8(j) capture Indigenous Peoples’ governance strengthening as a distinct, measurable dimension, not only land tenure security or participation.

UNCCD UNCCD: Recognize Indigenous Peoples’ governance strengthening as a distinct dimension of land degradation neutrality, rather than relying solely on biophysical indicators or folding governance into broader participation and tenure language, and reflect this recognition in national target-setting and reporting processes.



International and regional human rights bodies (including the Inter-American Court on Human Rights and Commission, the African Commission on Human and Peoples’ Rights, and United Nations treaty bodies and mechanism such as the Human Rights Committee, the Committee on the Elimination of Racial Discrimination, and the Expert Mechanism on the Rights of Indigenous Peoples): Continue to develop and apply jurisprudence, concluding observations, and recommendations that clarify and reinforce Indigenous Peoples’ collective rights to territory, self-determination, and Free, Prior, and Informed Consent, explicitly recognizing Indigenous Peoples’ own governance institutions as central to the exercise of these rights, and recommend states to close the gap between international commitments and domestic legal recognition and enforcement.



National governments: Recognize Indigenous Peoples and their collective territorial rights in national law, and enforce that recognition in practice. This includes closing the gap between legal recognition and its exercise, whether the underlying problem is the absence of an Indigenous Peoples category in national law, formal recognition without secure land tenure, or comparatively strong legal frameworks left unenforced against external pressures, such as illegal mining, logging, and land grabbing. Governments should ensure compliance with Free, Prior, and Informed Consent (FPIC), and recognize Indigenous Peoples’ governance institutions as a determinant of effective adaptation and disaster risk management, embedding this recognition in national policies and frameworks.

Recommendation 2: Strengthening the financial conditions for Indigenous Peoples’ governance

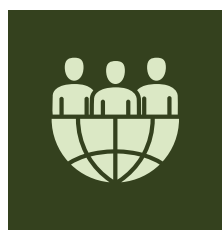
The findings show that limited access to climate finance remains one of the principal barriers reported by Indigenous Peoples. They also show that the critical issue is not only whether resources are allocated to activities involving Indigenous Peoples, but whether those resources reach and can be controlled by the institutions through which Indigenous Peoples govern their territories and organize collective responses. As the case studies demonstrate, finance is most effective when it strengthens existing governance institutions rather than substituting for them; yet among respondents who received climate finance, only 24.5% reported it as fully aligned with their own priorities. Climate finance should therefore move beyond financing individual projects for Indigenous Peoples toward providing direct, culturally appropriate, flexible, and long-term resources that strengthen Indigenous Peoples’ governance institutions and financial architectures. In that sense, the recommendations that follow are addressed primarily to the actors with the authority to strengthen these financial conditions: the Conference of the Parties to the Rio Conventions, climate funds, multilateral development banks and international organizations, national governments, and philanthropic organizations.



Conference of the Parties to the Rio Conventions (the United Nations Framework Convention on Climate Change – UNFCCC; the Convention on Biological Diversity – CBD; and the United Nations Convention to Combat Desertification – UNCCD):

UNFCCC Recognize Indigenous Peoples as rightholders whose governance strengthening is an effective adaptation strategy, rather than one item in a list of vulnerable groups, and track how finance actually reaches and is governed by their own institutions across financing mechanisms’ tracking, progress reporting, and review processes.

CBD Ensure that the design of the permanent financial mechanism allows Indigenous Peoples’ own financial architectures and institutions to qualify as eligible recipients, translating direct access into an operational entry point.

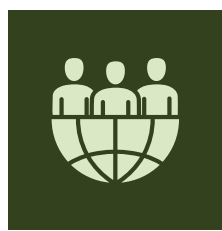


Climate funds (the Green Climate Fund – GCF; the Global Environment Facility – GEF; the Adaptation Fund; and the Fund for responding to Loss and Damage): Ensure that financing eligibility criteria are not limited to particular ecosystems or biomes and are instead accessible across the diversity of ecosystems in which Indigenous Peoples govern and respond to climate-related environmental disasters, including drylands, grasslands, mountain and glacial systems, freshwater systems, and coastal and marine ecosystems, reflecting Indigenous Peoples’ governance across these ecosystems and the ecological interconnections among them.

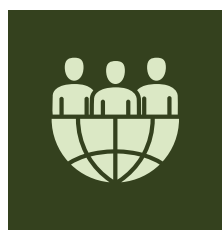
GEF Recognize Indigenous Peoples’ governance institutions as legitimate frameworks within its policies, accreditation requirements, and safeguards, applying Free, Prior and Informed Consent as a standing requirement rather than a one-time step, and distinguishing, in its financial and results reporting, when finance reaches and is governed by Indigenous Peoples’ own institutions rather than the agencies that implement on their behalf.

GCF Address, through the consultation currently underway for its next Strategic Plan, the recommendations its own 2025 Independent Evaluation identified: implement a dedicated financing window for Indigenous Peoples, indicators distinguishing how finance actually reaches them, and accreditation requirements suited to their own governance structures.

Multilateral development banks and international organizations (the World Bank; the African Development Bank – AfDB; the Asian Development Bank – ADB; the Inter-American Development Bank – IDB; the United Nations Environment Programme – UNEP; and the United Nations Development Programme – UNDP): Distinguish in financial reporting between resources spent by implementing agencies on programmes involving Indigenous Peoples and resources transferred to and controlled by Indigenous Peoples’ institutions. Where Indigenous Peoples’ institutions can administer resources, financing should be transferred directly rather than requiring implementation through external organizations.



National governments: Recognize Indigenous Peoples’ governance institutions and Indigenous Peoples-led funds as legitimate direct recipients and managers of climate and biodiversity finance. National financing strategies should provide long-term financing for the institutional functions that sustain Indigenous Peoples’ governance, including territorial planning, collective decision-making, environmental monitoring, ecosystem stewardship, and disaster preparedness, rather than limiting support to short-term, externally defined projects. Nationally designated authorities and other relevant public institutions should engage directly with Indigenous Peoples’ governance institutions to identify financing priorities and oversee implementation, without requiring intermediation by State agencies or external organizations.



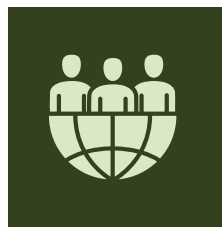
Philanthropic organizations:

Increase unrestricted, multi-year financing directly to Indigenous Peoples’ organizations, governance institutions, and Indigenous Peoples-led funds. Financing should cover institutional costs, staff, governance processes, financial administration, territorial monitoring, and other functions necessary to sustain Indigenous Peoples’ governance. Unlike many public climate finance mechanisms, philanthropic organizations often have the flexibility to provide unrestricted, long-term institutional support. Philanthropic organizations can also play a catalytic role by supporting Indigenous Peoples’ institutions to access multilateral climate finance without requiring them to adapt their governance systems to externally designed project models. Financing portfolios should diversify beyond regions and ecosystems that have historically received greater attention, particularly tropical forests, to reflect gaps in existing financing and the needs of Indigenous Peoples in underfunded ecosystems and regions.

Recommendation 3

Strengthening partnerships that reinforce Indigenous Peoples’ governance

The findings show that partnerships strengthen Indigenous Peoples’ responses when external actors provide genuinely complementary forms of support, including technical expertise, scientific information, legal assistance, financial resources, logistics, and institutional support. They become a barrier when priorities and implementation arrangements are defined externally, with Indigenous Peoples participating only after fundamental decisions have already been made. The distinguishing factor is not the presence of external support but who retains authority over it: partnerships strengthen Indigenous Peoples’ governance when priorities are set by their own institutions and governance capacity remains after the partnership ends; they weaken it when priorities are designed externally, parallel structures bypass existing institutions, and Indigenous Peoples are treated as beneficiaries rather than decision-makers. Partnerships should therefore be structured around Indigenous Peoples’ authority and institutions, with external actors performing complementary functions rather than assuming responsibilities that belong to Indigenous Peoples’ governance systems. In that sense, the recommendations that follow are addressed primarily to the actors positioned to structure such partnerships: multilateral development banks and international organizations, philanthropic organizations, and research institutions and universities.



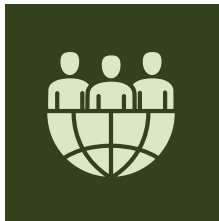
Multilateral development banks and international organizations

(the World Bank; the African Development Bank – AfDB; the Asian Development Bank – ADB; the Inter-American Development Bank – IDB; the United Nations Environment Programme – UNEP; and the United Nations Development Programme – UNDP): Move beyond project-based engagement toward longer-term institutional partnerships with Indigenous Peoples’ governance institutions, recognizing Indigenous Peoples as rights holders rather than primarily as project beneficiaries or stakeholders. Indigenous Peoples’ institutions should be engaged from project preparation through implementation, monitoring, and evaluation, with technical assistance and implementation arrangements structured around priorities defined with

them. External support, including technical expertise, scientific information, logistics, and administrative capacity, should complement Indigenous Peoples’ governance systems rather than establish parallel structures that bypass or displace their decision-making.



Philanthropic organizations: Provide longer-term and more flexible support for the institutions and functions that sustain Indigenous Peoples’ governance and knowledge systems, including organizational development, governance processes, leadership development, environmental monitoring, legal capacity, and intergenerational knowledge transmission. Financing priorities and partnership arrangements should be defined together with Indigenous Peoples’ institutions from the outset, including the forms of external expertise or support required. Indigenous Peoples’ organizations should retain the choice whether to implement directly or partner with intermediaries. Access to financing should not require partnerships with large international intermediaries, such as major conservation organizations or fund-implementing agencies, where Indigenous Peoples’ institutions have the capacity to receive and administer resources directly.



Research institutions and universities: Move from research on Indigenous Peoples toward Indigenous Peoples-led and co-governed research. Indigenous Peoples’ institutions should participate in defining research questions, methodologies, data collection, interpretation, and decisions regarding publication and use of results. Research findings and data should be returned in forms determined jointly with participating Indigenous Peoples’ institutions.

Figure 21: Summary of recommendations

Actor	Legal conditions	Financial conditions	Partnerships
COP of the Rio Conventions (UNFCCC, CBD, UNCCD)	Recognize Indigenous Peoples’ governance strengthening as a distinct, cross-cutting condition for effective adaptation, biodiversity, and land degradation neutrality, not only as knowledge or land tenure.	UNFCCC: Recognize Indigenous Peoples as rightholders whose governance strengthening is an effective adaptation strategy, rather than one item in a list of vulnerable groups, and track how finance actually reaches and is governed by their own institutions. CBD: Ensure that the design of the permanent financial mechanism allows Indigenous Peoples’ own financial architectures and institutions to qualify as eligible recipients	
International and regional human rights bodies	Continue developing jurisprudence, observations, and recommendations that reinforce collective rights and recognize Indigenous Peoples’ governance institutions as central to their exercise; recommend States to close the gap between international commitments and domestic enforcement.		

Actor	Legal conditions	Financial conditions	Partnerships
Climate funds (GCF, GEF, Adaptation Fund)		Ensure financing eligibility criteria are not limited to particular ecosystems or biomes, and are instead accessible across the diversity of ecosystems in which Indigenous Peoples govern and respond to climate-related environmental disasters. GEF: Recognize Indigenous Peoples’ governance institutions as legitimate frameworks within its policies, accreditation requirements, and safeguards, applying FPIC as a standing requirement, and distinguishing when finance reaches and is governed by Indigenous Peoples’ own institutions rather than the agencies that implement on their behalf. GCF: Address, through the consultation for its next Strategic Plan, the recommendations of its own 2025 Independent Evaluation: a dedicated financing window, indicators distinguishing how finance actually reaches Indigenous Peoples, and accreditation requirements suited to their own governance structures.	
Multilateral development banks and international organizations		Distinguish, in financial reporting, resources spent by implementing agencies from resources transferred to and controlled by Indigenous Peoples’ institutions.	Move beyond project-based engagement toward long-term institutional partnerships that recognize Indigenous Peoples as rightholders, not primarily as beneficiaries.
National Governments	Recognize and enforce Indigenous Peoples’ collective territorial rights; ensure FPIC compliance; recognize governance institutions as a determinant of effective adaptation and disaster risk management.	Recognize governance institutions and Indigenous Peoples-led funds as legitimate direct recipients of finance; provide long-term financing for governance functions, not only short-term projects.	
Philanthropic organizations		Provide unrestricted, multi-year financing directly to Indigenous Peoples’ institutions and funds; diversify portfolios beyond historically over-funded ecosystems and regions.	Provide long-term, flexible institutional support; let Indigenous Peoples’ institutions choose whether to partner with intermediaries, and support that choice either way.
Research institutions/universities			Move from research on Indigenous Peoples toward Indigenous Peoples-led and co-governed research, including joint decisions on publication and use of results.



V. Conclusion

Climate-related environmental disasters are becoming increasingly complex. Across the world, climate hazards are interacting, cascading across interconnected ecosystems and societies, and transforming the environmental conditions upon which communities have long depended. As these changes accelerate, adaptation requires institutions capable not only of responding to environmental change, but of continuously learning from it, coordinating collective action, and adjusting responses over time.

The evidence presented throughout this report demonstrates that Indigenous Peoples have long been responding to these challenges through governance systems that integrate environmental observation, collective decision-making, ecosystem stewardship, knowledge generation, disaster preparedness, and territorial management. These responses are neither isolated adaptation projects nor collections of individual practices. They constitute living territorial systems that organize adaptation continuously through Indigenous Peoples' governance.

This finding represents an important contribution to current international discussions on climate adaptation. International policy has progressively recognized Indigenous Peoples' rights, knowledge, and participation. These advances have been essential. However, the comparative evidence presented here suggests that the next implementation challenge is not simply expanding recognition of Indigenous Peoples, but strengthening the governance systems through which Indigenous Peoples organize adaptation.

Indigenous Peoples' governance is the foundation linking every dimension of Indigenous Peoples' responses documented in this report. It enables rights to be exercised collectively, organizes environmental observation, and transforms knowledge systems into collective action. It coordinates ecosystem stewardship, disaster preparedness, and territorial management across interconnected social and ecological systems. It allows Indigenous Peoples' knowledge systems to remain adaptive, continuously generating,

validating, transmitting, and applying knowledge as conditions change. It also determines whether financial resources, partnerships, and public policies strengthen Indigenous Peoples' institutions or unintentionally replace them.

The recommendations in this report address three complementary dimensions of that governance: the legal conditions that enable it, the financial conditions that sustain it, and the partnerships that reinforce it. These recommendations do not call for new international agreements or entirely new institutional frameworks. They identify practical opportunities to strengthen implementation within existing commitments under the United Nations Framework Convention on Climate Change, the Convention on Biological Diversity, the Sendai Framework for Disaster Risk Reduction, and related international processes.

The findings also invite a broader shift in how adaptation itself is understood. Adaptation is often organized as a series of sectoral interventions or time-bound projects designed to address specific climate impacts. The experiences documented across the case studies suggest a different perspective. Indigenous Peoples organize adaptation as an ongoing process of territorial governance that continuously integrates ecological observation, collective decision-making, knowledge systems adaptation, and stewardship across interconnected social-ecological systems. Long-term resilience depends not only on individual interventions, but on the institutions that enable societies to respond to change continuously.

The implications extend beyond Indigenous Peoples. As climate-related environmental disasters become increasingly interconnected, uncertain, and persistent, all societies face the challenge of developing institutions capable of learning, adapting, and responding over time. Indigenous Peoples' experiences documented in this report demonstrate that governance systems grounded in long-term relationships with territories, collective responsibility, intergenerational learning, and continuous observation can provide valuable insights for strengthening adaptation more broadly. These are not models to be replicated without context, but evidence that adaptation becomes more effective when institutions integrate knowledge, governance, and stewardship over time.

Indigenous Peoples are not simply important partners in climate adaptation: they are already implementing adaptation strategies across some of the world's most biodiverse territories, organizing collective action and sustaining territorial adaptation. In a world of financial scarcity, adaptation investment must be effective. The evidence in this report points to a clear answer: strengthen the governance systems Indigenous Peoples already have in place to achieve effective adaptation. Governments, international organizations, financing institutions, researchers, and development organizations should strengthen the governance systems through which Indigenous Peoples are already responding to climate-related environmental disasters.



VI. Case studies

Case studies

The case studies presented in this section were documented through three complementary modalities, depending on the context and availability of information: (1) direct interviews with Indigenous Peoples' organizations or NGOs working directly with Indigenous Peoples; (2) written information provided by Indigenous Peoples' organizations or partner NGOs through the case study matrix and questionnaire; and (3) secondary-source research where primary information could not be obtained. The same analytical framework was applied across all cases to ensure consistency in the information collected and analyzed.

The following section presents a summary of each case study, organized across Africa, Asia, and the Americas. The full case studies and analytical matrices provide more detailed information on climate-related hazards and impacts, Indigenous Peoples' responses, governance and knowledge systems, and the enabling conditions and barriers identified in each case.⁵¹

⁵¹ The full case studies and analytical matrices prepared for this study are available upon request.

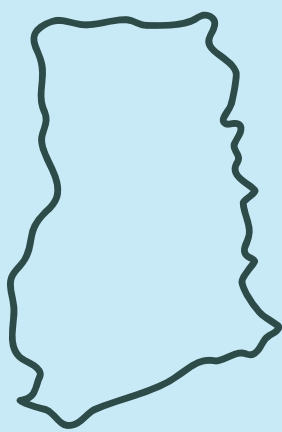
01 ÁFRICA

The African case studies span forest (**Democratic Republic of the Congo**), coastal (**Ghana**), grassland and savanna (**South Africa**), and dryland ecosystems (**Kenya and Chad**), illustrating Indigenous Peoples’ responses to drought, floods, coastal erosion, changing rainfall patterns, and other interacting climate-related hazards. The cases demonstrate how these responses take different forms according to the ecological, territorial, and institutional contexts in which Indigenous Peoples live.

CASE STUDIES

Anlo Ewe Indigenous Peoples (Volta Region)

Ghana



ECOSYSTEM:

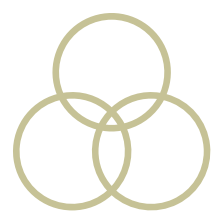
Low lying coastal ecosystems characterized by sandy soils, coastal areas, fishing grounds, agricultural land, and settlements whose livelihoods combine fishing, farming, dry season vegetable production, and livestock keeping. Between 2005 and 2017, an estimated 37 % of Ghana’s eastern coastal land was lost to erosion and flooding.

Livelihoods:



The *Anlo Ewe* combine sea fishing with crop farming, dry season vegetable farming, and livestock keeping. Two distinct livelihood patterns coexist within the territory: communities settled closest to the sea depend almost entirely on fishing, while those slightly further inland combine fishing with farming. Fish smoking and selling is a livelihood activity traditionally carried out by women, particularly elderly women, whose economic options narrow sharply once displacement cuts them off from the sea. As displacement pushes communities inland, fishing households are increasingly forced to take up farming as a new primary livelihood, often without the skills or experience the shift requires.

Compound hazards and cascading impacts:



Sea level rise, coastal flooding, erosion, saltwater intrusion, and sand mining interact to progressively reduce habitable and agricultural land; sand mining removes the natural buffer that once limited the sea’s intrusion, giving it more room to advance. *Fuveme*, once a fishing village of approximately 1000 people, was completely engulfed by the sea by 2022, and displaced Indigenous Peoples have faced repeated relocation as subsequent settlement sites have also become threatened. Loss of coastal land cascades into food insecurity, livelihood transformation from fishing toward farming, disruption of social networks, language loss, and declining transmission of fishing practices and rituals tied to the sea. Anlo Ewe Indigenous Peoples interpret the appearance of particular fish species as indicators that flooding is approaching.

Integrated territorial responses:



Anlo Ewe Indigenous Peoples are adapting primarily by relocating inland and diversifying toward farming and livestock production rather than attempting to remain permanently in locations considered unsafe. This requires Indigenous Peoples historically dependent on coastal fishing to acquire new livelihood skills as they move away from the ecosystems on which their livelihoods have depended.

Indigenous Peoples’ governance and knowledge systems:



Each community is led by a chief, a paramount leader elected for life, supported by subchiefs and household heads; at least one chief also serves as a member of Ghana’s Parliament and negotiates directly with the government on relocation matters. Indigenous Peoples retain and apply traditional fish based indicators for anticipating flooding. Decisions on whether and how to adapt are made community by community. This includes decisions about relocation, made as each community responds to changing environmental conditions. The gradual, piecemeal nature of displacement produces both material and intangible losses, including disruption of social relationships and cultural connections with the sea.

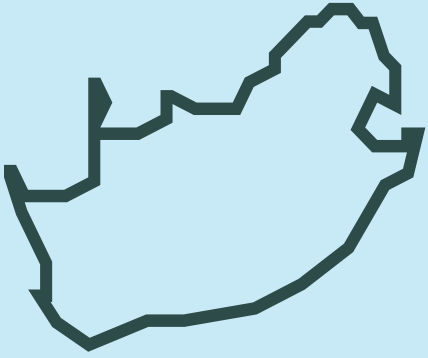
Enabling and institutional conditions, and barriers:



Government engagement can facilitate adaptation, but Indigenous Peoples report that responsiveness often depends on their own advocacy and on political representation, such as having a chief who is also a Member of Parliament. A significant barrier is insufficient formal recognition of the distinctive needs of coastal Indigenous Peoples and their dependence on the sea. The Keta Sea Defence Project, built between 1999 and 2014 at a cost of roughly USD 100 million, reduced erosion along the Keta to Hlorve stretch, but a World Bank linked analysis found it increased erosion by more than 50% in downdrift communities further along the coast; continuing sand mining near these same sites further undermines coastal protection.

AmaMpondo Indigenous Peoples (Mpondoland, Eastern Cape)

South Africa



ECOSYSTEM:

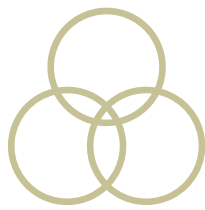
AmaMpondo Indigenous Peoples live along South Africa’s Wild Coast in Mpondoland, Eastern Cape Province, within a subtropical grasslands biome sustained by summer rainfall. The territory includes agricultural land, rivers, and coastal fishing grounds, and is experiencing rapid spread of alien invasive vegetation, including eucalyptus, wattle, lantana, and chromolaena.

Livelihoods:



The Mpondoland Indigenous Peoples’ community combines subsistence crop farming (maize, sweet potatoes, yams, and beans) with livestock keeping (cattle and poultry) and coastal fishing. Farming and food storage are largely managed by women, who also lead adaptation knowledge on weeding and poultry-related challenges, while men lead on livestock disease management. Firewood collection, essential for cooking, falls primarily to women as well, and becomes especially burdensome after storms when wood is too wet to burn. Fishing, though a smaller part of the livelihood mix, is disrupted for weeks at a time after flooding events, as the ocean remains too muddy to fish.

Compound hazards and cascading impacts:



Shifting rainfall seasons, extreme rainstorms, flooding, drought, strong winds, invasive vegetation, runaway fires, and livestock disease increasingly overlap. The April 2022 “rain bomb,” the region’s heaviest single day deluge in over 60 years, killed at least 436 people and destroyed nearly 4,000 homes across KwaZulu Natal and parts of the Eastern Cape. Heavy rain now regularly falls during historically dry periods, causing sweet potatoes and yams to rot underground and destroying maize and, in one recent year, an entire bean harvest, while the Indigenous Peoples’ community has faced drought and dry springs since the start of this year. Invasive eucalyptus, wattle, lantana, and chromolaena intensify runaway fires that cross roads and rivers and burn down settlements. Mud houses collapse during storms, and roads and bridges are washed away, cutting communities off from towns and clinics; in July 2025 severe winds tore roofs off many homes and several school classroom blocks. Fishing becomes impossible for weeks after flooding as ocean water remains muddy, and older cattle have died from cold exposure when heavy rain coincides with cold fronts.

Integrated territorial responses:



AmaMpondo Indigenous Peoples have changed food storage practices, moving harvests indoors and building zinc sheet storage containers to protect food supplies. Indigenous Peoples also continually manage invasive weeds affecting agriculture and clear firebreaks in areas affected by invasive vegetation, though these are not always effective during high wind runaway fires.

Indigenous Peoples’ governance and knowledge systems:



Territorial governance combines the elected political system with Indigenous Peoples’ traditional structures, including Sub-Headmen and Sub-Headwomen, Headmen and Headwomen, and the Chief and King of Mpondoland, each with their own traditional council responsible for land and community governance. Traditional leaders coordinate local responses to fire related challenges, while road and bridge repair falls to municipal authorities whose budgets are often insufficient. Indigenous women hold and lead knowledge concerning farming adaptation, including weed and poultry management, while Indigenous men lead on livestock disease issues.

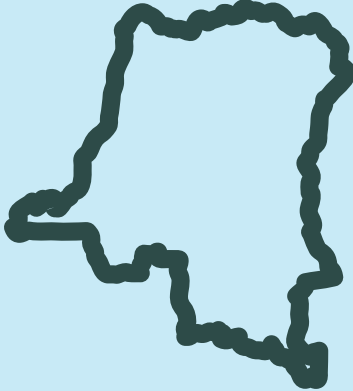
Enabling and institutional conditions and barriers:



NGOs have supported Indigenous Peoples through information sharing and learning, but funding shortages and general lack of awareness remain major barriers. *AmaMpondo Indigenous Peoples* report having received no climate specific funding, with agroecology support through NGOs being the closest available source. Climate vulnerability is compounded by territorial pressure: since 2007, the Australian company Mineral Commodities has sought to mine an estimated 348.7 million tonnes of titanium bearing ore from coastal sand dunes at Xolobeni, a project the community formed Amadiba Crisis Committee has fought in court, including a 2018 High Court ruling that government cannot grant mining rights without community consent. Offshore, Shell and partner Impact Africa have held oil and gas exploration rights along the Wild Coast since 2014 (renewed 2021); a September 2022 High Court ruling found the government failed to properly consult coastal communities or consider their customary fishing and cultural rights, though Shell has continued pursuing renewal through legal appeals as of 2025.

Batwa Indigenous Peoples (Kalehe, South Kivu)

Democratic Republic of the Congo



ECOSYSTEM:

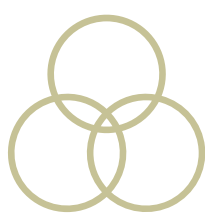
Forests and freshwater systems within the Lake Kivu landscape (1,300-2,000 m elevation), bordering Kahuzi-Biega National Park. The territory includes forest, bamboo, and shrubland; fertile clay-based agropastoral slopes; and rivers and groundwater systems feeding into Lake Kivu. The subsoil holds significant gold, cassiterite, coltan, and tourmaline deposits.

Livelihoods:



The *Batwa Indigenous Peoples'* community, alongside neighboring communities in Kalehe territory, depends primarily on an agropastoral economy suited to the region's fertile, clay-based soils, growing staple crops including maize, cassava, and bananas alongside livestock keeping. Traditional hunting, tied to the forests and natural habitats surrounding Kahuzi-Biega National Park, has historically supplemented these livelihoods but is in decline as deforestation, farmland expansion, and urbanization erode wildlife and natural habitat. Armed conflict compounds these pressures directly, as violence prevents farmers from safely accessing their fields, paralyzing farming activity at critical moments. Displaced and returning families increasingly depend on irregular humanitarian aid rather than their own production, and in-migration since 1994 has intensified competition over land and forest resources on which agropastoral and hunting livelihoods depend.

Compound hazards and cascading impacts:



Increasingly unpredictable rainfall combines with deforestation, cultivation on steep slopes, soil degradation, and population pressure, intensified by wartime and illegal logging and mining, to drive erosion, torrential flooding, and landslides. Major landslides in *Bushushu* and *Nyamukubi* in May 2023 caused hundreds of deaths and disappearances; further floods and landslides in late 2024 and May 2026, and a cholera outbreak and food crisis in early 2026, have continued to destroy settlements, farmland, roads, schools, health centers, and water infrastructure. These impacts cascade into declining agricultural yields, food insecurity and rising prices, malnutrition, deteriorating water quality, disease outbreaks, and displacement, within an already severe context of armed conflict and land insecurity. *Batwa Indigenous Peoples'* knowledge holders observe disrupted rainfall, hillside erosion, declining soil fertility, disappearing plant species such as bamboo, abnormal Lake Kivu water levels, unusual flowering patterns, and changes in bird and insect behavior.

Integrated territorial responses:



Batwa Indigenous Peoples combine local disaster-management and dialogue committees, mutual-aid networks, self-managed savings and credit associations, agroforestry, tree nurseries, and hillside reforestation to stabilize soils, restore livelihoods, and support Indigenous Peoples’ families displaced by disasters.

Indigenous Peoples’ governance and knowledge systems:



Governance combines state administration with customary chieftaincies and *groupements*. *Batwa Indigenous Peoples’* responses draw strongly on solidarity, communal sharing, local environmental knowledge, and increasingly on the integration of Indigenous knowledge with new disaster-risk-management techniques.

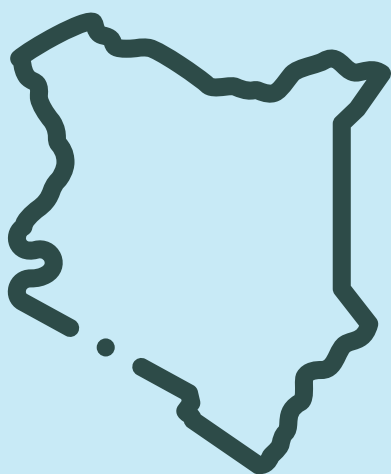
Enabling and institutional conditions and barriers:



Local dialogue mechanisms allow Indigenous Peoples to identify priorities, raise alerts and strengthen response capacity. Major barriers include insecure land rights, displacement tied to conservation and land conflicts, ongoing armed violence and illegal resource extraction, a chronic humanitarian emergency context that channels support toward emergency relief rather than climate adaptation, and external and government funds that communities report were diverted rather than reaching those in need.

Endorois and Tugen Indigenous Peoples (Baringo County)

Kenya



ECOSYSTEM:

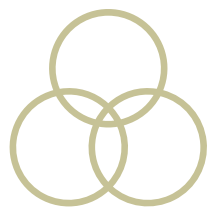
Arid and semi-arid lands of the East African Rift Valley in Baringo County, including Lake Baringo and Lake Bogoria (both Ramsar wetlands), savannah grasslands, bushlands, Acacia woodlands, dryland forests, riparian corridors along the Perkerra, Molo, and Endao rivers, highland agroforestry zones, and communal pastoral rangelands.

Livelihoods:



The *Endorois and Tugen Indigenous Peoples’* communities rely primarily on agro-pastoralism, combining livestock keeping (cattle, goats, and other herds) with dryland crop farming, particularly maize, in Baringo South. Herding, historically organized around communal grazing rotation and rangeland knowledge held by elder men, has become increasingly mobile and conflict-prone as herders travel further into neighboring counties in search of pasture. Indigenous women hold complementary livelihood roles centered on farming and food systems, including seed saving and cultivation of drought-tolerant indigenous crops (sorghum, millet, cowpeas, African nightshade, amaranth), as well as gathering wild vegetables, fruits, and medicinal plants that supplement household diets. Indigenous Peoples’ beekeeping, drawing on traditional Acacia ecosystem knowledge, offers a livelihood option requiring no land ownership, making it especially relevant as customary tenure excludes Indigenous women from land ownership. As pastoralism collapses and men migrate toward towns, women increasingly take on expanded livestock management and small trading roles, while charcoal burning has emerged as a poverty-driven, if ecologically damaging, survival livelihood.

Compound hazards and cascading impacts:



The breakdown of historically predictable rainy seasons has produced increasingly severe drought, flash flooding, land degradation, erosion, invasive species such as *Prosopis juliflora*, and resource conflict. The 2021 to 2023 drought, identified by communities as the most severe in living memory, caused extensive livestock mortality, crop failure, food insecurity, and displacement to towns such as Marigat. Hardened, drought affected soils increase runoff when intense rains return, generating flash floods along the *Perkerra* and *Molo* rivers, sometimes within the same season. Lake Baringo has simultaneously expanded into settlements, schools, and grazing lands while rivers dry earlier each dry season, producing drought and flooding within the same landscape. *Endorois and Tugen Indigenous Peoples* observe Acacia flowering, birds, bees, medicinal plants, soil texture, earthworms, lake levels and color, livestock condition, and the Pleiades constellation (*Kimwaret*), though traditional seasonal calendars are becoming less reliable as rainfall patterns shift.

Integrated territorial responses:



Endorois and Tugen Indigenous Peoples mobilize extended family, clan, neighborhood, and women’s chama networks to redistribute food, water, livestock, and labor; conserve drought-tolerant Indigenous seeds; diversify livelihoods through beekeeping and other activities; establish roof catchment, water pans, sand dams, strategic tree planting, and agroforestry; and adjust pastoral migration and planting calendars. Women’s conservation of Indigenous drought-tolerant varieties, including sorghum, millet, cow-peas, African nightshade, and amaranth, provided some of the only harvests available during the worst drought years.

Indigenous Peoples’ governance and knowledge systems:



The *Kokwo* council of elders remain a primary customary authority for resource governance and conflict resolution, often carrying more social legitimacy than formal government in rural areas. Indigenous Peoples’ knowledge is distributed among elder pastoralists, women farmers and seed keepers, medicinal plant knowledge holders, and specialist elders with celestial and meteorological knowledge, though women have historically been excluded from formal decision making in both traditional and government structures.

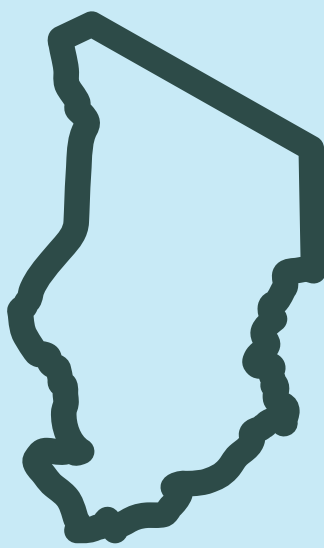
Enabling and institutional conditions and barriers:



Aligned, flexible, multi year funding centered on Indigenous women’s leadership, provided by partners such as the Agroecology Fund, the GEF Small Grants Programme, has strengthened adaptation, but this remains the exception. Government drought response is largely reactive, NGO projects can bypass existing Indigenous Peoples’ governance, and large climate funds such as the Green Climate Fund remain largely inaccessible directly to Indigenous Peoples’ organizations. Land conflict is the most pervasive structural pressure: the *Endorois* were forcibly displaced from ancestral land around Lake Bogoria in the 1970s to create a wildlife reserve, and despite the 2010 ruling finding Kenya in violation of their rights, they have not been restored to that land. Indigenous Peoples land also faces encroachment from large scale agriculture and conservation and tourism infrastructure, the government run Perkerra Irrigation Scheme intensifies competition for river water during drought, and geothermal energy exploration in the wider Rift Valley is an emerging pressure communities are monitoring.

Mbororo Fulani Indigenous Peoples (Sahel)⁵²

Chad



ECOSYSTEM:

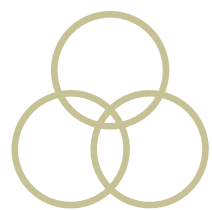
Mbororo Fulani Indigenous Peoples inhabit three ecologically distinct zones across Chad’s Sahel: the arid Lake Chad basin (and part of Hadjer-Lamis), where communities are fully nomadic and transhumant and share space with farmers, herders, and fishers; Chari-Baguirmi, a hard to access, sparsely developed area with a Sahelo-Saharan climate where communities combine agriculture and livestock farming; and Mayo-Kebbi East and West, an agro-pastoral zone extending into forest, wetland, and Sahelian ecosystems. The three areas span a north to south climate and ecosystem gradient traversed through seasonal pastoral mobility.

Livelihoods:



The *Mbororo Fulani Indigenous Peoples*’ communities practice livelihoods that vary along the north-south gradient of three regions. Lake Chad communities are fully nomadic/transhumant pastoralists, moving with their herds and sharing territory with farmers and fishers. Chari-Baguirmi communities combine agriculture with livestock farming, while Mayo-Kebbi communities, having lost their herds during the drought of the 1970s, shifted permanently from a purely pastoral to an agro-pastoral lifestyle combining farming and livestock keeping. Across all three regions, herding remains central and role-differentiated: herders manage day-to-day movement decisions, the *Modibo* (religious expert) contributes celestial knowledge used to guide transhumance, and women hold complementary knowledge, particularly on the seasonal availability of wild foods and medicinal plants, on which household food security depends especially when men are away with the herds.

Compound hazards and cascading impacts:



The arid and semi-arid Sahel is subject to increasingly variable and unpredictable weather, worsened by climate change, including drought, changing rainfall quality, altered season lengths, water scarcity, and deteriorating grazing conditions. *Mayo-Kebbi Indigenous Peoples* lost their livestock during the great drought of the 1970s, forcing a lasting shift from a purely pastoral to an agro-pastoral lifestyle. These hazards interact with land grabbing, agricultural expansion, closure of transhumance corridors, insecurity, and inter-community conflict, described as major and growing threats that further restrict community mobility. *Mbororo Indigenous Peoples* distinguish between three and seven seasons and inter-seasons

52 The *Mbororo Fulani Indigenous Peoples* (Chad) case study was elaborated using secondary sources, in particular: **UNESCO (United Nations Educational, Scientific and Cultural Organization)**. 2024. *Climate Change and Indigenous Peoples’ Knowledge in the Sahel: A Case Study on the Mbororo Fulani of Chad*. UNESCO, Paris. https://icipp.unfccc.int/sites/default/files/2024-07/2024_climate_change_and_ip_knowledge_in_the_sahel.pdf.

depending on local geography, and apply several hundred environmental indicators (228 documented for Lake Chad, 168 for Chari-Baguirmi, and 201 for Mayo-Kebbi, drawing on more than 2,000 indicators overall) to anticipate rainfall, drought, and pasture conditions. These indicators include bird migration, plant flowering, insects, livestock behavior, clouds, wind, temperature, rainfall, the Moon and stars, human bodily sensations, and changes in cattle milk texture. Some indicators are becoming less reliable as environmental conditions change.

Integrated territorial responses:



Mobility and transhumance remain the core adaptive strategy, though regional strategies differ: Lake Chad communities move mainly during the wet season toward temporary pastures in more arid areas, staying more locally mobile near the lakebed during the dry season, while communities further south transhume mainly during the dry season, linked to their agricultural practices. *Mbororo Indigenous Peoples* also distribute their use of water and pasture across different ecosystems and microclimates, store livestock feed, and send scouts ahead to identify water, grazing conditions, and conflict-free staging areas before larger groups move.

Indigenous Peoples’ governance and knowledge systems:



Decisions on transhumance and resource management are collective and draw on differentiated Indigenous Peoples’ knowledge held by elders, herders, women, chiefs, and the *Modibo*, a religious expert with specialized knowledge of the stars. Knowledge is transmitted orally in Indigenous Peoples’ language and through daily activities, songs, stories, rituals, and dances. Younger Indigenous Peoples, however, are increasingly becoming detached from these systems of knowledge transmission.

Enabling and institutional conditions and barriers:



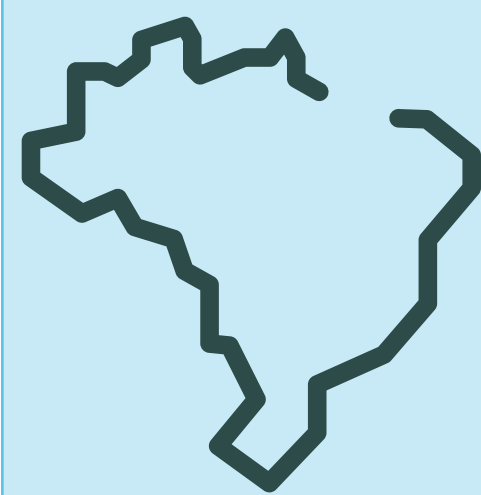
Collective decision-making institutions, scout-based exploratory networks, and dialogue with meteorological and scientific institutions strengthen adaptive capacity. External scientific forecasts, however, are frequently inaccessible, overly technical, unavailable in the Fulani language, too spatially coarse for localized decisions, and oriented toward the rainy season and farmers rather than mobile Indigenous Peoples’ year-round needs. Technical partnerships have connected Indigenous Peoples’ knowledge holders with the World Meteorological Organization, the UNFCCC Secretariat, and regional and national meteorological institutions including ACMAD, AG-RHYMET, and Chad’s National Meteorological Agency, through a project supported by the Swedish International Development Cooperation Agency and the Japanese Funds-in-Trust. Land grabbing, cultivated area expansion, closure of transhumance corridors, insecurity, and inter-community conflict further constrain mobility and resilience.

Q2 AMERICAS

The case studies from the Americas span **forest (Brazil and Ecuador), coastal and marine (Nicaragua), dryland (Guatemala), and mountain ecosystems (Peru)**, illustrating Indigenous Peoples’ responses to floods, drought, wildfires, changing rainfall patterns, glacier retreat, and other interacting climate-related hazards. Together, the cases show how responses vary across ecological, territorial, and institutional contexts.

CASE STUDIES

Guajajara Indigenous Peoples (Cana Brava and Araribóia, Maranhão) Brazil



ECOSYSTEM:

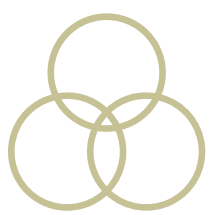
Guajajara Indigenous Peoples live across Cana Brava Indigenous Land (137,000 hectares, crossed by a federal highway) and the much larger Araribóia Indigenous Land, which also shelters isolated Indigenous Peoples and includes Lagoa Comprida, its most remote village. Both territories sit in the ecological transition zone between the Amazon and Cerrado biomes and include rivers, lakes, forests, and Indigenous food plots (roças). Indigenous Peoples’ land functions as one of the only remaining forested barriers in a landscape otherwise developed for roads and agribusiness; Cana Brava alone retains roughly 94% forest cover.

Livelihoods:



The Guajajara Indigenous Peoples’ community depends primarily on family food plots (roças), the main food source for many families across the Cana Brava and Araribóia Indigenous Lands. These plots were destroyed by wildfire, compounding losses from contaminated water sources during the drought. Livelihood roles are also gendered within the community’s territorial response: men concentrate in guardian and firefighting brigade roles protecting the forest that shelters their food plots, while women (*viveristas*) lead reforestation, seedling production, and nursery work, activities that directly support the long-term viability of the land the roças depend on.

Compound hazards and cascading impacts:



Increasingly severe drought and annual wildfire, concentrated in the second half of the year, interact with deforestation, illegal logging, highway access, and surrounding cattle ranching and soy expansion. A severe drought beginning in 2023 contributed to a roughly 300% increase in fires in 2024, when an estimated 527,000 hectares burned across the region and Cana Brava ranked 34th nationally by area burned; September alone recorded about 7,000 fire points and August about 4,807 hectares burned. Many fires start along the federal highway that cuts through Cana Brava and are linked to deforestation. Lakes and rivers dried to levels communities had not seen before, family food plots (*roças*) were destroyed by fire, several water sources became unfit to drink, and smoke caused respiratory health impacts, particularly among children and people with pre-existing conditions. *Guajajara Indigenous Peoples* monitor river and lake levels, forest humidity, and shifting rainfall timing, including rains that historically ended in May now extending into July, to anticipate drought and fire risk.

Integrated territorial responses:



In Araribóia, the autonomous Forest Guardians (*Guardiões da Floresta*) patrol the territory on foot against repeated invasions; the group gained strength after the 2019 killing of Guajajara guardian Paulinho Guajajara, and there are now five territorial protection groups. Cana Brava has no equivalent *Guardiões* group but relies on volunteer firefighting brigades. Indigenous Peoples' communities build firebreaks (*aceiros*) combining ancestral land clearing knowledge with modern methodology, an approach adopted by brigades in other territories, and understand fire not only as destructive but as an instrument of life within the Cerrado's natural fire cycle. Women's nursery (*viverista*) groups lead reforestation, including replanting around a dried up lake in Araribóia based on the ancestral understanding that tree cover strengthens the lake's water supply.

Indigenous Peoples' governance and knowledge systems:



Territorial monitoring and resource requests are coordinated in part through COAIB, the Coordination of Indigenous Organizations of the Brazilian Amazon. In Araribóia, Indigenous Peoples follow an annual cycle, dedicating the non fire season to environmental education and shifting to preparation and mobilization ahead of fire season; Maranhão has a comparatively strong network of 9 *viverista* groups and 17 brigades. Two brigade types operate: volunteer brigades, predominantly women, handling smaller scale prevention, and federally trained firefighting brigades, predominantly men. The 2015 fire season, which burned an estimated 70% to 90% of the territory and overwhelmed local brigades, was a turning point that led to strengthened brigade capacity; brigades from different territories, including Araribóia and Cana Brava, now support one another during severe fires.

Enabling and institutional conditions and barriers:

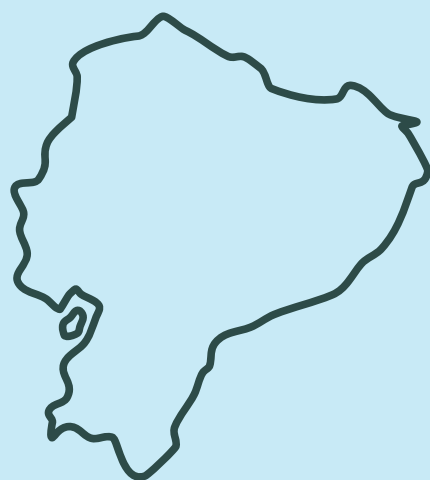


Strong self organization through COAIB, recent official federal recognition of Indigenous Peoples’ fire brigades, and legal support backing the removal (*desintrusão*) of illegal loggers from Araribóia have strengthened responses, alongside emergency public support, including helicopters, mobilized during the 2015 mega fires. Barriers include chronic shortages of resources and equipment, weak dialogue with municipal governments described as largely unsympathetic to Indigenous Peoples’ interests, and institutionalized racism rooted in the region’s history of non-Indigenous settlement. Continuous pressure from surrounding cattle ranches and soy farms generates direct conflict with farmers, and community members note that invasions are expected to continue even where active defense groups are in place.

Kichwa Indigenous People of Sarayaku (Pastaza)

Ecuador

ECOSYSTEM:



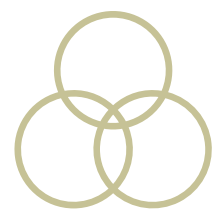
The Kichwa Indigenous People of Sarayaku are a community of about 1,600 inhabitants holding roughly 147,000 hectares of Amazonian territory in the middle basin of the Bobonaza River, including primary rainforest, rivers, family chacras, and the Kawsak Sacha (Living Forest) zone. Sarayaku has operated as a formally recognized organization for 45 years and is affiliated with PAKKIRU (Original Kichwa People of Pastaza), CONFENIAE (Confederation of Indigenous Nationalities of the Ecuadorian Amazon), and COICA (Coordinator of Indigenous Organizations of the Amazon River Basin).

Livelihoods:



The *Kichwa Indigenous People* of Sarayaku sustains itself primarily through chacras (family farm plots/agroecosystems) cultivated along the *Bobonaza* River, particularly in riverside communities such as Chihuacocha, Cuchillo, Puma, Chuntayaku, and Mantayaku. These agroecosystems, damaged or destroyed during the 2019 flood, represent the main food source for riverside families, who bore the largest share of the disaster’s impact. Since the flood, families increasingly maintain two dwellings, a primary home in higher, safer ground and a secondary “resting house” near the original riverside plots, reflecting how chacra-based farming continues to anchor livelihoods even as housing has shifted away from the highest-risk zone.

Compound hazards and cascading impacts:



In 2019, Sarayaku experienced an exceptional flood of the *Bobonaza* River, an event elders said might occur only once every 100 years, reaching roughly 10 meters compared with a normal flood level of about 5 meters. Roughly 30 kilometers of landslides from the *Pakayaku* sector to *Chapeton* blocked river channels and intensified the flood downstream, while deforestation and road construction in the upper basin, outside Sarayaku’s own territory, amplified the impact even though Sarayaku’s middle and lower basin retains primary forest. The flood struck riverside communities including Chihuacocha, Puma, Chuntayaku, and Mantayaku, damaging or destroying chacras, homes, the school, and the airstrip, and later requiring reconstruction of a bridge; mosquito populations rose afterward and were addressed through fumigation and cleanup. A separate, more recent landslide, following a pattern of strong sun then heavy rain, buried one family and cut off water access for others whose intake points lay to the north. Sarayaku elders read specific patterns of thunder and lightning at the river’s headwaters, distinct from ordinary storms, as warnings that the river will rise sharply, knowledge reinforced by an earlier event in which an unheeded warning cost lives.

Integrated territorial responses:



Sarayaku’s Governing Council led an intensive response, monitoring which families had lost their homes, coordinating food support, designating the riverside area as a risk zone for future construction, and organizing collective work (*mingas*) to rebuild homes and chacras. An international crowdfunding campaign built around a video documenting the damage funded most of the housing reconstruction. Intensive recovery work with affected families lasted about six months, with the full recovery process taking one to two years, managed largely through Sarayaku’s own organization in coordination with Ecuador’s national risk management ministry.

Indigenous Peoples’ governance and knowledge systems:



The Congress and General Assembly form Sarayaku’s highest collective authorities, followed by a Governing Council of seven *curacas* representing the territory’s subdivisions and associated security roles, alongside a women’s organization, a youth organization, and a Council of Elders responsible for social oversight. Elders hold and transmit the traditional storm warning knowledge that shaped the community’s understanding of the 2019 flood. To coordinate the response, Sarayaku formed a joint working group combining community members based in the territory with those studying or living abroad, creating a dedicated international outreach team; this internal-external structure is credited as essential to the recovery.

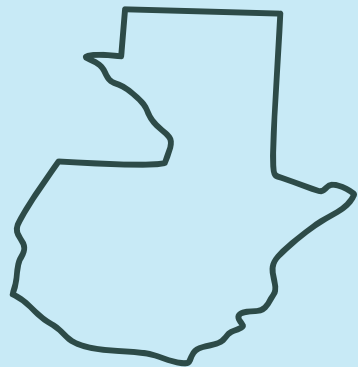
Enabling and institutional conditions and barriers:



Sarayaku’s 45 years of organizational and technical-financial capacity allowed externally raised resources to be managed and directed effectively. The bulk of recovery funding came from the international crowdfunding campaign, while bridge reconstruction, the largest single recovery cost, was funded through the worldwide Catholic mission network, with involvement from the Vatican and the Pope. A central barrier was the effective absence of state recovery support, leaving Sarayaku’s own organizing and external solidarity networks as the primary drivers of recovery; deforestation and road development outside Sarayaku’s territory remain a factor that can intensify hazards affecting the community.

Maya Achí Indigenous Peoples

Guatemala. Rabinal, Baja Verapaz



ECOSYSTEM:

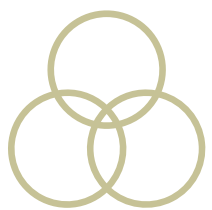
Maya Achí Indigenous Peoples live in Rabinal municipality, Baja Verapaz, characterized by subtropical dry forest along with conifer and mixed forests at higher elevations, mountainous terrain with valleys, hills, and ravines, and agricultural lands producing maize, beans, coffee, and vegetables, sustained by rivers, springs, and microwatersheds.

Livelihoods:



The *Maya Achí Indigenous Peoples'* community in Rabinal sustains itself through agriculture, cultivating maize, beans, coffee, and vegetables across the municipality's mountainous terrain, alongside livestock keeping. Water resources are essential to both household needs and this agricultural production. Maize, bean, and coffee losses to drought and irregular rainfall, together with declining livestock productivity from pasture and water scarcity, have directly reduced rural family incomes and worsened food insecurity, with small-scale farmers, rural women, and land-poor families facing the greatest vulnerability.

Compound hazards and cascading impacts:



Prolonged drought, rising temperatures, longer *canículas* (mid-summer dry spells), intense rainfall concentrated in short periods, landslides, tropical storms, strong winds, forest fires, and pest and disease outbreaks interact with deforestation and agricultural expansion. These pressures have caused soil erosion and loss of fertility, reduced forest cover and biodiversity, degraded microwatersheds, and reduced water availability, while maize, bean, and coffee losses and declining livestock productivity increase food insecurity and reduce rural incomes. Intense rainfall damages rural roads, bridges, homes, and drinking water systems, while high temperatures contribute to gastrointestinal illness, dehydration, and the spread of dengue-carrying mosquitoes. *Maya Achí Indigenous Peoples* monitor river and spring flow, tree flowering, planting cycles, staple grain yields, basic food basket prices, bird and insect behavior, temperature, rainfall onset, and wind intensity to track these changes.

Integrated territorial responses:



The *Maya Achí Indigenous Peoples* has an organization *Asociación de Comités de Producción Comunitaria* (ACPC) that promotes agroecology by strengthening soil conservation, restoration of water recharge zones, water harvesting, use of native seeds, crop diversification, production of organic fertilizers, protection of water springs, and community organization for risk management. Maya Achí Indigenous Peoples combine forest restoration, agroforestry, and rainwater harvesting through geomembrane ponds, addressing water, soil, food production, and ecosystem restoration as connected components of territorial resilience.

Indigenous Peoples' governance and knowledge systems:



Governance is exercised through the Municipality of Rabinal, Community Development Councils (COCODES), the Municipal Development Council (COMUDE), *Maya Achí Indigenous Peoples'* authorities, community mayoralties, and civil associations, with collective decisions made in ordinary and extraordinary assemblies that respect Maya Achí norms and customs. Indigenous Peoples' leaders hold ancestral agroecological knowledge related to agricultural cycles, water management, seed conservation, and natural resource protection, passed on to new generations alongside Maya cosmovision, history, and memory.

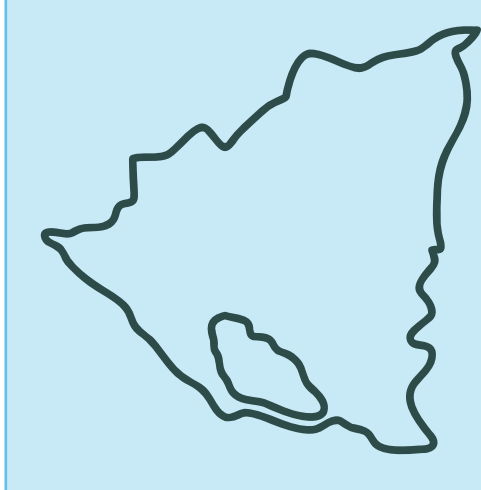
Enabling and institutional conditions and barriers:



Community organizations, led by groups such as *Asociación de Comités de Producción Comunitaria* (ACPC), are the main force sustaining local development and have built successful models including Agroecological Field Schools, integrated watershed and water resource management, strengthened bio factories, and small scale value chain development; where community organization is solid, this work continues even without external budget. Government and non-governmental programs have supported rural communities but have often been short term and limited in scope, preventing structural change in local capacities. Unlike other regions, mining and monoculture expansion such as African palm are not significant threats in this municipality; the main territorial pressures instead are growing demand on water resources without sufficient investment in recharge zone protection, moderate but persistent deforestation combined with irrigation water use, and the spread of ultra-processed and junk food displacing traditional dietary habits.

Miskitu Indigenous Peoples (Karata, Caribbean Coast)

Nicaragua

A stylized map of the Karata Indigenous Peoples' territory, showing a coastal area with a lagoon and mangrove forest.

ECOSYSTEM:

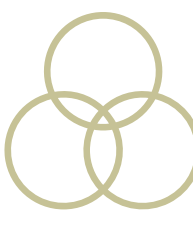
The *Karata Indigenous Peoples'* territory comprises five communities, Karata, Lambada, Guigas, Curcagan, and Laylan (with Ilue counted as two settlements within Karata), spanning Nicaragua's Caribbean coast near Puerto Cabezas from the coastline to a large biodiverse lagoon fringed by mangrove forest. Fishing is the main economic activity, complemented by small scale subsistence agriculture and hunting.

Livelihoods:

A stylized icon of a hand holding a plant, symbolizing livelihoods and agriculture.

The *Karata Indigenous Peoples'* community relies primarily on fishing, organized around the lunar cycle and tidal changes and regulated by an annual closed season (*veda*) that restricts *trasmallo* gillnet use to four months of the year, permitting only hook-and-line and cast nets (*atarrayas*) the rest of the time. Small-scale subsistence agriculture, cultivating yuca, plantain, and rice on farm plots roughly two hours away by boat, complements fishing, with surplus more often exchanged through barter than sold. Hunting supplements these livelihoods further. After the hurricanes, fishers lost their cayucos (traditional canoes) and other equipment, and farmers responded by relocating rice cultivation from riverbanks to higher ground to reduce flood exposure.

Compound hazards and cascading impacts:

A stylized icon of three overlapping circles, symbolizing compound hazards and cascading impacts.

Rainfall timing has become markedly less predictable: rain that once reliably arrived by May 13 now often brings sun instead, alternating with heavier and lighter rain. The territory has experienced major hurricanes, including Hurricane Felix (2007) and, later, Hurricanes Eta and Iota (both 2020, thirteen days apart), after which increased rainfall left the ground and soil muddier than usual. The lagoon shifts from saltwater in the dry season to freshwater in the rainy season, connecting via a bridge crossing to the Wawa River; as rainfall increases, the river's current strengthens and erodes the lagoon shoreline, worsened by strong north winds between September and January, causing the lagoon to lose depth and silt up over time. Where mangrove forest remains intact it has effectively prevented erosion, in contrast to built structures, which failed; after the hurricanes mangroves were left scorched and many trees were knocked down, though the ecosystem has been gradually regenerating on its own. One community was split in two when a hurricane's eye passed directly through it; wells and the lagoon itself were contaminated, leaving people to return home without food, water, or safe wells, and the school roof was damaged and later repaired. Fishers lost cayucos (traditional canoes) and other equipment used within their lunar cycle and tidal fishing system, which follows an annual closed season (*veda*) restricting gillnet use, while riverside rice cultivation proved vulnerable to flooding.

Integrated territorial responses:



After the hurricanes, families secured fishing equipment and food supplies inside concrete water tanks, reinforced homes, and strengthened house posts; carpenters now use significantly more nails, dig deeper post holes, and secure posts and beams more thoroughly than before. Farmers relocated rice cultivation away from riverbanks to higher ground to reduce flood exposure. Two young community members processed wood knocked down by the hurricane and distributed it to families who had lost their homes, and community members, in the hardest-hit community and to a lesser extent in Karata, took part in mangrove replanting.

Indigenous Peoples’ governance and knowledge:



Governance operates through different levels: at the community level, a judge, alternate judge, youth representative, and sports and health representatives; at the territorial level, an assembly functioning as the legislative branch and an executive branch led by a territorial president and board of directors. Traditional weather knowledge, including shoreline shape, sky color, tree flowering, and animal behavior, is held mainly by elders. Indigenous Peoples’ leaders organize evacuation once a hazard alert begins, prioritizing elderly people, children, and people with disabilities, and coordinating recovery with the territorial government and outside organizations.

Enabling and institutional conditions and barriers:



Government-provided multi-hazard training, combined with Indigenous Peoples’ leaders own organizing initiative, improved preparedness and reduced loss of life between Hurricane Felix and the later Eta and Iota events. External support has included government-distributed cayucos, boats, motors, and fishing equipment coordinated in part with United Nations funding, houses built by the organization METANOIA, UNICEF psychological support and school snack programs, and concrete post housing in the hardest-hit community, though distribution has been uneven and a housing project begun in another community was later discontinued. The absence of a formal study of mangrove and ecosystem losses further limits restoration planning. Although no extractive activity occurs within Karata itself, past logging and a shift from traditional cultural harvesting to commercial chainsaw logging have left the territory with a scarcity of Krasa, a high quality traditional house building wood, most of what remained having been destroyed by the hurricanes.

Quechua Indigenous Peoples (Ausangate Regional Conservation Area, Cusco)

Peru



ECOSYSTEM:

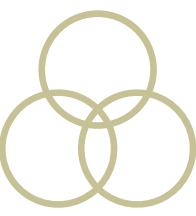
Quechua Indigenous Peoples in this area live in a high puna ecosystem at roughly 4,700 meters above sea level, with the main population center near 4,850 meters, within the Ausangate Regional Conservation Area (ACR), administered by Cusco’s regional government under Pitumarca district. The territory has no agriculture; livelihoods rest on alpaca pastoralism, with roughly 48,000 alpacas in the area alongside fewer llamas and some vicuñas, sustained by bofedales (high-altitude wetlands), springs, and rainfall. The Quelccaya glacier, the world’s second largest tropical glacier at roughly 4,000 square kilometers and the source of several rivers, has shrunk by about 40% in recent years, with a recent visit confirming reduced water flow.

Livelihoods:



The Quechua Indigenous Peoples’ communities of the Ausangate area depend almost entirely on alpaca pastoralism, with roughly 48,000 alpacas grazing the high puna at around 4,700-4,850 meters above sea level; the area supports no agriculture. Some communities nonetheless practice traditional food preservation, producing *chuño* and *moraya* (freeze-dried potato) for dehydrated food supplies from July through September. As glacial retreat from the Quelccaya glacier reduces natural water sources, communities have adapted pastoral livelihoods directly, redirecting water to create *bofedales* (high-altitude wetlands) for alpaca grazing and building fodder greenhouses at 4,000 meters to sustain herds through snow and drought.

Compound hazards and cascading impacts:



The area experienced drought in 2022, with a possible El Niño related drought anticipated the following year, alongside heavy snowfall, a recurring hazard that prevents alpacas from grazing. Communities have directly observed less heavy snowfall than before but more rainfall, attributed to climate change, alongside a steady decline in water availability linked to glacial retreat at Quelccaya. Traditional indicators, including reading the stars, the flowering of certain plants, and the howling of foxes, are used to anticipate these changes, but knowledge of these signs is fading as most young people leave herding for technical studies in cities such as Sicuani, Cusco, and Arequipa, leaving an aging population behind and widening the intergenerational knowledge gap.

Integrated territorial responses:



Quechua Indigenous Peoples have built *qochas* (small water-storage ponds) with support from the *Conservación Amazónica – ACCA* project, constructing dikes to expand water surface area so stored water lasts further into the dry season than before. Water is also redirected from the main stream source to create new *bofedales* for alpaca grazing, and communities have built fodder greenhouses at 4,000 meters, a recent adaptation of under five years, to grow fresh pasture during snow and drought periods. When drought signals livestock losses ahead, families sell animals at market rather than lose them outright, Ministry of Agriculture hay bale support helps communities through dry periods, and, where agriculture is practiced, traditional chuño and moraya (freeze dried potato) preservation provides dehydrated food supplies from roughly July through September.

Indigenous Peoples’ governance and knowledge:



Governance operates through two parallel structures under Pitumarca district, an elected popular vote authority (*centro poblado*) and a consejo menor municipal body of mayor and councilors, alongside a governing board (*junta directiva*) for each of the three communities and a peasant patrol committee (*comité de rondas campesinas*) shared with a neighboring community, which has sought a more prominent role in decisions about mining and the ACR’s future. Efforts to document Indigenous Peoples’ knowledge systems, including star reading, plant flowering, and fox howl indicators, through elder interviews are only now beginning, motivated by an *Conservación Amazónica – ACCA* supported pasture guide project aiming to transmit this knowledge, including which plants different animals do or do not eat, to younger generations. Participatory research involving four families is testing water management approaches intended to build capacity communities can apply themselves without depending on an NGO or the regional government each time.

Enabling and institutional conditions and barriers:



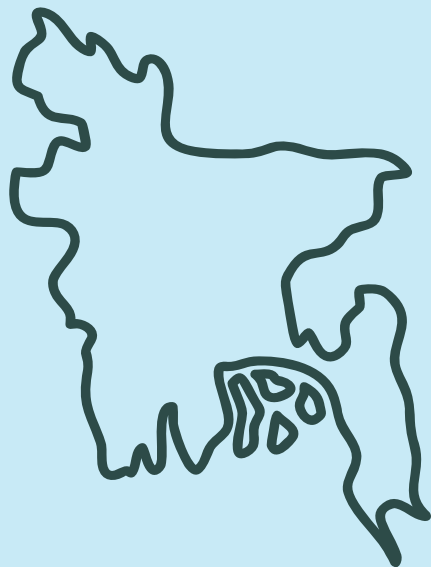
Indigenous Peoples’ inter-community exchange visits have been an important enabling practice, with members visiting less-resourced communities concluding that Indigenous Peoples’ communities generally have the underlying capacity to improve land management and mainly need technical direction. External support, including the *Conservación Amazónica – ACCA* project, Ministry of Agriculture hay bales, and past regional government funding for alpaca-management infrastructure such as larger *qochas*, has been described by interviewees as essential, without which neither the *qochas* nor the broader adaptation work would have happened, though some regional government funded projects have had mixed results. Illegal miners from a neighboring district, not from the three communities, have entered the conservation area beneath the glacier; their wastewater flows into a different watershed and does not directly affect the ACR’s water supply, but mining still draws some young people to work at roughly 5,000 meters despite severe cold, strong wind, and uncertain pay.

03 ASIA

The Asian case studies span forest (Indonesia), freshwater (Bangladesh and India), mountain (Nepal), and coastal and marine ecosystems (Japan), illustrating Indigenous Peoples’ responses to floods, landslides, extreme rainfall, and other interacting climate-related hazards. Together, the cases show how responses vary across ecological, territorial, and institutional contexts.

CASE STUDIES

Chakma Indigenous Peoples (Chittagong Hill Tracts) Bangladesh



ECOSYSTEM:

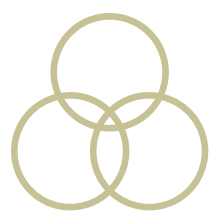
Chakma Indigenous Peoples inhabit the Chittagong Hill Tracts of southeastern Bangladesh, a hilly landscape of freshwater and mountain systems including rivers, streams, springs, wetlands, Kaptai Lake, forested hills, and traditional shifting cultivation (*jhum*) areas, with freshwater central to fisheries, agriculture, transportation, and cultural identity. Deforestation, hill cutting, infrastructure development, and pollution increasingly compound climate change, driving water scarcity, sedimentation, and declining aquatic biodiversity.

Livelihoods:



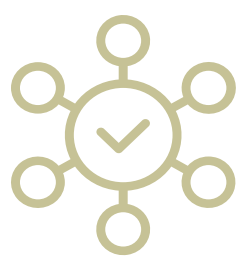
The *Chakma Indigenous Peoples’* communities rely on *jhum* (shifting) cultivation, paddy farming, fruit production, fishing, and forest-based livelihoods, all closely tied to the region’s freshwater ecosystems, rivers, and forests. Wild foods, medicinal plants, and bamboo gathered from surrounding forests supplement household food security and income. Erratic rainfall, drought, and landslides have reduced productivity across all these activities simultaneously, and many households have responded by diversifying into wage labor, migration, and small businesses rather than relying solely on land- and forest-based livelihoods.

Compound hazards and cascading impacts:



Increasingly erratic monsoon rainfall, prolonged droughts, and rising temperatures reduce water availability, soil moisture, and slope stability, while intense monsoon rainfall then produces flash floods and landslides, including the 2017 monsoon-induced landslides considered the most severe disaster of the past decade; drought, heavy rainfall, deforestation, and land degradation increasingly interact as compound events that raise landslide risk. These hazards damage houses, roads, bridges, schools, and water systems, isolating communities from essential services, and contribute to water shortages, waterborne disease, heat-related illness, poor sanitation, malnutrition, and psychological stress. *Chakma Indigenous Peoples* monitor seasonal rainfall, stream and spring water levels, soil moisture, slope cracks, leaning trees, water seepage, crop performance, and tree flowering and fruiting to anticipate change, though these traditional indicators have become less reliable as rainfall grows more unpredictable.

Integrated territorial responses:



Chakma Indigenous Peoples adjust planting calendars, diversify crops and livelihoods, including through wage labor, migration, and small businesses, reduce dependence on jhum cultivation, strengthen mutual aid during disasters, and continue applying traditional ecological knowledge to guide farming and natural resource management; livelihood diversification, flexible cropping calendars, and community solidarity are identified as the most effective responses.

Indigenous Peoples' governance and knowledge systems:



Governance combines Bangladesh's formal administrative system with Chakma customary authority, including the Circle Chief (*Raja*), Headmen at the mouza level, and Karbaris at the village level, who oversee customary land management, dispute resolution, and community affairs. Collective decisions are made through community consultations involving elders, traditional leaders, women, and community members, guided by customary rules governing forests, water, and agricultural lands. Indigenous Peoples' knowledge systems continue to inform farming practices, crop selection, and resource management, though its transmission is weakening as younger generations increasingly rely on formal education and external information.

Enabling and institutional conditions and barriers:



Indigenous Peoples' solidarity, knowledge systems, and support from government agencies and NGOs, including disaster response, climate-smart agriculture, water supply improvements, reforestation, and livelihood diversification programs, strengthen adaptation. Climate finance reaches communities primarily through government and donor programs rather than direct Indigenous Peoples' direct access, and support is often project-based and insufficiently aligned with Indigenous Peoples' priorities, particularly on land rights and long-term adaptation. Barriers include limited financial resources, weak infrastructure, insecure land tenure and long-standing land conflicts, and the remoteness of many Indigenous Peoples' villages, compounded by deforestation, hill cutting, infrastructure expansion, and commercial plantations that reduce forest cover, increase slope instability, and restrict access to customary lands.

Mising Indigenous Peoples (Brahmaputra Basin)⁵³

India



ECOSYSTEM:

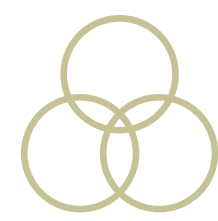
Mising Indigenous People inhabit the *Brahmaputra* floodplain of Assam, including highly flood-prone areas such as *Dhemaji* and *Golaghat* districts. Their territories form part of a dynamic riverine ecosystem shaped by the *Brahmaputra* and its tributaries, where seasonal inundation, erosion, sediment deposition, and shifts in river channels continually reshape land and settlements. In *Dhemaji*, numerous unstable tributaries cross the district before joining the *Brahmaputra*, contributing to recurrent flooding. Bamboo and other locally available materials are closely integrated into housing and everyday livelihood practices.

Livelihoods:



The *Mising Indigenous Peoples'* community sustains itself through agriculture and livestock rearing on the *Brahmaputra* floodplain in *Dhemaji* and *Golaghat* districts, an area shaped by the river's shifting course and near-annual flooding. Property and livestock losses to flooding recur almost every year, and historically the community has relocated its settlements as part of what is described as their "settlement habit," following the changing path of the *Brahmaputra*. The elevated space beneath their traditional *Chang ghor* stilt houses, built 8 to 13 feet high depending on local flood history, is put to direct livelihood use for weaving, rearing livestock, and storing produce, integrating housing design with the community's productive activities. Indigenous women play a central role in these livelihood decisions, recalibrating house height and stockpiling supplies such as bamboo each year based on remembered flood levels before the monsoon arrives.

Compound hazards and cascading impacts:



Recurrent river flooding and changing river courses create interconnected impacts on *Mising Indigenous Peoples* settlements, livelihoods, infrastructure, and mobility. Flooding occurs almost every year in highly exposed parts of Assam; in 2022, more than 100,000 people in *Dhemaji* district were affected by three successive waves of flooding. Repeated floods damage homes and household property, cause losses of livestock and agricultural production, and disrupt water and sanitation systems. Flooding also interacts with the changing course of the *Brahmaputra*, periodically making settlements unsafe and requiring families to relocate. Mobility between settlements has consequently formed part of *Mising Peoples'* longer-term adaptation to a riverine landscape that is continually changing.

⁵³ The *Mising Indigenous Peoples (India)* case study was elaborated using secondary sources, in particular: Mongabay India. 2023. *How Assam's Mising community is coping with floods through architectural design*; and *The Hindu*. 2024. *How bamboo houses in Assam withstand floods and earthquakes*. <https://india.mongabay.com/2023/01/how-assams-mising-community-is-coping-with-floods-through-architectural-design/>.

Integrated territorial responses:



Mising Indigenous Peoples have developed housing and preparedness practices specifically adapted to recurrent flooding. Central to these responses is the *chang ghor*, a traditional stilt house constructed primarily from bamboo and other locally available materials. Houses are commonly elevated approximately 8–13 feet above the ground, with their height adapted to local flood conditions. Rather than following a fixed construction standard, families draw on their experience of previous floods to determine how high the floor should be built. The houses can also be dismantled and reconstructed when erosion, changing river channels, or other conditions require relocation. Interior spaces and elevated storage help protect household belongings and essential supplies, while spaces associated with the raised structures are used for activities such as weaving, livestock rearing, and storing produce. These locally developed architectural principles have also informed more recent flood-resilient bamboo housing interventions in Assam, combining elevated floors with steep water-shedding roofs and flexible bamboo-and-wood structural frames.

Indigenous Peoples’ governance and knowledge systems:



Accumulated observation of the Brahmaputra and previous floods provides an important knowledge base for *Mising Indigenous Peoples’* preparedness and adaptation. Families remember how high floodwaters reached in previous years and use those observations to estimate possible future water levels and determine the appropriate height of their houses. Knowledge is therefore continually applied and recalibrated as households experience successive floods and changing river conditions. Indigenous women play important roles in translating this knowledge into household preparedness and decision-making. Documented examples include women organizing family members and neighbors to seek shelter during floods and preparing before the monsoon by raising houses and stockpiling bamboo. The capacity to dismantle, relocate, and reconstruct housing similarly reflects accumulated knowledge of living within a shifting river system rather than treating relocation solely as an emergency response.

Enabling and institutional conditions and barriers:



Mising Indigenous Peoples' locally developed technologies have provided a foundation upon which external organizations have built additional flood-resilience measures. Following severe flooding in Assam, external organizations have supported the construction of upgraded bamboo stilt houses incorporating elevated construction, flexible cross-braced bamboo and wood frames, and improved water and sanitation facilities. Houses constructed through these interventions were reported to have withstood multiple subsequent floods, illustrating how external technical support can complement locally adapted architectural principles. Government housing programs have also incorporated elements of flood-resilient housing. At the same time, recurrent losses, geographic remoteness, and limited household resources constrain the ability of families to reinforce or upgrade their homes, while available support has often focused on immediate reconstruction rather than long-term recovery. These conditions demonstrate that strengthening resilience requires sustained support for the Indigenous Peoples' knowledge, locally available materials, and adaptive practices through which *Mising Indigenous Peoples'* already respond to recurrent flooding.

Ryukyuan Indigenous Peoples (Ryukyu Islands)

Japan



ECOSYSTEM:

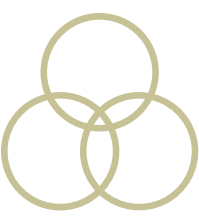
Ryukyuan Indigenous Peoples inhabit a subtropical island archipelago extending between Kyushu and Taiwan and comprising more than 160 islands. The territory encompasses interconnected coral reefs, mangroves, seagrass meadows, forests, wetlands, rivers, coastal ecosystems, fisheries, and agricultural areas that sustain livelihoods, cultural practices, spirituality, and relationships with land and sea. The ecological vulnerability of these relatively small island systems is intensified by the interaction between climate change and other pressures, including coastal development, habitat fragmentation, land reclamation, and the extensive military presence concentrated in Okinawa.

Livelihoods:



The *Ryukyuan Indigenous Peoples*’ communities sustain livelihoods through fisheries, seaweed (*mozuku*) cultivation, agriculture, and, increasingly, tourism, all closely tied to the islands’ coral reefs, seagrass meadows, and coastal ecosystems. Coral reef degradation and shifting fish distribution directly threaten fishing incomes, while marine heatwaves and coral bleaching have reduced *mozuku* production specifically. Agricultural livelihoods face compounding pressure from heat stress, irregular rainfall, and water scarcity, with fishers, farmers, and coastal communities identified as disproportionately affected by these combined livelihood impacts.

Compound hazards and cascading impacts:



Rising temperatures and ocean warming interact with typhoons, extreme rainfall, sea-level rise, and existing environmental pressures to produce interconnected impacts across terrestrial and marine ecosystems. Marine heatwaves and rising seawater temperatures contribute to coral bleaching and degradation, while sea-level rise and coastal erosion threaten low-lying coastal areas. Extreme rainfall and typhoons generate floods, landslides, infrastructure damage, and sediment runoff that can further affect coastal and reef ecosystems. These changes affect fisheries, seaweed cultivation, agriculture, water resources, and culturally significant lands and waters. *Ryukyuan Indigenous Peoples* observe environmental change through winds, tides, clouds, rainfall, flowering plants, marine conditions, fish behavior, animal movements, and seasonal cycles. Traditional references include the flowering of the *deigo* tree, associated with severe typhoon seasons, and seasonal practices such as *Hari*, the dragon-boat festival. Elders report that temperatures, rainfall and typhoon patterns, fish distribution, coral health, and planting seasons are increasingly changing, making established ecological and seasonal patterns less predictable. Climate pressures also intersect with military construction, coastal development, land reclamation, habitat fragmentation, and freshwater contamination, further reducing the resilience of interconnected terrestrial and marine ecosystems.

Integrated territorial responses:



Ryukyuan Indigenous Peoples combine their knowledge systems and collective practices with contemporary forms of ecosystem restoration, education, and advocacy. Responses documented across the islands include mutual aid and disaster preparedness, coral-reef restoration, watershed conservation, coastal cleanups, environmental education, language revitalization, and efforts to document and transmit Indigenous Peoples’ knowledge. Cultural festivals, fisheries, agricultural practices, and other collective practices also reinforce relationships with land and sea. These responses increasingly connect ecosystem protection with cultural and language revitalization, recognizing that sustaining Indigenous Peoples’ knowledge systems also depends on maintaining the languages, practices, relationships, and territories through which knowledge is transmitted and applied.

Indigenous Peoples’ governance and knowledge systems:



Ryukyuan Indigenous Peoples’ knowledge is maintained and transmitted through elders, fishers, farmers, religious custodians, cultural practitioners, kinship networks, and local organizations and is grounded in long-term observation of relationships among land, sea, weather, plants, animals, and seasonal cycles. Elders hold important knowledge concerning changing conditions, while fishers, farmers, and cultural practitioners continue to apply and transmit knowledge through their activities and relationships with territory. At the same time, language loss, historical displacement, and youth outmigration are reducing opportunities for intergenerational transmission. Language revitalization, documentation of Indigenous Peoples’ knowledge, intergenerational initiatives, ecosystem restoration, and participation in international Indigenous Peoples’ and human rights forums are therefore increasingly important strategies for sustaining these knowledge systems.

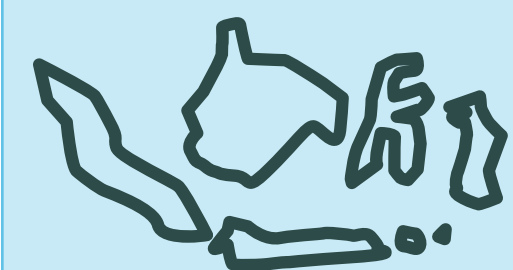
Enabling and institutional conditions and barriers:



Indigenous Peoples’ cohesion, cultural continuity, knowledge systems, and collaboration with researchers, civil society organizations, environmental groups, and international Indigenous Peoples’ networks provide important foundations for *Ryukyuan Indigenous Peoples’* responses. These efforts nevertheless operate within a significant institutional constraint: Japan does not formally recognize the Ryukyuan as Indigenous Peoples. Consequently, Ryukyuan Indigenous Peoples lack recognition of collective territorial rights and FPIC and have limited formal participation as rights holders in decisions affecting their lands, waters, and adaptation. These constraints intersect with militarization, military-base expansion, land reclamation, coastal development, habitat destruction, water contamination, and restrictions on access to traditional territories. Although Okinawa Prefecture has developed climate adaptation policies and Indigenous Peoples initiatives receive support from civil society and other partners, Ryukyuan Indigenous Peoples’ organizations have limited direct access to climate finance and remain insufficiently included as rights holders in climate governance and adaptation planning.

Tano Batak Indigenous Peoples (North Sumatra)

Indonesia



ECOSYSTEM:

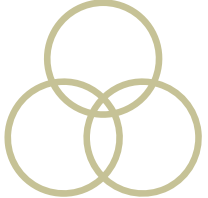
The *Tano Batak Indigenous Peoples* inhabit territories across the Bukit Barisan mountain range of North Sumatra, within interconnected tropical montane forests, customary forests (*Tombak*), rivers, springs and watersheds, rice fields (*Hauma*), agroforestry systems, benzoin (*Kemenyan*) forests, and Indigenous Peoples’ settlements (*Huta*). These interconnected ecosystems sustain food production and livelihoods as well as customary governance, cultural identity, and spiritual practices. Forest and watershed conditions are therefore closely connected to the security of settlements and agricultural areas. Deforestation, land-use change, road construction, and commercial plantation expansion have increasingly degraded forests and watersheds, contributing to greater exposure to floods and landslides.

Livelihoods:



The *Batak Indigenous Peoples’* communities practice integrated agroforestry combining rice cultivation (*Hauma*), coffee, benzoin (*Kemenyan*), sugar palm, customary forests, and home gardens. Benzoin and sugar palm production, alongside forest-based gathering of wild foods and medicinal plants, depend directly on access to the *Tombak* (customary forests), which the November 2025 disaster severely disrupted, burying roughly 716 hectares of productive farmland under sediment and debris. Farming households, benzoin and sugar palm producers, and customary forest users suffered the greatest economic losses, and the disaster is described as affecting the community’s entire integrated food system rather than any single livelihood activity in isolation.

Compound hazards and cascading impacts:



Increasingly unpredictable rainfall and prolonged rainy seasons interact with forest degradation, weakened watersheds, and unstable slopes to intensify floods and landslides. In late November 2025, exceptionally heavy rainfall associated with Tropical Cyclone Senyar contributed to severe flash floods and landslides across North Sumatra, including *Tano Batak Indigenous Peoples’* territories. The disaster damaged customary forests, watersheds, springs, rivers, agricultural land, and settlements, while roads, bridges, clean-water systems, and other infrastructure were destroyed or obstructed, isolating some Indigenous Peoples’ settlements and delaying access to assistance. Hundreds of houses and hundreds of hectares of farmland were damaged across affected *Tano Batak Indigenous Peoples’* territories. The impacts extended across Indigenous Peoples’ food systems based on rice cultivation, coffee, benzoin, sugar palm, home gardens, forest foods, and medicinal plants. Damage to rice fields and other productive areas disrupted both livelihoods and cultural practices associated with food production, while damaged water systems created shortages of clean water and additional health risks.

Integrated territorial responses:



Tano Batak Indigenous Peoples mobilized their own institutions and systems of collective action to respond immediately to the disaster. Indigenous Peoples organized evacuation and temporary shelter, communal food provision, clearance of blocked access routes, repair of water systems, and efforts to restore access to agricultural areas. Collective labor and solidarity, including practices described through *Marsialapari*, provided an important basis for responding where roads were blocked and external assistance was delayed. AMAN’s Tano Batak structures complemented these locally organized responses by conducting rapid assessments, mobilizing Indigenous volunteers, collecting information from isolated settlements, distributing emergency supplies, and communicating needs to government and humanitarian actors. This allowed external assistance to be coordinated through existing Indigenous Peoples’ networks rather than substituting for local organization.

Indigenous Peoples’ governance and knowledge systems:



Response and recovery draw upon customary institutions, collective responsibilities, and accumulated knowledge of forests, water, weather, and territorial conditions. The case-study evidence identifies *Dalihan Na Tolu* as an important system organizing reciprocal responsibilities among clans, while customary assemblies (*Tonggo Raja*) and *Raja Huta* provide spaces and authorities for collective decision-making concerning land, forests, water, conflict resolution, and responses to territorial threats. Indigenous Peoples also observe changes in rainfall, river and spring levels, vegetation, wildlife behavior, winds, and seasonal cycles as indicators of environmental change. Elders and other knowledge holders contribute accumulated knowledge systems, Indigenous women sustain food, water, caregiving, and communal food systems during displacement and recovery, while Indigenous youth increasingly connect customary organization with contemporary communication, assessment, and humanitarian networks. The response therefore combines customary knowledge and institutions with contemporary weather information and external communication systems rather than treating these knowledge systems as mutually exclusive.

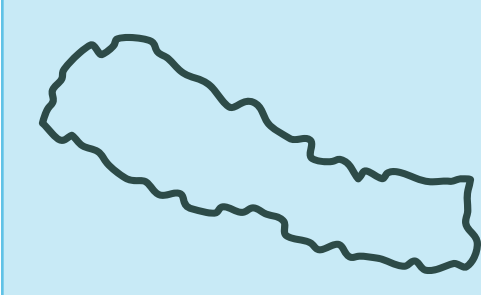
Enabling and institutional conditions and barriers:



Strong customary institutions, territorial organization, collective solidarity, and Indigenous Peoples' networks enabled *Tano Batak Indigenous Peoples* to organize rapidly despite severe disruption to infrastructure and access. AMAN's territorial and emergency-response networks strengthened this capacity by connecting affected Indigenous Peoples with humanitarian assistance and government institutions. At the same time, the disaster exposed significant structural barriers. Deforestation, commercial plantation expansion, forest conversion, road construction, and broader land-use change have degraded watersheds and forest cover, increasing the vulnerability of slopes and river systems. Insecure recognition of Indigenous Peoples' territories and limited integration of Indigenous Peoples' governance into formal disaster-management systems further constrain long-term resilience. Although government agencies, humanitarian organizations, churches, AMAN, and other actors provided emergency assistance, available support was predominantly short-term and humanitarian, while Indigenous Peoples received little or no direct climate finance for ecosystem restoration, Indigenous Peoples' food systems, and long-term adaptation. Recovery therefore continues to depend substantially on Indigenous Peoples' own institutions, knowledge systems, and systems of collective solidarity.

Thami Indigenous Peoples (Dolakha District)

Nepal



ECOSYSTEM:

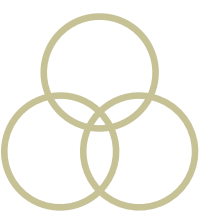
Thami Indigenous Peoples inhabit ancestral territories in Dolakha District in central-eastern Nepal, within a Himalayan mountain ecosystem comprising sub-alpine forests, terraced agricultural landscapes, river corridors, springs, and high-altitude grasslands reaching approximately 3,000 meters. Settlements are concentrated around the *Tamakoshi* River valley, where steep terrain and fragile geology create high exposure to landslides. Forests, agricultural terraces, rivers, springs, medicinal plants, and wild foods sustain livelihoods as well as Thami cultural and spiritual practices. Forest degradation, soil erosion, and changing water availability are increasingly affecting these interconnected territorial systems.

Livelihoods:



The *Thami Indigenous Peoples*’ communities depend on subsistence agriculture, livestock raising, medicinal plant collection, and traditional weaving, sustained by terraced agricultural landscapes and sub-alpine forests. A significant share of farming households operate under sharecropping arrangements, which deepen their vulnerability since they remain obligated to surrender part of the harvest to landowners even after climate-related crop losses, compounding food insecurity for families who already lack secure land tenure.

Compound hazards and cascading impacts:



Increasingly intense and erratic monsoon rainfall interacts with steep terrain, unstable slopes, deforestation, soil degradation, and periods of drought to intensify recurrent landslides and flash floods. Landslides erode soils and destroy agricultural terraces, forests, springs, roads, homes, water systems, and other infrastructure, while altered river systems and declining water availability affect agriculture and daily life. Crop losses, damaged farmland, disrupted irrigation, and declining access to medicinal plants and wild foods reduce food production and increase food insecurity. Sharecropping can further compound these impacts because families may remain obligated to surrender part of their harvest despite climate-related losses. Landslides also damage sacred places and ancestral territories, while displacement disrupts cultural practices and access to schools, health services, and markets. *Thami Indigenous Peoples* observe changing conditions through plant flowering and fruiting, animal behavior, river color and flow, cloud formations, winds, soil conditions, and knowledge of historically unstable slopes and previous landslide locations. These observations guide decisions concerning settlement, farming, construction, and preparedness, but youth migration and language loss are increasingly weakening their intergenerational transmission.

Integrated territorial responses:



Thami Indigenous Peoples combine their knowledge systems with locally adapted bioengineering and territorial restoration to reduce erosion and landslide risk. Responses include planting deep-rooted broom grass and guava trees to stabilize slopes, maintaining and reconstructing agricultural terraces, building stone barriers and bamboo stabilization structures, and restoring degraded slopes and vegetation. These measures work with the characteristics of mountain terrain rather than relying exclusively on engineered infrastructure. Restoration is also connected to cultural practices: tree planting around *Chautara* memorial sites combines slope and vegetation restoration with the maintenance of culturally significant places. Community awareness activities and practical restoration work further extend these responses beyond individual sites and create opportunities for collective learning.

Indigenous Peoples' governance and knowledge systems:



Thami Indigenous Peoples' responses are organized through customary institutions, Indigenous leadership, and the intergenerational application of their knowledge systems. Elders and Kirat spiritual leaders guide collective decision-making, customary land use, species selection, and relationships with forests, water, and culturally significant places, while the *Bigu Thami Bhume Samaj* coordinates collective action concerning land, adaptation, and cultural rights. Elders contribute knowledge about plants, soils, slopes, water, and previous landslides, while Indigenous youth participate directly in restoration activities. This division of responsibilities makes adaptation itself a space for intergenerational learning: younger generations acquire knowledge through practical work alongside elders while contributing their own capacities to restoration activities. Climate education activities in local schools provide an additional space for strengthening transmission at a time when youth migration, language loss, and formal education systems that marginalize Indigenous Peoples' knowledge are reducing opportunities for learning through everyday territorial practices.

Enabling and institutional conditions and barriers:



Indigenous Peoples' cohesion, customary governance, knowledge systems, local leadership, and intergenerational participation provide the principal foundations for collective adaptation. External support has complemented these capacities, including support associated with the *Bigu Thami Bhumme Samaj*, Cultural Survival's Keepers of the Earth Fund, and ecosystem-restoration initiatives. Such support has contributed to community-led bioengineering and restoration activities. Significant structural barriers nevertheless remain. Insecure land tenure, sharecropping, lack of recognition of customary territorial rights, limited infrastructure, weak political representation, and exclusion from decisions affecting ancestral lands constrain the ability of Thami Indigenous Peoples to sustain long-term adaptation. Restrictive conservation policies around the Gaurishankar Conservation Area can further limit customary land management. At the same time, direct and sustained climate finance for Indigenous Peoples' governance remains limited. Youth migration and language loss create an additional long-term challenge by weakening the intergenerational transmission of the knowledge systems upon which these territorial responses depend.

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UNFCCC (United Nations Framework Convention on Climate Change). 2018. *Decision 2/CP.24: Local Communities and Indigenous Peoples Platform*. FCCC/CP/2018/10/Add.1. Bonn, Germany. <https://unfccc.int/sites/default/files/resource/10a1.pdf>.

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VIII. Annexex

Annexex

ANNEX 1:

Glossary

This glossary takes or adapts definitions published by the Intergovernmental Panel on Climate Change (IPCC), the United Nations Office for Disaster Risk Reduction (UNDRR), the UNEP Adaptation Gap Report, the United Nations Framework Convention on Climate Change (UNFCCC), the Convention on Biological Diversity (CBD), and the United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP).

Adaptation:

In human systems, the process of adjustment to actual or expected climate and its effects, in order to moderate harm or exploit beneficial opportunities. In natural systems, the process of adjustment to actual climate and its effects; human intervention may facilitate adjustment to expected climate and its effects.⁵⁴

Adaptation finance gap:

The difference between actually implemented adaptation and a societally set goal, determined largely by preferences related to tolerated climate change impacts and reflecting resource limitations and competing priorities.⁵⁵

⁵⁴ **IPCC (Intergovernmental Panel on Climate Change)**. 2022. *Climate Change 2022: Impacts, Adaptation and Vulnerability*. Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change, Annex II: Glossary. Geneva, Switzerland, IPCC. https://www.ipcc.ch/report/ar6/wg2/downloads/report/IPCC_AR6_WGII_Annex-II.pdf.

⁵⁵ **UNEP (United Nations Environment Programme)**. 2025. *Adaptation Gap Report 2025*. Glossary. Nairobi, UNEP. <https://www.unep.org/resources/adaptation-gap-report-2025>.

Adaptive capacity:

The ability of systems, institutions, humans, and other organisms to adjust to potential damage, to take advantage of opportunities, or to respond to consequences.⁵⁶

Cascading impacts:

Cascading impacts from extreme weather/climate events occur when an extreme hazard generates a sequence of secondary events in natural and human systems that result in physical, natural, social, or economic disruption, whereby the resulting impact is significantly larger than the initial impact. Cascading impacts are complex and multi-dimensional, and are associated more with the magnitude of vulnerability than with that of the hazard.⁵⁷

Compound risks:

Risks that arise from the interaction of hazards, which may be characterised by single extreme events or multiple coincident or sequential events that interact with exposed systems or sectors.⁵⁸

Climate-related environmental disaster:

As used in this report, a serious disruption in Indigenous Peoples' territories, resulting from the interaction of one or more hazardous events with exposure, vulnerability, and capacity, and leading to human, material, ecological, economic, and cultural losses and impacts.⁵⁹

Collective rights:

Rights held by a people as a group rather than by individuals alone, including rights to self-determination, lands, territories and resources, and cultural integrity, recognized for Indigenous Peoples under international instruments such as the United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP) and the International Labor Organization (ILO) Convention N° 169, Indigenous and Tribal Peoples Convention.⁶⁰

Compound hazards:

The combination of multiple hazards or hazardous events, occurring simultaneously or in succession, whose interaction generates impacts greater than or different from the sum of their individual effects.⁶¹

⁵⁶ **IPCC (Intergovernmental Panel on Climate Change)**. 2022. *Climate Change 2022: Impacts, Adaptation and Vulnerability*. Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change, Annex II: Glossary. Geneva, Switzerland, IPCC. https://www.ipcc.ch/report/ar6/wg2/downloads/report/IPCC_AR6_WGII_Annex-II.pdf.

⁵⁷ **IPCC (Intergovernmental Panel on Climate Change)**. 2022. *Climate Change 2022: Impacts, Adaptation and Vulnerability*. Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change, Annex II: Glossary. Geneva, Switzerland, IPCC. https://www.ipcc.ch/report/ar6/wg2/downloads/report/IPCC_AR6_WGII_Annex-II.pdf.

⁵⁸ **IPCC (Intergovernmental Panel on Climate Change)**. 2022. *Climate Change 2022: Impacts, Adaptation and Vulnerability*. Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change, Annex II: Glossary. Geneva, Switzerland, IPCC. https://www.ipcc.ch/report/ar6/wg2/downloads/report/IPCC_AR6_WGII_Annex-II.pdf.

⁵⁹ **United Nations Office for Disaster Risk Reduction (UNDRR)**. 2025. *UNDRR Terminology on Disaster Risk Reduction*. Disaster Risk Reduction Terminology. Geneva, Switzerland, UNDRR. <https://www.undrr.org/drr-glossary/terminology>.

⁶⁰ This definition is based on: **United Nations General Assembly**. 2007. *United Nations Declaration on the Rights of Indigenous Peoples*. A/RES/61/295, Preamble, Art. 3, 8, 11 and 26. New York, UN. https://social.desa.un.org/sites/default/files/migrated/19/2018/11/UNDRIP_E_web.pdf. **ILO (International Labour Organization)**. 1989. *Indigenous and Tribal Peoples Convention*, No. 169. Geneva, Switzerland, ILO. https://normlex.ilo.org/dyn/nrmlx_en/f?p=NORMLEXPUB:12100:0:-NO::P12100_ILO_CODE:C169.

⁶¹ **IPCC (Intergovernmental Panel on Climate Change)**. 2022. *Climate Change 2022: Impacts, Adaptation and Vulnerability*. Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change, Annex II: Glossary. Geneva, Switzerland, IPCC. https://www.ipcc.ch/report/ar6/wg2/downloads/report/IPCC_AR6_WGII_Annex-II.pdf.

Customary law:

The body of rules, institutions, and decision-making processes through which Indigenous Peoples govern their territories, resources, and communities, developed and applied according to their own traditions, and recognized under international instruments as a valid source of authority alongside state law.⁶²

Disaster:

A serious disruption of the functioning of a community or a society at any scale due to hazardous events interacting with conditions of exposure, vulnerability and capacity, leading to one or more of the following: human, material, economic and environmental losses and impacts.⁶³

Disaster risk reduction:

Disaster risk reduction is aimed at preventing new and reducing existing disaster risk and managing residual risk, all of which contribute to strengthening resilience and therefore to the achievement of sustainable development.⁶⁴

Ecosystem-based adaptation (EbA):

Incorporates biodiversity and ecosystem services into an overall adaptation strategy to help people to adapt to the adverse effects of climate change.⁶⁵

Ecosystem approach:

recognizes ecosystems as interconnected systems in which ecological processes, biodiversity, human well-being, and cultural relationships are closely linked. It emphasizes the integrated management of land, water, and living resources, taking into account interactions across ecosystems and appropriate spatial and temporal scales. In this study, an ecosystem-based approach allows Indigenous Peoples’ responses to climate-related environmental disasters to be examined within the broader ecological systems in which they occur, recognizing the relationships among ecosystem integrity, livelihoods, Indigenous Peoples’ knowledge systems, and adaptation.⁶⁶

Environmental indicator:

As used in this report, an observable ecological signal, biotic (such as plant flowering, animal behavior, or bird migration) or abiotic (such as wind patterns, cloud formations, or celestial positions), that Indigenous Peoples interpret, individually or in combination with other signals, to diagnose current environmental and seasonal conditions and to anticipate short-term hazards or long-term seasonal quality, guiding collective decision-making.⁶⁷

62 This definition is based on: **UNGA (United Nations General Assembly)**. 2007. *United Nations Declaration on the Rights of Indigenous Peoples*, Preamble, Art. 3, 8, 11 and 26. New York, UN. https://social.desa.un.org/sites/default/files/migrated/19/2018/11/UNDRIP_E_web.pdf. **ILO (International Labour Organization)**. 1989. *Indigenous and Tribal Peoples Convention*, No. 169. Geneva, Switzerland, ILO. https://normlex.ilo.org/dyn/nrmlx_en/f?p=NORMLEXPUB:12100:0::NO::P12100_ILO_CODE:C169.

63 **United Nations Office for Disaster Risk Reduction (UNDRR)**. 2025. *UNDRR Terminology on Disaster Risk Reduction*. Disaster Risk Reduction Terminology. Geneva, Switzerland, UNDRR. <https://www.undrr.org/drr-glossary/terminology>.

64 **United Nations Office for Disaster Risk Reduction (UNDRR)**. 2025. *UNDRR Terminology on Disaster Risk Reduction*. Disaster Risk Reduction Terminology. Geneva, Switzerland, UNDRR. <https://www.undrr.org/drr-glossary/terminology>.

65 **SCBD (Secretariat of the Convention on Biological Diversity)**. 2009. *Connecting Biodiversity and Climate Change Mitigation and Adaptation: Report of the Second Ad Hoc Technical Expert Group on Biodiversity and Climate Change*. Montreal, Canada, SCBD. <https://www.cbd.int/doc/publications/cbd-ts-85-en.pdf>

66 **CBD (Convention on Biological Diversity)**. 2000. *Decision V/6: Ecosystem Approach*, Annex, paras. 1–5 and Principles 1–12. Nairobi, Kenya. <https://www.cbd.int/ecosystem>

67 This definition is based on: **UNESCO (United Nations Educational, Scientific and Cultural Organization)**. 2024. *Climate Change and Indigenous Peoples’ Knowledge in the Sahel: A Case Study on the Mbororo Fulani of Chad*. Paris, France, UNESCO. https://icipp.unfccc.int/sites/default/files/2024-07/2024_climate_change_and_ip_knowledge_in_the_sahel.pdf. **IPCC (Intergovernmental Panel on Climate Change)**. 2022. *Climate Change 2022: Impacts, Adaptation and Vulnerability*. Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change. Geneva, Switzerland, IPCC. <https://www.ipcc.ch/report/ar6/wg2/>. Reyes-García, V., Fernández-Llamazares, Á., Guèze, M., Garcés, A., Mallo, M., Vila-Gómez, M. & Vilaseca, M. 2016. *Local indicators of climate change: the potential contribution of local knowledge to climate research*. WIREs Climate Change, 7(1): 109–124. <https://wires.onlinelibrary.wiley.com/doi/10.1002/wcc.374>.

Free, Prior, and Informed Consent (FPIC):

The right of Indigenous Peoples to give or withhold their consent to actions that would affect their lands, territories, and resources, exercised through their own representative institutions, without coercion or manipulation, and prior to project approval.⁶⁸

Hazard:

A process, phenomenon, or human activity that may cause loss of life, injury, or other health impacts, property damage, social and economic disruption, or environmental degradation.⁶⁹

Hazardous event:

The manifestation of a hazard at a particular place and time.⁷⁰

Impact:

The consequences of realized risks on natural and human systems, where risk results from the interaction of climate-related hazards with the exposure and vulnerability of the affected system. Impacts generally refer to effects on lives, livelihoods, health and well-being, ecosystems and species, economic, social and cultural assets, and infrastructure. Impacts may be referred to as consequences or outcomes and can be adverse or beneficial.⁷¹

Indigenous Peoples' governance:

As used in this report, the structures, institutions, and processes, formal or customary, through which a community or society makes and implements collective decisions, exercises authority, and holds actors accountable for those decisions.⁷²

Indigenous Peoples' knowledge systems:

As used in this report, the cumulative body of observations, practices, and institutions through which Indigenous Peoples understand, interpret, and respond to environmental change, developed and continuously renewed through direct relationship with their territories and transmitted across generations.⁷³

Indigenous Peoples-led research approach:

For the purposes of this study, this refers to a research approach that recognizes Indigenous Peoples as knowledge holders, rights holders, and decision-makers in the research process, rather than solely as research participants. It is grounded in principles of self-determination, Free, Prior and Informed Consent (FPIC), Indigenous Peoples' data sovereignty, and Indigenous Peoples' authority over how their knowledge and information are collected, interpreted, validated, and shared. In this study, Indigenous Peoples'

⁶⁸ This definition is based on: **UNGA (United Nations General Assembly)**. 2007. *United Nations Declaration on the Rights of Indigenous Peoples*. A/RES/61/295. New York: United Nations. <https://social.desa.un.org/issues/indigenous-peoples/united-nations-declaration-on-the-rights-of-indigenous-people>. **ILO (International Labour Organization)**. 1989. *Indigenous and Tribal Peoples Convention*, No. 169. Geneva, Switzerland, ILO. https://normlex.ilo.org/dyn/nrmlx_en/f?p=NORML-EXPUB:12100:0::NO::P12100_ILO_CODE:C169, and UNPFII (United Nations Permanent Forum on Indigenous Issues). 2022. Report on the Twenty-First Session. New York, UN. <https://docs.un.org/en/E/2022/43>.

⁶⁹ **United Nations Office for Disaster Risk Reduction (UNDRR)**. 2025. *UNDRR Terminology on Disaster Risk Reduction*. Disaster Risk Reduction Terminology. Geneva, Switzerland, UNDRR. <https://www.undrr.org/drr-glossary/terminology>.

⁷⁰ **United Nations Office for Disaster Risk Reduction (UNDRR)**. 2025. *UNDRR Terminology on Disaster Risk Reduction*. Disaster Risk Reduction Terminology. Geneva, Switzerland, UNDRR. <https://www.undrr.org/drr-glossary/terminology>.

⁷¹ **IPCC (Intergovernmental Panel on Climate Change)**. 2022. *Climate Change 2022: Impacts, Adaptation and Vulnerability*. Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change, Annex II: Glossary. Geneva, Switzerland, IPCC. https://www.ipcc.ch/report/ar6/wg2/downloads/report/IPCC_AR6_WGII_Annex-II.pdf.

⁷² This definition is based on: **FAO (Food and Agriculture Organization of the United Nations)**. n.d. *Indigenous Peoples: Governance of Natural Resources and Collective Rights*. Rome, FAO. <https://www.fao.org/indigenous-peoples/pillars-of-work/governance-of-natural-resources-and-collective-rights/en>.

⁷³ This definition is based on: **IPBES (Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services)**. n.d. *Glossary: Indigenous and local knowledge systems*. Bonn, Germany, IPBES. <https://www.ipbes.net/node/41404>.

organizations contributed to the design of the questionnaire, identification and documentation of case studies, validation of findings, and interpretation of the evidence.⁷⁴

Loss and damage:

Research has taken Loss and Damage (capitalised letters) to refer to political debate under the United Nations Framework Convention on Climate Change (UNFCCC) following the establishment of the Warsaw Mechanism on Loss and Damage in 2013, which is to “address loss and damage associated with impacts of climate change, including extreme events and slow onset events, in developing countries that are particularly vulnerable to the adverse effects of climate change.” Lowercase letters (losses and damages) have been taken to refer broadly to harm from (observed) impacts and (projected) risks and can be economic or non-economic.⁷⁵

Rapid-onset hazard:

A hazard that manifests suddenly, over a short timeframe, such as floods, storms, heat-waves, wildfires, and landslides. Climate change literature commonly distinguishes rapid-onset events from slow-onset events, though this distinction is analytical rather than absolute: some hazards, such as drought, may exhibit characteristics of both categories, while slow-onset processes may also increase the likelihood or severity of rapid-onset events.⁷⁶

Resilience:

The ability of a system, community or society exposed to hazards to resist, absorb, accommodate, adapt to, transform and recover from the effects of a hazard in a timely and efficient manner, including through the preservation and restoration of its essential basic structures and functions through risk management.⁷⁷

Risk:

The potential for adverse consequences for human or ecological systems, recognising the diversity of values and objectives associated with such systems. In the context of climate change, risks can arise from potential impacts of climate change as well as human responses to climate change. Relevant adverse consequences include those on lives, livelihoods, health and well-being, economic, social and cultural assets and investments, infrastructure, services (including ecosystem services), ecosystems and species. In the context of climate change impacts, risks result from dynamic interactions between climate-related hazards with the exposure and vulnerability of the affected human or ecological system to the hazards. Hazards, exposure and vulnerability may each be subject to uncertainty in terms of magnitude and likelihood of occurrence, and each may change over time and space due to socio-economic changes and human decision-making. In the context of climate change responses, risks result from the potential for such responses not achieving the intended objective(s), or from potential trade-offs with, or negative side-effects on, other societal objectives, such as the Sustainable Development Goals (SDGs). Risks can arise, for example, from uncertainty in the implementation, effectiveness or outcomes of climate policy, climate-related investments, technology development or adoption, and system transitions.⁷⁸

⁷⁴ **GIDA (Global Indigenous Data Alliance)**. 2019. *CARE Principles for Indigenous Data Governance*. Collective Benefit, Authority to Control, Responsibility and Ethics. <https://www.gida-global.org/careprinciples>.

⁷⁵ **IPCC (Intergovernmental Panel on Climate Change)**. 2022. *Climate Change 2022: Impacts, Adaptation and Vulnerability*. Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change, Annex II: Glossary. Geneva, Switzerland, IPCC. https://www.ipcc.ch/report/ar6/wg2/downloads/report/IPCC_AR6_WGII_Annex-II.pdf.

⁷⁶ **UNFCCC (United Nations Framework Convention on Climate Change)**. 2012. *Slow Onset Events: Technical Paper*, FCCC/TP/2012/7, paras. 20–21. Bonn, Germany, UNFCCC. <https://unfccc.int/documents/7429>. **IPCC (Intergovernmental Panel on Climate Change)**. 2022. *Climate Change 2022: Impacts, Adaptation and Vulnerability*. Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change, Glossary. Cambridge, UK, Cambridge University Press. <https://www.ipcc.ch/report/ar6/wg2/>.

⁷⁷ **United Nations Office for Disaster Risk Reduction (UNDRR)**. 2025. *UNDRR Terminology on Disaster Risk Reduction*. *Disaster Risk Reduction Terminology*. Geneva, Switzerland, UNDRR. <https://www.undrr.org/drr-glossary/terminology>.

⁷⁸ **IPCC (Intergovernmental Panel on Climate Change)**. 2022. *Climate Change 2022: Impacts, Adaptation and Vulnerability*. Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change, Annex II: Glossary. Geneva, Switzerland, IPCC. https://www.ipcc.ch/report/ar6/wg2/downloads/report/IPCC_AR6_WGII_Annex-II.pdf.

Rights-based approach:

recognizes Indigenous Peoples as collective rights holders rather than beneficiaries of development or climate interventions. It places internationally recognized rights, including self-determination, self-government, lands, territories and resources, cultural integrity, participation, and Free, Prior and Informed Consent (FPIC), at the center of research, policy, and practice. In this study, a rights-based approach means that research and analysis respect Indigenous Peoples' governance, own institutions, knowledge systems, priorities, and decision-making authority.⁷⁹

Self-determination:

The right of Indigenous Peoples to freely determine their political status and freely pursue their economic, social, and cultural development, including the right to autonomy or self-government in matters relating to their internal and local affairs.⁸⁰

Slow-onset event:

A hazard that develops gradually through incremental climatic changes, including sea-level rise, desertification, glacial retreat, salinization, ocean acidification, increasing temperatures, land and forest degradation, and biodiversity loss. Climate change literature commonly distinguishes slow-onset events from rapid-onset events, though this distinction is analytical rather than absolute: some hazards, such as drought, may exhibit characteristics of both categories, and slow-onset processes may also increase the likelihood or severity of rapid-onset events.⁸¹

⁷⁹ **UNGA (United Nations General Assembly)**. 2007. *United Nations Declaration on the Rights of Indigenous Peoples*. A/RES/61/295. New York: United Nations. <https://social.desa.un.org/issues/indigenous-peoples/united-nations-declaration-on-the-rights-of-indigenous-people>.

⁸⁰ **UNFCCC (United Nations Framework Convention on Climate Change)**. 2012. *Slow Onset Events: Technical Paper*, FCCC/TP/2012/7, paras. 20–21. Bonn, Germany, UNFCCC. <https://unfccc.int/documents/7429>. **IPCC (Intergovernmental Panel on Climate Change)**. 2022. *Climate Change 2022: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change*. Geneva, Switzerland <https://www.ipcc.ch/report/ar6/wg2/>.

⁸¹ **UNGA (United Nations General Assembly)**. 2007. *United Nations Declaration on the Rights of Indigenous Peoples*. A/RES/61/295. New York: United Nations. <https://social.desa.un.org/issues/indigenous-peoples/united-nations-declaration-on-the-rights-of-indigenous-people>.

ANNEX 2:

Detailed Methodology

This annex provides the detailed methodology used to generate the evidence presented in this assessment. It complements the methodological overview included in the main report by describing the research design, data collection methods, analytical framework, and analytical procedures in greater detail. The objective is to ensure methodological transparency while documenting the procedures through which evidence from the global questionnaire and comparative case studies was collected, analyzed, and synthesized into the assessment findings.

A. Assessment design

This assessment frames Indigenous Peoples not merely as populations affected by climate-related environmental disasters, but as rights holders, knowledge holders, and active agents observing environmental change, exercising governance, mobilizing Indigenous Peoples' knowledge systems, and implementing responses adapted to their territories. In line with a rights-based and Indigenous Peoples-led research approach, it recognizes Indigenous Peoples as co-producers of knowledge rather than simply research participants. The study also adopts a comparative, ecosystem approach, recognizing that climate hazards, ecological processes, livelihoods, governance systems, and cultural relationships with territory differ substantially across ecosystems. Consequently, Indigenous Peoples' responses are place-based and inseparable from their ecological and institutional contexts.

Comparing experiences across diverse ecosystems and regions makes it possible to identify recurring patterns, enabling conditions, barriers, and policy implications without treating Indigenous Peoples' adaptation as a universal or standardized model. In that sense, the study addresses the following research question: **How are Indigenous Peoples already responding to climate-related environmental disasters, and what enables these responses to emerge and develop over time?**

B. Data collection and sources of evidence

The assessment combines two complementary sources of evidence to answer this research question. The first is a **global questionnaire**, distributed to Indigenous Peoples' organizations across regions and translated into four languages (English, Spanish, French, and Portuguese). It collected information on observed climate-related environmental disasters, environmental change, impacts, Indigenous Peoples' responses, governance systems, enabling conditions, and barriers. A total of 216 responses were received, providing a broad comparative evidence base across ecosystems and regions.

Table 2.1 Characteristics of the global questionnaire

Characteristic	Description
Languages	English, Spanish, French and Portuguese
Respondents	Indigenous Peoples and Indigenous Peoples' organizations
Number of valid responses	216
Geographic coverage	Africa, Asia, the Americas and the Pacific
Countries	Botswana, Burundi, Cameroon, Democratic Republic of the Congo, Ghana, Kenya, Malawi, Mali, Namibia, Niger, Nigeria, Rwanda, Sierra Leone, Somalia, South Africa, Tanzania, Uganda, Zambia, Bangladesh, Cambodia, India, Indonesia, Japan, Malaysia, Nepal, Pakistan, Philippines, Taiwan, Thailand, Argentina, Bolivia, Brazil, Canada, Colombia, Ecuador, El Salvador, Guyana, Guatemala, Honduras, Mexico, Nicaragua, Panama, Paraguay, Peru, Venezuela, Papua New Guinea.
Purpose	Identify recurring patterns across Indigenous Peoples' experiences of climate-related environmental disasters.

The second is a **comparative case study** analysis distributed across Africa, Asia, and the Americas. Each case documents one Indigenous Peoples community’s response to a specific climate-related environmental disaster through a standardized analytical matrix applied consistently across cases.

The information was collected through three modalities. First, interviews were conducted directly with Indigenous Peoples’ organizations leading the documented response, whenever possible. Second, through Indigenous Peoples’ regional organizations or Non-Governmental Organizations (NGOs) with longstanding working relationships with the communities, where language barriers or accessibility constraints prevented direct interviews. In some cases, these organizations completed the analytical matrix jointly with Indigenous Peoples’ representatives through workshops or consultations. In other cases, the organizations completed the matrix independently based on their longstanding knowledge of the Indigenous Peoples’ communities on the ground. Finally, in two cases, the case studies were made with secondary evidence.

Together, the questionnaire and case studies provide different forms of evidence. The questionnaire provides quantitative data and identifies broad trends across a large number of Indigenous Peoples’ territories. The case studies provide qualitative information about the institutional, procedural, and contextual depth necessary to understand how Indigenous Peoples’ responses emerge, how they are governed, and what conditions influence their implementation.

B. Case study selection

The comparative case studies were selected using four complementary criteria designed to maximize diversity while maintaining analytical consistency across cases.

First, **regional diversity**, selecting cases across Africa, Asia, and the Americas. Second, ecosystem diversity, representing six ecosystem types:⁸² forests, mountains, freshwater ecosystems, coastal and marine ecosystems, grasslands and savannas, and drylands.⁸³

82 **CBD (Convention on Biological Diversity)**. 2000. *Recommendations Adopted by the Subsidiary Body on Scientific, Technical and Technological Advice at Its Fifth Meeting*, Recommendation V/4, “Programme of Work on Dry and Sub-humid Lands.” Convention on Biological Diversity. <https://www.cbd.int/recommendations/sbstta?m=sbstta-05>. **IPCC (Intergovernmental Panel on Climate Change)**. 2022. *Climate Change 2022: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change*. H. O. Pörtner, D. C. Roberts, M. Tignor, E. S. Poloczanska, K. Mintenbeck, A. Alegría, M. Craig, S. Langsdorf, S. Löschke, V. Möller, A. Okem & B. Rama, eds. Cambridge, UK and New York, NY, USA: Cambridge University Press. <https://www.ipcc.ch/report/ar6/wg2/>. The six ecosystem types used in this report (**forest, mountain, freshwater, coastal and marine, grassland and savanna, and dryland**) are consistent with ecosystem classifications adopted by major international climate and biodiversity frameworks.

83 Although **tundra and polar ecosystems** are recognized as distinct ecological regions in major international assessments, including the **Intergovernmental Panel on Climate Change (IPCC)** and the **Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES)**, they are not represented in this study because it was not possible to identify and document case studies within the timeframe of the research. Their absence reflects the geographic scope of the case studies rather than their relevance to Indigenous Peoples’ climate adaptation. Indigenous Peoples inhabiting the Arctic and other tundra and polar regions face significant climate-related environmental disasters, including permafrost thaw, sea-ice loss, and coastal erosion, that warrant dedicated analysis in future research.

This approach captures the diversity of climate hazards, Indigenous Peoples’ knowledge systems, and adaptation strategies associated with different ecological contexts. Third, each case required a **documented climate-related environmental disaster** affecting an Indigenous Peoples’ territory.⁸⁴ Fourth, each case required evidence that **Indigenous Peoples had developed and implemented a response** grounded in their own knowledge, governance systems, institutions, or collective action.

Together, these criteria ensure that the assessment captures a wide range of ecological and cultural contexts while supporting systematic comparison across regions.

Table 2.2. Case study selection criteria

Characteristic	Description
Regional diversity	Cases were selected across Africa, Asia, and the Americas to capture a broad range of geographical, cultural, institutional, and climatic contexts.
Ecosystem diversity	Cases represent six ecosystem types (forests, mountains, freshwater, coastal and marine, grasslands and savannas, and drylands) to reflect the diversity of climate hazards, Indigenous Peoples’ knowledge systems, and adaptation strategies associated with different ecological contexts.
Climate-related environmental disaster	Each case documents one or more climate-related environmental disasters affecting an Indigenous Peoples’ territory, including both rapid-onset and slow-onset hazards.
Indigenous Peoples-led response	Each case provides evidence that Indigenous Peoples developed and implemented responses through their own governance, knowledge systems, institutions, and collective territorial action .

C. Analytical framework

A common analytical framework was applied across the questionnaire and case studies to enable systematic comparison while respecting the diversity of Indigenous Peoples’ particular contexts. The framework examines four interconnected analytical dimensions that together describe how Indigenous Peoples experience and respond to climate-related environmental disasters: (1) climate-related environmental disaster; (2) impacts; (3) Indigenous Peoples’ responses; and (4) enabling conditions and barriers. Rather than analyzing these dimensions independently, the framework examines how they interact to explain Indigenous Peoples’ adaptive capacity across diverse ecosystems and territorial contexts.

The analysis begins by documenting the **climate-related hazard** affecting each territory. This first analytical dimension identifies the climate-related hazard or hazardous event that gave rise to the disaster, considering both rapid-onset events, such as floods, storms, heatwaves, wildfires, and landslides; and slow-onset events, including sea-level rise, glacier retreat, desertification, salinization, and increasing temperatures.⁸⁵ Rather than documenting hazards as isolated physical phenomena, the assessment

84 This study focuses on **Indigenous Peoples’ responses to documented climate-related environmental disasters**, rather than the full spectrum of Indigenous Peoples climate action. Accordingly, each case examines a specific climate-related environmental disaster affecting an Indigenous Peoples’ territory and the responses developed to address its impacts. This focus allows the study to analyze how Indigenous Peoples’ governance and knowledge systems. It does not imply that Indigenous Peoples climate adaptation is limited to disaster response. Indigenous Peoples continuously adapt before, during, and throughout evolving climate-related hazards and slow-onset processes through practices such as ecosystem restoration, traditional fire management, watershed management, and seasonal mobility. Indigenous Peoples climate action also encompasses preventive efforts to reduce future risks and protect ecosystem integrity, including defending lands, waters, and rights against extractive activities and securing territorial rights. These broader actions are fundamental to Indigenous Peoples climate resilience but fall outside the specific analytical scope of this study.

85 **UNFCCC (United Nations Framework Convention on Climate Change)**. 2012. *Slow Onset Events: Technical Paper*, FCCC/TP/2012/7, paras. 20–21. Bonn, Germany, UNFCCC. <https://unfccc.int/documents/7429>. **IPCC (Intergovernmental Panel on Climate Change)**. 2022. *Climate Change 2022: Impacts, Adaptation and Vulnerability*. Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change, Glossary. Cambridge, UK, Cambridge University Press. <https://www.ipcc.ch/report/ar6/wg2/>.

examines how climate-related hazards interact with conditions of exposure, vulnerability, adaptive capacity, and territorial context to generate disasters affecting Indigenous Peoples and their territories.⁸⁶

The second analytical dimension examines the impacts of climate-related environmental disasters across Indigenous Peoples’ territories and communities. To enable comparison across case studies, impacts were analyzed through five interconnected dimensions: **(i) territory and ecosystems, (ii) livelihoods and food systems, (iii) infrastructure, health and well-being, (iv) social and cultural dimensions, and (v) differential impacts across community members.**⁸⁷ This structure recognizes that climate-related environmental disasters affect Indigenous Peoples not only through environmental change but also through interconnected effects on livelihoods, culture, health, mobility, governance, and social relations.⁸⁸

The third analytical dimension examines the responses developed and implemented by Indigenous Peoples following climate-related environmental disasters. Rather than documenting isolated technical adaptation measures, the assessment examines the collective actions undertaken by Indigenous Peoples to respond to the impacts of climate-related environmental disasters through their governance systems, Indigenous Peoples’ knowledge systems, and relationships with their territories. Across the questionnaire and the case study matrix, the study documents seven broad categories of responses: **(i) ecosystem protection and restoration; (ii) adaptation of agricultural and other productive practices; (iii) community-based early warning systems; (iv) community disaster preparedness; (v) community management of land and forests; (vi) strengthening territorial governance; and (vii) territorial defense and the protection of Indigenous Peoples rights.**⁸⁹ These categories provide a common analytical structure for comparing responses across regions and ecosystems while recognizing that Indigenous Peoples’ responses are rarely implemented in isolation.

The fourth analytical dimension examines the **conditions that enable or constrain Indigenous Peoples’ responses** to climate-related environmental disasters.⁹⁰ Recognizing that Indigenous Peoples’ adaptive capacity is shaped not only by community action but also by broader institutional, legal, financial, and territorial contexts, the assessment analyzes the factors that Indigenous Peoples identified as strengthening or limiting their ability to respond. Across the questionnaire and the case study matrix, the study documents **(i) the legal recognition of Indigenous Peoples and their rights; (ii) the**

86 **IPCC (Intergovernmental Panel on Climate Change).** 2021. *The Concept of Risk in the IPCC Sixth Assessment Report: A Summary of Cross-Working Group Discussions*, pp. 5–7. Geneva, Switzerland. <https://www.ipcc.ch/site/assets/uploads/2021/01/The-concept-of-risk-in-the-IPCC-Sixth-Assessment-Report.pdf>; IPCC (Intergovernmental Panel on Climate Change). 2022. *Climate Change 2022: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change*, Chapter 1 and Glossary. Cambridge, UK and New York, USA, Cambridge University Press. <https://www.ipcc.ch/report/ar6/wg2/>; UNDRR (United Nations Office for Disaster Risk Reduction). 2025. **UNDRR Terminology on Disaster Risk Reduction**, entries “Disaster”, “Hazard”, “Exposure” and “Vulnerability”. Geneva, Switzerland. <https://www.undrr.org/drr-glossary/terminology>.

87 The impact categories were developed specifically for this study and applied consistently in both the questionnaire and the case study matrix. They were designed to capture the multidimensional impacts of climate-related environmental disasters on Indigenous Peoples while remaining compatible with the IPCC understanding of climate risk, which recognizes that climate impacts affect both natural and human systems. Accordingly, the assessment examines impacts on **(i) territory and ecosystems** (e.g., ecosystem degradation, biodiversity loss, forest impacts, soil degradation, changes in water sources and territorial use), **(ii) livelihoods and food systems** (e.g., agricultural losses, fishing and hunting disruptions, food insecurity, seasonal changes, and species decline), **(iii) infrastructure, health and well-being** (e.g., damage to homes, roads, schools and water systems, illness, stress, reduced mobility, and nutrition impacts), **(iv) social and cultural dimensions** (e.g., displacement, migration, impacts on sacred sites, cultural practices, and community relations), and **(v) differential impacts**, documenting which groups within the community are most affected, including women, youth, elders, pastoralists, fishers, and forest users. This analytical structure recognizes that, for Indigenous Peoples, climate-related environmental disasters simultaneously affect ecological integrity, livelihoods, governance, culture, and social well-being rather than isolated sectors.

88 **IPCC (Intergovernmental Panel on Climate Change).** 2022. *Climate Change 2022: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change*, Chapter 1 and Glossary. Cambridge, UK and New York, USA, Cambridge University Press. <https://www.ipcc.ch/report/ar6/wg2/>.

89 The response categories were developed specifically for this study and applied consistently across the questionnaire and case study matrix. They were informed by a review of the literature on Indigenous Peoples’ climate adaptation and refined through consultations with participating Indigenous Peoples’ organizations. Rather than organizing responses according to conventional adaptation sectors, such as agriculture, water, or infrastructure, the framework captures the types of responses most frequently identified by Indigenous Peoples themselves: **ecosystem protection and restoration, adaptation of agricultural and productive practices, community-based early warning systems, community disaster preparedness, community management of land and forests, strengthening territorial governance, and defense of Indigenous Peoples’ territories.** While presented separately for analytical purposes, these responses are interconnected and often implemented simultaneously, reflecting the integration of territorial management, livelihoods, governance, Indigenous Peoples’ knowledge systems, and territorial defense in strengthening resilience and adaptive capacity.

90 **IPCC (Intergovernmental Panel on Climate Change).** 2022. *Climate Change 2022: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change*, Chapter 17 and Glossary. Cambridge, UK and New York, USA, Cambridge University Press. <https://www.ipcc.ch/report/ar6/wg2/>; **UNFCCC (United Nations Framework Convention on Climate Change).** 2023. *Decision 2/CMA.5. Global Goal on Adaptation: UAE Framework for Global Climate Resilience*. Bonn, Germany. <https://unfccc.int/documents/636608>. The enabling conditions and barriers were developed specifically for this study and applied consistently in both the questionnaire and the case study matrix. They were selected to examine the institutional, legal, financial, and territorial conditions that Indigenous Peoples identified as influencing their capacity to respond to climate-related environmental disasters. Accordingly, the assessment examines **the legal recognition of Indigenous Peoples and the effective protection of territorial rights**, recognizing that these vary considerably across countries and shape Indigenous Peoples’ adaptive capacity; **access to climate finance**, to assess whether adaptation and loss and damage finance reaches Indigenous Peoples’ territories and supports Indigenous Peoples-led responses; **collaboration with governments, Indigenous Peoples’ organizations, and civil society**, reflecting the role of partnerships in strengthening community responses; **the strength of Indigenous Peoples’ governance and Indigenous Peoples’ knowledge systems**, as the institutional foundations of Indigenous Peoples’ adaptation; and **territorial pressures associated with extractive activities and land conflicts**. While the study does not assess the impacts of extractive activities as an independent object of analysis, it documents situations where they interact with climate-related environmental disasters by increasing vulnerability or constraining Indigenous Peoples’ capacity to respond.

recognition of territorial rights; (iii) access to climate finance; (iv) participation in decision-making processes; (v) collaboration with governments and other institutions; (vi) support from Indigenous Peoples’ organizations and civil society; (vii) the strength of Indigenous Peoples’ governance and Indigenous Peoples’ knowledge systems; (viii) territorial organization and solidarity; and (ix) territorial pressures associated with extractive activities and land conflicts.⁹¹ Examining these enabling conditions and barriers allows the study to move beyond only describing Indigenous Peoples’ responses to understanding the broader institutional and territorial conditions that influence Indigenous Peoples’ adaptive capacity.

⁹¹ Although extractive activities, including mining, oil and gas development, logging, large-scale infrastructure, and land conversion, often intensify the impacts of climate-related environmental disasters by increasing exposure, vulnerability, and ecosystem degradation, this report does not examine extractivism as the primary object of analysis. Rather, extractivism is documented as a contextual factor that shapes the conditions under which Indigenous Peoples respond to climate-related environmental disasters and influences the effectiveness and sustainability of those responses. This has been a common response from most of the case studies interviews, how climate action is focused on these activities because it worsened the impacts and makes the disasters worse. However, it is also a methodological choice of our

Table 2.3. Analytical framework applied across the assessment

Hazards	Impacts	Indigenous Peoples’ responses	Enablers and barriers
Rapid-onset events: floods, storms, cyclones, hurricanes, wildfires, landslides, and heat-waves. ⁹²	Territory and ecosystems: ecosystem degradation, biodiversity loss, forest degradation, soil degradation, changes in water sources and territorial use.	Ecosystem protection and restoration: restoration of forests, wetlands, watersheds, and other ecosystems; protection of biodiversity and natural resources.	Legal recognition of Indigenous Peoples and their rights
Slow-onset events: Droughts ⁹³ , sea-level rise, glacier retreat, desertification, salinization, irregular or changing rainfall patterns, and biodiversity loss	Livelihoods and food systems: food insecurity, reduced water availability, impacts on agriculture, fishing, hunting, pastoralism, and other livelihoods.	Adaptation of agricultural and productive practices: diversification of crops and livelihoods, changes in farming, fishing, hunting, and water management practices.	Access to climate finance
	Infrastructure, health and well-being: damage to homes, water systems, schools, roads, and community infrastructure; impacts on health, nutrition, mobility, and well-being.	Community-based early warning systems: environmental monitoring, observation of ecological indicators, early warning and risk communication.	Participation in decision-making processes
	Social and cultural dimensions: impacts on cultural practices, sacred sites, Indigenous Peoples’ knowledge systems, community cohesion, and knowledge transmission; displacement and migration.	Community disaster preparedness: emergency planning, collective preparedness, evacuation, and response mechanisms.	Collaboration with governments and other institutions
	Differential impacts: disproportionate impacts on women, youth, elders, persons with disabilities, fishers, pastoralists, forest users, and other groups within the community.	Community management of land and forests: collective territorial management, sustainable resource management, watershed and forest governance.	Support from Indigenous Peoples’ organizations and civil society
		Strengthening territorial governance: strengthening Indigenous Peoples’ institutions, traditional authorities, collective decision-making, and Indigenous Peoples’ governance systems.	Strength of Indigenous Peoples’ governance and Indigenous Peoples’ knowledge systems
		Territorial defense: protection of Indigenous Peoples’ lands, waters, territories, and rights where these actions contribute to reducing climate-related risks and maintaining adaptive capacity.	Territorial organization and solidarity
			Territorial pressures associated with extractive activities and land conflicts

⁹² Although **heatwaves** may last from several days to weeks, the IPCC generally classifies them as extreme weather events, and they are therefore considered **rapid-onset hazards**.

⁹³ Droughts occupy an intermediate position. Meteorological drought develops gradually and is generally treated as a **slow-onset process** by the UNFCCC. However, droughts can culminate in acute crises with rapid impacts on livelihoods, food security, and ecosystems.

Together, these four analytical dimensions provide a systematic framework for examining Indigenous Peoples' responses to climate-related environmental disasters across diverse ecosystems and regions. Rather than documenting climate impacts or adaptation measures in isolation, the framework enables a comparative analysis of the relationships between climate-related hazards, their cascading impacts, the responses developed by Indigenous Peoples, their governance, knowledge systems, as well as the enabling conditions that sustain those responses over time. This integrated approach makes it possible to identify recurring patterns across diverse territorial contexts while recognizing that Indigenous Peoples' responses remain deeply rooted in their own ecological, cultural, and institutional realities. In doing so, the framework shifts the analytical focus from documenting individual adaptation practices to understanding the territorial systems through which Indigenous Peoples organize climate adaptation over time.

D. Data analysis

Questionnaire responses were compiled into a master database and analyzed using descriptive statistics to identify the frequency of reported hazards, impacts, Indigenous Peoples' responses, enabling conditions, barriers, and climate finance. Because respondents could report multiple hazards, impacts, responses, and enabling conditions, most variables were analyzed as multiple-response categories. The questionnaire was used to identify broad patterns across Indigenous Peoples' territories rather than to establish causal relationships.

The case studies were analyzed through qualitative comparative analysis using the common analytical framework. Information from each case was coded according to the four analytical dimensions and then compared across ecosystems and regions to identify recurring patterns, similarities, and differences. Rather than evaluating communities according to standardized indicators or ranking adaptation performance, the analysis examined how Indigenous Peoples' governance systems, knowledge systems, and territorial conditions shape responses to climate-related environmental disasters.

The assessment findings were developed through iterative comparison between the questionnaire results and the case studies. Quantitative evidence was used to identify recurring patterns across respondents, while qualitative evidence provided the contextual depth necessary to explain the institutional, ecological, and governance processes underlying those patterns. The integration of these complementary sources of evidence strengthened the robustness of the assessment by combining breadth of coverage with contextual understanding.

E. Scope and limitations

The findings presented in this report are based primarily on the experiences, observations, and analyses of Indigenous Peoples and their organizations. They should therefore be understood as an assessment of Indigenous Peoples-led experiences rather than as an external evaluation of adaptation interventions. The study documents Indigenous Peoples-defined responses as they are conceived, implemented, and sustained by the communities themselves.⁹⁴

The study does not seek to represent all Indigenous Peoples or all Indigenous Peoples' responses to climate change. Rather, it identifies recurring patterns across a global questionnaire and comparative case studies while recognizing that responses remain inherently context-specific. Questionnaire responses are self-reported and are used to identify broad trends, whereas the case studies constitute the principal body of evidence supporting the report's findings.⁹⁵

⁹⁴ Although data were collected through different modalities depending on context, all case studies followed the same analytical framework and documented Indigenous Peoples' experiences and perspectives. Differences in data collection may have affected the level of detail available for individual cases but did not prevent systematic comparison across cases.

⁹⁵ Questionnaire responses generated a broad comparative dataset across regions and ecosystems but were self-reported and not independently verified to

Finally, the assessment does not evaluate Indigenous Peoples’ responses against standardized technical indicators or compare communities according to their performance. Instead, it examines how Indigenous Peoples’ governance, Indigenous Peoples’ knowledge systems, and territorial conditions shape communities’ capacity to respond to climate-related environmental disasters. ⁹⁶

ANNEX 3:

Comparative evidence supporting the assessment findings

This annex summarizes how the eight documented case studies contributed to the assessment findings presented in the report, rather than presenting the cases as separate country narratives.

Table 3.1 Geographic distribution of case studies across regions and ecosystems

Hazards	Impacts	Indigenous Peoples’ responses	Enablers and barriers
AFRICA	Chad	Drylands	Freshwater; Grasslands
	Democratic Republic of Congo	Forest	Mountains; Freshwater
	Ghana	Coastal and marine	Forest
	Kenya	Drylands	Freshwater; Grasslands
	South Africa	Grasslands	Coastal and marine
AMERICAS	Brazil	Forest	Savanna (Cerrado transition)
	Ecuador	Forest	Freshwater
	Guatemala	Drylands	Mountains; Forest
	Nicaragua	Coastal and marine	Freshwater
	Peru	Mountains and glaciers	Freshwater
ASIA	Bangladesh	Freshwater	Forest; Mountain
	India	Mountains and glaciers	Freshwater; Forest
	Indonesia	Forest	Mountains; Freshwater
	Japan	Coastal and marine	Forest; Freshwater
		Mountains and glaciers	Forest; Freshwater

the same extent as the case studies. Response rates also varied across the four languages in which the questionnaire was distributed (English, Spanish, Portuguese, and French). Questionnaire results are therefore used to identify broad trends rather than given the same evidentiary weight as the case studies.

⁹⁶ This study does not evaluate the effectiveness of Indigenous Peoples’ responses against standardized technical indicators or rank responses across cases. Rather, it documents Indigenous Peoples-defined responses on their own terms and examines the governance systems, knowledge systems, and territorial conditions that sustain them, consistent with the study’s methodological approach of centering Indigenous Peoples’ own accounts of their experiences.

Table 3.2. Distribution of case studies across geographic regions and ecosystem types

Ecosystem	Region		
	Africa	Americas	Asia
Forest	Democratic Republic of the Congo	Brazil, Ecuador	Indonesia
Grassland and savanna	South Africa	-	-
Freshwater	-		Bangladesh
Coastal and marine	Ghana	Nicaragua	Japan
Dryland	Kenya, Chad	Guatemala	
Mountain	-	Peru	India, Nepal

Table 3.3. Comparative evidence supporting the assessment findings

Indigenous People	Ecosystem	Interacting hazards and cascading impacts	Integrated territorial responses	Governance and Indigenous Knowledge	Institutional enabling conditions and barriers	Key contribution
Chad Mbororo Fulani Indigenous Peoples Sahel	Sahelian drylands, wetlands, grazing lands and agro-pastoral systems.	Drought, rainfall variability, and water and pasture scarcity interact with land pressures and restrictions on transhumance, increasing livelihood and conflict risks.	Indigenous Peoples use transhumance, flexible access to water and pasture, livestock-feed storage, and scouts to anticipate conditions along migration routes.	Indigenous Peoples’ collective decision-making draws on knowledge held by elders, herders, women, chiefs and the <i>Modibo</i> , including environmental and celestial indicators.	Indigenous Peoples’ institutions and dialogue with meteorological actors enable adaptation; inaccessible forecasts, land pressures, restricted mobility and limited direct finance constrain it.	Shows how Indigenous Peoples’ early-warning knowledge and mobility operate together as a territorial adaptation system.
Democratic Republic of the Congo <i>Batwa Indigenous Peoples</i> <i>South Kivu</i>	Mountain forests and freshwater systems around Lake Kivu.	Intense rainfall interacts with deforestation, degraded slopes and land pressures to intensify floods and landslides, affecting water, agriculture, food security, health and displacement.	Indigenous Peoples combine mutual aid, disaster-response mechanisms, agroforestry, tree nurseries and hillside restoration.	Indigenous Peoples’ solidarity and environmental knowledge operate alongside customary chief-taincies and local governance structures.	Indigenous Peoples’ organization enables response; insecure land rights, conflict, displacement and short-term humanitarian funding constrain long-term adaptation.	Shows how climate hazards interact with land insecurity, conflict and displacement to intensify vulnerability.
Ghana <i>Anlo Ewe Indigenous Peoples</i> <i>Volta Region</i>	Low-lying coastal ecosystems, fishing grounds and agricultural lands.	Sea-level rise, coastal flooding, erosion and salt-water intrusion interact with sand mining, driving land loss, displacement and transformation of fishing livelihoods.	Indigenous Peoples relocate inland and increasingly diversify from fishing toward farming and livestock production.	Indigenous Peoples’ decisions draw on traditional leadership and environmental knowledge, including fish-based indicators of approaching floods.	Indigenous Peoples’ organization supports adaptation; inadequate relocation support, poorly coordinated coastal protection, and continuing sand mining constrain it.	Shows how climate-related displacement transforms Indigenous Peoples’ territory, livelihoods, culture, and relationships with the sea.
Kenya <i>Endorois and Turken Indigenous Peoples</i> <i>Baringo County</i>	Arid and semi-arid rangelands and freshwater systems.	Drought, land degradation and increasingly concentrated rainfall interact to produce livestock losses, food insecurity, flash floods and resource conflict.	Indigenous Peoples combine water and rangeland management, agroforestry, Indigenous seed conservation and livelihood diversification.	Councils of elders and Indigenous Peoples’ organizations govern land, water and grazing, drawing on knowledge held by elders, pastoralists and women.	Strong Indigenous Peoples’ institutions and aligned partnerships enable responses; insecure rights and limited direct finance remain major barriers.	Shows how Indigenous pastoral governance integrates water, livestock, ecosystems and knowledge across a dryland territory.
South Africa <i>AmaMpondo Indigenous Peoples</i> <i>Mpondoland, Eastern Cape</i>	Forest territories in the Amazon-Cerrado transition, including rivers and water sources.	Severe drought and wildfire interact with illegal logging, deforestation, and surrounding agricultural expansion, intensifying forest and water degradation.	Indigenous Peoples combine territorial defense, Indigenous fire-fighting brigades, firebreaks, environmental monitoring, and ecological restoration.	Indigenous Peoples’ leadership and organizations coordinate territorial monitoring and fire response using knowledge of water, rainfall, forests, and fire.	Indigenous organization, brigade recognition, and public support enable responses; illegal logging, agribusiness pressures, and resource shortages constrain them.	Shows that Indigenous Peoples’ wildfire adaptation and territorial defense operate through the same governance systems.

Indigenous People	Ecosystem	Interacting hazards and cascading impacts	Integrated territorial responses	Governance and Indigenous Knowledge	Institutional enabling conditions and barriers	Key contribution
Brazil <i>Guajajara Indigenous Peoples</i> <i>Cana Brava and Araribóia</i>	Forest territories in the Amazon-Cerrado transition, including rivers and water sources.	Severe drought and wildfire interact with illegal logging, deforestation, and surrounding agricultural expansion, intensifying forest and water degradation.	Indigenous Peoples combine territorial defense, Indigenous fire-fighting brigades, firebreaks, environmental monitoring, and ecological restoration.	Indigenous Peoples’ leadership and organizations coordinate territorial monitoring and fire response using knowledge of water, rainfall, forests, and fire.	Indigenous organization, brigade recognition, and public support enable responses; illegal logging, agribusiness pressures, and resource shortages constrain them.	Shows that Indigenous Peoples’ wildfire adaptation and territorial defense operate through the same governance systems.
Ecuador <i>Kichwa Indigenous People of Sarayaku</i> <i>Pastaza</i>	Amazonian rainforest, rivers and chacras within the Kawsak Sacha or Living Forest territory.	Extreme flooding and landslides interact with upstream deforestation and road development, affecting chacras, housing, water and settlement areas.	Indigenous Peoples use their governance institutions to assess impacts, mobilize resources, identify high-risk areas and organize mingas for recovery.	The General Assembly, Governing Council, elders, women and youth connect collective decision-making with Indigenous Peoples’ environmental warning knowledge.	Strong Indigenous Peoples’ governance and institutional capacity enable self-directed recovery; limited State support and external territorial pressures constrain it.	Shows how Indigenous Peoples’ governance can organize environmental knowledge, collective labor, and external support into an integrated disaster response.
Guatemala <i>Maya Achi Indigenous Peoples</i> <i>Rabinal, Baja Verapaz</i>	Dry forests, mountain ecosystems, agricultural lands, rivers and springs within the Dry Corridor.	Drought, heat, intense rainfall, landslides, storms and fires interact with deforestation to affect water, soils, agriculture, food security and infrastructure.	Indigenous Peoples combine forest and watershed restoration, agroforestry, soil conservation, crop diversification and rainwater harvesting.	Indigenous authorities and assemblies draw on knowledge of water, vegetation, rainfall, soils and crops to guide territorial decisions.	Indigenous Peoples’ organization enables collective action; water scarcity, environmental degradation, land pressures and limited resources constrain adaptation.	Shows why compound dry-land hazards require integrated responses linking forests, water, soils and food production.
Nicaragua <i>Miskitu Indigenous Peoples</i> <i>Karata</i>	Nicaragua Miskitu Indigenous Peoples Karata	Hurricanes and rainfall variability damage forests, mangroves, housing, agriculture, fisheries and infrastructure.	Indigenous Peoples reinforce housing, protect food and fishing equipment, relocate crops to safer areas, and restore mangroves.	Indigenous Peoples’ territorial governance and elders’ environmental knowledge guide preparedness, evacuation and recovery.	Indigenous Peoples’ leadership and disaster training strengthen preparedness; uneven external support and limited ecosystem-loss assessment constrain recovery.	Shows how Indigenous Peoples learn across successive disasters and transform preparedness to reduce future losses.
Peru <i>Quechua Indigenous Peoples</i> <i>Ausangate Regional Conservation Area, Cusco</i>	High Andean glaciers, lagoons, bofedales, puna grasslands and headwaters.	Glacier retreat, drought, rainfall variability, and changing water availability degrade <i>bofedales</i> and grasslands and affect alpaca herding and knowledge transmission.	Indigenous Peoples store and redistribute water through <i>qochas</i> and canals and restore bofedales and grasslands for grazing.	Indigenous Peoples’ communal organization and knowledge of water, bofedales, pastures, and alpaca herding guide territorial decisions.	Indigenous Peoples’ organization and territorial knowledge enable adaptation; weakening intergenerational transmission creates a growing challenge.	Shows how high-Andean adaptation integrates water governance, ecosystem management, pastoralism, and Indigenous Peoples’ knowledge transmission.
Bangladesh <i>Chakma Indigenous Peoples</i> <i>Chittagong Hill Tracts</i>	Freshwater and mountain ecosystems.	Drought and rising temperatures reduce water and soil moisture; intense monsoon rainfall then triggers floods and landslides, affecting water, agriculture, food security and infrastructure.	Indigenous Peoples adjust jhum and cropping practices, diversify production, protect water sources and organize collective disaster response.	Customary governance through the Raja, Headmen and Karbaris combines with Indigenous Peoples’ knowledge of rainfall, water, vegetation and slope conditions.	Customary governance and collective resource management enable adaptation; insecure land rights, deforestation and limited direct finance constrain it.	Shows how interconnected hazards cascade through a freshwater territorial system, requiring integrated territorial responses.
India <i>Mising</i> <i>Indigenous Peoples</i> <i>Brahmaputra</i>	Brahmaputra River and floodplain freshwater ecosystems.	Recurrent flooding damages homes, property and livestock and disrupts water and sanitation.	Indigenous Peoples adapt <i>chang ghor</i> stilt houses to remembered flood levels and use elevated spaces for livestock and food storage.	Knowledge of river behaviour and past flood levels guides housing and preparedness decisions, with women playing a central role.	Indigenous Peoples’ housing practices and NGO partnerships enable adaptation; economic constraints and limited long-term recovery support create barriers.	Shows how Indigenous Peoples’ knowledge of river dynamics informs adaptive housing and preparedness for recurrent floods.

Indigenous People	Ecosystem	Interacting hazards and cascading impacts	Integrated territorial responses	Governance and Indigenous Knowledge	Institutional enabling conditions and barriers	Key contribution
Indonesia <i>Tano Batak Indigenous Peoples</i> <i>North Sumatra</i>	Mountain forests, rivers, watersheds, rice fields and agroforestry systems.	Extreme rainfall interacts with deforestation and watershed degradation to intensify floods and landslides, affecting forests, water, food systems, and infrastructure.	Indigenous Peoples use customary governance and <i>Marsialapari</i> collective labor to organize evacuation, food, water, access, and recovery.	<i>Dalihan Na Tolu, Tonggo Raja</i> and <i>Raja Huta</i> organize collective responsibilities and territorial decision-making informed by Indigenous knowledge.	Strong customary governance enables rapid response; insecure territorial recognition and limited direct finance constrain long-term recovery.	Shows how Indigenous Peoples’ governance itself can function as disaster-response infrastructure.
Japan <i>Ryukyuan Indigenous Peoples</i> <i>Ryukyu Islands</i>	Subtropical islands, coral reefs, mangroves, seagrass, forests and coastal systems.	Typhoons, extreme rainfall, sea-level rise, marine heatwaves and coastal erosion affect fisheries, agriculture, water,	Indigenous Peoples combine disaster preparedness, ecosystem restoration, environmental education, knowledge documentation and language revitalization.	Elders, fishers, farmers and cultural and spiritual knowledge holders maintain Indigenous Peoples’ knowledge of winds, tides, species and seasonal change.	Indigenous Peoples’ cultural continuity and networks support adaptation; lack of recognition, territorial rights and FPIC constrain Indigenous Peoples’ governance.	Shows how lack of legal recognition limits Indigenous Peoples’ capacity to exercise territorial governance for climate adaptation.
Nepal <i>Thami Indigenous Peoples</i> <i>Dolakha District</i>	Himalayan forests, terraced agricultural landscapes, rivers, springs and high-altitude grasslands.	Erratic monsoon rainfall, drought and unstable slopes interact to produce floods and landslides affecting agriculture, water, infrastructure and sacred places.	Indigenous Peoples combine slope stabilization, bio-engineering, vegetation restoration and culturally significant tree planting.	Elders and spiritual leaders guide ecological practices, while Indigenous youth participate in restoration and intergenerational knowledge transmission.	Indigenous Peoples’ governance and external Indigenous Peoples-led funding support responses; insecure tenure, migration, language loss and limited direct finance constrain them.	Shows how ecosystem restoration can simultaneously reduce disaster risk and strengthen Indigenous Peoples’ knowledge transmission.

ANNEX 4:

Summary of questionnaire results

The questionnaire received 216 valid responses from Indigenous Peoples and Indigenous Peoples’ organizations representing diverse ecosystems, geographic regions and Indigenous Peoples’ knowledge systems. The tables summarize the frequency with which respondents reported climate-related hazards, impacts, Indigenous Peoples’ responses, governance conditions and enabling factors. Together, these descriptive statistics provide the empirical foundation for the assessment findings presented in the main report. Because respondents could select multiple responses for most questions, percentages shown in many tables do not sum to 100%.

The purpose of this annex is to provide the quantitative evidence supporting the assessment findings presented in the main report. Rather than interpreting the questionnaire independently, the tables document the frequency and distribution of hazards, impacts, Indigenous Peoples’ responses, governance conditions and institutional factors reported by respondents. They increase the transparency of the assessment by allowing readers to examine the descriptive evidence underlying the report’s synthesis while preserving the report’s focus on comparative analysis across case studies and regions.

A. Annex 4.1 Respondent characteristics

This section describes the characteristics of the respondents and illustrates the geographic, ecological and cultural diversity represented in the questionnaire. Together, these tables demonstrate the broad territorial coverage of the assessment and the diversity of Indigenous Peoples contributing evidence.

Table 4.1.1 Geographic distribution of respondents

Region	Number of responses	Percentage (%)
Africa	101	46.8
Asia	39	18.1
Americas	73	33.8
Pacific	3	1.4
Total	216	100.0

Table 4.1.2 Languages of questionnaire responses

Language	Number	Percentage (%)
English	109	50.5
Spanish	63	29.2
French	42	19.4
Portuguese	2	0.9
Total	216	100.0
Total	216	100.0

Table 4.1.3 Ecosystems represented by respondents

Ecosystem	Number of responses	Percentage (%)
Forest Ecosystem	124	57.4
Grassland and savanna ecosystems	29	13.4
Freshwater ecosystems	25	11.6
Coastal and marine ecosystems	14	6.5
Mountain ecosystems	12	5.6
Dryland ecosystems	9	4.2
Other ecosystems	3	1.4
Arctic/Tundra ecosystems	0	0
Total	216	100

Table 4.1.4 Indigenous Peoples represented in the questionnaire

Region	Indigenous Peoples represented (examples)
Africa	AmaMpondo, Batwa, Bambuti, Bedzang, Borana, Chewa, Endorois, Ewe, Ilchamus, Khoesan, Luhya, Maasai, Mbororo Fulani, Ogiek, Ogoni, Rendille, Samburu, San (!Kung), Songhai, Tonga, Yoruba and other Indigenous Peoples.
Asia	Balinese, Chakma, Chamling Rai, Dayak, Gaddang, Igorot, Kalasha, Kasepuhan Cisungsang, Kui, Lahu, Magar, Marma, Mro, Newa, Orang Asli, Orang Rimba, Paliyar, Pulaiyar, Rai, Rohingya, Ryukyuan, Sindhi, Sunuwar, Taokas, Tanchangya, Tripura, West Papuan and other Indigenous Peoples.
Americas	Achuar, Asháninka, Arhuaco, Aymara, Baniva, Carapana, Chapra, Cubeo, Cuiba, Emberá Chamí, Emberá Dovida, Eduria, Guna, Inga, Kichwa, Kogui, Matsigenka, Mayangna, Maya (Kaqchikel, K'iche', Pipil), Miskitu, Nahua, Pastos, Puruhá, Quechua, Shuar, Sikuani, Tacana, Tseltal, Waiãpi, Wayuu, Wounaan, Yanesha, Zoque, and other Indigenous Peoples.
Pacific	Motu Koita, Roro, and other Indigenous Peoples of Papua New Guinea.

B. Annex 4.2 Climate-related environmental disasters

This section summarizes the climate-related hazards reported by respondents and documents the combinations of hazards most frequently experienced within Indigenous Peoples’ territories. The results complement the assessment findings on interacting hazards and cascading environmental disasters.

Table 4.2.1 Most frequently reported climate-related hazards

Hazard	Number of responses	Percentage (%)
Flood	117	54.2
Drought	105	48.6
Irregular rainfall / seasonal disruption	84	38.9
Heatwaves / rising temperatures	61	28.2
Erosion	51	23.6
Severe storms	46	21.3
Wildfires	40	18.5
Desertification / land degradation	41	19.0
Sea-level rise	16	7.4
Glacier retreat	6	2.8

Note: Respondents could select more than one hazard; therefore, percentages do not sum to 100%.

Table 4.2.2 Most frequently reported hazard combinations

Hazard combination	Number of responses
Flood + Drought + Wildfire	11
Flood + Drought + Heatwaves	10
Drought + Heatwaves + Irregular rainfall	10
Flood + Drought + Severe storms	9
Flood + Heatwaves + Irregular rainfall	6
Flood + Drought + Irregular rainfall	6
Flood + Drought	6
Flood + Irregular rainfall + Erosion	5
Flood + Wildfire + Erosion	5
Drought + Irregular rainfall + Desertification	5

C. Annex 4.3 Impacts of climate-related environmental disasters

This section summarizes the principal impacts associated with climate-related environmental disasters as reported by respondents. Because multiple impacts frequently occur simultaneously, respondents could identify more than one category of impact.

Table 4.3.1 Multiple impacts

Impacts	Type of impact	Number of responses	Percentage (%)
Ecosystem impacts	Ecosystem degradation and biodiversity loss	144	66.7
	Reduced water availability	52	24.1
Livelihood impacts	Agriculture, fishing and hunting affected	98	45.4
Food systems	Food insecurity	93	43.1

Impacts	Type of impact	Number of responses	Percentage (%)
Infrastructure, health and well-being	Infrastructure and housing damage	58	26.9
	Health and well-being problems	21	9.7
Cultural and social impacts	Cultural impacts (including sacred sites and knowledge transmission)	66	30.6
		38	17.6

Note: Respondents could select more than one impact; therefore, percentages do not sum to 100%.

D. Annex 4.4 Indigenous Peoples’ responses

This section summarizes the principal responses reported by Indigenous Peoples across the questionnaire. The tables illustrate both the frequency of reported responses and their distribution across major categories of territorial adaptation.

Table 4.4.1 Most frequently reported Indigenous Peoples’ responses

Response	Number of responses	Percentage (%)
Ecosystem protection and restoration	124	57.4
Agricultural and productive adaptation	97	44.9
Strengthening territorial governance	73	33.8
Community land and forest management	73	33.8
Community disaster preparedness	46	21.3
Community early warning systems	41	19.0
Territorial defense	55	25.5
Community health protection	30	13.9

Note: Respondents could report more than one response category; therefore, percentages do not sum to 100%.

E. Annex 4.5 Enabling conditions and barriers

This section summarizes the institutional conditions that respondents identified as enabling or constraining Indigenous Peoples’ responses to climate-related environmental disasters, including governance conditions, barriers, and access to climate finance.

Table 4.5.1 Main enabling conditions

Enabling condition	Number of responses	Percentage (%)
Access to climate finance	111	51.4
Legal recognition of Indigenous Peoples	102	47.2
Participation in decision-making	92	42.6
Support from Indigenous Peoples’ organizations and civil society	85	39.4
Recognition of territorial rights	78	36.1
Strength of Indigenous Peoples’ governance and knowledge systems	71	32.9
Collaboration with governments and institutions	44	20.4

Table 4.5.2 Main barriers

Barrier	Number of responses	Percentage (%)
Limited climate finance	78	36.1
External interventions not aligned with Indigenous Peoples’ priorities	31	14.4
Lack of legal recognition	27	12.5
Exclusion from decision-making	25	11.6

Barrier	Number of responses	Percentage (%)
Weak government and institutional support	22	10.2
Lack of territorial rights	14	6.5
Pressure from extractive activities	14	6.5

Note: Respondents could identify more than one barrier; therefore, percentages do not sum to 100%.

Table 4.5.3 Climate finance

Climate finance status	Number of responses	Percentage (%)
Received directly by Indigenous Peoples or organizations	59	27.3
Received through another institution	53	24.5
Did not receive climate finance	104	48.1
Total	216	100

Note: Percentages are based on all 216 questionnaire respondents. The three categories are mutually exclusive and therefore sum to 100%.

ANNEX 5:

QUESTIONNAIRE

This questionnaire seeks to document the impacts of climate-related environmental disasters on Indigenous Peoples’ territories and to better understand Indigenous Peoples-led responses to those impacts. The focus of this research is specifically on climate-related environmental disasters, including floods, droughts, wildfires, cyclones, sea-level rise, glacial melt, and extreme heat events.

Introductory consent note

Before answering this questionnaire, please confirm that:

- ☐ I understand that this questionnaire is part of a global study on Indigenous Peoples’ responses to climate-related environmental disasters.
- ☐ I agree that the information shared may be used for comparative analysis and reporting.
- ☐ I understand that participation is voluntary and that information may be withdrawn at any stage before final analysis.

Section I: General Information

This section collects general contextual information about the Indigenous Peoples and the organization of Indigenous Peoples responding to the questionnaire. It helps situate the case geographically and ecologically and facilitates regional comparison across different types of ecosystems and governance contexts.

1. In which region is the Indigenous Peoples' territory located?

(Select one option only)

☐ Americas

☐ Africa

☐ Asia

☐ Arctic

☐ Pacific

Country: _____

Indigenous Peoples: _____

2. Which type of ecosystem best describes the territory?

(Which ecosystem is most directly affected?)

☐ Forest (Areas dominated by trees and dense vegetation, often rich in biodiversity and important for climate regulation and carbon storage)

☐ Grassland / savanna (Open landscapes dominated by grasses and scattered vegetation, often shaped by seasonal rainfall, fire, and grazing)

☐ Freshwater ecosystems (Inland water systems including rivers, lakes, wetlands, marshes, swamps, floodplains, and other freshwater-dependent ecosystems)

☐ Coastal and marine ecosystems (Sea-based and coastal ecosystems including coastal waters, estuaries, mangroves, coral reefs, and shore zones)

☐ Dryland ecosystems (Dry territories with low rainfall, sparse vegetation, and high vulnerability to drought and desertification. Covers arid, semi-arid, Sahel, dry corridor)

☐ Mountain ecosystem (High-elevation areas with steep terrain, often characterized by altitude-sensitive biodiversity, glaciers, and water sources)

☐ Tundra / polar ecosystem (Very cold regions with frozen soils, limited vegetation, and ecosystems highly sensitive to temperature change)

☐ Other: _____

Section II: Climate-Related Environmental Disaster

This section identifies the main climate-related environmental disasters affecting the territory. The objective is to understand the type, frequency, and evolution of climate events impacting Indigenous Peoples across different regions.

3. Over the past 10 years, which climate phenomena have most affected your territory?

(Select up to 3 options)

- ☐ Floods (Overflow of water that temporarily covers land that is normally dry, affecting homes, crops, infrastructure, and ecosystems)
- ☐ Droughts (Prolonged periods of low rainfall that reduce water availability for people, ecosystems, crops, and livestock)
- ☐ Severe storms (Intense storms with strong winds and heavy rainfall that can cause flooding, damage, and displacement, including cyclones, hurricanes, and typhoons)
- ☐ Wildfires (Large uncontrolled fires affecting forests, grasslands, drylands, and territories under hot or dry conditions)
- ☐ Heatwaves / rising temperatures (Periods of unusually high temperatures or long-term warming that affect health, ecosystems, crops, and water systems)
- ☐ Sea-level rise (Gradual increase in sea level that affects coastal areas through flooding, erosion, and saltwater intrusion)
- ☐ Glacier retreat / glacial melt (Progressive loss of glaciers or snow cover that alters water availability and mountain ecosystems)
- ☐ Desertification / land degradation (Progressive loss of soil fertility, vegetation, and ecosystem productivity, especially in drylands)
- ☐ Irregular rainfall / seasonal disruption (Changes in rainfall timing, intensity, or duration that alter seasonal cycles, agriculture, and ecosystem balance)
- ☐ Erosion (Loss of land caused by river currents, waves, tides, or changing water dynamics, including riverbank or coastal erosion)
- ☐ Other: _____

4. Considering the three climate phenomena selected above, how has their overall frequency changed in your territory over the past 10 years?

- ☐ Stable (Similar frequency as before, with no major noticeable increase)
- ☐ Slight increase (More often than before, but changes are gradual or occasional)
- ☐ Moderate increase (More often than before and are increasingly affecting the territory)
- ☐ Strong increase (Much more often than before and have become a major and recurring concern for the territory)

Section III: Dimensions of Impact

This section seeks to identify how climate-related environmental disasters affect the territories and systems of life of Indigenous Peoples. It focuses on understanding the main impacts on ecosystems, livelihoods, access to water and food, health, and cultural practices linked to the territory. The information will help analyze the severity and types of impacts faced by communities.

5. What are the most significant impacts on Indigenous Peoples and their systems of life?

(Possible to select more than one option)

- ☐ Ecosystem degradation or loss of biodiversity (Damage to forests, water sources, soils, wildlife, or other ecosystems in the territory)
- ☐ Reduced water availability (Less access to water for drinking, food production, daily use, or ecosystem needs)
- ☐ Impacts on agriculture, fishing, or hunting (Reduced production, loss of species, or difficulty maintaining traditional livelihoods)
- ☐ Food insecurity (Reduced access to sufficient, safe, or culturally appropriate food)
- ☐ Damage to homes, water systems, or community infrastructure (Damage to houses, water tanks, wells, roads, schools, or shared community systems)
- ☐ Community health or well-being problems (Illness, stress, reduced mobility, or other impacts on physical or mental well-being)
- ☐ Impacts on cultural practices, sacred sites, or knowledge transmission (Disruption of ceremonies, traditional knowledge, sacred places, or cultural activities)
- ☐ Community displacement (Temporary or permanent movement of families or communities from their territory)
- ☐ Other impact: _____

Section IV: Responses Led by Indigenous Peoples

This section documents the responses led by Indigenous Peoples to climate-related environmental disasters. The objective is to understand how governance systems, knowledge systems, and community initiatives contribute to adaptation, resilience, and territorial protection.

6. What are the main responses developed by Indigenous Peoples to address these impacts?

(Possible to select more than one option)

- ☐ Ecosystem protection or restoration (Actions to protect forests, water sources, soils, biodiversity, or restore damaged ecosystems)
- ☐ Adaptation of agricultural or productive practices (Changes in farming, fishing, hunting, or other livelihoods to cope with changing environmental conditions)
- ☐ Community-based early warning systems (Local systems to monitor risks and alert the community before floods, fires, storms, or other events)

- ☐ Community disaster preparedness (Community plans, training, or collective actions to prepare for emergencies and reduce risks)
- ☐ Actions to protect community health (Measures to prevent disease, protect well-being, or respond to health impacts caused by climate events)
- ☐ Community-based land or forest management (Collective management of territory, forests, water, or natural resources through local governance systems)
- ☐ Strengthening territorial governance (Actions to reinforce community organization, decision-making, or territorial control)
- ☐ Defense of the territory (Actions to protect the territory from external pressures such as mining, oil extraction, logging, or others)
- ☐ Other: _____

Please briefly describe the main response(s), including who led the response, how decisions were organized, whether Indigenous Peoples’ knowledge guided the response, and what results it has had so far (maximum of 200 words): _____

Section V: Enabling Conditions and Barriers

This section examines the structural conditions that influence the capacity of Indigenous Peoples to respond to climate-related environmental disasters. It seeks to identify both the enabling factors that support Indigenous Peoples’ responses and the structural barriers that may limit them.

7. Which conditions help strengthen the capacity of Indigenous Peoples to respond to climate impacts?

(Possible to select more than one option)

- ☐ Legal recognition of Indigenous Peoples (Official recognition of Indigenous Peoples and their collective rights within national laws or policies)
- ☐ Recognition of territorial rights (Legal or customary recognition of the Indigenous Peoples community’s rights over its territory and natural resources)
- ☐ Access to climate finance (Availability of financial support for community responses, adaptation, or recovery)
- ☐ Participation in decision-making processes (Involvement in decisions affecting the territory, resources, or climate responses)
- ☐ Collaboration with governments or institutions (Support or coordination with public institutions, local authorities, or other organizations)
- ☐ Support from Indigenous Peoples’ organizations or civil society (Technical, political, or organizational support from Indigenous Peoples’ organizations, NGOs, or networks)
- ☐ Strong Indigenous Peoples’ knowledge and governance systems (Use of Indigenous Peoples’ knowledge, local practices, and community decision-making systems)
- ☐ Other: _____

8. If you selected “Access to climate finance” above, was the funding received directly by Indigenous Peoples or through another institution?

(Select one option and indicate the main source of funding.)

- ☐ Yes, directly received by the community or Indigenous Peoples’ organization
- ☐ No, received through another institution
- ☐ No climate funding received

9. What was the main source of funding?

(Possible to select more than one source)

- ☐ National government (Funding provided through public institutions or government programs)
- ☐ International organization (Funding provided by multilateral agencies, UN agencies, or international cooperation)
- ☐ NGO or foundation (Funding provided by non-governmental organizations, charities, or private foundations)
- ☐ International climate fund (Funding originating from dedicated international climate finance mechanisms such as GEF, GCF, or others)
- ☐ Other: _____

If funding was received, was it aligned with Indigenous Peoples’ priorities?

- ☐ Yes, fully aligned
- ☐ Partially aligned
- ☐ No
- ☐ Difficult to assess

10. What is the main barrier limiting the response to climate impacts?

(Select the most important one)

- ☐ Lack of legal recognition of Indigenous Peoples (The State does not fully recognize Indigenous Peoples or their collective rights)
- ☐ Lack of recognition of territorial rights (Territorial rights are not fully protected or recognized)
- ☐ Limited access to climate finance (Insufficient funding for adaptation, recovery, or community responses)
- ☐ Exclusion from decision-making processes (Limited participation in decisions affecting the territory or climate actions)
- ☐ Weak government or institutional support (Insufficient support from public institutions or external actors)
- ☐ Pressure from extractive activities (Mining, oil, logging, or other external pressures affecting the territory)

☐ External interventions that do not respond to Indigenous Peoples’ priorities (Projects or measures imposed without respecting local needs, rights, or Indigenous Peoples’ knowledge)

☐ Another important barrier (please describe): _____

If possible, briefly explain why this barrier is most significant: _____

ANNEX 6:

CASE STUDY MATRIX

This case study matrix was used to guide data collection across all territories included in this study. The matrix is organized into seven dimensions, from general territorial context and governance to climate hazards, their impacts, Indigenous Peoples’ responses, and the enabling conditions and barriers shaping those responses, each paired with guiding analytical questions used to structure interviews and desk research, and a column for the aimed information to be collected. This common template was applied consistently across all case studies, allowing for comparability across territories while still capturing what is specific to each Indigenous Peoples’ community.

Dimension		Guiding analytical questions	Information to collect
General Information	Territorial context	Can you describe the territory where your community lives today, its main ecosystems?	Main ecosystems, ecological zones, territorial characteristics, recent landscape changes
	Territorial governance	How is the territory governed? Who makes collective decisions, and what traditional authorities exist?	Governance structure, traditional authorities, assemblies, territorial norms, decision-making mechanisms
Climate - Related Environmental Disaster	Main climate phenomena	What climate-related changes or events have most affected the territory in the last 10 years? Was there one event communities identify as especially severe? Are hazards overlapping?	Main hazards, chronology of events, slow onset / sudden onset, compound hazards
	Observation of phenomena	How do communities identify or interpret environmental changes? Are there some indicators?	Seasonal indicators, ecological signals, animal behavior, water cycles, stars, winds, territorial indicators
Dimensions of Impact	Territory and ecosystems	How have climate phenomena affected the territory and natural systems?	Ecosystem degradation, biodiversity loss, forest impacts, soil degradation, water source alteration, territorial use changes
	Livelihoods and food systems	How have livelihoods and food systems been affected?	Agricultural losses, fishing changes, hunting disruption, food insecurity, seasonal changes, species decline
	Infrastructure, health and well-being	How have climate events affected homes, infrastructure, health, and daily well-being?	Damage to houses, roads, schools, water systems, illness, stress, reduced mobility, nutrition impacts
	Social and cultural dimensions	Have climate impacts affected mobility, cultural practices, sacred places, or community relations? Who has been most affected?	Displacement, migration, sacred site impacts, disrupted ceremonies, women, youth, elders, pastoralists, fishers, forest users
	Differential impacts	Who has been most affected within the community?	Women, youth, elders, pastoralists, fishers, forest users
Responses Led by Indigenous Peoples	Indigenous Peoples’ response	What responses have communities developed? Which has worked best? Which practices changed, remained, or were strengthened?	Adaptation practices, territorial responses, collective measures, continuity and innovation
	Governance and knowledge systems	Which knowledge guided these responses and who led decision-making? Was traditional knowledge used, and is it still being transmitted?	Leadership roles, decision-making processes, role of elders, women, youth, traditional authorities, knowledge continuity and transmission

Dimension		Guiding analytical questions	Information to collect
Enabling Conditions and Barriers	Enabling Conditions and Barriers	What has helped communities respond effectively, and what makes response more difficult today?	Territorial organization, solidarity, external support, funding gaps, legal barriers, land pressure, conflict
	External support and climate finance	Have governments, NGOs, or international actors supported responses? Has climate funding reached the territory? Was it useful and aligned with community priorities?	Climate finance access, external interventions, relevance of support, direct or indirect funding
	Territorial pressure	Is there a link between climate impacts and pressures such as mining, oil, logging, or land conflicts?	Territorial pressure due to extractivism
		What climate risks are most worrying now, and what support would communities prioritize today?	Main future threats, urgent needs, long-term priorities



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