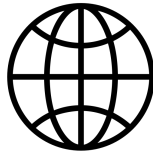


# LATIN AMERICA AND GLOBAL CATASTROPHIC RISKS

TRANSFORMING RISK  
MANAGEMENT





Observatorio de Riesgos Catastróficos Globales (ORCG) is a science-diplomacy organization that works on formulating governance proposals that allow the comprehensive management of different global risks in Spanish-speaking countries. We connect decision-makers with experts to achieve our mission, producing evidence-based publications.

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## Executive Summary

This report aims to comprehensively analyze risk management systems in Latin American countries, focusing on strengthening the management of Global Catastrophic Risks (GCR). GCRs are defined as those with the potential to harm human well-being on a global scale. Although various risks that meet this definition have been identified, this work focuses on the risks associated with artificial intelligence (AI), biological risks, and abrupt sunlight reduction scenarios (ASRS).

These risks represent global challenges that require international cooperation and adequate management. Various stakeholders have shared their growing concern around GCRs. Among them is the Secretary-General of the United Nations, the Organization for Economic Cooperation and Development (OECD), the United Nations Office for Disaster Risk Reduction (UNDRR) (Appendix 1 - UNDRR interview), the World Economic Forum (WEF), as well as civil society organizations and research centers. To prevent them, countries like the United States, the United Kingdom, and Norway have articulated their own local efforts, such as legislation and national plans.

For its part, Latin America has had to strengthen its institutions and coordination mechanisms at the national and regional levels due to its high exposure to these risks. Although a minority of Latin American countries have implemented some strategies to prevent, mitigate, or respond directly or indirectly to GCRs, efforts are limited. Despite this, we highlight that, in the past, the region has demonstrated its capacity to contribute to initiatives related to nuclear disarmament and the elimination of biological weapons.

In this context, we recommend that Latin America stay informed to face other emerging threats. Lack of preparation jeopardizes its stability and progress, significantly impacting key areas such as the economy and public health. Based on the three risks of interest, a series of measures are proposed for the countries of the region:

Area of interest	Proposals
<b>General</b>	<ol style="list-style-type: none"> <li>1. Integrate GCR into national risk assessments</li> <li>2. Reconsider risk prioritization in national registries</li> <li>3. Develop institutional mechanisms to improve comprehensive risk management</li> <li>4. Develop financial mechanisms to encourage GCR management</li> <li>5. Strengthen regional and international cooperation for GCR reduction</li> <li>6. Encourage accessible and clear communication about GCRs</li> </ol>
<b>Artificial intelligence</b>	<ol style="list-style-type: none"> <li>1. Develop national plans and regulations for AI</li> <li>2. Monitor AI adoption for risks</li> <li>3. Participate in multilateral initiatives for global governance</li> </ol>
<b>Biosecurity</b>	<ol style="list-style-type: none"> <li>1. Promote intersectoral integration and transparency in epidemiological surveillance systems</li> <li>2. Strengthen regulation for high-containment laboratories</li> <li>3. Conduct preparation exercises for anthropogenic biological</li> </ol>

Area of interest	Proposals
	events 4. Monitor antimicrobial resistance in the animal industry 5. Safeguard natural ecosystems
<b>Abrupt Sunlight Reduction Scenarios (ASRS)</b>	1. Include ASRS preparedness and response measures in national management plans 2. Promote regional cooperation in ASRS management 3. Strengthen resilient food producing industries 4. Implement information and training strategies for ASRS 5. Ensure food equity in crisis scenarios

Based on the work we have carried out, we conclude that Latin America will benefit from adopting a wider perspective and a proactive attitude in adequately managing catastrophic risks. This implies recognizing biases, strengthening institutions, and promoting anticipatory governance that addresses regional vulnerabilities. Once this “risk knowledge” has been accumulated, we recommend that the region strengthen its prevention and mitigation capabilities.

# Introduction

Due to their cultural, historical, and social similarities, in this report we analyze the risk management systems of Brazil and Spanish-speaking countries in Latin America, including the Dominican Republic and Cuba, from the perspective of Global Catastrophic Risks (GCR). Risks linked to artificial intelligence, biological risks, and abrupt sunlight reduction scenarios are specifically examined to identify opportunities in the region's risk management systems and propose strategies that strengthen the capacity for anticipation, response, and recovery in these challenges.

Risk is defined as the potential loss of life, injury, or destroyed or damaged assets that could occur to a system, society, or community in a specific period (United Nations, 2016). This is determined probabilistically based on danger, exposure, vulnerability, and capacity. Its manifestations range from earthquakes and natural pandemics to emerging threats such as advanced artificial intelligence and manipulating artificial pathogens.

Today we are immersed in a "risk society" characterized by emerging risks on an unprecedented scale derived from scientific and technological advances and processes of globalization (Beck, 1992). In this global reality, it is necessary to highlight the importance of Latin America and take advantage of the region's potential for greater risk management. Although it could contribute to the management of GCR and take advantage of its resources, infrastructure, and specialized knowledge, the region also faces challenges such as lack of public awareness, limited investment in prevention, and poor regional coordination.

In the first section, the concepts of risk and GCR are evaluated. In the second, the most notable global initiatives for the management of GCR are reviewed. The third presents an analysis of the national risk management systems in Latin America, the regional cooperation initiatives on which they are supported, and the presence of different GCRs in developing public policies. The fourth section explains the importance of Latin America in the governance of different GCRs. The fifth section proposes improvements for risk management systems, both in general and for each of the GCRs that we prioritize. The report closes with a conclusion.

# Understanding global risk

Risk management is fundamental to public governance and citizen well-being (Banerjee & Ewing, 2004). In the context of this report, risk is understood as the combination of the probability of occurrence and the impact of an adverse event. Risk can also be conceptualized as the combination of three factors (UNDRR, 2015):

- Hazard: a potentially harmful physical event, phenomenon, or human activity that may cause loss of life or injury, property damage, serious disruption of social and economic life, or environmental degradation.
- Exposure: proportion of people and elements subject to the effects of a certain danger.
- Vulnerability: conditions determined by physical, social, economic, and environmental factors or processes that increase the susceptibility and exposure of a community to the impact of threats.

On the subject of hazard, humans have suffered throughout history the effects of all types of natural hazards, including floods, earthquakes, cyclones, and volcanic eruptions. Conversely, pandemics, wars, and famines have led to some of the deadliest events. For example, the number of deaths attributed to COVID-19 is 100 times greater than annual deaths attributed to all natural disasters (Boyd & Wilson, 2023).

However, the frequency of these disasters is not linear. On the one hand, until 2022, the number of large-scale wars (Roser et al., 2016) and famines (Hasell, 2018) decreased for several decades. On the other hand, the number of climate-related disasters quintupled between 1970 and 2019 globally (Douris & Kim, 2021). In the coming decades, epidemics could triple in occurrence (Marani et al., 2021).

Regarding vulnerability and exposure, the analysis is ambivalent. Although global vulnerability to disasters, especially climate-related ones, has decreased (Formetta & Feyen, 2019), exposure to certain hazards has also increased. For example, accelerated urbanization implies greater concentrations of people, a greater risk of infectious disease outbreaks (Neiderud, 2015), and a greater impact of some disasters (Gencer, 2017). Given this, it has been documented that some pillars<sup>1</sup> are “factors that contribute to making a country more or less resilient and vulnerable to crises, whether internal or exogenous” (Dahl et al., 2022).

In any case, today's society faces a scenario substantially different from all previous ones since the risk landscape has evolved over time to integrate the emergence of new dangers and the mitigation of others. In the words of Beck (1992), the current society is a “risk society,” characterized by the growing production of a type of risk largely driven by scientific-technological progress and modernization processes. Technical advances can help prevent and mitigate certain risks but also create new dangers of their own (Beckstead et al., 2014). Likewise, globalization allows these emerging risks to transcend borders and acquire a global character, increasing their scale (Aven & Zio, 2021).

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<sup>1</sup>Among them are economic stability; the quality of governance, education, gender equality; the resilience of the business environment, among others. (Dahl et al., 2022).

In this context, global catastrophic risks (GCR) emerge, defined as those with the potential to inflict serious harm on human well-being globally (Bostrom & Ćirković, 2012). Some dangers considered GCRs are climate change, pandemics – natural or designed –, nuclear war, deployment of misaligned artificial intelligence, the eruption of a supervolcano, or asteroid impacts (Ord, 2020). Many of these hazards have been created or exacerbated by anthropogenic actions and can, therefore, be prevented by appropriately modifying these actions. Additionally, there are mitigation measures that could alleviate the impact of each hazard.

This report focuses on the risks posed by artificial intelligence, biological risks (such as pandemics or bioterrorism), and abrupt sunlight reduction scenarios. This prioritization arises from the fact that these risks, specifically the angle through which they are analyzed in this report, have generally been neglected by the scientific and political communities.

Artificial intelligence (AI) reduces the barriers to entry for malicious actors, such as authoritarian states or criminal and terrorist organizations, to cause large-scale damage through the execution of cyberattacks (Hazell, 2023), the malicious use of scientific and technological advances (Soice et al., 2023), or the manipulation of individuals (Park et al., 2023). AI systems are expected to have more advanced capabilities and greater autonomy, and their behavior is difficult to align with the preferences of their developers (Carlsmith, 2022). This combination of factors raises the possibility that, in the future, AI systems themselves could autonomously cause catastrophic incidents (Amodei et al., 2016; Ngo et al., 2022).

Global catastrophic biological risks<sup>2</sup> refer to events in which biological agents could lead to a sudden, extraordinary, and widespread disaster that escapes the collective control capacity of governments and the private sector (Schoch-Spana et al., 2017). Natural pandemics such as the Black Death or Influenza A have caused some of the historical episodes with the highest mortality rates (Castañeda Guillot et al., 2021). However, advances in biotechnology could also facilitate the development of pathogens genetically modified to be more transmissible or virulent. This kind of event could arise from legitimate scientific purposes with serious risks of accident (Selgelid, 2016) or from deliberate acts of bioterrorism (Pinto, 2013).

Abrupt sunlight reduction scenarios (ASRS) are those in which the atmosphere is clouded by a large amount of particulate matter. In this scenario, sunlight would be prevented from reaching the Earth, causing a global winter, and, consequently, a rapid agricultural collapse that could end the lives of billions of people (Xia et al., 2022). This could be caused by nuclear war, a supervolcano eruption, or an asteroid impact (Denkenberger & Pearce, 2015). A historical example of this scenario was the 1815 eruption of the Tambora volcano in Indonesia, which triggered the so-called “year without summer,” a global food crisis in 1816 (Brönnimann & Krämer, 2016).

Regarding the nuclear conflict that could cause an ASRS, the Stockholm International Peace Research Institute (SIPRI) presented its annual analysis of the global

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<sup>2</sup> These can be (i) naturally emerging, (ii) deliberately created and released, or (iii) engineered in a laboratory and accidentally released.



arms, disarmament, and security situation in mid-2023 (SIPRI, 2023). Matt Korda, associate researcher with the Weapons of Mass Destruction program, highlights that the rhetoric of nuclear states is hardening, and some are issuing veiled or direct threats about the use of nuclear weapons.

Russia and the United States hold almost 90% of the total nuclear weapons. At the same time, China's arsenal estimate has increased to 410 nuclear warheads, and its intercontinental missile capacity is approaching that of the United States and Russia. Furthermore, France, North Korea, and Israel show ongoing modernization and development of nuclear weapons, generating concerns about geopolitical tensions and the urgency of measures for disarmament and international security (SIPRI, 2023).

The conception of risk is increasingly adopting a systemic and multi-risk approach. Beyond the challenge that these hazards present individually, risks tend to interact and combine (Stauffer, Kirsch-Wood, et al., 2023). For example, artificial intelligence could help identify and engineer pathogens with pandemic potential (Sandbrink, 2023; Soice et al., 2023) or alter nuclear stability (Amadae & Avin, 2019; Boulanin et al., 2020).

As the COVID-19 pandemic has shown, the interdependencies of today's world mean that the materialization of risk often leads to impacts on multiple nodes in society through the "cascade effect" (Hagenlocher et al., 2022). In this scenario of increasing complexity, it is necessary to consider multiple dangers and vulnerabilities, as well as the interactions that occur between them in space and time: the "convergent risk" (Komendantova et al., 2014).

Although these risks have usually been presented as hypothetical or distant problems, most could materialize in the near future and therefore require immediate attention (Baum, 2015). For example: the COVID-19 pandemic demonstrated that biological risks are very present; the growing tension on the international game board increases nuclear risk; the rapid progress in artificial intelligence makes it difficult to control the technology.

In any case, risk estimates must consider a high degree of uncertainty and contemplate the possibility of unanticipated events, known as *black swans* (Taleb, 2016). Thus, although it is useful to identify the most notable dangers, some authors have been interested in other dimensions of GCR. Avin et al. (2018), for example, conceptualize risk based on three factors: (i) the disruption of a critical system, (ii) the existence of a global mechanism that propagates that disruption, and (iii) the failure of prevention and mitigation efforts. This report aims to help governments avoid the third factor, which is a major challenge.

Despite their importance, GCRs are a neglected problem for several reasons. Firstly, managing these risks constitutes a global public good. That is, everyone benefits from greater protection against a possible global catastrophe. However, the responsibility for undertaking these efforts is diffuse, and decision-makers often delegate the task (Ord, 2020).

On a financial level, catastrophic risk insurance is expensive, and public institutions are more reluctant to contract it. Consequently, it is estimated that current

insurance programs have not covered 60% of historical loss cases caused by natural catastrophes. This figure rises to 85% in the case of cyber incidents and 99% in the case of infectious disease outbreaks (OECD, 2021a).

Furthermore, existing mechanisms primarily focus on response and recovery, not prevention efforts. In this sense, it is estimated that every dollar invested in disaster prevention saves between 4 and 7 dollars in response (Economist Impact, 2023). However, global investment is low because governments prefer investments that generate immediate and tangible benefits (Economist Impact, 2023).

In addition, current political systems tend to favor the management of the most pressing problems. Factors such as electoral incentives induce political decision-makers to focus on obtaining visible benefits, especially when the present costs of preventing a catastrophe are high. Likewise, budget limitations favor closer and more tangible problems (Institute for Government, 2022). Disaster resilience is often relegated to the background due to a misperception that it is politically risky. In many cases, it is perceived as a cost to prepare for an event that may never occur during the period of a political mandate (UNDRR, 2022a).

Finally, human beings have psychological biases that make the objective assessment of GCR difficult and tend to favor action due to inertia and focusing on known problems (UNDRR, 2022b). Therefore, this report explores ways to mitigate these biases and enable effective action against other threats.

## GCR management in the world

Despite the obstacles listed in the previous section, GCR has attracted increasing interest from political actors and civil society organizations in recent years. This section reviews some of the most relevant initiatives into which this interest has been transformed.

In 2015, the United Nations Office for Disaster Risk Reduction (UNDRR) published the Sendai Framework for Disaster Risk Reduction. This applies to “the risks of small and large-scale, frequent and infrequent, sudden and slow-evolving disasters, due to natural or human-induced hazards” (UNDRR, 2015). The definition of its scope includes “related environmental, technological, and biological threats and risks” (UNDRR, 2015).

During the Mid-Term Review of the Framework, UNDRR confirmed the intention to broaden the spectrum of risks by commissioning studies on food resilience (Gaupp, 2022), existential risks associated with technological development (Stauffer, Seifert, et al., 2023), and the identification of dangers with the potential to escalate to an existential catastrophe (Stauffer, Kirsch-Wood, et al., 2023). As a result, the Report of the Mid-Term Review recognizes the need to adapt current governance systems to address global catastrophic risks and calls for states to identify emerging hazards and their interactions (UNDRR, 2023).

Also at the international level, the Secretary General of the United Nations, António Guterres, has recognized the “existential threats” posed by artificial intelligence and climate change. The Organization for Economic Cooperation and Development (OECD) has a Strategic Foresight Unit dedicated to anticipating future risks, including potential existential threats such as misaligned artificial intelligence or engineered pandemics (OECD, 2021b). The World Economic Forum publishes an annual report titled *Global Risks* that includes some of the most severe aforementioned risks..

At the individual level, several states in the English-speaking world have begun to develop initiatives to address the problem. One of the most significant is the Global Catastrophic Risk Management Act, a law passed by the United States Congress that directs the government to submit comprehensive assessments of GCR and develop a strategy to manage it. In the United Kingdom, the Government Resilience Framework reflects the commitment of public institutions to take responsibility for “complex and catastrophic risks.” Many of these risks are already listed in the National Risk Register, one of the most exhaustive compilations in the world.

Finally, several academic institutions and civil society organizations work to prioritize global catastrophic risks in their respective countries and regions. This includes the Center for the Study of Existential Risk (University of Cambridge), the Future of Humanity Institute (University of Oxford), the Center for Long-Term Resilience, the Nuclear Threat Initiative (NTI), Global Shield, the Global Challenges Foundation, the Council on Strategic Risk (CSR), and the Global Governance Forum, among others. For this project, representatives of some of these organizations have been interviewed (Appendix 1, interviews with Clarissa Ríos Rojas, James Ginns, Ariel Conn, Jens Orback, Augusto López-Claro, and John Miller).

## Artificial intelligence (AI)

In a joint statement by the Center for AI Safety, dozens of experts and public figures said that “mitigating the risk of extinction caused by AI should be a global priority along with other global risks such as pandemics and nuclear war.” Various actors — including the UN Secretary General, the European Commission president, and the British prime minister — have echoed the statement.

At the international level, there are already several efforts for AI governance. Among them are the Guiding Principles and the Code of Conduct developed by the G7 (OECD, 2023), the OECD’s Working Party on Artificial Intelligence Governance, and the creation of a High-Level Advisory Body on Artificial Intelligence by the Secretary General of the UN. In addition, UNESCO and the International Telecommunication Union (ITU) have been involved in initiatives such as developing Recommendations for Ethical AI (UNESCO, 2022) and organizing the AI for Good Summit, respectively.

In terms of specific jurisdictions, one of the most relevant legislative proposals so far is the European Union’s regulation of AI. This comprehensive law is expected to be approved in the coming months. In the United States, the Administration has presented an Executive Order that introduces several obligations for developers of cutting-edge models. For its part, the United Kingdom hosted the first global AI Safety Summit, which resulted in the Bletchley Declaration, signed by all attending countries. Both the USA and the United Kingdom have also established Institutes for AI Safety.

## Biological risks

Countries with stronger levels of pandemic preparedness capabilities have been shown to experience lower excess COVID-19 mortality (Ledesma et al., 2023). In the wake of this pandemic, the international community has undertaken training efforts to contain future health emergencies. Recently, various countries and international organizations have reached a provisional agreement to work on approving a convention for the prevention of, preparation for, and response to pandemics (WHO, 2023). An international fund has been established for the same purpose (WHO, 2022).

The World Health Organization has a Laboratory Biosafety Manual (WHO, 2020) to prevent accidental releases, establishing techniques and procedures to strengthen safe work with infectious agents. The Manual also classifies laboratories into four levels of biological safety, each with specific practices, equipment, and safety measures. Complementary to these global efforts, each country has developed its own regulations, although most regulatory frameworks are not specifically oriented to high-containment laboratories.

Finally, regarding the deliberate use of pathogens, the Biological Weapons Convention prohibits the development, production, stockpiling, acquisition, or preservation of biological weapons. The Secretary-General Mechanism and the Implementation Support Unit constitute the main institutional support of the Convention.

At the national level, some states have strategies to combat bioterrorism. These include the preparation and planning protocols of the United States and the biological threat radar of the United Kingdom (Cabinet Office, 2023).

## Abrupt sunlight reduction scenarios

Globally, there is a shortage of food resilience strategies in the face of abrupt sunlight reduction scenarios (ASRS). The most relevant plans that can be identified involve either mitigating one of the potential causes of an ASRS or increasing food resilience in the face of other dangers.

Regarding natural hazard mitigation, NASA has a strategy to mitigate the effects of a potential supervolcano eruption (NASA, 2018). Likewise, NASA and the United Nations Office for Outer Space Affairs have published plans to defend the planet against objects close to Earth (NASA, 2023; UNOOSA, 2023). In the United States, the National Science and Technology Council has a Strategy and Action Plan on Space Weather, which is intended to address extreme space weather events which could severely damage critical functions, assets, and operations on Earth (NSTC, 2019).

In the case of emergencies related to nuclear war, only limited information is available to the public. Although there are some publicized plans focused on immediate responses to nuclear detonations, including some recent ones such as the response guidelines of the US Federal Emergency Management Agency (FEMA, 2022), no country has published guidelines on how to proceed in the face of potential climate impacts from such an event.

Some documents, such as the 2023 National Risk Registry of the United Kingdom, consider scenarios in which a misinterpretation or miscalculation could occur that would trigger a nuclear war. The UK government has established strategies for this scenario, such as maintaining qualified civilian personnel to monitor radiation levels, providing humanitarian assistance, and preparing to manage increased numbers of refugees in need. However, there are no preparedness plans that specifically address the devastating consequences that a nuclear winter could have on agriculture.

In turn, Norway's national risk assessment in 2014 made brief mention of the possibility that a large volcanic eruption could "cool the earth by several degrees" (Norwegian Directorate for Civil Protection, 2014, p. 94), although the repercussions it would have on agricultural production globally weren't detailed. Likewise, the 2020 UK National Risk Register highlighted that volcanic eruptions "can have detrimental effects on crops" (HM Government, 2020).

Supranationally, the Food and Agriculture Organization of the United Nations has worked to strengthen the resilience of food systems globally (Constas et al., 2021). However, its focus until now has been limited to considering factors such as climate change or disruptions to supply chains, such as those caused by the COVID-19 pandemic.

# Risk management in Latin America

As we saw, the discussions around GCR are gaining increasing importance worldwide. These risks transcend borders and require global cooperation, but they also require specific attention in regions, such as Latin America, that may be severely affected by their consequences. In these contexts, it is crucial to analyze regional risk management systems to evaluate their capacity to anticipate, respond to, and recover from large-scale global threats while strengthening the region's resilience to these catastrophic challenges.

## Current scenario

According to research by the [Global Governance Forum](#), Latin America is the region with the third lowest risk in the Global Catastrophic Risk Index, after Europe and North America (Dahl et al., 2022). However, the region is exposed to many more localized risks, ranging from earthquakes and volcanic eruptions to tropical storms and droughts. Over the past two decades, countries in this region have suffered the devastating impact of these events, which have resulted not only in significant human losses but also in considerable economic damage and the massive displacement of populations (OCHA, 2020).

The United Nations Office for the Coordination of Humanitarian Affairs (OCHA) and UNDRR have collaborated to create a joint publication presenting an Overview of Disasters in Latin America and the Caribbean for the period 2000-2022 (OCHA & UNDRR, 2023). This report was released against a backdrop of forecasts for an above-normal Atlantic hurricane season in 2023 and the persistence of the El Niño phenomenon. Its findings reveal that historical disaster trends in the region, combined with factors such as high exposure to natural risks, poverty, inequality, and urbanization, generate a constant risk of disasters.

Latin America and the Caribbean are emerging as the second region most affected by disasters worldwide, with 190 million people impacted by 1,534 events between 2000 and 2022 (OCHA & UNDRR, 2023). The region faces high physical exposure to various threats and complex risk factors. Unplanned urban growth, environmental degradation, inequality, poverty, mass migration, government inefficiency, corruption, and poor legal compliance have contributed to increased risk. These characteristics, known as “extensive risk manifestations,” represented 99.7% of all events recorded in Latin America and the Caribbean between 1990 and 2013 (UNDRR, 2021b).

The interrelation of these risk factors generates conditions of vulnerability that significantly impact the population's ability to prevent, confront, and recover from disasters (OCHA & UNDRR, 2023). It is estimated that damages from disasters in Latin America and the Caribbean have amounted to about US\$20 billion annually in a decade, with more than 45,000 deaths and 40 million people affected (Kiepi & Tayson, 2002). Disasters have impacts beyond direct damage, affecting economic development, GDP, balance of payments, indebtedness, and investment rates (Kiepi & Tayson, 2002). According to data from the INFORM Risk Index 2023, an index that evaluates the level of

risk according to variables associated with categories of danger and lack of response capacity, in Latin America, five countries have a high level of risk (see Table 1).

Country	Score	Risk class	Rank	Danger and exposure	Vulnerability	Lack of responsiveness
	(0-10)	(Very low - very high)	(1-191)	(0-10)	(0-10)	(0-10)
Colombia	5.4	High	30	6.9	6.2	3.6
Guatemala	5.1	High	35	4.2	5.7	5.4
Honduras	5.1	High	35	4.0	6.2	5.3
Mexico	5.1	High	35	6.9	4.3	4.4
Venezuela	5.0	High	41	6.6	3.8	5.0
Peru	4.8	Medium	43	4.6	5.5	4.4
Ecuador	4.6	Medium	48	4.9	4.9	4.0
Brazil	4.5	Medium	55	5.7	3.8	4.3
Nicaragua	4.4	Medium	61	4.2	3.7	5.3
El Salvador	4.3	Medium	65	3.9	4.4	4.6
Dominican Republic	4.1	Medium	71	4.1	3.8	4.4
Bolivia	4.0	Medium	75	3.1	3.8	5.3
Panama	3.9	Medium	79	3.8	3.8	4.1
Costa Rica	3.5	Medium	94	3.7	4.6	2.5
Chile	3.4	Low	99	3.8	3.8	2.8
Argentina	2.9	Low	121	2.4	2.8	3.6
Paraguay	2.6	Low	132	1.4	2.9	4.2
Cuba	2.3	Low	145	3.3	1.2	2.9
Uruguay	1.8	Very Low	167	0.9	2.5	2.6

Table 1. Score of Latin American countries in the INFORM Risk Index 2023.

In addition, according to the Regional Assessment Report on Disaster Risk in Latin America and the Caribbean (UNDRR, 2021b), the accumulated losses from disasters over 38 years represent a significant economic blow for several countries. In small nations with weak economies, these losses can range between 2 and 3.5% of average annual

GDP. In low-income countries such as Bolivia and Haiti, these losses exceed 9% of GDP annually.

In extreme situations, such as Hurricane Maria in Dominica in 2017, damage can exceed the island's total annual production. However, larger countries such as Brazil, Mexico, Argentina, Chile, Venezuela, and Colombia, which have financial strategies to mitigate the impact of disasters, experience much smaller proportional losses in terms of their national GDP (UNDRR, 2021b). Despite this, these figures can still significantly impact local economies.

Loss and damage caused by disasters over time undermine efforts toward sustainable development. However, existing studies have failed to persuade governments of the importance of investing in reducing underlying risk factors. In general, countries continue to invest mainly in response and recovery after disasters, as well as in protecting public assets or issuing catastrophe bonds to obtain resources for large-scale reconstruction (UNDRR, 2021b). Likewise, Latin America has been criticized due to its “paternalistic approach” to disaster management (Cardona, 2008).

Despite the progress in adopting national policies and strategies aligned with the UNDRR’s Sendai Framework for Disaster Risk Reduction, the region faces challenges in effectively integrating risk management, developing plans, and mobilizing adequate resources. For example, 14 countries in Latin America and the Caribbean have national plans or strategies for disaster risk management. Still, only 9 countries in the region have disaster risk reduction strategies active the local level (ECLAC, 2020). This reveals the need for robust information systems and statistics to monitor and evaluate efforts and promote cooperation and participation of *multiple* actors in risk management (UNDRR, 2021b).

In 2020, the COVID-19 pandemic emerged as the main cause of death in most regions, affecting global development. This has hindered the pursuit of the Sustainable Development Goals and the goals within the Sendai Framework (UNDRR, 2021b). Although these setbacks may seem temporary at first, they become a long-term financial burden for countries, reducing the resources available to boost economic development. Furthermore, the pandemic has shed light on inequality, which leaves certain groups more vulnerable to the impacts of the virus (Allen et al., 2020).

The COVID-19 pandemic provides a crucial lesson about managing risks at scale. However, despite the lessons learned, some countries in Latin America have not given due attention to large-scale risks. This disparity in the perception and response to global risks may be due to several factors, such as the availability of relevant information and data, institutional capacity, and evolving national priorities. A review of some of these factors will follow.

## Institutions

### Regional cooperation



Historically, countries in this region have faced large, numerous, and impactful disasters. Often, these events exceed the individual response capacity of states. That is why regional support in disaster risk reduction is crucial to reducing economic losses and increasing disaster resilience. This is especially relevant in the context of extreme events that disproportionately impact low- and middle-income countries, generating devastating effects in terms of mortality, displacement, economic losses, and damage to critical infrastructure (UNDRR, 2021a).

The nations of Latin America have worked together to establish institutions and regional coordination mechanisms through different integration schemes. For example, the Organization of American States (OAS) created the Inter-American Committee for Natural Disaster Reduction (IACNDR) to strengthen the capacity of the countries in the region to deal with disasters and adverse events, based on the Inter-American Convention to Facilitate Assistance in Cases of Disaster of 1991. The IACNDR is the body in charge of giving recommendations to the Inter-American Assistance Fund for Emergency Situations (FONDEM).

At the regional level, the Regional Platform for Disaster Risk Reduction in the Americas, coordinated by UNDRR, promotes cooperation and capacity building. Functioning as a catalyst for collaboration, it has contributed significantly to strengthening the capacity of Latin American and Caribbean countries in disaster risk management. It is also necessary to consider the Regional Action Plan, which serves as a base document to promote the implementation of the Sendai Framework for Disaster Risk Reduction 2015-2030 in the Americas and the Caribbean (Appendix 1, UNDRR interview).

Entities like the Inter-American Development Bank (IDB) (Appendix 1, interview Cristian Torres) and the World Bank have provided financing and technical advice to the countries of the region (SELA, 2007). Other important mechanisms include the United Nations Development Program (UNDP) and the World Food and Agriculture Program (WFP). In addition, the Economic Commission for Latin America and the Caribbean (ECLAC), the UNDP, and the WFP all work in collaboration with Latin American countries in building resilience and risk management, offering technical and financial support (Appendix 1, interviews with Cristian Torres, Flávia Aragão Santos, Norma Amarillo, and Karen Romero).

ECLAC has dedicated great efforts to conducting research, analyzing, and providing policy advice to member countries regarding risk management (ECLAC, 2020). Furthermore, it has created the Regional Development Planning Observatory as a space for analysis, information, and collective construction of knowledge of the different actors that govern risk management in the region (Appendix 1, interview with Omar Bello and Alejandro Bustamante).

In the field of health, the Pan American Health Organization (PAHO) has played a crucial role. This organization has contributed significantly to preparing for and responding to public health emergencies in Latin America. Their work ranges from managing disease outbreaks to coordinating efforts to guarantee medical care in crisis situations, such as the recent COVID-19 pandemic.

In the more subregional fields, various initiatives that cover Central America, the Caribbean, and South America stand out, as well as more specific blocs such as the Southern Common Market (MERCOSUR) (Appendix 1, interview with Sergio Rico) and the Pacific Alliance (PA). In this context, there are organizations such as the Caribbean Community (CARICOM), the Central American Integration System (SICA), and the Andean Community (CAN). These have established specialized institutions for emergency response, disaster prevention, and risk management (SELA, 2007).

Added to this are specific efforts, such as the COOPERASÜR Platform and the Mesoamerica Project (Mesoamerican Integration and Development Project), that seek to expand and improve the capacities of the participating countries (Appendix 1, interview Rafael Bonilla). The Mesoamerica Project also includes the Mesoamerican Network for Comprehensive Risk Management (RM-GIR). As a result, both represent a comprehensive regional network to address challenges related to risk management in the area.

In the Caribbean region, the Caribbean Disaster Emergency Response Agency (CDEMA) is the institution responsible for managing disasters. This intergovernmental agency, created in 1991, is currently made up of representatives from 16 Caribbean states. Its main function is to coordinate immediate responses to emergencies and disasters.

In Central America, the Coordination Center for Disaster Prevention in Central America (CEPRENAC) is the regional organization specialized in disaster management. This intergovernmental entity collaborates closely with SICA and comprises several countries in the region. Its objective is to promote international cooperation, as well as the exchange of information and experiential knowledge in areas such as prevention, mitigation, and response to disasters.

In the Andean region, there is the Andean Committee for Disaster Prevention and Attention (CAPRADE), an institution specializing in disaster prevention created in 2002. Its purpose is to reduce the risk and impact of disasters in this territory. CAPRADE addresses this mission through three areas of action: i) coordination and promotion of policies, strategies, and plans; ii) promotion of activities in prevention, preparation, mitigation, disaster response, rehabilitation, and reconstruction; and iii) cooperation and mutual assistance, as well as the exchange of experiences in the subject (Andean Council of Ministers of Foreign Affairs, 2002).

The Pacific Alliance, an economic integration bloc composed of Chile, Colombia, Mexico, and Peru, has established the Catastrophic Risk Management Working Group. This initiative focuses on risk management and preparedness for catastrophic events, especially geological and environmental disasters. As part of their program, they manage a catastrophe bond, a joint insurance scheme structured by the World Bank against earthquake risks.

Finally, although MERCOSUR does not have an institution specialized in disasters, it has established mechanisms to coordinate disaster assistance, adopting a risk management strategy for member countries (Argentina, Brazil, Paraguay, and Uruguay). The strategy is an indicative guide that defines future actions and plans according to the material reality of the member countries and international frameworks, such as the

Sendai Framework 2030 and the 2030 Agenda. It also facilitates financial cooperation, projects, and programs in the area of disaster risk reduction (MERCOSUR, 2019). Likewise, MERCOSUR organizes a Meeting of Ministers and High Authorities of Comprehensive Disaster Risk Management (RMAGIR) at least once a year.

## National Level Management

Regarding management at the national level, each country in the region has developed its own systems and institutions to address disaster risk, adapting them to their specific contexts and particular challenges. Examples of this are in countries such as Brazil, Honduras, and Colombia. These states have structured their systems based on past experiences of significant disasters, such as the Brumadinho dam collapse in Brazil, Hurricane Mitch in Honduras, and the eruption of the Nevado del Ruiz volcano that led to the Armero tragedy in Colombia (Appendix 1, interviews Elena Pabón, Flávia Aragão Santos and José Cabrera).

Recently, progress has been made in structuring institutional risk management mechanisms in Latin America. As a case study, Chile enacted its first risk management law in 2021, marking a milestone in the formalization of its system, the National Disaster Prevention and Response Service (SENAPRED) (Appendix 1, interview Alicia Cebrián). Another relatively recent mechanism is Argentina's National System for Comprehensive Risk Management (SINAGIR), created in 2016. These systems, like many others in the region, are characterized by high decentralization and committee operations at various administrative levels.

In some cases, such as Venezuela, Brazil, and Cuba, the coordination of risk management falls on Civil Defense (Appendix 1, interview Flávia Aragão Santos, for the case of Brazil). However, most Latin American countries have developed decentralized risk management systems that operate autonomously (See Table 2). These systems usually have legal foundations in specific laws that detail their operation, organization, and objectives. (Except for Ecuador, where, despite legislative efforts in this direction, the approval of a risk management law has not yet materialized [Appendix 1, interview Cristian Torres].)

Most Latin American countries share a common feature: a committee structure that operates at the national, departmental, municipal, and local levels. This structure is reflected in their risk management plans, involving bodies from ministries or secretariats at the national level who coordinate closely with local authorities, such as committees, governorships, and mayors' offices.

Costa Rica stands out by requiring that all its municipalities develop strategies for disaster risk reduction (Appendix 1, interview Luis Fernández). In Mexico and Uruguay, strategic coverage reaches 100%, although at the level of intermediate governments, that is, the states in the case of Mexico and the departments in the case of Uruguay. In Ecuador, Colombia, and Chile, a significant proportion of local governments have developed disaster risk reduction strategies, with strategic coverage of 90%, 82%, and

56%, respectively (Regional Observatory of Planning for Development & Latin America and the Caribbean, 2020)

Country	Mechanism
Argentina	National System for Comprehensive Risk Management (SINAGIR)
Bolivia	National System for Risk Reduction and Disaster Response (SISRADE)
Brazil	National Civil Protection and Defense System (SINPDEC)
Chile	National Disaster Prevention and Response System
Colombia	National Disaster Risk Management System (SNGRD)
Costa Rica	National Risk Management System (SNGR)
Cuba	Civil Defense - Management Centers for Risk Reduction
Ecuador	National Decentralized Risk Management System
El Salvador	National Civil Protection System
Guatemala	National Coordinator for Disaster Reduction (CONRED)
Honduras	National Risk Management System (SINAGER)
Mexico	National Civil Protection System (SINAPROC)
Nicaragua	National System for Prevention, Mitigation and Attention to Disasters (SINAPRED)
Panama	National Civil Protection System (SINAPROC)
Paraguay	National Emergency Secretariat (SEN)
Peru	National Disaster Risk Management System (SINAGERD)
Dominican rep	National Disaster Prevention, Mitigation and Response System
Uruguay	National Emergency System (SNE)
Venezuela	National Directorate of Civil Protection and Disaster Administration

Table 2. Risk management systems in Latin American countries.

Risk management falls mainly to government bodies and civil protection agencies. However, it is crucial to highlight that other branches of government, especially the legislature, can play a significant role in identifying and managing certain risks. This is achieved through participation in technical investigation committees, or the implementation of legislative initiatives aimed at strengthening security and prevention.

A relevant example is the creation of commissions specifically dedicated to the future, such as those active in at least two Latin American countries: Uruguay and Chile. These groups are dedicated to foresight and exploring future challenges and opportunities. The [Special Futures Commission in Uruguay](#) has addressed topics such as emerging technologies and the future of work (Parliamentary Special Committee on Futures, 2023). It also organized the [Second World Summit of Future Commissions](#) in September 2023 to discuss challenges related to artificial intelligence. Meanwhile, in Chile, the Future Challenges Commission has carried out [Projects](#) on artificial intelligence, climate change, human genome research, and protection of neurorights<sup>3</sup>, among others.

<sup>3</sup>The aim is to give personal data the same legal status as organs, so that data cannot be trafficked or unfairly manipulated.

Regarding legislative initiatives, several national parliaments have presented laws and bills to address the risks associated with artificial intelligence or biosafety. These efforts are mainly collected at the end of this section in the areas corresponding to individual risk management.

## Prioritization in management plans

National and subnational plans and strategies for disaster risk reduction play a fundamental role in managing a country's priority risks. These plans allow for establishing implementation goals, assigning responsibilities to the various governmental and non-governmental actors, and identifying the necessary technical and financial resources (Regional Observatory of Planning for the Development of Latin America and the Caribbean, 2020).

According to the analysis carried out in 2020 by the Regional Development Planning Observatory of Latin America and the Caribbean, of the 33 countries that make up the region, only 14 had national plans or strategies aimed at disaster risk reduction (ECLAC, 2020). Since then, several of these countries have taken the initiative to implement new plans or review and improve their existing strategies, as detailed in Table 3.

<b>Country</b>	<b>Strategy</b>
Argentina	National Plan for Disaster Risk Reduction 2018-2023
Bolivia	National Risk Management Program
Chile	National Policy for Disaster Risk Management; National Strategic Plan for Disaster Risk Reduction 2020-2030
Colombia	National Disaster Risk Management Plan: a development strategy 2015-2030
Costa Rica	National Risk Management Plan 2021-2025
Ecuador	Specific Risk Management Plan 2019-2030
El Salvador	National Plan for Civil Protection, Prevention and Mitigation of Disasters
Guatemala	Guatemala National Disaster Risk Management Plan 2018-2022
Honduras	National Comprehensive Risk Management Plan - (PNGIRH) - Period 2014-2019
Mexico	National Civil Protection Program 2022-2024

Panama	National Strategic Plan for Comprehensive Disaster Risk Management of Panama 2022-2030
Paraguay	National Disaster Risk Reduction and Management Policy 2018
Peru	National Disaster Risk Management Plan: PLANAGERD 2022-2030
Paraguay	National Implementation Plan of the Sendai Framework 2018-2022
Dominican Republic	National Comprehensive Disaster Risk Management Plan
Uruguay	National Comprehensive Emergency and Disaster Risk Management Plan 2023

Table 3. National plans for disaster risk reduction in Latin America

Latin American countries have prioritized specific risks in their plans based on their geographic, climatic, and development context, adapting risk management to the specific threats they have faced historically. In the Pacific Ring of Fire, which extends along the western coast of Latin America, countries such as Chile, Peru, Colombia, and Mexico face volcanic risks, earthquakes, and tsunamis due to intense tectonic activity. Therefore, its risk management plans have prioritized preparing and responding to these events, establishing early warning systems and resilient infrastructure, and developing evacuation protocols for at-risk communities.

In the Caribbean, a region highly vulnerable to risks such as hurricanes, countries have developed risk management plans focused on preparation and response to the constant threat of tropical cyclones. On the Atlantic coast of Latin America, countries such as Uruguay and much of Argentina are less exposed to disasters of this origin. Consequently, their risk management plans primarily focus on managing extreme weather events, such as floods and droughts, and other risks such as earthquakes, volcanic eruptions, fires, and tsunamis.

Regarding prioritizing global catastrophic risks, although Latin American countries have implemented some strategies to prevent, mitigate, or respond directly or indirectly to these risks, these efforts still face significant limitations. The difficulties lie in the complexity of anticipating global-scale events in order to consider them in risk assessment processes, as well as the lack of resources and technical capabilities necessary to address these challenges effectively. Below, we explore some of Latin America's approaches to addressing global catastrophic risks.

## Artificial intelligence and other technological risks

According to the Latin American Artificial Intelligence Index, the five countries with the best AI governance are Brazil, Chile, Argentina, Colombia, and Peru, all with developing strategies and regulatory frameworks. They highlight the [Recommendations for reliable artificial intelligence in Argentina](#) and the [bill in Chile that regulates artificial intelligence systems, robotics, and related technologies](#). Although these countries have strong

approaches to AI, none have integrated the risks associated with AI into their risk management plans. Appendix 2 lists the most important initiatives.

Regarding related technological risks, cyber incidents have begun to position themselves as an emerging factor. The most notable advance in this dimension occurred in Costa Rica, where thirty public institutions suffered a cyberattack in 2022. The event led the Executive Branch to declare a state of emergency, which forced the National Commission for Risk Prevention and Emergency Assistance to develop a General Emergency Plan for Cyberattacks.

In the Mid-Term Review of the Sendai Framework, Costa Rica highlighted the cyber threat as a new problem that requires attention, considering it an intentional event which, poorly managed, can lead to uncontrollable situations. Additionally, Argentina and Colombia's plans address other technological hazards, such as explosions or data leaks. Finally, it is relevant to note that the plans of Uruguay and the Dominican Republic which govern AI express the intention to explore technological and scientific risks in subsequent iterations, but do not yet explore ideas of risk at all.

## Biological risks

According to the Global Health Security Index, the Latin American countries with a higher level of preparation – capacity for prevention, detection, and response – in the face of health emergencies are, in this order: Mexico, Chile, Peru, Argentina, and Panama (Bell & Nuzzo, 2021). These countries have consolidated epidemiological surveillance systems and, where appropriate, biosafety regulations in high-containment laboratories. Appendix 2 contains a summary of these initiatives.

Unfortunately, few risk management plans currently include biological risk. Only Ecuador, Panama, and Uruguay consider epidemics and pandemics, but all of them do so only with a brief mention. However, the trend developed by Panama and Uruguay – whose plans are for 2022 and 2023, respectively – seems to indicate that biological risks could occupy a more important position in future plans.

Most countries mentioned biological risks in the Midterm Review of the Sendai Framework after the start of the COVID-19 pandemic. Countries such as Costa Rica or Guatemala recognized health and biological events, such as epidemiological outbreaks, as a threat factor to be considered more closely. Likewise, Argentina has prioritized investments in response to health emergencies.

## Food safety in an ASRS

Although there are no specific plans to strengthen food resilience in the face of ASRS, some countries have institutional mechanisms to strengthen the agricultural industry in a disaster were to occur. For example, Argentina has the Agricultural Risk Office ([ORA](#)) and the Agricultural Emergencies Monitoring Office ([OMEGA](#)), while Colombia has the Information System for Agricultural Risk Management ([SIGRA](#)). Chile has also developed a [National Sovereignty Strategy for Food Security](#), which seeks to build “a more resilient,

inclusive and stable national food system.” These and other initiatives are compiled in Appendix 2.

In the context of the Midterm Review of the Sendai Framework, Guatemala's report highlights that the country faces notable challenges in food security. These challenges are exacerbated by agroclimatic threats and impacts on the agricultural industry (CONRED, 2022).

## The importance of Latin America for GCR mitigation

By definition, GCRs entail universal effects: regardless of where they originate, all or practically all of the world's population is exposed to the risk. This reality includes several important global implications of interest to Latin America.

First, countries must consider potential risks beyond their borders, as these can expand and affect nations that at first seem foreign to them. Secondly, the materialization of certain risks in Latin America could have a global reach and, therefore, a greater impact. Finally, given Latin America's participation in multilateral decision-making platforms, the region could also play an important role in global risk management. These possible scenarios are illustrated below.

The first scenario, which addresses how external dangers may affect countries in the region, has to do with the possibility of events such as nuclear conflicts between global powers or the eruption of supervolcanoes in other parts of the world. Although it is unlikely that an event resulting in an abrupt sunlight reduction scenario originates in Latin America, if these events are triggered, the countries of the Southern Cone could have relatively favorable conditions for guaranteeing their population's food supply and that of other countries. Therefore, developing food resilience plans in these countries becomes especially valuable, benefiting them and the rest of the world (Torres, Ulloa, Tiznado, Tinoco, et al., 2023).

Informed by the second scenario, countries must approach risks understanding that the materialization of some of them in Latin America can spread globally. For example, due to their geographical and demographic conditions, the countries of Central America and the Caribbean can become a focal point of zoonotic transmission of emerging infectious diseases. Hence, disease prevention and detection efforts in this region are crucial to ensure global health (Ulloa, Bas Graells, et al., 2023).

Likewise, countries like Brazil or Argentina have BSL-4 laboratories, the highest level of biosafety, which work with dangerous pathogens that could cause a pandemic if they are accidentally released. Implementing biocontainment measures is crucial in order to prevent biological risks (Ulloa, Torres, et al., 2023).

Latin America could also be important to governing risks such as those associated with artificial intelligence (AI), either during the development or deployment of systems. For example, Uruguay leads the Latin American Artificial Intelligence Index in key



indicators such as research and development. It has attracted significant investments from companies such as Microsoft or Google in 2023, so it could become a relevant player in the development of AI.

On the other hand, some Latin American countries could be especially affected by harms associated with AI, such as socioeconomic inequality or sociopolitical instability (Muggah & Szabó, 2023). In this sense, it is important that public institutions can mitigate the damage and ensure that the benefits of AI are distributed throughout society to the greatest possible extent.

Regarding the third scenario, managing a global problem requires a global response, with the participation of all countries. In this context, Latin America can play a crucial role in contributing to international global risk and crisis management mechanisms, as it has demonstrated throughout contemporary history. A significant milestone was in 1967 when the Treaty of Tlatelolco made the region the first nuclear weapons-free zone in a large, densely populated area.

Furthermore, within the scope of the Biological Weapons Convention, Latin American countries have managed to build a solid and cooperative position. This joint effort has led to notable advances, such as the establishment of the Implementation Support Unit in 2006 (Coutto, 2013). More recently, in 2023, all countries in the region joined together in a pioneering initiative by issuing the Belén Communiqué, urging a ban on lethal autonomous weapons.

These examples demonstrate that Latin America has the political will and capacity to contribute to global efforts to reduce GCR. Contributing to this mission, below are some proposals for the comprehensive management of these risks, ranging from general aspects to preparation and response strategies for specific risks.

# Proposals

## General proposals

- **Integration of global catastrophic risks into national risk assessments (NRAs)**

The risk assessment and prioritization processes in Latin American countries do not have a clear definition. We have seen a lack of transparency in methodology and how risks are selected for evaluation. This absence of a standardized framework makes informed decisions and efficient resource allocation for risk management difficult.

National assessment processes frequently omit large-scale cross-border risks, such as GCRs. This exclusion creates gaps in the understanding of potential threats. Therefore, to address these shortcomings, we must review the fundamental assumptions that can bias national risk assessments (Boyd, Matt & Wilson, Nick, 2022).

In this context, we propose creating a standardized and transparent framework for implementing and regularly updating National Risk Assessments in each Latin American country. We recommend that each state include a review of key assumptions such as time horizon, discount rate, and choice of decision rule (Boyd, Matt & Wilson, Nick, 2022). Additionally, this process will benefit from greater stakeholder engagement to ensure full representation of perspectives and prevent bias.

Within this approach, we highlight the following actions for successful implementation of the proposal:

- Adopting a standardized, evidence-based methodology to assess various types of risks consistently and effectively. We suggest that the development and implementation of this methodology be coordinated by the main regional platforms involved in risk management, such as the UNDRR Regional Office for the Americas and the Caribbean.
- Clarifying and precisely defining the key concepts of risk, probability, uncertainty, and impact. Ambiguity in these terms can lead to misinterpretations and talking past one another in the risk assessment and management process.
- Encouraging the proactive inclusion of risks in risk assessments. This is necessary to avoid inclusion being only post-hoc, that is, after the risk has led to a catastrophe. It is intended that all identified risks be considered from the beginning of the process, including global catastrophic risks, to avoid omissions that could negatively affect decision-making and resource allocation.
- Intrinsically connecting assessments with the planning and implementation of mitigation and response strategies, such as national risk management plans.

Regarding the first point, we propose incorporating future analysis methodologies to alert policymakers to emerging risks and facilitate better long-term decision-making (Global Shield, 2023). Some recommended foresight techniques are horizon scanning and network teaming (Sepasspour, 2023). Likewise, over the past 20 years, forecasting research has demonstrated the feasibility of tracking the accuracy of predictions answering real-world questions over short periods (Karger et al., 2022). These forecasting exercises have already been implemented at institutional levels (McHenry, 2018).

In the era of interconnected risk, where risks can have cascading impacts, it is necessary to adopt an approach that recognizes the complexity and uncertainty inherent in systemic problems. To address these challenges, UNDRR has suggested implementing techniques such as scenario building, digital twins, and identifying turning points as effective tools to address these challenges (UNDRR, 2022b).

## ● Reconsider risk prioritization in national registries

### Introduce GCRs into risk management plans

The analyzed plans usually reproduce several biases that affect their completeness and effectiveness. Some of them are the tendency to focus excessively on the threats that countries usually face (availability bias); risks located within borders, in contrast to global risks (localist bias); and risks with short time horizons (presentist bias). These biases often cause risk assessments to underestimate the probability of extreme risks and even be very different in countries with similar profiles (Kohler, 2023).

It is important that countries also consider potential high-impact risks, even when the probability of their occurrence is estimated to be low.<sup>4</sup> Several studies estimate that the cost-effectiveness of marginal efforts to reduce various low-probability catastrophic risks is greater than that of more traditional risk management (Boyd, Matt & Wilson, Nick, 2022; Millett & Snyder-Beattie, 2017; Shulman & Thornley, forthcoming). In this sense, the costs associated with preventing largely unexpected events, such as the COVID-19 pandemic, are significantly lower than the devastating effects of such events (Bernstein et al., 2022).

### Articulate a broad spectrum of risks in a comprehensive manner

Having a general overview of a country's risks makes it easier for the response to a potential emergency to be comprehensive and multisectoral. As explained above, risks are interdependent and often systemic. In this sense, it is important to avoid excessive focus on isolated hazards and instead develop integrated systems that mitigate a broad spectrum of potential risks. This can facilitate better responses to common consequences of various hazards, such as supply chain disruption.

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<sup>4</sup> In some cases, the probability is not even low. In Metaculus, a forecasting platform, the probability assigned to a natural pandemic originating between 2016 and 2026 oscillated around 40%.

By way of illustration, several anglophone and northern European countries have particularly comprehensive national risk registers. United Kingdom, New Zealand, the Netherlands, Denmark, Sweden, Norway, and Finland have public documents that bring together risks of a very diverse nature: disasters of geological and environmental origin, epidemics and pandemics, cyberattacks, terrorism, nuclear accidents, accidents involving other toxic substances, and disruptions of critical infrastructure, among others. In 2021, the European Union recommended its member states to consider all these risks in their National Risk Assessments (European Commission Joint Research Centre, 2021).

- **Develop institutional mechanisms to improve comprehensive risk management**

To improve risk reduction, it is essential to address the biases and decision-making processes that influence risk management (UNDRR, 2022b). These biases perpetuate a cycle of extreme reactions in crises followed by periods of neglect in preparation and prevention (Ord et al., 2022). Therefore, it is imperative to consider implementing incentives that break this cycle of "panic" and "negligence." In this regard, governments can reward early interventions and preparation to counteract the impulsive response and promote a more proactive perspective on risk management (Appendix 1, interview Augusto López-Claros and John Miller).

To improve comprehensive risk management, it is essential to have appropriate institutional designs. Countries can promote the prioritization of Comprehensive Risk Management (CRM) by establishing predominantly technical commissions independent of political dynamics. These committees could support executive or legislative bodies and focus on studying emerging issues and challenges. Previously, it has been identified that it is beneficial for such institutions to be anticipatory, centralizing, coordinating, apolitical, transparent, adaptable, and accountable (Boyd & Wilson, 2021).

Additionally, we recommend that risk identification and assessment be carried out by interdepartmental mechanisms that go even further than most current risk management systems. Especially relevant designs promote a clear separation of responsibilities in government risk management so that risk ownership,<sup>5</sup> supervision, and audit are clearly defined and separated (Appendix 1, interview James Ginns).

To develop comprehensive risk management systems through a three-dimensional approach, national ministries must first assume responsibility for managing catastrophic risks in their areas due to their expertise. Secondly, we recommend that the institution in charge of risk management oversee and ensure the appropriate management of risks and vulnerabilities across the government, assigning responsibilities to ministers and leading improvements in risk management at the government level and globally. Finally, we recommend establishing an independent commission within this institution to carry out audits and submit recommendations, its

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<sup>5</sup> Risk ownership means that the institution is "ultimately responsible for ensuring that the risk is appropriately managed" (Ord et al., 2022). That is, the organization that addresses the risk.

own and third parties', on catastrophic risks to the office in charge of risk management (Ord et al., 2022).

In the same way, we recommend that the processes for developing risk management plans follow the example of Uruguay by including the active participation of external organizations. This collaborative approach can involve NGOs and think tanks, allowing them to play a fundamental role in promoting and providing resources for proactive risk management (Appendix 1, interview Augusto López-Claros and John Miller). These actors can provide new perspectives and contribute to expanding the vision of public institutions.

To achieve this, we suggest using risk management to encourage collaboration that breaks the existing silos between academia, the private sector, and the government. Specifically, from the public sphere, science and technology can be used as tools to enrich the ecosystem (Appendix 1, interview with Alma Hernández). We highlight the importance of those leading this effort as individuals who deeply understand each nation's politics, culture, and specific challenges (Appendix 1, interview with Ariel Conn).

- **Develop financial mechanisms to encourage GCR management**

It is essential that governments consider risks and disasters in their budgets, as they often act as the insurer of last resort (Sepasspour, 2023). It has been documented that many governments do not have a disaster resilience approach due to the misperception that it represents an expense for an event that may never occur rather than an investment in the future (UNDRR, 2022a) (Appendix 1 - interviews Alicia Cebrián, Cristian Torres and Luis Alfonso Amaya). This occurs because political decision-makers do not have, by default, sufficient economic and political incentives to ensure effective management of GCRs, which are generally not covered in conventional insurance markets either.

Given this, we urge financial and government institutions to change the investment approach from ex-post to ex-ante (Economist Impact, 2023). To address this need, we propose creating a catastrophic risk insurance program. This program could include reinsurance coverage that allows for risk diversification and the absorption of significant losses in the case of catastrophic events (OECD, 2021a). This coverage must include a wide range of threats that have the potential to degrade the well-being of most of humanity (Economist Impact, 2023).

In addition, we emphasize the importance of implementing actions with quick payments. These actions have proven effective in mitigating the economic impacts of adverse phenomena, preventing emergencies from becoming disasters, and accelerating recovery in shorter periods (Lopera, 2020). We also highlight the importance of applying fully risk-based premiums, considering factors such as location, characteristics, and hazard exposure to ensure premiums are proportional to risk and encourage effective management (OECD, 2021a).

Finally, we highlight the relevance of public sector participation as it could guarantee losses exceeding certain limits (OECD, 2021a). In the same sense, we emphasize the importance of investing in research and development to identify possible new emerging threats. Additionally, we recommend establishing measurement and monitoring systems to evaluate the effectiveness of investments over time (Economist Impact, 2023).

At the international level, it would be essential for countries to contribute, in proportion to their capabilities, to an international fund to prepare for global catastrophic risks. A similar example of this way of pooling risk management is the Disaster Relief and Containment Trust Fund of the International Monetary Fund, which “provides debt relief donations to the poorest and most vulnerable countries affected by natural catastrophes or disasters linked to public health.” As mentioned, the World Health Organization and the World Bank are preparing a similar mechanism for prevention, preparedness, and response to pandemics.

- **Strengthen international and regional cooperation to reduce catastrophic risks**

We emphasize the importance of increasing regional and international cooperation to reduce global catastrophic risks (Cernev, 2022). In Latin America, regional unions play a fundamental role as they foster regional cooperation and solidarity in the face of shared risks (Appendix 1, interview Jens Orback). It is crucial that this cooperation is not limited only to governments but also involves civil society groups (Appendix 1, interview Augusto López-Claros and John Miller)

In this sense, we welcome the initiatives and joint response mechanisms mentioned in the section on regional cooperation. However, to strengthen these efforts further, we propose that joint response mechanisms are not limited exclusively to disasters of geological and environmental origin but also include global catastrophic risks. This will ensure that regional cooperation is prepared to address a wide range of threats and will promote a more effective response and greater resilience by strengthening the necessary capacities.

Likewise, there are some windows of opportunity in international cooperation. As part of the Our Common Agenda Report, the UN General Secretariat highlighted the need to publish a Strategic Foresight and Global Risk Report to be presented to Member States every five years (United Nations, 2021). Previously, it has been documented that implementing this type of initiative strengthens the capacity to anticipate and respond to global risks, particularly in smaller countries with limited resources (Kohler, 2023). We therefore urge countries to take advantage of the results of these global risk assessments at the national level.

Initiatives related to some global catastrophic risks are also being discussed at the multilateral level, for example, a WHO international instrument on prevention and

preparedness.<sup>6</sup> Anticipating this and other opportunities, Latin American countries are urged to actively participate in these discussions as a bloc with similar realities and commit to contributing to, creating, and applying effective policies.

- **Encourage accessible and clear communication about global catastrophic risks**

Two-way communication by experts and local communities provides global decision-makers with a level of detail essential to understanding each community's challenges. In turn, this allows policies and strategies for global risk management to be adapted to each region's specific needs and concerns, thus strengthening the effectiveness of risk reduction measures, and avoiding homogeneous approaches that could be ineffective in some contexts. This communicative process transcends the mere transmission of information; it is a strategic interaction that plays a crucial role in risk management decision-making (UNDRR, 2022b).

In global catastrophic risks, public perception is critical in deciding which prevention projects should be prioritized and directly supported. Therefore, simplicity in communication is required to effectively convey the relative importance of different hazards to non-experts (Turchin & Denkenberger, 2018). To achieve this, it is essential to have a risk communication tool that reflects the relevance of these different risks and allows the establishment of priorities for action.

Risk probabilities are typically used for this purpose. Still, in the case of global catastrophic risks, this presents challenges because ambiguity and quantitative probabilities do not adequately address certain aspects of these risks. Therefore, we propose the use of a scale, such as the one proposed by Turchin and Denkenberger (2018), to communicate the magnitude of catastrophic risks. This scale consists of 6 color codes ranging from white to purple, and color assignments are primarily based on risk probability intervals.

In addition to this, we present some suggestions to address general aspects of GCR communication based on the report *Risk Communication Strategies for the Very Worst of Cases* (Johns Hopkins Center for Health Security, 2019):

Present these risks as concrete problems, relating them to current situations and immediate concerns. Establish connections with contemporary events and challenges, linking them to current issues and showing how these risks can influence ongoing crises or aggravate existing problems.

Highlight pandemics as representatives of the GCR, considering the recent experience caused by COVID-19. In times of crisis, people are more willing to seek solutions for risks they would otherwise consider distant.

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<sup>6</sup> In this regard, international health experts and civil society groups have warned that during the process, the new treaty "is being diluted and stripped of key stipulations necessary to prevent another global health disaster." (Taylor, 2023)

Present GCRs as a challenge with possible solutions, as this allows audiences to feel that they have the knowledge and ability to make a difference. A solution-oriented narrative prevents people from viewing GCR as a hopeless cause.

Be cautious when projecting GCR results, as using extreme cases to attract attention can lead to dire prospects. It is proposed to present intermediate scenarios that show the situation's severity and treatability.

Identify scientific communicators with solid technical knowledge in GCR who can transmit accurate and reliable information.

Finally, we recommend that GCR communication be clear and accessible, adapting to audiences with varying levels of education and technical understanding. We suggest avoiding the use of confusing technical terminology and addressing scientific uncertainty in a frank and transparent manner. It is advisable to use clear, easy-to-understand language when communicating risks to diverse audiences, as well as offering information in accessible formats such as infographics, explanatory videos, and easy-to-read summaries.

## Proposals on artificial intelligence

- **Develop national plans and regulations for AI**

As set out in Appendix 2, several Latin American countries have already published national AI strategies, policies, and plans. In some cases, laws have also been approved, and bills have been processed. It is recommended that all countries approve at least one document from each category and that these establish the need to consider the risks associated with developing and deploying the technology. To develop these plans, countries could start by relying on global guidelines such as the [Recommendation on the Ethics of Artificial Intelligence](#) of UNESCO, something already done by countries such as [Argentina](#), [Costa Rica](#), and [Uruguay](#).

To ensure compliance with these regulations, we suggest that each country designate an institution predominantly dedicated to the governance of artificial intelligence. This body could be established as a ministry department in charge of technological affairs, as a state agency, or as a national office. It is important that, among other things, these organizations carry out risk assessments that feed into the national risk identification and management process.

Where advances in research and infrastructure could facilitate the development of AI, it is essential that regulations and the bodies designated to implement them ensure that AI model training processes in the region meet strict standards for security, reliability, and robustness. States can offer support by improving forecasting and monitoring progress in AI development, and by providing more technical expertise in AI (Ord et al., 2022).



- **Monitor AI adoption for risks**

Implementing AI on a large scale will bring enormous benefits but also create vulnerabilities that carry risk. Monitoring technology deployment can help anticipate these risks and inform subsequent policy design (Clarke & Whittlestone, 2022).

The area where monitoring is most feasible is probably the public sector and, more specifically, critical infrastructure. For example, suppose an AI system is adopted in the public health system to reduce waiting lists. In that case, the new mechanism must be continually evaluated to ensure the system does not facilitate discriminatory decision-making. Likewise, if AI is integrated into the electrical grid, the government must ensure the system is robust enough to withstand unexpected environmental alterations or cyberattacks.

At the private level, we suggest that market surveillance authorities inspect the systems marketed in the country and, if any unacceptable risk is identified, require the provider of said system to solve the problem or, failing that, withdraw the system. Likewise, evaluating how technology transforms society from a more systemic perspective is important. In this sense, for example, governments can track how AI is being implemented to automate tasks and how this process impacts unemployment rates and socioeconomic inequality.

- **Participate in multilateral initiatives for global governance**

Despite the importance of national regulations, AI governance will largely depend on the success of multilateral initiatives created for it. Several Latin American countries participate in AI-related processes of organizations such as the Organization for Economic Cooperation and Development, the Global Partnership on AI, and the G20. The United Nations has also begun to pay attention to AI, with discussions in the General Assembly and the Security Council, as well as with the announcement of a High-Level Advisory Body. On the subject of lethal autonomous weapons, Latin American countries have already been pioneers with the aforementioned Belén Communiqué.

In this context, the active participation of Latin American countries in multilateral initiatives brings several benefits. Firstly, it allows them to influence the formulation of international policies and adapt them to their needs, avoiding regulatory impositions. Additionally, being at the forefront of AI discussions allows them to contribute to creating global standards. Finally, cooperation promotes the development of local capabilities and facilitates access to shared resources and knowledge. For these reasons, we recommend that countries collaborate in these spaces to democratize international AI governance.

## Proposals on biosafety

- **Promote intersectoral integration and transparency in epidemiological surveillance systems**

Countries with higher scores on the Global Health Security Index (GHSI) have experienced lower excess mortality from COVID-19 (Ledesma et al., 2023). This speaks to the importance of prepared public health systems, relevant surveillance, and coordination between the human and animal health sectors.

Regarding epidemiological surveillance, we propose the creation of an intersectoral committee, joint training for human and veterinary health professionals, the establishment of efficient communication channels, and the implementation of integrated surveillance systems to detect diseases early (Ulloa, Bas Graells, et al., 2023). Furthermore, we suggest involving local communities through mobile technologies for participatory surveillance, educational programs, and efficient logistics (Ulloa, Bas Graells, et al., 2023).

We propose strengthening integrated surveillance systems to improve pathogen monitoring programs transparently, allowing access and exchange of epidemiological data between relevant departments. We also suggest strengthening communication with the international community, collaborating with international organizations, and establishing alliances (Ulloa, Bas Graells, et al., 2023). Finally, we emphasize the importance of investing in technological solutions to strengthen epidemiological surveillance capacity, such as genomic sequencing (Xu et al., 2021), and natural language processing systems, such as the WHO EARS platform.

- **Strengthen regulation for high-containment laboratories**

High-containment laboratories, known as BSL-3, BSL-3+, and BSL-4, play an essential role in the research and study of emerging and re-emerging infectious diseases, as well as in the analysis of high-risk pathogens for public health. These laboratories have become more prominent in recent years due to the increased threat of infectious diseases and the need to understand them to develop effective countermeasures (Ulloa, Torres, et al., 2023). However, the long history of highly contagious pathogenic leaks in laboratories poses significant challenges in terms of safety.

For countries that do not have it, we suggest strengthening regulation through collaboration between the Ministries of Health of each country, biosafety experts, and laboratory representatives. Firstly, we urge them to identify and define the different levels of biocontainment (BSL-3, BSL-3+, and BSL-4) and establish clear infrastructure, equipment, and training requirements, aligning them with international standards and biosafety guidelines. (Ulloa, Torres, et al., 2023). We also encourage the creation of multidisciplinary committees composed of biosafety experts, laboratory representatives, and health professionals.

- **Perform preparation exercises for anthropogenic biological events**

Anthropogenic biological events, such as pandemics and bioterrorist acts, represent significant risks to global public health and safety. Therefore, we urge increasing the level of scenario planning for preparation for these scenarios, because communities must be prepared to face them.

In the region, the Pan American Health Organization included biological threats as a preparedness scenario for the first time in the III Regional Emergency and Disaster Drill in Central America and the Dominican Republic. Likewise, Argentina has held workshops on preventing bioterrorist acts in the Senasa BSL-4 laboratory (Senasa, 2019). Along these lines, we recommend reinforcing biological risk preparedness efforts by creating scenario plans and exercises for serious natural and designed pandemics.

We suggest the plans train and involve different sectors, such as health, security, defense, and specialized laboratories. Likewise, it is crucial to train personnel in high-security laboratories to identify patterns of suspicious behavior related to bioterrorist acts.

- **Monitor antimicrobial resistance**

There is a need to avoid the excessive use of antibiotics in Latin America to address the problem of antimicrobial resistance (AMR) and protect public health. In addition to passing stricter regulations on the use of non-therapeutic antibiotics in the animal industry, such as Regulation (EC) No. 1831/2003 and Regulation (EU) 2019/6 of the European Union, it is proposed that the indiscriminate use of antibiotics in people continue to be restricted.

Regarding monitoring policies, we recommend periodically examining the levels of antimicrobial resistance in meat products intended for human consumption and adapting antibiotic use standards to international recommendations (Ulloa, Bas Graells, et al., 2023).

- **Safeguard ecosystems**

Since in Latin America, biological risks can be caused by infectious diseases transmissible from animals to humans (zoonosis), intensifying the protection of ecosystems can advance the prevention of biological risks (Ulloa, Bas Graells, et al., 2023). To this end, we encourage countries to take action to stop illegal wildlife trafficking and deforestation.

For one, illegal wildlife trafficking is associated with an increased risk of zoonotic disease transmission. This implies prioritizing monitoring species with high zoonotic risk and strengthening patrolling in critical areas. We recommend exploring satellite technology and drones to improve monitoring (LaRue et al., 2017). Likewise, we call to

strengthen land, sea, and air border control (Gluszek et al., 2021) and intensify inspections in municipal markets to prevent the illegal commercialization of wildlife.

Moreover, combating deforestation could also prevent the spread of zoonotic diseases since there is a link between greater environmental degradation and worsening public health (Ulloa, Bas Graells, et al., 2023). For this reason, we propose that countries continue the governance of forest areas and payment programs for environmental services, which have already demonstrated their effectiveness in reducing deforestation and protecting biodiversity (Jayachandran et al., 2017; Schirpke et al. al., 2018; Vorlaufer et al., 2017).

## Proposals on ASRS

- **Include ASRS preparedness and response measures in national management plans**

We recommend that countries' management plans include specific measures to address the consequences of extreme climate events in agriculture, such as abrupt sunlight reduction scenarios.

We suggest evaluating the feasibility of massive-scale implementation of various initiatives and strategies in risk management plans, which can guarantee access to food, minimize impacts on agricultural production, and maximize the availability of food for human consumption in a scenario of this nature (Torres, Ulloa, Tiznado, Tinoco, et al., 2023). This can be done with experts from different national institutions, such as the ministries of economy and agriculture, livestock, and fisheries, among other entities in charge of investigating and managing agricultural risks.

Some of the proposals that can be evaluated and included are:

- Plans and strategies for water supply (Torres, Ulloa, Tiznado, Bas Graells, et al., 2023)
- Rationing and reducing food waste (Rivers et al., 2022)
- Redirection of food used as raw materials in animal production and biofuel production (Rivers et al., 2022)
- Adaptations to agricultural systems to increase food production (Rivers et al., 2022) and deployment of simple greenhouses (Alvarado et al., 2020)
- Aquaculture adaptations to increase food production, such as algae production (Jehn et al., 2023)
- High-tech adaptations independent of climatic conditions, such as the production of lignocellulosic sugar (Throup et al., 2022) or methane-based single-cell protein (García Martínez et al., 2022).
- Expansion of cultivated area.
- Ensuring universal access to food (Hinge et al., 2022), including subsidies to producers and consumers to maintain affordable prices, benefiting vulnerable groups.

- Setting minimum prices on essential foods to protect farmers and ensure constant availability at reasonable prices.

- **Promote regional cooperation in the management of ASRS**

Since an ASRS would be a global catastrophe, maintaining international supply chains would be vital to maintaining national productivity and economic activity. Disruptions to global supply chains could quickly impact each country's production; there are likely to be foods that would be difficult to grow and agricultural inputs that are difficult to obtain, requiring foreign partners. In turn, national hoarding could create severe shortages in some countries or even lead to additional conflicts, so facilitating trade is crucial to meeting minimum caloric requirements in the population (Rivers et al., 2022).

We suggest promoting closer collaboration between the region's countries by establishing agreements and mechanisms that facilitate the continuation of trade in essential agricultural inputs during crisis scenarios. In turn, we propose maintaining key supply chains and international collaboration to support the efforts of regional partners in addressing the crisis, which would be beneficial for both individual states and the region (Torres, Ulloa, Tiznado, Tinoco, et al., 2023).

- **Strengthen resilient food-producing industries**

To ensure food security in an ASRS, it is crucial to strengthen the agricultural sector's infrastructure and improve supply chain resilience. Furthermore, it is necessary to invest in food sources that do not depend on traditional climatic conditions, such as sunlight, temperature, and rainfall (Rivers et al., 2022).

This can be achieved through supporting seaweed-based food production and aquaculture (Jehn et al., 2023). Creating or strengthening a robust seaweed industry before a disaster could provide an alternative source of human food, biofuels, and animal feed, as well as contribute to the food system's resilience.

Additionally, investments in industrial resilient foods could help build flexibility into countries' food systems and contribute to response efforts to counter crop losses. Two examples are the conversion of lignocellulosic biomass — such as plant residues, leaves, and wood — into sugars (Throup et al., 2022), and the conversion of methane — such as that from natural gas or biogas — into proteins (García Martínez et al., 2022).

- **Implement information and training strategies for ASRS**

Given the complexity of this threat, it is necessary for specialists to be aware of the specific implications and consequences that an event of this type could have. To ensure an accurate understanding of ASRS among professionals, we propose integrating specialized information into existing disaster outreach materials and guidelines (Hinge et

al., 2022). These resources, adapted and complemented with the necessary information, will allow experts to anticipate and manage the situation more effectively.

We recommend providing specialized training to government employees, especially those in strategic positions such as ministries and other key government entities. This ensures that they are adequately prepared to communicate and coordinate strategic responses in the event of ASRS, thus optimizing management during the disaster. Adequate preparation of these officials will allow for an efficient and coordinated response in emergency situations.

- **Guarantee food equity in crisis scenarios**

In food crisis situations, it is vital to ensure that all people have access to nutritious, fresh, and affordable food, regardless of their financial resources. This involves addressing several fundamental criteria to achieve food equity, such as provisioning sufficient nutritious food for the population affected by the crisis and ensuring that this food reaches communities in fresh and safe conditions (Hinge et al., 2022).

Various strategies can be implemented to counter rising prices of essential foods such as rice, corn, wheat, barley, soybeans, and meat. Providing subsidies is a crucial measure, both for producers and consumers. This would allow farmers to maintain confidence in the coverage of their production costs, thus ensuring the maximization of production and continuity in the cultivation of crops (Torres, Ulloa, Tiznado, Tinoco, et al., 2023) while guaranteeing affordable prices for the most vulnerable groups (Hinge et al., 2022).

The expansion of welfare programs, such as food assistance and food stamps, can also greatly help low-income people, allowing them to purchase nutritious foods and maintain a balanced diet. Likewise, establishing minimum prices for certain basic foodstuffs can protect farmers and ensure the constant availability of these products at reasonable prices.

## Conclusions

In a global environment marked by increasingly interconnected and complex challenges, it is imperative that Latin America adopts a comprehensive vision of catastrophic risk management. The tendency to focus on immediate problems can jeopardize our ability to address crucial issues that require proactive solutions, such as global catastrophic risks. To achieve this, it is essential to recognize and confront existing biases, strengthen our institutions, and promote anticipatory governance that addresses regional vulnerabilities, thus ensuring an effective response to global threats.

In this sense, it is crucial that Latin America not only understands global risks but also uses this knowledge to inform policies, create strategies, and mobilize human resources. By doing so, the region can place itself at the forefront of global risk management. Likewise, this proactive approach will allow us to manage our global assets effectively.

It is encouraging to note that other countries and agencies are already considering these risks and working together to address them effectively. Therefore, we urge the countries of Latin America to join this initiative as a united, collaborative, and proactive region, thereby strengthening it. In this way, it will be able to strengthen its capacity to manage global catastrophic risks efficiently and contribute to the well-being and security of its citizens in both the short and long term.

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# Appendices

## Appendix 1. Interviews

(Sorted in alphabetical order)

### **Alicia Cebrian**

**Deputy Director of Risk Management of the National Disaster Prevention and Response Service  
Chile**

In 2021, Chile enacted its first risk management law, which marked a milestone in structuring the risk management system in the country. This legislation led to the creation of SENAPRED, which replaced ONEMI. The Chilean risk management system bridges public organizations, academia, the private sector, civil society, and international organizations. Management is carried out through committees distributed at different administrative levels of the country, from regions to communes.

The Minister of the Interior is responsible for chairing the national committee, while SENAPRED provides the technical secretariat. These committees operate in two essential phases: one for response and recovery and another for preparation and mitigation.

The National Emergency Plan (PNE) is one of the three main instruments in this area, with its most recent version from 2021. Work is currently underway on a comprehensive update of the PNE, which is expected to be presented next year. This review seeks to modernize the plan's terminology, roles, functions, structures, and alert systems.

Despite progress, risk management still does not occupy a prominent place on the Chilean public agenda. The trend has been to focus more on response than prevention. However, there is cautious optimism that this outlook will change with the inclusion of more sectors and faculties in the process.

Chile has established alliances with several countries at the international level. The relationship with Japan, which is focused on preventive work, is especially notable. In addition, Chile has signed protocols coordinated with other Latin American countries to exchange information and best practices.

The national policy runs until 2030 and has been aligned with key international commitments, such as the Sendai Framework 2015-2030 and Agenda 2030. Furthermore, key sectors such as academia, industry, and civil society are deeply integrated into the system. There are numerous agreements with NGOs and academic entities to promote collaboration and research.

Regarding long-term resilience, Chile is actively implementing the law and preparing maps of threats and risks. Integration into planning and creating common

criteria are identified areas for future improvements. Additionally, there is a recognition of the need to adapt to emerging global risks, such as pandemics and climate change. Although the service has not fully incorporated emerging technologies, initiatives are underway, especially in artificial intelligence, to improve risk forecasts and early warning systems.

## **Alma Hernandez**

**Guest professor at the Center for Research and Advanced Studies (CINVESTAV)  
Mexico**

Alma began her career in Mexico, focusing on creating technology-based companies, identifying a lack in this area from science. Despite the evident need for these companies, she noted pending actions in this sector. In attempting to approach decision-makers in the executive and legislative spheres, she faced challenges due to the divergence of interests between the political parties. To get their attention, Alma understood the importance of researching the other party and finding connection points with her areas of interest.

Alma shared a key lesson: the need to institutionalize efforts to integrate science into decision-making. This implies having advanced academic training and additional training that allows scientists to integrate their knowledge into practical and political contexts. In addition, Alma emphasized the importance of modifying evaluation systems to recognize the work of integration between science and policy.

For Alma, it is essential to involve society in this process and break down the silos between academia, the private sector, and the government. She proposes introducing entrepreneurship classes and redefining the curriculum in the academic field, so students understand that science goes beyond the laboratory. In the political sphere, she suggests using science as a hook to propose improvements in the political and scientific ecosystem since politicians would not want to reject proposals that could benefit society.

Alma also shared her experience proposing retirement and hiring schemes at CINVESTAV, highlighting the importance of establishing trust and mutual respect in any interaction. According to her, the institutionalization process is essential, and the pandemic has highlighted the need for science in decision-making. However, there is still a lack of support and "champions" to drive these efforts.

Finally, Alma mentioned initiatives such as the political training of scientific advisors in Mexico City and long-term programs that seek to integrate science into diplomacy and decision-making, such as the Science, Technology, Policy (STeP) Fellowship of the Inter-American Institute for Global Change Research (IAI).

## **Ariel Conn**

**Global Shield Co-Founder**

Ariel emphasized the critical importance of nations diving into research on global catastrophic risks (GCR). She thinks governments need a basic understanding of the risks. Right now, there are few cases, and that lack of understanding is one of the main reasons governments are not acting on these threats.

Central to Global Shield's strategy is establishing local offices in several countries. This approach is based on the belief that advocacy efforts will be most effective when driven by individuals who deeply understand each respective nation's unique politics, culture, and challenges.

She emphasizes the importance of understanding the audience, whether educating the public or advocating for better policies with governments. How problems, especially potential solutions, are communicated depends largely on the target audience. Lawmakers, for example, might resonate more with messages designed for the public since they are not always specialists in the field. She believes the public and legislators have a similar understanding of a complex issue. Therefore, it is useful if both groups need more information to understand the problems. However, the messages that motivate them may be different.

One of the challenges Ariel highlights is helping people understand the technology itself before diving into the associated risks. This often adds a layer of complexity to the communication process. To bridge this gap, she employs analogies and relatable scenarios, such as comparing AI in its current state to a young child, to make complex concepts more digestible to the layman.

Ariel has observed the effectiveness of open letters and media campaigns in drawing attention to pressing issues. Although these tools can be instrumental in gaining media attention and influencing politicians, they can also have negative sides. Missteps can polarize issues or even alienate lawmakers. However, when executed correctly, such campaigns can pave the way for meaningful discussions and open doors to influential platforms.

The "all hazards approach" is a comprehensive strategy in disaster management that addresses a wide range of threats and risks rather than focusing on individual ones. This approach recognizes that many mitigation and response measures are similar across different threats. For example, regardless of the nature of a disaster, there is a universal need for warning systems and government response plans. Your response would be consistent regardless of the specific threat in question.

The advantage of the all-risks approach is its broad applicability. In a political context, such as in the US, where there are numerous representatives and senators, each with their unique concerns ranging from nuclear weapons to climate change, it is challenging to gain consensus on individual threats. However, it could be easier to gain political support by advocating for measures that address multiple threats simultaneously.

## Augusto Lopez-Claros<sup>1</sup> and John Miller<sup>2</sup>

<sup>1</sup> **Executive Director of the Global Governance Forum, co-author of the Global Catastrophic Risk Index**

<sup>2</sup> **Fellow of the Global Governance Forum, co-author of the Global Catastrophic Risk Index**

The interview with Augusto López-Claros and John Miller focused on the Global Catastrophic Risk Index (GCRI) and catastrophic risk management globally, focusing on Latin America. The main motivation behind the GCRI was to increase awareness and understanding of global catastrophic risks and stimulate global mitigation and adaptation efforts. The aim was to provide a comprehensive unit of measurement for catastrophic risks that policymakers and the public would easily understand. The GCRI has positively influenced policy decision-making by comparing countries and demonstrating the interaction of different risk factors.

Although it does not offer specific policy prescriptions, it has helped prioritize resources and international cooperation efforts. Data collection challenges included availability, quality and reliance on high-quality sources such as the United Nations, World Bank, and the International Monetary Fund. The Global Governance Forum plans to improve the GCRI by tracking countries' progress and expanding its coverage.

It is argued that improving cooperation and coordination is the key to addressing today's global governance problems. Furthermore, the idea of writing a [Second Charter of the United Nations](#) to adapt the architecture of global governance to the challenges of the 21st century. The European Union is highlighted as a successful global governance model, with its supranational institutions and collaborative approach. Ultimately, it highlights the need for effective global governance to address global catastrophic risks, which are beyond the ability of any individual country to address.

The close relationship between sustainable development and global risk management is emphasized in the conversation about catastrophic risk management. It is highlighted that sustainable development seeks to meet current needs without compromising future ones, and risk management recognizes that risks, whether environmental, economic, or social, can hinder progress towards sustainable development. Integrating these two aspects can lead to responsible development that mitigates global catastrophic risks and improves the quality of life of the most vulnerable people.

Regarding risk management in Latin America, priority areas include preparation for natural disasters, economic diversification, social inclusion, improving governance, and investment in education and healthcare. Furthermore, the importance of building strong financial systems and social safety nets to mitigate vulnerabilities is highlighted. It is suggested that Latin American countries must recognize the magnitude of their vulnerabilities and work on systemic strategies such as economic diversification. International collaboration and knowledge sharing are essential, and governments are urged to adopt proactive policies and create incentives for preventive approaches to risk management.



## Clarissa Ríos Rojas

**Affiliated researcher, The Center for the Study of Existential Risk (CSER)**

The possibility of establishing dialogues with prominent multilateral entities, such as the World Bank and the Inter-American Development Bank, was suggested. These institutions could offer valuable perspectives on risk management in Latin America. The idea of approaching the industry, particularly insurance companies, as possible allies in related initiatives was also raised.

Links were shared to profiles of professionals who might be interested in collaborating on related projects. These professionals, with experience and connections in relevant areas, could be valuable allies in future initiatives. One of the challenges discussed was the inclusion of the Global South in global discussions and projects. It was noted that there are linguistic and cultural barriers that can limit participation and diversity of voices. Specifically, it was mentioned that not everyone has access to English resources or skills, which can be a barrier to full inclusion.

It was highlighted that natural threats and environmental problems are relevant in the region. Although these issues are crucial, there is a lack of discussion on other emerging issues, such as the existential risks that may arise from technologies related to artificial intelligence and biology.

Capacity building is a key dimension in these issues, with entities such as UNODA and BWC focused on biosecurity. This process is complemented by recognizing the need for science diplomacy to balance academic influence with political decision-making for effective risk management. Likewise, it is crucial to identify those actors in positions of power who can influence decisions at the governmental and international level. In this context, financing emerges as a primary concern, and the complexity associated with financing challenges is recognized.

The provision of concrete data and numerical solutions is essential. Organizations such as EU Science Hub, Cinestav, and IAI, among others, play a vital role in this interdisciplinary dialogue. It is suggested that funding could come from multiple sources, from embassies such as those of the United Kingdom or Australia to multilateral organizations such as the World Bank. Although universities have a role to play in this context, it is observed that their participation is not as active as it could be.

Events such as the UN "Summit of the Future" in 2024 indicate a need for clarity and direction. The construction of ecosystems that encompass diverse sectors and the search for common solutions are presented as essential. Facilitating dialogue and the value proposition, anticipation, and dissemination through media such as social networks, are essential steps in consolidating this integrative approach between science and politics.

## Cristian Torres

**General Director of the National Risk and Emergency Management Service**

## **Ecuador**

The new 2008 constitution proposes the move from a reactive risk management model to an proactive one. The original structure was a lower-level technical secretariat that evolved into the National Secretariat. The governing body for risk management is the Risk Management Secretariat.

There are problems related to concurrent competencies due to how government is structured. Ecuador has 221 municipalities with significant differences in their budgets. There is no specific risk management law, although attempts have been made to create one, and in 2023, they were close to doing so.

The country faces various threats, including earthquakes, such as the one in Pedernales in 2016, which resulted in a high number of deaths and economic damage; volcanic threats, such as that of the Cotopaxi volcano, the most dangerous in the region; tsunamis, forest fires, and annual floods that affect the livelihoods of the population.

Each municipality has a risk management unit. There is a funding gap for preparedness, although resources are prioritized when an emergency occurs. Firefighters, assigned to municipalities and with direct funding sources not dependent on the public budget, are the primary entities for the response. The Police, Armed Forces, and Red Cross also perform rescue and evacuation tasks. Civil Defense ceased to exist in 2008.

There are various plans, such as the Security Plan, the *Plan Responde Eze*, and the National Risk Management Plan published in June 2023, which also incorporates the SENDAI policy. Although prevention is generally seen as an expense, it is necessary to specify that every dollar invested can have a transformative impact. There are significant gaps in risk transfer, and the relationship with the private sector is more focused on reaction.

Ties on climate change issues have been strengthened with organizations such as the UNDP and the World Food Programme. The country is on the United Nations early warning priority list and participates in the UN Risk Reduction Program. They have also received financing, such as the recent IDB loan for an early warning system. Other allies in cooperation are CAPADRE (CAF committee), Great Britain, and France.

## **Elena Pabon**

### **Specialized Professional in National Unit for Disaster Risk Management (UNGRD)**

#### **Colombia**

The history of disaster risk management in Colombia is a narrative of evolution and maturity in response to the country's natural threats. Due to its geographical location, Colombia has new soils and rich biodiversity, which carries a greater risk of natural threats. This context led to the need to develop an effective risk management system.

Before the current system's implementation, risk management was carried out by organizations such as the Red Cross and Civil Defense, and the government had a

conservative approach to this issue. However, an important turning point occurred with the Armero disaster, which forced the Government to take decisive action. In response to this disaster, the Colombian Government enacted Law 1646 and its regulations in Decree 919, to implement an articulated life protection system.

Then, in 2010-2011, Colombia faced the La Niña phenomenon, which affected 70% of the territory. This event revealed deficiencies in the system, which led to the creation of Law 1523 of 2012, which established the National Disaster Prevention System. This new system is based on the idea that risk management is a social process in which everyone has a role to play. Key components are defined to do this, such as an organizational structure, planning instruments, an information system, and financing mechanisms.

A fundamental aspect of the system is the departmental risk management plans, which put people at the center of management. Basic emergency response committees were created to ensure a coordinated and effective disaster response. Risk management is defined as knowledge, reduction, and management of disasters, with responsibilities shared by the public, private, and community sectors. This involves the identification of risk scenarios and the implementation of mitigation actions.

Since 2013, work has been carried out on implementing the risk management plan, including implementing contingent credits at all system levels. The system's structure comprises national, departmental, and municipal levels, each with its respective risk management councils. In addition, knowledge, management, and risk reduction committees were established to advise these councils.

The National Risk Management Plan 2015-2030 is linked to territorial risk management plans and other territorial and environmental development plans. Business plans are also included. Regarding financing, there is the National Disaster Risk Management Fund and subaccounts to implement risk management. In addition, a special Nation account and territorial risk management funds were established.

International coordination is an important part of risk management in Colombia. Work has been done on updating risk management instruments in Latin America and it is recognized that biodiversity poses significant risks.

## **Flávia Aragão Santos**

**External Researcher, National Center for Natural Disaster Monitoring and Alerts  
Brazil**

The cliff management system in Brazil has evolved over two years, influenced by major disasters and the need for a more effective and coordinated response. Although significant progress has been made, areas, such as effective communication and prevention, still require continued attention and development.

Brazil has faced several socio-environmental disasters, from floods and droughts to catastrophic events such as dam collapses. A notable example is the Brumadinho

disaster, a tragic dam failure that led to a review and change of laws related to risk management in the mining industry. As a result of this event, mining companies now have a greater responsibility towards the communities near the dams.

Civil Defense plays a crucial role in responding to disasters in municipalities. Flávia began her career in this area, working directly in disaster situations. The Secretariat of Civil Defense, linked to the Ministry of Integration and Regional Development, coordinates disaster response at the national level. This secretary is responsible for dialogue with other ministries, such as the Ministry of Environment, Health, and Social Assistance, depending on the nature of the disaster.

Brazil faces some challenges in risk management. Political tensions often exist between the federal, state, and local levels, which can complicate coordination and effective response. Additionally, advances in research and understanding of risk prevention, response, and recovery have also dominated the country's focus.

Effective communication with communities is essential for ongoing risk management. Flávia highlights the importance of communication from the cliffs and the community's perception. Communities are often not well informed about how to protect themselves in emergency situations, and this highlights the need for improved self-protection and education.

At the international level, Brazil collaborates with agencies such as JICA (Japan International Cooperation Agency), and UNDP (United Nations Development Program and World Bank). These organizations help in the development of studies and strategies to reduce disaster risk in the country and do not provide funds directly.

## **James Ginns**

### **Head of Risk Management Policy, The Center for Long-Term Resilience (CLTR)**

James worked in the aviation sector and, following the outbreak of COVID-19, became convinced that the government could adopt the private sector approach to risk management to improve national risk management, especially concerning risks of global catastrophes. This conviction led him to collaborate with the Center for Long-Term Resilience, with which he worked for two years before officially joining to lead risk management as Head of Risk Management Policy.

James applies risk management best practices from the private sector to the government arena, especially in preparing for catastrophic risks. His transversal approach addresses risk governance, risk management processes, and international cooperation. James has collaborated with organizations such as the UN, the World Economic Forum, and the OECD.

James highlights the importance of clear risk governance, especially in complex situations that require a cross-departmental response. He advocates a “three lines of defense” approach, where risk ownership, oversight, and audit are clearly defined and

separated. Additionally, James emphasizes the need for a regularly updated national risk register that focuses on vulnerability rather than probability.

As for resilience, James believes it is built by assessing the vulnerability of each risk. Furthermore, he suggests the creation of a multilateral forum where risk managers from different countries can share knowledge on the identification, assessment, and mitigation of global risks. No such forum exists and no country has a designated risk officer, complicating risk management in a fragmented geopolitical context.

## **Jan Marco Müller**

### **Scientific diplomacy and multilateral relations, European Commission, DG Research and Innovation**

The interview addressed the structure and functioning of science diplomacy in the European Union, a topic that has become essential in a world where political challenges are increasingly complex and intertwined. The structure of science diplomacy involves all 27 member states, some highly advanced and others less so, and the EU has to be more strategic due to the growing influence of geopolitics.

The fact that more and more countries are investing in science diplomacy was highlighted, with 18 of the 27 member states already having scientific advisor or science diplomacy coordinator positions established in their foreign ministries. Furthermore, the existence of the "EU Science Diplomacy Alliance" was mentioned as the main platform created in 2021, which underlines the importance given to this area.

A crucial point is that diplomacy can no longer be limited to consulting think tanks but must dialogue with experts such as epidemiologists and virologists, as the COVID-19 pandemic has demonstrated. Policy problems have become more systemic and require the involvement of scientific experts at all stages of policy development. Science itself has become a diplomatic actor, and its role in decision-making is increasingly important.

However, there is still little coordination in this field. A European science diplomacy framework is being developed, and working groups are being established on it, where ideally half of the members are scientists, and the other half are diplomats. This reflects the need for a multidisciplinary approach in science diplomacy.

The definition of scientific diplomacy is emphasized as the direct or indirect use of science, scientific evidence, and scientific cooperation for diplomatic purposes, serving national, regional, and global interests. Science provides options for decision-making. For this reason, having an ecosystem of reliable scientific advice is important. In addition, he highlighted the importance of having scientific advisors in governments and collaborating with scientific academies.

The interview also addressed the relationship between scientific diplomacy and Latin America. He emphasized that scientific diplomacy is an instrument with which a country can project itself abroad. For example, it is a way for smaller countries to have a global impact. He highlighted the role of science in budget allocation and the need for institutional changes, including incorporating scientific voices in ministries.

Collaboration between the scientific community and decision-makers is seen as a way to create jobs, develop competitive advantages and make policies more efficient. Science is essential in managing global risks, such as climate change, pandemics, artificial intelligence, and food security.

As for the future of science diplomacy, it is expected to continue to evolve and play a critical role in solving global challenges in the coming years. Coordination and collaboration will be essential, and science is expected to continue to be a vital component of political decision-making.

## **Jens Orback**

### **Executive Director, Global Challenges Foundation**

Jens Orback emphasized the significant gaps in global governance, especially in managing these risks. He noted that current systems, established after World War II, are not equipped to handle today's modern challenges. Orback underscored the need for stronger international law, noting that the current system often allows stronger nations to dictate terms. He believes in the importance of creating systems that ensure everyone's rights.

He is a proponent of the principle of subsidiarity, where decisions must be made as close as possible to the people affected. However, he recognizes that global problems transcend borders, such as water, air, and the treatment of forests and animals. He cited the deteriorating condition of the Baltic Sea as an example of the failure of regional governance.

When discussing global governance, Orback sees the European Union as a positive example, emphasizing the importance of thinking about the collective good rather than individual national interests. He believes regional unions in places like Latin America could play a similar role. He also believes the world needs to develop an economy where, for example, uncut trees have value, like regions like the Amazon. He also discussed the challenges of managing resources that lie underground, emphasizing the need for investments in sustainable development.

Orback supports initiatives such as the Bridgetown agenda, which seeks to facilitate investments in sustainable solutions. He also mentioned the importance of civil society in shaping global governance and highlighted the role of the UN in facilitating discussions and cooperation between nations.

Regarding global risks, Orback identified climate change, biological collapse, weapons of mass destruction, and artificial intelligence as the main threats. He emphasized the interconnectedness of these risks and the need for a comprehensive approach to addressing them.

## **Jose Alberto Cabrera**

**Management of response groups in risk management, Permanent Contingencies Committee  
Honduras**

The Risk Management Secretariat is the central entity that concentrates resources and relief entities in the country. There are eight regional offices of the Permanent Contingency Committee (COPECO), which in turn has only the Central COPECO and an Immediate Response Unit (URI) office. The ministry plans to establish a unit in each department, although delays have been experienced due to the change in government.

Since 1989, the system has undergone numerous changes. Hurricane Mitch in 1998 revealed significant integration and coordination problems between different entities such as firefighters and the Red Cross. Responsibilities were unclear, and the population was neither prepared nor sensitized to the risks, leading the country to prioritize risk management. Approximately 2 and a half years ago, COPECO was promoted to Secretary of State.

COPECO largely coordinates risk management resources and redeploys resources, also having material resources to respond to emergencies and receive donations. The National Emergency Operation Center (COEN) is national. It is in the facilities of the Secretariat, and there are Local Emergency Operations Centers (CODELES) that are established in case of local emergencies. The system is complemented by the military, the Red Cross, the Green Cross, police, and firefighters.

Although it appears that the latest management plan has not been updated, there will be a commission working on it. The country's risk management priorities include floods, hurricanes, and tropical storms since the northern area is especially vulnerable, as well as forest fires.

Internationally, COPECO has received assistance from the US Southern Command for Latin America and has established links with Costa Rica for preparation. Recently, support in training has been sought from Saudi Arabia, just as Spain has contributed to forming the COPECO structure and material resources. An international cooperation office within the secretariat manages proposals and requests for work with other countries.

## **Luis Alfonso Amaya Durán**

**General Director of Civil Protection, Prevention and Mitigation of Disasters  
El Salvador**

Director Luis Amaya addressed the structure and approach of the risk management system in El Salvador. The system is based on the Risk Protection Law of 2005, which establishes four levels of committees: national, departmental, municipal, and communal. When identifying the most significant risks, hydrometeorological events are highlighted, such as floods during the wet season and droughts and forest fires in the dry season. In

addition, geological risks, such as earthquakes, volcanoes, and tsunamis, are mentioned, along with anthropogenic events related to hazardous materials.

He mentioned that there are important advances in terms of risk management, including the presentation of the first National Risk Assessment Plan. The country is currently in the consultation phase, supported both technically and politically. The plan's strategy is based on the adoption of Sendai priorities and the Sustainable Development Goals (SDGs) 2030, focusing its focus on risk governance and the generation of knowledge in risk management.

International cooperation plays a crucial role in El Salvador's risk management, with multilateral and bilateral relations, involving development agencies from countries such as the United States, the United Kingdom, Switzerland, Spain and South Korea. The main challenges include ensuring constant support in political, economic and technical terms, and changing the perception that risk prevention is an expense, highlighting its investment nature through risk transfer.

Finally, he commented on the need to address both long-term risks and immediate challenges, with climate change a relevant global threat. Furthermore, he highlighted the importance of education, knowledge sharing, and public awareness as an integral part of risk management and called not to give up efforts in this field.

## **Luis Fernandez Rivas**

**Risk Manager, National Commission for Risk Prevention and Emergency Response  
Costa Rica**

The National Emergency Commission (CNE) of Costa Rica was created through Law 8488, which established the National Risk Management System. Before the CNE existed, it was known as the National Emergency Fund, with staff in charge, but had no institutional status.

The National Risk Management System includes the participation of local governments, where mayors play an important role in coordinating risk management committees. It also involves private entities and organized civil society. A National Risk Management Policy 2016-2030 has been established that aligns objectives with the Sustainable Development Goals (SDG) at a global level.

The system has subsystems for prevention, preparation and response, and recovery or construction after a disaster. These subsystems guide the planning and execution of risk management activities.

The CNE has specialized units, such as the Strategic Planning Department of the National Risk Management System, which is responsible for programming and planning the system's operation. There are operations management units, institutional communications units (press), standardization units for training, and other internal services units (legal and administrative).



The Law grants ordinary and extraordinary powers to manage emergencies, both undeclared (which do not require a presidential decree) and those declared by decree.

The National Emergency Fund and the municipalities are responsible for managing resources related to disasters and risk management, including investment in public infrastructure and particular situations.

The Emergency Operations Center (COE) is a decentralized entity attached to the Presidency of the Republic and plays a crucial role in coordinating emergency responses. This COE has a Board of Directors with the participation of the president and other ministries and entities. In the case of the CNE, it has an Executive Director (who is part of the Board of Directors of the COE), in addition to two main directorates, one related to risk management and operations, and the other to administrative and financial matters.

The system has more specific work plans with main axes, and plans and activities are assigned to the members of the system. In addition, specific standards and plans are created to address different types of emergencies, such as CNE emergency plans and plans related to other sectors such as health and waste management (Ministry of Health) or occupational health (Ministry of Labor).

Municipalities have the autonomy to create their own risk management plans through land use planning, which includes building and planning regulations in areas such as housing and human settlements, as well as river management.

## **Marina Casas**

### **Researcher at ECLAC, Sustainable Development and Urban Settlements Division, Climate Change Unit**

The Sustainable Development and Urban Settlements Division of ECLAC (Economic Commission for Latin America and the Caribbean) is made up of several units, including the Urban Settlements Unit, the Climate Change Unit and the Escazú Unit. There is also a Statistical Division and other divisions related to economic development, planning, the Latin American Institute for Economic and Social Planning (ILPES), natural resources and productive development.

The main headquarters of ECLAC is in Santiago de Chile, and they also have sub-offices in Uruguay, Buenos Aires, Bogotá, Mexico and Port of Spain. The Climate Change Unit has been working on incorporating the gender perspective in projects related to climate change since 2015, especially within the framework of the European Euroclima project.

The unit specializes in sectors such as electromobility, particularly transportation and gender issues. They have carried out important regional work in relation to climate change and gender, and have also been involved in climate finance issues.

The unit's work includes the promotion of public policies with a gender perspective, as well as participation in forums and events related to climate change. The Latin American and Caribbean Climate Week (LACCW 2023), to be held in Panama City,

from October 23 to 27, is an example. They have also collaborated with the Fundación Futuro Latinoamericano (FFLA) and have addressed gaps in access to climate finance.

An example of its work is the proposed regulation for electromobility, including the concept of "retrofit", which refers to converting diesel vehicles to electric vehicles. ECLAC has played an important role in the development of this regulation.

The unit has also worked in public policy, including Chile's Climate Change Law with a gender perspective. They have carried out participatory processes and territorial consultations, involving specialists and ministries. Additionally, they have worked on gender issues in the transport sector, such as gender equality in driving and the prevention of harassment on public transport.

### **Norma Amarilla<sup>1</sup> and Karen Romero<sup>2</sup>**

**<sup>1</sup>Executive Director, NEAD Communication, former Press and Institutional Promotion of the National Emergency Secretariat**

**<sup>2</sup>Environmental consultant, FAO  
Paraguay**

The risk management system in Paraguay is structured around the National Emergency Secretariat (SEN), the governing entity in charge of disaster management in the country. The SEN was formed in response to an adverse event that was not natural, specifically, a fire on August 1, 2004, at a supermarket that resulted in more than 400 deaths. As a result of this incident, the SEN was created in 2005 to respond to emergency situations. There is also the National Disaster Risk Management Policy, approved in 2018, although it is not implemented.

However, the SEN's focus has been on immediate response to disasters, such as floods and fires, rather than prevention and preparedness. The SEN budget is allocated mainly to transportation, basic housing supplies, and food kits for people affected by disasters. Unlike other countries, in Paraguay, there is no culture of disaster preparedness.

Food safety in Paraguay is an issue that escapes the SEN and falls on the Ministry of Agriculture, the latter being very limited in terms of risk management. Coordination between the different institutions involved in risk management, such as the SEN and the Ministry of Agriculture, is practically non-existent, making an effective response and identifying the greatest risks difficult.

Regarding the risks identified in Paraguay, floods, forest fires, and droughts stand out, in addition to diseases such as dengue and chikungunya. The lack of coordination between government institutions and resources allocated to risk prevention and mitigation are important challenge.

International cooperation plays a crucial role in risk management in Paraguay. International organizations such as the Food and Agriculture Organization of the United Nations (FAO) and the United Nations Development Program (UNDP), and the United States Agency for International Development (USAID) work in collaboration with local

governments, governorates, and municipalities to promote risk management policies and strategies.

Concerning international commitments such as the Sendai Framework 2015-2030 and the Sustainable Development Goals, their integration into disaster prevention and mitigation strategies in Paraguay appears to be limited since the main focus is on disaster response, rather than prevention and building long-term resilience.

Regarding the participation of key sectors such as academia, industry and civil society in the identification and mitigation of long-term risks, it is mentioned that there is a lack of coordination and that a strategy is needed to involve these actors in a more effective manner.

### **Omar Bello<sup>1</sup> and Alejandro Bustamante<sup>2</sup>**

**<sup>1</sup> Economic Affairs Officer of the Office of the ECLAC Secretariat**

**<sup>2</sup> Assistant to the Latin American and Caribbean Institute for Economic and Social Planning (ILPES) of ECLAC**

The interview highlights the importance of ECLAC as a pioneer in allocating resources to evaluate disasters. The carrying out of 120 evaluations highlights the difficulty of addressing risks in Latin America from a European perspective.

Emphasis is placed on the territorial approach to vulnerability, pointing out that it must be defined by the municipalities, as exemplified by Acapulco recently. In addition, the financial issue is addressed, illustrating with the case of Hurricane Mitch that, with a cost (for example) of 3.5 billion dollars, it can exceed the GDP of several countries, evidencing the complexity and unreality of investment from an external perspective.

Regarding the specific work of ECLAC, it is highlighted that it focuses on disaster evaluations, with 128 reports in the region. The risk assessment methodology involves the monetary estimation of the impact of a disaster to determine the resources necessary to restore the initial situation of the population. The concepts of loss, damage and costs are mentioned, and restructuring financing, emphasizing that the decision to rebuild falls on the affected country.

In addition, the DALA (Damage and Loss Assessment) methodology, which covers the disaster, emergency, recovery, and reconstruction phases, is introduced. Reference is made to a 2015 World Bank study that highlights the lack of financial resources and experience as obstacles to implementing resilient infrastructure in Latin American countries.

The interview concludes by mentioning the Treaty on Adequate Information for Disaster and Environmental Issues in the Rio Declaration on Environment and Development, also known as Treaty Principle 10. This treaty addresses the importance of transparency and citizen participation in issues related to disasters and the environment.

## Orietta Valdes Rojas

**Analyst of Methodologies in the Environment, Disaster Risk and Climate Change, Ministry of Social Development and Family of Chile  
Chile**

Chile's risk management methodology is born from the national disaster management policy 2015-2018, and the Ministry of Social Development and Family plays a role in investing in public infrastructure as one of the lines of action. One of the crucial aspects is the financing of projects that meet standards for disaster mitigation and prevention (such as hospitals, schools, and public buildings). The ministry manages an allocated budget and various investment items that support public investment and works with the Ministry of Finance to ensure that resources are used efficiently.

For example, the Ministry's methodological development area focuses on incorporating climate change and waste management considerations into the planning of public infrastructure projects. This involves the development of tools and standards to evaluate and mitigate risks in public works. The methodology is applied in projects that address various threats, such as fires, tsunamis, mass removal, and volcanic eruptions. The evaluation is carried out considering not only physical and environmental aspects but also social vulnerability, including crimes.

A real case is the 'I love my neighborhood' program, in which 45 indicators were used to identify territorial gaps and prioritize public investment projects. This is done in collaboration with the community, promoting citizen participation and seeking to reduce the rate of urban and social deterioration. For example, physical deterioration, micro-garbage management, health control, and even perceptions about different crimes are measured.

One of the biggest concerns is the cost-benefit evaluation, especially in projects with a social focus. However, it is recognized that not all threats have a known probability of occurrence, making measuring return challenging. A methodology that is used is that of avoided damage for rain and river issues, which, based on scientific evidence, calculates a projection of the social benefit that an investment in this aspect can have for a specific locality or population.

## Rafael Bonilla

**Coordinator of Cooperation and Knowledge Transfer Center, Regional Logistics Center for Humanitarian Assistance  
Panama**

Rafael Bonilla provided an overview of risk management and humanitarian assistance in Panama, with a regional focus in the context of the Mesoamerica Project. He highlighted Panama's National Civil Protection System, established in 1982 and updated over time to address disaster response and a more comprehensive perspective involving prevention, management, and community development.

Within the scope of the Mesoamerica Project, the importance of cooperation between countries to improve infrastructure, interconnectivity and social development was noted. Within the risk management framework, initiatives such as the Mesoamerican Network for Comprehensive Risk Management (RM-GIR) and the COOPERASÜR Platform were highlighted to strengthen collaboration in the region.

The role of the Regional Logistics Center for Humanitarian Assistance (CLRAH) in Panama was emphasized, describing it as a platform for humanitarian assistance with regional reach. It was mentioned that Panama had become a humanitarian "hub," being a convergence point for organizations that assist, coming from Dubai or Kuala Lumpur. The CLRAH has two types of users: national and international, including organizations such as the Red Cross, the Green Cross, and the UN, and collaborates closely with strategic partners such as the Coordination Center for Disaster Prevention in Central America and the Dominican Republic. (CEPRENAC), a regional organization focused on disaster risk reduction.

On the other hand, the breadth of the approach of the National Civil Protection System was highlighted, since it not only focuses on disaster response, but also on prevention, management, and community development. In addition, it houses Panama's humanitarian warehouse within the Humanitarian Hub.

Among the current challenges, the need to update the National Disaster Plan and the implementation of a new law was highlighted. This comprehensive approach to risk management, regional collaboration, and work structure at both the national and international levels are crucial aspects of the efforts of Panama and the Mesoamerican region in the field of humanitarian assistance and disaster management.

## **Sergio Rico**

### **Director of the National Emergency System Uruguay**

Director Rico provided a detailed overview of risk management in Uruguay. The country faces four main risks: forest fires, floods, water deficit, and high winds. It has established 19 departmental emergency committees to address them. In addition, Uruguay has a national disaster risk reduction system that involves several ministries. If unforeseen risks occur, they must be coordinated with the relevant ministry.

He mentioned that the current priority is to learn from the recent water crisis and develop protocols to face the drought, promoting teamwork between government agencies. Implementation of the National Plan for Comprehensive Emergency and Disaster Risk Management (GIREDE) is underway, although it faces financing challenges, such as damage assessment and expense labeling. The next reform is planned for 2030.

In the same way, he delved into the importance of emphasizing the investment nature of comprehensive risk reduction management. To this end, training is being carried out for public officials through the School of Public Administration to increase awareness. Uruguay cooperates internationally in risk management, participating in

regional initiatives such as MERCOSUR and participating in South-South collaboration with countries such as Ecuador and Colombia in damage and loss assessment.

He highlighted that the country seeks to involve academia, civil society and the private sector in the identification and mitigation of risks, with initiatives such as training university students in disaster risk reduction through professional practices. In October, the first youth network in Uruguay will be launched.

Finally, it recognized the need to address both long-term risks and immediate challenges, such as cybersecurity and radioactive risks. Regarding other emerging technologies, the National Emergency System is interested in staying informed, although it mentions that it is difficult to allocate resources to the issue due to the low probability of occurrence in the country and the lack of awareness.

## **UNDRR**

### **United Nations Office for Disaster Risk Reduction (UNDRR) Regional Office America and the Caribbean Panama**

The United Nations Office for Disaster Risk Reduction's (UNDRR) main objective is to help decision-makers worldwide improve their understanding and act on risk. We work towards a world where disasters no longer threaten the well-being of people or the future of the planet and where sustainable development and the Sustainable Development Goals (SDGs) can be achieved without compromising security.

UNDRR is also responsible for promoting the coordination of disaster risk reduction activities in the economic, social, humanitarian, and development fields, as well as for supporting policy integration in close collaboration with national and local governments, international organizations, civil society, and the private sector.

Natural disasters do not exist. Phenomena or threats can have a natural origin (such as tropical storms and volcanic eruptions), anthropogenic (caused by human action, such as a technological or environmental disaster), or even biological (such as the COVID-19 pandemic). Whether threats become disasters results from human actions (or inactions) and decisions. Using the word "natural" to describe disasters can give the impression that they are inevitable and that human actions can do little to prevent or mitigate their impacts.

UNDRR is headed by the Special Representative of the UN Secretary-General for Disaster Risk Reduction, Mami Mizutori, followed by the Director, Paola Arbitro, who leads the Secretariat. The main divisions and departments are detailed below:

- UNDRR Front Office
- Division of Risk Understanding, Monitoring and Capacity Development  
Division of Intergovernmental Processes, Cooperation between Agencies and Alliances  
Division of Communication, Promotion and Knowledge Management
- Coordination of the Global Platform

- Policy Coordination
- Regional Offices in Africa (Nairobi / Addis Ababa), Asia and the Pacific (Bangkok / Suva), America and the Caribbean (Panama), Europe and Central Asia (Brussels), and Arab States (Cairo).

UNDRR uses various strategies and mechanisms, including:

- Facilitation of international cooperation.
- Capacity development through education and training institutes. Global risk analysis and reporting.
- Support for intergovernmental processes and cooperation between agencies. Promotion of policies that integrate disaster risk reduction into sustainable development.

The collaboration includes strengthening the capacity of countries to develop disaster risk reduction plans, preparedness, and effective response to emergencies. Regional offices play a crucial role. Some of those collaborations include:

- Support for implementing the Sendai Framework: provides support to member countries in implementing the Sendai Framework for Disaster Risk Reduction 2015-2030. This includes providing technical assistance, sharing good practices, and facilitating coordination between countries to achieve the objectives of the Sendai Framework.
- Strengthening local and territorial capacities promotes the strengthening of the local and territorial resilience capacities of cities and communities in an urban context. Through initiatives such as "Developing Resilient Cities 2030", UNDRR works collaboratively with member countries to strengthen disaster response and recovery capacity at the local level.
- International cooperation: promotes international cooperation for developing countries through adequate and sustainable support that complements the measures taken at the national level to implement the Sendai Framework for Risk Reduction 2015 – 2030. This international cooperation seeks to significantly improve the capacity disaster risk management in member countries.

UNDRR plays a central role in implementing the Sendai Framework for Disaster Risk Reduction, working closely with Member States, local governments, the private sector, communities, agencies of the United Nations system, and other stakeholders.

UNDRR is responsible for supporting the implementation, monitoring and review of the Sendai Framework. Among the activities carried out in this context are:

- Coordination of actions within the United Nations system to achieve the implementation objectives of the Sendai Framework
- Promotion of the establishment of multi-sector coordination mechanisms for disaster risk reduction, including National and Regional Platforms for Disaster Risk Reduction
- Promoting collaboration and alliance-building for disaster risk governance at the national, regional, and global levels

UNDRR interacts with other United Nations agencies in disaster risk management in several ways:

- Coordination and strategic support: Provide strategic and operational support to UN country teams for the development of their programmes and contributes to the development of tools for UN programming, such as disaster risk reduction guidelines for the Framework United Nations Development Assistance Program (UNDAF) and post-disaster needs assessments.
- Establishment of working alliances: UNDRR establishes working alliances with the UN regional commissions to promote collaboration and alliance formation in disaster risk governance at the national, regional and global levels.
- Support for the implementation of the Sendai Framework: UNDRR provides support for the implementation, monitoring and review of the Sendai Framework for Disaster Risk Reduction. This collaboration involves working with other UN agencies to achieve national, regional, and global disaster risk reduction objectives.

Advances in early warning and preparedness systems have saved tens of thousands of lives and billions of dollars. End-to-end, people-centric, multi-hazard early warning systems can help minimize damage to people, property, and livelihoods by triggering well-prepared and tested early action.

For this reason, the Secretary General of the United Nations launched the Early Warnings for All initiative in March 2022, which calls for all inhabitants of the Earth to be protected by early warning systems by 2027. In November 2022, the UN Secretary-General launched an Executive Action Plan at COP27 to implement the initiative and appointed the World Meteorological Organization (WMO) and the United Nations Office for Disaster Risk Reduction as co-leads. (UNDRR).

Early warnings of 24 hours in advance can reduce damage by 30%. One third of the world's population, mainly in the least developed countries and small island developing States, remains uncovered by early warning systems. In Africa, 60% of the population lacks coverage. Investing US\$800 million in early warning systems in developing countries would prevent losses of between US\$3 billion and US\$16 billion a year.

UNDRR faces various challenges and has crucial future perspectives in its global disaster risk reduction work. One main challenge is strengthening the post-disaster response and recovery capacity. Furthermore, it is essential to increase public awareness of the importance of preparedness and advance the integration of disaster risk reduction into policies and planning at all levels of government and in various sectors. It is also essential to advance the integration of DRR into policies and planning at all levels of government and in diverse sectors, such as health, education and infrastructure. We need to increase the capacities of the National Disaster Risk Reduction Offices as well as the National Meteorological Services. Inter- and multi-sector coordination mechanisms must also be strengthened to achieve governance that is essential for integration between different sectors. It is imperative to deal with the complexity of extreme climate phenomena and other existential risks. Future perspectives involve strengthening



decision-making capacity based on science and technology, as well as advancing the implementation of multi-hazard early warning systems to reduce the impacts of disasters.

UNDRR addresses disaster risk management by recognizing the interconnection between natural and man-made hazards. The strategy focuses on reducing vulnerability and strengthening resilience in the context of global catastrophic risks, such as extreme weather events and pandemics. This involves not only physical preparedness measures, but also understanding and mitigating the underlying social, economic, and environmental factors that contribute to risk.

Concerning existential risks, UNDRR plays a crucial role in preparedness and response. Its comprehensive approach includes forward-looking strategies to identify and address underlying risk factors. In the case of nuclear threats, the organization seeks to collaborate closely with governments and other organizations to develop coordinated and effective responses.

Collaboration with other organizations and governments materializes in a global network to exchange knowledge and resources. Active participation in networks and alliances ensures coordination of efforts to address risks globally. The organization acts as a facilitator, promoting coherence and building links between different sectors and actors for a comprehensive response.

UNDRR participates in key regional and global initiatives to reduce the impact of disasters, such as the Early Warning for All Initiative, which demonstrates its commitment to implementing multi-hazard early warning systems. Additionally, the promotion of science and technology through the Regional Science and Technology Advisory Group (RSTAG) is essential to inform public policy and make evidence-based decisions.

International collaboration is essential to address catastrophic and existential risks. UNDRR plays a key role in facilitating the effective communication of scientific knowledge, promoting the implementation of evidence-based policies, and improving intersectoral coordination. Additionally, UNDRR advocates for the creation of a global collaborative network that efficiently shares lessons learned and best practices, ensuring more effective risk management globally.

## Appendix 2. Initiatives related to Global Catastrophic Risks in Latin America

Initiatives on Artificial Intelligence		
Country	Plans, strategy	Laws
Argentina	<u>National Artificial Intelligence Plan</u>	<u>Recommendations for Reliable Artificial Intelligence</u>
Chile	<u>National Artificial Intelligence Policy</u>	<u>Draft Law on Artificial Intelligence, Robotics and Related Technologies in their Different Areas of Application</u>
Colombia	<u>National Policy for Digital Transformation and Artificial Intelligence (Conpes 3975)</u>	<u>Bill through which the duty of information is established for the responsible use of AI in Colombia</u> <u>Bill 059/23S, to establish public policy guidelines for the development, use and implementation of artificial intelligence.</u>
Costa Rica	<u>Artificial Intelligence Strategy (in development)</u>	<u>Draft Law for the Regulation of Artificial Intelligence in Costa Rica</u>
Ecuador	<u>Diagnosis on Artificial Intelligence (2021)</u>	-
El Salvador		<u>Law for the Promotion of Innovation and Manufacturing of Technologies</u>
Mexico	<u>Artificial Intelligence Strategy</u>	<u>Initiative to issue the Law on the Ethical Regulation of Artificial Intelligence and Robotics</u>
Panama		<u>Draft Law Regulating Artificial Intelligence</u>
Peru	<u>National Artificial Intelligence Strategy</u>	<u>Law that promotes the use of artificial intelligence in favor of the economic and social development of the country</u>
Dominican Republic	<u>Artificial Intelligence Strategy (in development)</u>	<u>Artificial Intelligence Bill</u>
Uruguay	<u>Artificial Intelligence Strategy (in development)</u> <u>Artificial Intelligence Strategy for Digital Government (2020)</u>	
Venezuela		<u>Draft Law for the Use of AI (in</u>

Initiatives on Artificial Intelligence		
		development)

Initiatives on Biological Risks		
Country	Plans, strategies	Laws
Argentina		<u>Rules for the Organization and Operation of the Laboratory Area of Healthcare Establishments. (1997)</u>  <u>Resolutions issued to address the COVID-19 pandemic</u>
Chile	<u>Standards Manual biosafety and associated risks</u>  <u>Biosafety Guide for Clinical Laboratories (2019)</u>	<u>Regulations for the treatment of viral, infectious and non-communicable diseases in biomedical laboratories</u>
Colombia	<u>Biosafety and Biocontainment Guidelines</u>	<u>Biosafety and Biocontainment - Section 5. Regulations</u>  <u>Resolutions issued to address the COVID-19 pandemic</u>
Guatemala	<u>Protocol of the National Epidemiological Surveillance System (2018)</u>	<u>National biosafety policy for living modified organisms 2013-2023</u>  <u>Provisions for the containment and prevention of the spread of COVID-19 at the national level</u>
Mexico	<u>Biosafety and biocustody protocol for taking and handling samples in the laboratory</u>	<u>Official Mexican Standards applicable to laboratories</u>
Panama		<u>National regulations on biosafety</u>
Peru	<u>Biosafety and biocustody manual</u>	<u>Regulations on coronavirus (COVID-19) compendium</u>

Initiatives on Agricultural Risks		
Country	Strategies	Institutional mechanisms

Initiatives on Agricultural Risks		
Argentina	National Disaster Risk Reduction Plan 2024-2030	Agricultural Risk Office ( <u>PRAY</u> ) Agricultural Emergencies Monitoring Office ( <u>OMEGA</u> )
Chile	<u>National Sovereignty Strategy for Food Security.</u>	
Regional	<u>Comprehensive risk management and agricultural insurance in Central America and the Dominican Republic</u> <u>Communal Agricultural Risk Management Plan (Peru-Bolivia)</u>	
Colombia	<u>Public policy strategy for the comprehensive management of agricultural risks in Colombia.</u>	Information System for Agricultural Risk Management ( <u>SIGRA</u> ).
Mexico	<u>Risk Map of the Agri-Food Sector.</u>	
Uruguay	<u>Strategies for agricultural emergencies</u>	