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# HEALTH, CLIMATE AND THE ENVIRONMENT

in Latin America and the Caribbean



Latinoamérica21



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# HEALTH, CLIMATE AND THE ENVIRONMENT

in Latin America and the Caribbean



**Latinoamérica21**

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The Inter-American Institute for Global Change Research (IAI) is an intergovernmental organization with 19 Parties in the Americas that promotes transdisciplinary research and the enhancement of capacities to improve public awareness. The IAI also provides information to governments for the development of public policy, which is relevant for a global environmental change based on scientific excellence, international and intersectoral cooperation, and the open exchange of knowledge. As part of its strategic plan 2019–2044 (<http://www.iai.int/pdf/en/Strategicplan-en.pdf>), the IAI Directorate also hosts the Belmont Forum Secretariat.

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## PREFACE

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*Irene Torres*

**M**ore than ever, it has become increasingly relevant to understand the links between environmental degradation, weather events—extreme, such as heat waves, and repetitive, such as heavy seasonal rainfall—and the proliferation of vector- and water-borne diseases. The exponential growth of dengue infections in the Americas in 2024, with cases reported in previously unaffected countries such as Uruguay, demonstrates that socioeconomic and environmental vulnerabilities expose people to the serious risks caused by climate change. As of March 17, 2024, the Pan American Health Organization reported a 249% increase in the number of suspected cases compared to the same period last year, with nearly 1.9 million detected in the region out of a total of two million reported globally.

In Latin America and the Caribbean, regional institutions and networks play a fundamental role in the development of science, cross-border intersectoral cooperation, and the exchange of knowledge to address climate and environmental challenges that have an impact on health. The Inter-American Institute for Global Change Research (IAI), an intergovernmental organization with 19 member countries, promotes transdisciplinary research and capacity building to inform public policy and disseminate knowledge relevant to global environmental change.

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Specifically in the field of health, climate and environment, the IAI has promoted and supported different initiatives serving governments in the region, and has a steering committee guiding the work conducted in this area, including: 1) the transdisciplinary research and training seed fund initiative with 12 selected projects; 2) the development and implementation of climate-integrated early warning systems in the Caribbean with the Caribbean Public Health Agency (CARPHA) in St. Lucia, Grenada and Barbados; 3) the co-funding of the Belmont Forum Collaborative Research Action Climate, Environment, and Health 2; 4) the organization of free online courses—also available asynchronously on the IAI Virtual Campus—in collaboration with the Global Consortium on Climate and Health Education (GCCHE), PAHO and the World Meteorological Organization (WMO).

This compendium, published by the IAI in partnership with Latinoamérica21 and with the support of the WMO, explores the complexities and health risks and challenges of the climate and environmental crises in Latin America and the Caribbean. A number of IAI-funded researchers and IAI collaborators and partners offer unique perspectives on crucial issues.

Soledad Nión examines the risks and inequalities inherent in these crises, while Victoria Mendizábal questions the possibility of carrying out health prevention on a planetary scale. Luz Cumba and María Inés Carabajal propose a “One Health” approach to face the consequences of climate change. Carolina Cerrudo highlights the importance of early warning systems as lifelines for global health, which, as Bárbara Tapia Cortés points

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out, contribute to a 30% reduction in the damages caused by natural disasters.

Both in the exploration of the connection between “heat islands” and public health, addressed by Gabriel Sánchez Rivera and Leticia Gómez Mendoza, and the need for green areas to mitigate heat waves, according to Enrique Muñoz and Adán Castro Añorve, the authors explore crucial interconnections between health and environment. Patricia Iribarne delves into how our waste affects climate change, while Sonia Alejandra Pou and Camila Niclis propose dual actions to mitigate climate change and prevent obesity.

Finally, Iohanna Filippi highlights the harmful connection between pesticides, climate change and obesity; Hilario Espinosa addresses the inseparable link between climate change and migration, with terrible consequences for the environment; and Nicole Arbour closes by reminding us that all elements are interconnected.

The importance of health has gained well-deserved attention on the international agenda. The Conference of the Parties to the United Nations Framework Convention on Climate Change (COP28) included for the first time a day dedicated to health in 2023. IAI initiatives, in partnership with other organizations, demonstrate that shared knowledge can make a difference in protecting human health and are an opportunity for joint action between science and policy in Latin America and the Caribbean for the benefit of the common good.

# RISKS AND INEQUALITIES IN CLIMATE AND ENVIRONMENTAL CRISES

*Soledad Ni3n Celio*

SOS

An illustration depicting environmental protest. On the left, a man with a beard, wearing an orange shirt and blue pants, stands on a grassy bank holding a yellow sign with the letters 'SOS' and a globe icon. The background features a large, multi-story industrial factory with two tall smokestacks emitting dark smoke. The foreground shows a polluted river with trash like plastic bottles and paper cups floating in it. The landscape is a mix of green grass and brown, dead trees, suggesting environmental damage. The sky is light blue with soft clouds.

Climate and environmental crises are not experienced in one single way. Every person understands reality as what is close and known, something that is collectively constructed based on beliefs, daily knowledge, social norms, and established routines located in a specific place. This means that the actions and strategies that will allow us to tackle the challenges posed by climate and environmental change do not have one single social definition. Therefore, the responses to these challenges will also be diverse.

Far from being true that the heterogeneity of perceptions about environmental risks is a consequence of the lack of available information or the inability to understand said information, social sciences have shown that these differences are mainly due to matters linked to structurally rooted material and socio-cultural inequalities. Evidence shows that the amount of information on environmental health risks is not related to how people act with regard to the problems said information identifies.

Since the 1980s, there has been interest in understanding in what way risk perception is understood by different audiences (academics, technicians, policymakers, general public) in relation to environmental hazards generated by technological and industrial development and cultural patterns of consumption. Several authors have shown that the perception of environmental and health risks is largely constructed based on socio-politically imposed definitions of risks, i.e. definitions provided by those who have the power to define problems in political and technical decision-making spheres.



The “multiverses” that coexist around the definition of the climate and environmental crisis occur in different spheres. Scientists and political decision-makers preserve differences in the ways they define the problem and propose possible solutions. As the Argentine political scientist and environmental activist Flavia Broffoni says, “Whoever defines the concept controls the debate”.

For example, in Uruguay, by the middle of 2023, the government decreed a water crisis defined by social movements, academic circles, and various self-convened demonstrations as a result of the “plundering” of water by hegemonic production models. This “water crisis” came to light as a result of the lack of drinking water, especially for small producers in the metropolitan area, something that had never happened in the country before. Yet this situation had been denounced for years.

### HETEROGENEITY OF DEFINITIONS OF ENVIRONMENTAL RISKS

Reality is full of meanings based on socially validated knowledge and is constructed under power structures. The definition of environmental and climate risks is a field of disputes where technical and popular knowledge intersect with interests, power relations, and the legitimization of knowledge by societies themselves. Everything depends on how we define progress, development, technology, well-being, nature, and participation, among other issues.

Discussing climate and environmental crises as problems implies socially defining the risks associated with them in competition with the risks linked to economic growth and scientific-technical progress. Decisions on how to deal with the consequences of increasingly extreme climatic events, the lack of access to quality environmental services for life (water, air), or the availability of space for growing food are framed in risk selection processes defined by science or politics. Not only what we know matters, but what we can do with what we know, individually and collectively.

« [...] The actions and strategies to face the challenges posed by climate and environmental change do not have one single social definition »

« [...] Not only what we know matters, but what we can do with what we know, individually and collectively. »

The answers to what the risks and problems are and how they should be addressed are diverse and often contradictory. There are debates about what the criteria for assessing environmental risks should be, depending on the groups or social referents under analysis. The imposition of narratives concerning these

definitions of risks and their consequences has significant economic, social, and environmental impacts. These impositions occur both within countries among socio-economically hegemonic groups and among “more developed” countries or regions on others that are also burdened by the development model in its consequences.

The causes and consequences of global threats, such as the proliferation of diseases and climatic events, are distributed unequally across the planet, as are the resources to deal with them.

### INEQUALITY AND ALTERNATIVES

There is a little-mentioned debt in technical and political spheres that is related to responsibilities and causes linked to multiple inequalities that are generated and deepened in the context of the climate crisis. Despite the seriousness of the situation that the planet is going through socio-environmentally, many countries have not yet ratified the Escazú Agreement (which establishes broad social participation, justice, and access to information on environmental issues as an international standard), and few have considered their socio-ecological debt. On the contrary, recently, the climate of violence against environmental activists and movements has worsened in the region, and the conditions of the most socio-economically disadvantaged populations continue to deteriorate.

Some academic circles have moved away from the purely scientific knowledge-generating scheme to propose and seek concrete transformations to address multiple inequalities. Those who advocate the Ecosocial and Intercultural Pact of the South, for example, argue that the energy, social, and digital transition should be designed by regions that bear the material, cultural, and environmental cost of saving the planet.

In a context where the definitions of the environmental crisis are plural, where the excess of information does not solve problems, and where there are different geopolitical responsibilities concerning planetary risks, it is necessary to discuss the mechanisms that could reverse continuing and deepening social inequalities on the planet. This implies the acceptance of multiple realities that coexist around the subject, taking academic and political narratives as constructions loaded with meaning, making visible the structures that perpetuate the mechanisms of inequality, and giving space to alternative solutions with a social license.

#### Soledad Ni3n Celio

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**IS PREVENTIVE  
HEALTH CARE  
ON A PLANETARY  
SCALE POSSIBLE?**

*Victoria Mendizábal*

“ It was a Sunday. We were all at home and then, all of a sudden, we were surrounded by water. We were on the roof for six hours until they were able to rescue us”, recalls Sandra, a neighbor of Río Ceballos. On February 15, 2015, residents of several towns in the Sierras Chicas, in the Argentinian province of Córdoba, saw rivers and streams in the area overflow. The riverbeds where locals would usually “paddle” were transformed into torrents of water that swept away lives, houses, bridges and everything in their path. In twelve hours there were 300 millimeters of rain: almost a third of the annual average calculated for this mountainous area.

Two years earlier, a group of scientists from the National University of Córdoba warned about this possibility in a technical report. The uncontrolled advance of urban areas and the clearing of native forest could lead to an increase in the risk of landslides and floods, precisely in the basin of the Ceballos and Saldán rivers, in the Sierras Chicas.

“It was not the rain, it was the clearing of woodland” denounced the self-convened assembly of locals on the seventh anniversary of the flood that has marked the area’s history. And yet the neighbors had not been alerted before the disaster struck, simply because the information was not available to society.



For this reason, this group of victims and activists initiated a collective action in which, among other things, they requested the implementation of an early warning system to detect and evaluate any severe weather phenomena in the province, inform residents and prevent negative consequences.

### HEALTH FROM A GLOBAL PERSPECTIVE

Day after day, the media, including social media, show the consequences of droughts, floods, extreme temperatures, fires and other environmental catastrophes in all corners of the world. Some even claim that “the Earth has a fever” or that it is suffering from “an infection called humanity”. Yet, can we speak of planetary health? Can we find indicators of this health and measure them? And could this information help us to make better decisions on a global scale?

The effects of climate change are not only evident in the significant increase in extreme weather events, whose growing intensity and magnitude have a direct impact on people’s daily lives. They also have a decisive influence on people’s health indirectly, due to the close association between human health and factors such as air and water quality, and access to food. In fact, various international forums and organizations are warning of the need to adopt a health perspective that incorporates the challenges brought about by climate change.

Such an approach includes a broader set of forces and systems that have an impact on living conditions, such as food and production systems, and even forms of political organization. Moreover, it is necessary to include the complex interconnections and balances between human health and the health of the planet, the latter being understood as a universal right that must be respected for present and future generations.

« [...] Various international forums and organizations are warning of the need to adopt a health perspective that incorporates the challenges brought about by climate change. »

## MEASURE, INTEGRATE AND ALERT

To combine data on the triad of climate, environment, and health as a strategy to monitor those areas that require more attention and care, a consortium of South American researchers from different scientific disciplines and geographies proposes to design a digital platform with publicly accessible information that will be hosted on the website of the National University of Córdoba, in Argentina.

The team intends to collect key data to construct indicators that will bring together data that is currently dispersed, fragmented or expressed in different time scales. It is precisely this dispersion that hinders the creation of an integrated surveillance and monitoring system to address problems at different territorial scales. This platform, therefore, could contribute to the development of interventions for mitigation or adaptation to the climate crisis.

“In all its phases, the participation of key stakeholders and potential users will be promoted”, says Dr. Sonia Muñoz, lecturer and researcher at the Faculty of Medical Sciences of the National University of Córdoba, who is leading the project. “We are convinced of the strategic importance of transdisciplinarity during the platform’s design and development process, and also when communicating it to decision-makers and society as a whole”.

For decades, the scientific community has been taking various measurements which, in each of its reports, integrate elements that agree on the need to adopt measures in the face of the climate emergency. Therefore, the possibility of designing a regional cooperative platform that aims to manage integrated data on key indicators in the climate-environment-health triad is a fundamental step in the region’s epidemiological context. This approach will make it possible to close the gap between research and scientific evidence, and public policies and health practices.

Not only is it important to identify hotspots that may involve health risks associated with climate change; it is also essential to develop appropriate strategies to make this information easily accessible to decision-makers such as local, provincial and national authorities in the fields of health, the environment, agriculture, welfare and education, among others. In this


way, response capacity during climate emergencies and disasters could be improved, thus benefiting society as a whole.

Undoubtedly, what happened in Córdoba’s Sierras Chicas was not a coincidental event or an isolated episode; rather, it is a symptom of an increasingly widespread and frequent phenomenon that needs to be addressed. The answer lies in gathering scientific evidence, making it accessible to society as a whole and supporting its application in practice.

### Victoria Mendizábal

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**“ONE HEALTH”  
AS A PILLAR OF THE LOSS  
AND DAMAGE FUND**

*Luz Cumba García  
and María Inés Carabajal*

The creation of the Loss and Damage Fund at the 27th United Nations Climate Change Conference (COP27) held in Egypt in 2022 was hailed as one of the major achievements of this meeting. This fund, designed to provide financing to vulnerable nations to address the impacts of climate change, represented a crucial breakthrough after decades of pressure from developing countries, especially those in the global South.

One year after this historic milestone, countries and territories of Latin America and the Caribbean continue to suffer the consequences of climate change, with impacts that go beyond the economy and affect all aspects of daily life and the natural habitat. We wonder when the funding will arrive and whether it will be sufficient to compensate for the losses and damage to human, animal, and environmental health.

In this context, the “One Health” and science diplomacy approaches emerge as key aspects to strengthen regional collaboration and enhance adaptation and mitigation capacities in the face of climate change.

On the one hand, the “One Health” concept seeks to address the interconnection among human health, animal health, and the environment. Launched in the early 2000s by the World Health Organization (WHO),



this approach promotes multisectoral and cross-cutting collaboration at the local and global levels, integrally addressing economic and non-economic factors. On the other hand, science diplomacy is an essential tool to promote international cooperation and the articulation of global efforts to mitigate these interconnected impacts. Science diplomacy promotes collaborative research and knowledge sharing and facilitates the formulation of science-based public policies.

The response to the losses and damages that climate change causes and will continue to cause in the region could be based on these two approaches, promoting regional collaboration to address problems that are global in scale but local in impact. In addition to the scientific evidence that informs public policies, the participation and commitment of multiple sectors of civil society, governments, and the private sector is required.

« [...] To what extent can money compensate for the loss of social ties, the deterioration of the quality of life, practices, and ancestral knowledge of the affected communities? »

While the Fund approved at COP27 focuses predominantly on economic losses and damage, such as the costs of rebuilding infrastructure damaged by flooding or sea level rise, it is essential to recognize the complexity of another type of loss and damage: non-economic. The latter is difficult to quantify, but profoundly affects individuals, communities, and ecosystems.

In Latin America and the Caribbean, the most significant non-economic loss and damage caused by climate change concern four areas. The first is the spread of zoonotic diseases such as Covid-19, which pose a threat to physical and mental health and impact all aspects of daily life. The second is the loss of biodiversity and pollution, which impacts the environment and animal health, directly affecting human health. The third is the loss of ancestral knowledge, which has consequences on the identity and ways of life of local communities, as well as on mental health. Finally, we find food insecurity, which compromises safe and sustainable practices, with repercussions on both human and animal health.



The trauma generated by the survival or forced displacement of a community by extreme weather events cannot be ignored. To what extent can money compensate for the loss of social ties, the deterioration of the quality of life, practices, and ancestral knowledge of the affected communities? Clearly, people will prefer to remain close to their family and community in cases of displacement. In this sense, funding for their adaptation becomes central.

### **THE “ONE HEALTH” APPROACH FOR LATIN AMERICA AND THE CARIBBEAN**

The key question is whether there can be sufficient compensation for these losses. The answer is probably not, because no amount of money can fully restore the disappearance of a world and a way of life, as these are particularly significant losses.

The “One Health” approach thus becomes fundamental to understanding these non-economic aspects and the progress of developing countries, as it allows us to consider the non-economic losses and damages in the communities of the global South with the same commitment as the economic ones.

Ultimately, we strongly believe that the promotion of sustainable practices and awareness of the connection between human health, animal health, and the environment are crucial to mitigate these non-economic losses and damages and that regional collaboration under the “One Health” approach can improve resilience and achieve prosperity and sustainability in the Americas.

#### **Luz Cumba García**

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# EARLY WARNING SYSTEMS: A LIFESAVER FOR GLOBAL HEALTH?

*Carolina Cerrudo*

Climate change, resulting from human activity and evidenced by phenomena such as heat waves, heavy rains, droughts, and air and water pollution, has significant influence on public health. Recently, experience and scientific observation have shown how these climate change-induced events not only cause considerable economic losses in the region but also result in the regrettable loss of tens of thousands of lives.

« [...] The number of extreme heat-related deaths in people over the age of 65 has increased by 70% in two decades. »

According to a report by the World Meteorological Organization (WMO), the number of extreme heat-related deaths in people over the age of 65 has increased by 70% in two decades. In addition, rainfall variability impacts the availability and quality of freshwater, increasing pollution and facilitating the

spread of diseases. These climate changes can also aggravate malnutrition and undernutrition by making food production more difficult. According to the WMO report, in 2020 the number of food insecure people increased by 98 million compared to the period 1981-2010.

Air pollution, responsible for 7 million premature deaths every year, generates respiratory, cardiovascular, and dermatological problems, as well as a negative impact on eye health. Moreover, warm conditions promote the release of allergens, which increases respiratory diseases. These risks particularly affect women, children, the elderly, ethnic minorities, disadvantaged communities, and people with pre-existing health conditions.

The World Health Organization (WHO) forecasts around 250,000 additional deaths per year between 2030 and 2050 due to the effects of climate change. Given this socio-environmental scenario, what measures could be implemented to mitigate these risks and minimize their impacts on society?

#### HOW TO ADAPT: EARLY WARNING SYSTEMS

One way to tackle the effects of climate change is to develop early warning systems, commonly used for disaster risk management.

Some governments issue warnings for heat waves accompanied by recommendations to prevent their effects on health, as is the case of Argentina's "early warning system for extreme temperatures".

Early warning systems monitor climate information and create indicators to provide data to facilitate decision-making and the design of public policies and strategies. In the field of health, an indicator is a measure used to describe and monitor a health characteristic within a population. For example, it could be the mortality rate from respiratory diseases or the number of hospitalizations due to heat.

Often, information on climate, environment, and health is presented in a fragmented manner, using different time and spatial scales, making it difficult to access and analyze. For example, let us assume we intend to investigate how air temperature affects dengue cases at a specific time of the year. Despite having daily temperature data, it is not common for dengue cases to be reported as public or open data with the same





« [...] Often, information on climate, environment, and health is presented in a fragmented manner, using different time and spatial scales, making it difficult to access and analyze. »

periodicity. The lack of detailed data makes it difficult to identify when dengue cases increased and make correlations with temperature variation, presenting challenges both in communication between data providers and data users and in the development of effective public health policies.

Robust and comprehensive information systems with reliable, accurate, and up-to-date data are crucial. In the Southern Cone, several professionals from public administration, civil society and academia, with



research in the fields of health sciences, social sciences and atmospheric sciences, are designing a digital platform focused on five specific problem areas: gestational health, chronic diseases, occupational health, water safety, and food systems. This platform, whose development involves the participation of numerous research institutes from CONICET and the National University of Córdoba (Argentina), the University of Buenos Aires (Argentina) and the University of São Paulo (Brazil), the Inter-American Heart Foundation of Argentina, and the National Meteorological Service of Argentina, among others, seeks to integrate information on climate, environment, and health, promoting the active participation of users in the creation of relevant indicators.

With the future implementation of the platform, the aim is to promote data collection and the creation of indicators to strengthen an integrated surveillance and monitoring system at the regional level. This system will be geared towards evidence-based decision-making. Just as Google Maps provides a variety of information on different aspects, this platform will offer indicators that connect climate, environment, and health in an agile and accessible format for risk management and health planning.

#### Carolina Cerrudo

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EARLY WARNING  
SYSTEMS REDUCE  
DAMAGE  
FROM NATURAL  
DISASTERS BY 30%

*Bárbara Tapia Cortés*



In the face of an impending natural disaster such as a hurricane, flood, or tsunami, an alert just 24 hours in advance can reduce damage by 30%. Compared to countries with early warning systems, mortality in countries with low coverage is eight times higher since neither people nor the authorities can make informed decisions in advance. Experience has shown that early warning systems are a reliable — as well as cost-effective — solution to protect people's lives and livelihoods from natural disasters.

### WHAT IS AN EARLY WARNING SYSTEM AND WHY IS IT IMPORTANT?

According to the United Nations (UN), an early warning system (EWS) combines hazard monitoring, forecasting, and prediction with disaster risk assessment, communication, and preparedness activities. An EWS enables individuals, communities, governments, and businesses to take preventive action to reduce the risk of catastrophes before dangerous events occur.

The planet is warming at a faster rate than at any time in history, which is causing disasters to become more severe and more frequent. As a consequence, these systems are becoming increasingly important. In this context, in March 2022, UN Secretary-General António Guterres launched the global Early Warning for All (EW4All) initiative, which aims to have the whole world protected by early warning systems by the end of 2027.

The implementation of multi-hazard early warning systems (MHEWS) can save lives while preventing and minimizing losses and damages. These systems provide a ten-fold return on investment and, according to UN agency reports, five times more people affected by disasters in countries with low MHEWS coverage than in countries with high coverage.

To put figures on the matter, according to estimates by the UN Global Commission on Adaptation, an investment of US\$ 800 million in the installation of early warning systems in developing countries could prevent annual losses of between US\$ 3 and 16 billion. Since three out of every four people on the planet have a cell phone, and most have access to broadband networks, communication of warnings is guaranteed.

Early warning systems are made up of different interlinked components, where, once the alarm has been issued, there is a public body in charge

of giving evacuation instructions and providing facilities such as food and shelter to those impacted. Therefore, after the warning is received by the people, the following stages are activated depending on the level of the catastrophe and the person affected. In addition, these systems also have a governance system dedicated to the reconstruction of infrastructure for the post-disaster stages.

The development and implementation of local disaster risk reduction strategies have increased since the adoption by UN member countries of the Sendai Framework for Disaster Risk Reduction, which in 2015 established seven global targets to reduce disaster risks and disaster losses. However, so far, only half of the world (52%) is covered by an early warning system, according to the 2023 Global Status of Multi-Hazard Early Warning Systems report, presented during COP28 in Dubai. Although only 101 countries have advanced warning systems, the number has doubled since 2015, when only 46% of the least developed countries and 39% of Small Island Developing States had such warning systems in place.

« [...] The planet is warming at a faster rate than at any time in history, which is causing disasters to become more severe and more frequent. »

### WHAT MAKES AN EARLY WARNING SYSTEM EFFECTIVE?

An effective warning system must detect different threats that may occur independently, simultaneously, or in cascade. In addition, it must cover from hazard detection to early action, which includes providing understandable and actionable warning messages. And finally, it must be people-centric so they can act in a timely and appropriate manner to reduce potential harm.

Therefore, warning services must have more and better data from meteorological, climatic, and hydrological services. In the case of health, adapted climate information and services are needed in the face of increasing extreme weather events, poor air quality, changing patterns of infectious diseases, and food and water insecurity. Nearly three-quarters



of National Meteorological and Hydrological Services (NMHSs) provide climate data to the health sector, but their use is limited. Less than a quarter of Ministries of Health globally have a health surveillance system that uses weather information to monitor climate-sensitive health risks.

Still, a recent study has shown that simply improving the accuracy of weather forecasts will not translate into better outcomes for vulnerable people. As a matter of fact, most of the deadliest and costliest hydrometeorological disasters of this century have been predicted in advance. Yet, the biggest gaps and opportunities for improvement were found in communication and response capability. Consequently, the design and implementation of any MHEWS must take an integrated, people-centered approach.

Within this framework, during the implementation phase of the global Early Warning for All initiative promoted by the UN, the focus has been on 30 of the most vulnerable countries globally and on complementary activities to be developed in other nations. In the case of Latin America and the Caribbean, six of the most at-risk countries have been selected: Antigua and Barbuda, Barbados, Ecuador, Guatemala, Guyana, and Haiti.

Last year, extreme weather and climate events had a significant impact on all continents, with major floods and rising rivers, tropical cyclones, extreme heat and drought, and resulting wildfires. The wildfire season in Canada far exceeded all previous seasons and caused severe smoke pollution episodes, especially in densely populated areas, while the most lethal fire of the year occurred in Hawaii, where at least 99 fatalities were reported.

The year 2023 was the warmest on record, and the warming effect of the current El Niño episode is likely to further intensify the heat in 2024. This will cause even more extreme weather events that will destroy more lives and livelihoods. Therefore, we must ensure and work to ensure that all countries have multi-hazard early warning systems that allow informed and timely decisions to be made to mitigate adverse effects. EWS are not a luxury, but a cost-effective tool that saves lives and reduces economic losses.

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# “HEAT ISLANDS”, A RISK FOR PUBLIC HEALTH

*Gabriel Sánchez Rivera  
and Leticia Gómez Mendoza*



On June 19, 2023, in the subway that Juan took to the clinic where he works in Mexico City, the temperature was 42°C. When he arrived, his first patient was an elderly woman who reported dizziness and nausea for the past two days. In June, the heat wave affecting the Mexican capital, one of the largest metropolises in the world, was already having consequences on the health of its inhabitants.

That day, as reported by the National Meteorological

Service, an extreme maximum temperature of 41°C was recorded for Mexico City, while the Ministry of Health reported 1,072 cases associated with extreme temperatures and 100 deaths nationwide attributable to the third heat wave that summer, between June 1 and June 22.

Recently, this phenomenon has become increasingly frequent and scientists suggest that due to global warming, we are observing an increase in temperature and, in particular, in the number of heat waves each summer. This is causing an increase in diseases associated with extreme heat, mainly in areas where the phenomenon known as urban heat islands occurs.

### WHAT ARE HEAT ISLANDS?

The term heat island refers to those sites or areas within cities in which the surface temperature of streets and buildings is significantly higher than that recorded on the periphery of urbanized areas, with differences that can reach up to 10°C. These heat islands are the result of the growth and development of urban areas, the construction of new buildings, and the increase in streets and avenues covered by materials such as asphalt or concrete that allow heat to accumulate during the day.

In addition, as a result of urban activity, there are other sources of heat such as automobiles, public and cargo vehicles, or refrigeration equipment such as air conditioning — increasingly used — whose temperature also builds up on the surfaces of facades and streets. All the heat accumulated during daylight hours is slowly released at night.

### THE CONSEQUENCES OF EXTREME HEAT

Rising temperatures have impacts on the health and well-being of the population in different ways, ranging from loss of comfort, which can be associated with irritability and lack of concentration, to dehydration, respiratory problems, sunstroke, and fatigue. Heat stroke can even cause death, since, facing high temperatures, the body's capacity to dissipate heat can be overwhelmed. Children, the elderly, and people with respiratory diseases are the most vulnerable sectors of the population.

Heat stroke, according to the Mexican Institute of Social Security (IMSS), occurs when the temperature rises above 40°C, exceeding body temperature, which is considered normal between 36.5°C and 37.2°C. This occurs mainly when a person loses the ability to self-reduce the body's temperature through sweating due to dehydration.

The effects associated with urban heat islands and heat waves are a problem for the world's population. In its 2022 report, the Lancet Countdown published the results of a study conducted in 43 countries in which it highlights that heat-related mortality increased by about 68% in people over 65 years of age between the periods 2000-2004 and 2017-2021. For the same period, the document reports the percentages of change and number of deaths per country. In the case of Latin America, Ecuador stands out, with a percentage change of 1477% (300 deaths); Honduras, with 547% (190); Brazil, 191% (3,920); Mexico, with 123% (2,070), and Argentina with 85% (1,300).

« [...] Heat stroke can even cause death, since, facing high temperatures, the body's capacity to dissipate heat can be overcome »

Another effect is the difficulty in preserving food, which tends to spoil easily if exposed to higher temperatures, making it necessary to use refrigeration systems for preservation.

### THE CASE OF MEXICO CITY

But before any action is taken to prevent or reduce this phenomenon, it is necessary to obtain detailed knowledge about where the highest temperatures occur, how many people are exposed to this risk, and the specific conditions of each area. A group of researchers from the Seminar on Climate Change, Biodiversity, and Health at the National Autonomous University of Mexico is conducting a study to identify the areas of greatest vulnerability, as well as public perception in two municipalities, in order to propose measures to mitigate the effects of the heat island on the population.

According to the preliminary results of the survey, 10% of people say that during heat waves they usually suffer from headaches, while almost half of them suffer from headaches only sometimes. In addition, almost one third of respondents indicated that they sometimes suffer from dizziness, and 15% that on hot days they regularly tend to suffer from nausea or vomiting.

The information obtained in this study allows us to refine the lines of action to identify the most appropriate and pertinent actions to prevent and care for the population exposed to these heat islands. Studies conducted by various researchers indicate that in areas where there is little or no vegetation, temperatures tend to be higher than in urban areas with trees.

### HOW CAN THIS BE SOLVED?

The impact of heat islands is so important that several national and international, governmental, academic, and civil society organizations (NGOs) have proposed various initiatives and actions to reduce the concentration of heat in cities and, therefore, the risks to the population. These include increasing the number of trees and green areas, painting roofs and facades with light colors, and installing green rooftops, i.e. covering these surfaces with vegetation. These actions generate greater reflectance, thus reducing heat storage. Other measures include encouraging natural ventilation and installing low-energy and low-heat equipment in buildings.

Attracting attention to minimize or address the effects associated with urban heat islands depends on society as a whole. Thus, actions must be carried out by different actors and at different scales, from the various spheres of government, academia, organized civil society (NGOs), and from within families at a personal level. All these spheres must work in a coordinated and harmonious manner. From the individual and family level, we can do a lot to minimize energy consumption, from using energy-saving equipment to planting trees on our properties or including vegetation on our rooftops. Governments and NGOs should promote mechanisms to adapt the legal framework to favor urban tree planting and architectural designs following the climate of each city, to re-naturalize urban areas. The options are many; therefore, the first thing we need is the civil and political will to address this problem, which, as a result of global warming, will grow significantly if ignored.

« [..] 10% of survey participants said that during heat waves they usually suffer from headaches, one third responded that they sometimes suffer from dizziness, and 15% said that on hot days they regularly tend to suffer from nausea or vomiting. »

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# WE NEED GREEN AREAS TO WITHSTAND HEAT WAVES

*Enrique Muñoz López  
and Adán Castro Añorve*





**M**ajor cities worldwide are experiencing rising temperatures due to climate change, lack of green spaces, and the heat island effect. In 2023 alone, Mexico City faced four heat waves. Heat strokes, where the body's temperature rises to around 40 degrees, can be fatal.

To counter these heat waves, many cities globally are investing in creating more green spaces, which natural or induced vegetation in the form of parks, squares, or wooded areas. Green areas can mitigate high temperatures, directly influencing the improvement of the quality of the environment in large urban areas.

In Latin America, 17 cities have undertaken improvement projects to maintain and expand their green areas, with the Brazilian city of Curitiba leading the way. Other notable cities for their improvements include Belo Horizonte, Bogotá, Brasília, Rio de Janeiro, São Paulo, Medellín, Monterrey, Puebla, Porto Alegre, Quito and Santiago, while cities like Buenos Aires, Montevideo, Guadalajara, and Lima fall below the average.

In other parts of the world, green spaces, besides mitigating heat waves, also enhance citizens' living conditions by providing spaces for sports, improving social relations, and strengthening ecological awareness. For example, New York has Central Park, one of the most visited urban parks globally, spanning 341 hectares; Barcelona has Ciudadel Park, and Madrid has the famous Retiro Park, considered part of its cultural heritage.

In Mexico City, there are nearly 68 square kilometers of green areas, covering 4.5% of its total surface. However, this is not sufficient for its more than 9 million inhabitants. The Green Infrastructure Program promoted by the city's government aims to connect and increase the link between green areas and bodies of water, equally distribute the benefits of services to the population, ensure

social confluence in these spaces, and incorporate actions to minimize the impacts of climate change.

« [..] *A useful tool for evaluating the efficiency of green areas is participatory cartography or community mapping.* »



Nevertheless, these efforts have not succeeded in highlighting the issue of the impacts of extreme heat on the health of marginalized areas. Environmental and health policies in Mexico City seem to be disconnected, and while there are strategies for adapting to climate change, plans, and programs do not seem to focus on the impacts on the environment and health concerning the increase in heat waves.

Within the same city, there are contrasts both in temperature and in risk to the population. Between the center and east of the city, there can be differences of up to 3°C during periods of extreme temperatures. The city's central and western areas are home to boroughs with a higher purchasing power, with a less vulnerable population and more extensive green areas. In contrast, the east of the city houses populations with lower purchasing power, a high percentage of children and adults over 65, and few green areas. In this context, the proximity of vulnerable population to green areas would alleviate the effects of heat waves.

While Mexico City averages 7.5 m<sup>2</sup> of green areas per inhabitant, the World Health Organization recommends an average of 16.4 m<sup>2</sup>, more than double. Therefore, there is still a long way to go to achieve thermal comfort in the sixth most populous city in the world.

### COMMUNITY MAPS

In this context, a useful tool for evaluating the efficiency of green areas is participatory cartography or community mapping. Creating these maps helps complement technical knowledge with the real-life experiences of people. It is an open process that captures ideas about how the land, its environment, culture, problems, and possible solutions are understood, indicating inhabitants' needs.

A group of researchers from the National Autonomous University of Mexico is creating participatory maps to assess green areas as buffers against heat waves in Mexico City. They are also advancing the analysis of satellite images to map the temperature of areas with and without green areas in the east of the city.

The objective of the project "Citizen Consultation and Cartography on Green Areas and their Role in Public Health, Case: Extreme Heat in Mexico City" is to build communication bridges between departments

and the community to improve public health. In this way, it is possible to promote the conservation of green areas and improve decision-making by public authorities, considering the population's opinion based on participatory maps.

Thus, if academia participates actively, the local government engages in green areas programs and citizens is involved in community mapping, it is possible to identify vulnerability hotspots and improve planning green areas and healthcare

« [...] *Environmental and health policies in Mexico City seem to be disconnected, and while there are strategies for adapting to climate change, plans, and programs do not seem to focus on the impacts on the environment and health.* »

services. All this will make it possible to face heat waves more effectively, which are becoming more frequent in Mexico City.

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OUR WASTE ALSO  
CONTRIBUTES  
TO CLIMATE CHANGE

*Patricia Iribarne*



**M**ore than half of the world's population lives in urban areas and the proportion is increasing. Cities consume 75% of energy, use 60% of residential water, and generate 80% of greenhouse gas (GHG) emissions globally. In addition, cities promote lifestyles that produce thousands of tons of waste per day, causing major impacts on ecosystems with very diverse social, economic, health, and ecological consequences.

The rate of waste generation is exponential, multifactorial, and varies according to a region's level of industrialization of. Moreover, much of the waste we produce is synthetic, resistant to degradation and potentially polluting. We also generate large volumes of waste which, albeit organic in origin (e.g. paper, cardboard, or plastics), does not degrade easily because it requires certain environmental conditions and, in some cases, a long time. For example, a plastic bottle takes hundreds of years to degrade.

A significant fraction of this waste originates in households, which is one of the urban environment's main concerns. Some data suggest that each person, at least in Latin America and the Caribbean, produces around 1 kg of waste per day, although some countries exceed this figure. This adds up to thousands of tons per day, and in order to address the problems so much waste generates, we must do more than simply improve the cleaning and management systems of cities. Rather, it is necessary to build new ways of relating to objects. It is important to question consumption patterns, production processes, and what we do with what we no longer need.

### WHY DO WE GENERATE SO MUCH WASTE?

A critical look at why so much waste is generated reveals the deep interconnection between urban life, consumption patterns, productive processes, capitalist economic models, technological development, public policies, and certain educational, cultural, and gender aspects. The linear and highly technological economic models developed by consumer society favor the intensification of material extraction, the production of gadgets, marketing, consumption, and rapid discarding.

To reverse the world economic crises of the early 20th century, strategies such as planned obsolescence were devised, setting up a culture of discarding and immediacy. Planned obsolescence consists of intentionally reducing the useful life, design, or quality of products and deploying commercial strategies to get people to buy new items constantly. In

short, companies purposely design objects whose useful life is short and whose repair is neither very accessible nor attractive. At the same time, advertising promotes mechanisms to make it more rewarding to buy new items.

The scarcity of educational programs that promote more conscious behavior and contribute to making more ethical and fairer decisions also influences waste generation. In the region, environmental education strategies and policies are generally weak, fragmented and generally not oriented toward social transformation processes. There are few actions aimed at developing a critical and comprehensive awareness of the impacts of the predominant consumption model. This aspect is reflected in the decisions made, both at the individual and collective levels, which favors the development of a society of uncritical and unengaged consumers.

« [...] Each person, at least in Latin America and the Caribbean, produces around 1 kg of waste per day. »

### SOLID URBAN WASTE AND GREENHOUSE GAS EMISSIONS

Part of the GHG generated globally come from household waste. All compostable wet materials such as food waste as well as paper, cardboard, and petroleum-derived materials such as plastic can emit GHGs if they are not properly treated. On the other hand, the incineration of waste under uncontrolled conditions not only generates toxic gases but also increases the concentration of GHGs.

Wet degradable waste represents almost half of household waste. Its decomposition in the absence of oxygen generates biogas, which consists mainly of methane, one of largest contributors to climate change. Some types of paper and cardboard are also degradable under certain conditions. However, these are usually considered to be dry recyclable materials, an important fraction of household waste that can exceed 35%. Dry recyclable materials includes plastics, paper, cardboard, cartons, glass, and metals.

The most common plastics emit trace amounts of methane and ethylene when exposed to sunlight. It is estimated that approximately 79% of all



plastic waste produced globally as of 2015 is in disposal sites, dispersed in ecosystems, or floating on “garbage islands” in the Pacific Ocean. Every year, 11 million tons of plastic waste enters the ocean, half of which corresponds to short-lived or single-use packaging.

In turn, the increase in GHGs produces diverse impacts at a global level, such as the loss of glaciers, rising sea levels, imbalances in weather patterns, an increase in tropical diseases or those linked to extreme weather situations, loss of biodiversity and fertile soil, among other impacts. All this brings with it a wide range of negative consequences linked to lifestyles, the economy, and people’s health.

### HOW DO WE CHANGE THIS REALITY?

The complexity and interconnection of different factors that favor the production and mismanagement of waste require a critical, collective, and transdisciplinary approach. The starting point is to question and reduce its generation. We must question production and consumption models, the production of disposable materials, especially plastics, and promote new forms of consumption, alternatives to the capitalist model. A second important action is to adequately treat the fraction of compostable waste.

From the perspective of integrated waste management, it is essential to consider regions’ diversity and needs, as well as to promote participatory

processes aimed at the development of critical thinking and the collective construction of new values. For example, creating community compost bins can be relevant as a critical management and education process, thus contributing to reducing GHG generated by household waste.

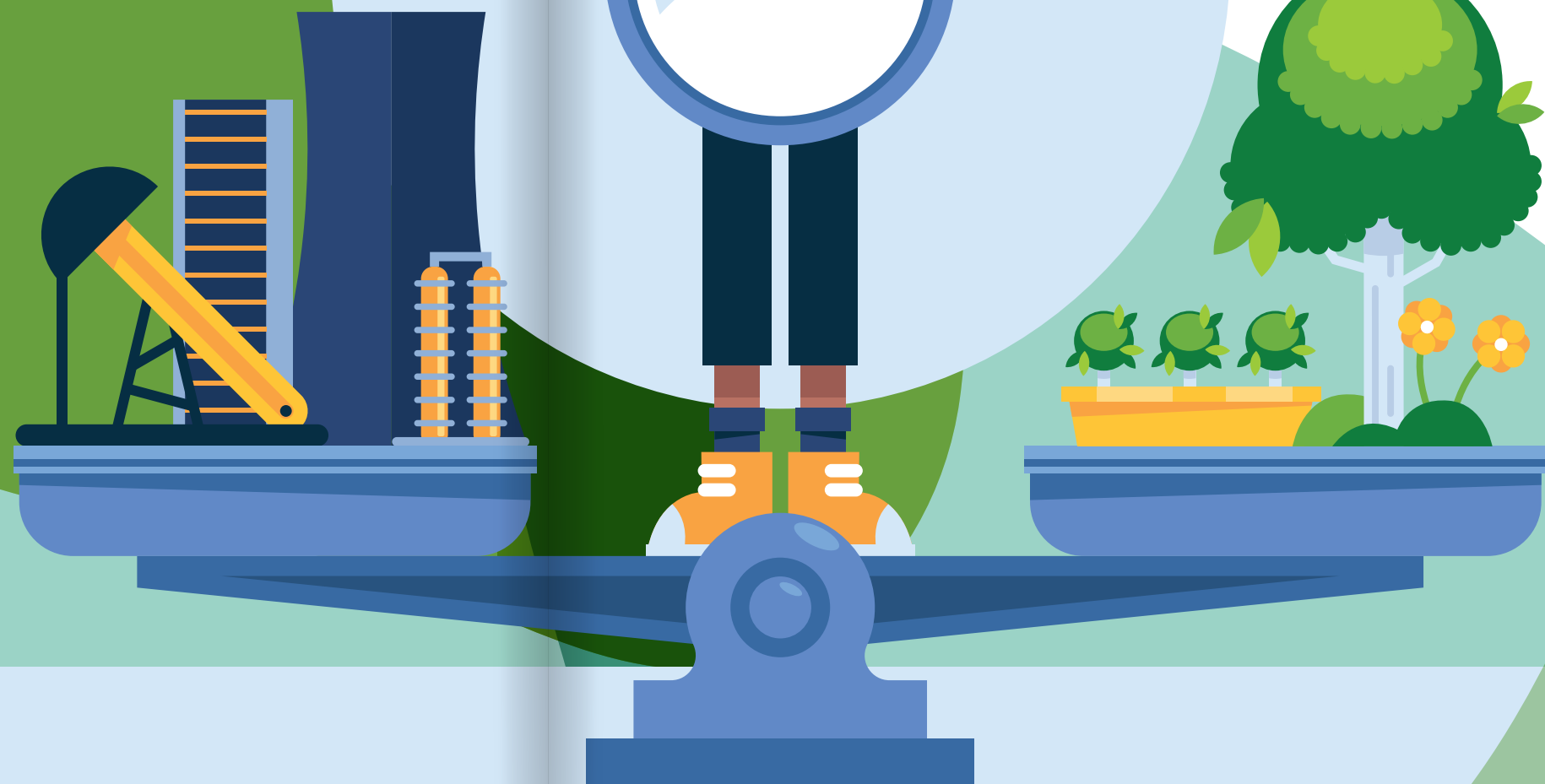
Another relevant aspect is the implementation of policies aimed at problematizing current consumption practices. Some countries have adopted “Zero Waste” strategies, a proposal based on the idea of not generating waste. This promotes changes in consumption, repair and recycling, redesign of products and services, among others. This entails great challenges when it comes to promoting environmental communication actions, transforming the “use and throw away” culture, and understanding ecosystem processes, as well as reorienting production processes.

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# TWO ACTIONS IN ONE: MITIGATING CLIMATE CHANGE AND PREVENTING OBESITY

*Sonia Alejandra Pou  
and Camila Niclis*





“Cycling has the advantage that it is faster and you can go anywhere you want, which does not always happen with other means of public transport in the city. And it is nice because you are outdoors” says Julia, a young user of the public bicycle service in the city of Córdoba, Argentina. The service is free of charge and consists of seven bicycle parking facilities connected by a network of overland cycling lanes, complemented by a elevated cycling lane almost 2 km long, recently built in the city.

Julia is right: using bicycles instead of motorized means of transport in big cities can be more practical and attractive. But also, faced with the problems of climate change and obesity, promoting the use of bicycles instead of cars is a concrete action that brings two benefits in one. On the one hand, it is ecologically more sustainable. On the other hand, it promotes a healthy lifestyle by providing the opportunity to do physical exercise. This contributes to the prevention of excess weight and other chronic diseases such as cardiovascular disease and diabetes.

The scheme in Córdoba (Argentina), as well as others carried out in Latin American cities, such as the Bogotá Bicycle Sharing System in Colombia or the Quito Public Bicycle System in Ecuador, are examples of opportunities to obtain co-benefits for health from actions aimed at mitigating climate change.

### GLOBAL SYNDemic: AN INNOVATIVE VISION TO SEARCH FOR TWO-IN-ONE ACTIONS

With the sudden appearance of Covid-19 in our lives, talk about pandemics has become an everyday occurrence. The notion of syndemic, on the other hand, is somewhat less well known. In general terms, the concept refers to epidemics or pandemics that coincide temporally and geographically, interacting and enhancing their harmful effects on the health of the affected population. This idea came to the attention of the scientific community a few years ago, following a report published by the Commission on Obesity of the medical journal *The Lancet*.

This article introduced the vision of “The Global Syndemic of Obesity, Undernutrition, and Climate Change”. From this perspective, it is understood that malnutrition in all its forms is a pandemic that threatens global health, and that coincides in time and place with climate change, with which it interacts and which today affects most people in every country and region around the world.

It is estimated that in several Latin American countries, such as Mexico, Panama, Argentina, and Chile, more than one-third of the adult population lives with obesity. In addition, according to the Intergovernmental Panel on Climate Change (IPCC), this region is highly vulnerable and is being strongly impacted by the consequences of climate change, a situation that is amplified by numerous factors, including inequality and poverty. In particular, the effect of climate change on the food security of populations in turn increases the prevalence of malnutrition.

We can consider the epidemic of obesity and climate change as carriages of a train that is speeding toward a disheartening scenario of health risks. We can also imagine that it is necessary to slow down the train and find appropriate actions capable of mitigating environmental damage and negative impacts on human health. To this end, it is useful to take up the

« [...] It is estimated that in several Latin American countries, such as Mexico, Panama, Argentina, and Chile, more than one-third of the adult population lives with obesity. »

global syndemic vision, which recognizes that the wheels of the train that drives the pandemics of undernutrition and climate change are largely shared factors.

Recognizing that there are shared factors is important, as it provides an opportunity to seek joint responses to address these global challenges. The unhealthy lifestyles that are gaining ground in more urbanized societies, as well as marked social inequality, are some examples of these factors that simultaneously drive or determine the two pandemics.

### **OBESITY AND CLIMATE CHANGE: LIFE IN CITIES AS A MEETING POINT**

Latin America is one of the most urbanized regions in the developing world. Two-thirds of the Latin American population lives in cities with more than 20,000 inhabitants and almost 80% live in urban areas. This is the equivalent to approximately 530 million people. The current pace of life in these cities brings with it changes in lifestyles that can be detrimental to health and the environment in which we live.

Urban residents are generally the most exposed to air pollution and sedentary lifestyles. The use of automobiles increases exposure to these factors. In addition, in cities, it is common to find a high consumption of ultra-processed food products and a low consumption of fruits and vegetables. It is widely recognized that an unhealthy diet is associated with an increased risk of obesity and chronic diseases. On the other hand, the relationship between diet and climate change is less well-known.

In this regard, an article published in the scientific journal *Current Obesity Reports* explains that livestock production for meat and dairy products generates methane gas, which accounts for more than 80% of agricultural greenhouse gases (GHG). Moreover, overconsumption of ultra-processed products can increase the generation of urban waste, also contributing to a higher concentration of GHG. GHG emissions are largely responsible for the greenhouse effect and contribute to global warming, which is of particular concern in urban environments.

Therefore, paying attention to the ways of moving within cities, as well as promoting a healthy and balanced diet and encouraging ecologically

sustainable food production, will not only be important to take care of human health, but also to contribute to environmental sustainability.

“The bicycle service in Córdoba is accessible”, says Julia, who adds that “the only requirement is to be a resident.” Equal opportunities, the “leave no one behind” proposed by the 2030 Agenda for Sustainable Development, is perhaps the greatest challenge to promote truly transformative actions for the environment and global health.

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**PESTICIDES, CLIMATE  
CHANGE, AND OBESITY:  
A DETRIMENTAL  
CONNECTION FOR HUMAN  
AND ENVIRONMENTAL  
HEALTH**

*Iohanna Filippi*

In Argentina, nearly 60% of adults are overweight or obese, exceeding the global average of 40%. These figures are estimated to grow to 50% worldwide by 2035. The World Health Organization (WHO) states that around 4 million adults die every year due to this problem, considered a global pandemic and the result of malnutrition.

Excess weight and obesity are closely linked to the consumption of processed foods rich in sugars, fats and salt, in addition to a sedentary lifestyle. The consequences of this excess weight include an increased risk of chronic non-communicable diseases, such as cardiovascular disease, diabetes, hypertension and oncological diseases. These worrying health implications are compounded by the effects of global climate change.

#### **CLIMATE CHANGE: HOW IT CAN AFFECT OUR DAILY LIVES**

According to the United Nations (UN), climate change refers to long-term alterations in temperatures and weather patterns, regionally and globally. It is usually associated with natural disasters such as floods, intense storms, prolonged droughts, water shortages, thaws, fires, and extreme temperature conditions. However, the potential implications that climate change could have on our daily routines, particularly on food, are rarely considered.

Climate change clearly and irrefutably impacts food production, decreasing or deteriorating its availability, diversity, and accessibility. According to the latest report by the National Drought Monitoring Board in Argentina for the year 2022, about 175 million hectares were severely affected by drought. This situation generated problems in water supply, both

for human consumption and for livestock, putting the production of more than 17 million head of cattle at risk. It also caused a significant reduction in crop yields in more than 1 million hectares.

« [...] *Overweight and obesity are closely linked to the consumption of processed foods rich in sugars, fats and salt, in addition to a sedentary lifestyle.* »

In addition to the adverse impacts of climate change on food production, the growth in food demand, driven by population growth, puts significant pressure on the agricultural sector and food systems. As a result, agri-food producers are compelled to employ all available resources to cope with adverse climatic conditions and ensure high yields.

In the region, the food industry has tended to produce ultra-processed foods, which contain little or no whole foods, include additives, and are nutritionally poor. According to estimates by the Pan American Health Organization (PAHO), consumption of ultra-processed foods in Latin America is expected to increase by more than 20% in the next 15 years. In agriculture and horticulture, the extensive use of fertilizers and pesticides has been the main strategy to increase crop yields. In Argentina, the sale of agrochemicals has experienced a marked increase in recent years, from 225 million kg in 2008 to 343 in 2016, according to data from the Chamber of Agricultural Health and Fertilizers.

#### **PESTICIDES: BENEFITS, CONTROVERSIES, AND ENVIRONMENTAL RISKS**

Pesticides are agents used at all stages of the production chain, from processing and storage to food transportation. Their function is to prevent, destroy, or control any pest that may damage the quality of the product. Some of these compounds are also used in domestic environments: who has never wanted to eliminate ants from their garden?

Despite the agricultural and food benefits they have brought, the use of pesticides has aroused controversy in recent decades. On the one hand, its misuse or indiscriminate use has led to the contamination of several aquatic environments, such as rivers, lakes, and seas. This is partly attributed to the lack of information or advice on the nature of the products used. On the other hand, uncertainties persist about the possible adverse health effects on populations exposed to these chemical agents.

Recently, it has been found that exposure to pesticides can cause alterations in fat metabolism, such as adipogenesis, which is the formation of adipocytes or fat cells and their accumulation through various processes. Therefore, despite the demanding physical activity involved in agricultural work, it is common to see overweight farmworkers. This situation raises the possibility that there is some external factor related to the work of this population that contributes to this unfavorable health condition.

## HEALTH CARE AND THE ENVIRONMENT, AN INSEPARABLE PAIRING

Both climate change and exposure to pesticides are elements that have an impact on the health conditions of populations and can act together to increase the likelihood of becoming overweight or obese.

So, what will the climate bring in the coming years, and what will happen to food production? How will the availability and quality of food affect the health of populations? What consequences will it have on the health of farmworkers? These are some of the questions that emerge from this intersection between the environment, human health, and food production.



Climate change is a reality and a threat to global health in the 21st century, especially in developing countries. Given that obesity is an avoidable disease, it is important to continue promoting plans aimed at preventing it. It is also crucial to continue generating policies aimed at reducing and counteracting the negative impacts of climate change on communities and public health. Collective strategies are required to achieve food security and maintain harmony between society and the natural environment since the health and well-being of populations are closely linked to the preservation and sustainability of the environment.

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# THE QUIET ADVANCE OF EMERGING FEVERS IN LATIN AMERICA

*Irene Torres and  
Daniel Romero Álvarez*



**F**rom Colombia to Chile, from Bolivia to Paraguay – not even Uruguay, with its temperate climate, is spared. Every day, cases of vector-borne diseases make the news. The year 2023 closed with the announcement of human cases of Oropouche and Mayaro fever in Brazil and western equine encephalitis in Argentina. In numbers, these cases do not compare with more common diseases such as dengue fever, a disease caused by the dengue virus, which has broken infection records in the region this year. But, due to climate and environmental changes, the epidemic potential of these three diseases is growing: they can be transmitted to more people and reach countries where they could not be found before.

« [...] Deforestation is often accompanied by illegal mining and unplanned urbanization, which create ideal conditions for the proliferation of insects in or near inhabited areas. »

These are three zoonotic viruses; that is, their life cycle is spent in nature infecting non-human mammals until they are transmitted to human populations, usually by insects. The most recent outbreaks or unusual increases of Mayaro and Oropouche were reported in ten cities in the Brazilian state of Acre, in the middle of the Amazon. This is no mere coincidence. Oropouche virus has been detected in humans in places where vegetation cover is

progressively decreasing and Acre has lost a significant part of its forests in recent years. Between 2002 and 2022, 1,57 million hectares disappeared, or 11% of its tree cover.

Deforestation is often accompanied by illegal mining and unplanned urbanization, which create ideal conditions for the proliferation of insects in or near inhabited areas. Water soaks into eroded soils, abandoned tires and makeshift dwellings, and it only takes a specific range of temperature and rainfall for virus-transmitting insects to reproduce exponentially in just one week. Once they proliferate, the probability increases that the dipterans (two-winged insects) that transmit the Oropouche, Mayaro and equine encephalitis viruses will infect people.



According to the different possible scenarios related to climatic and environmental changes in the region, if there is an inadequate response in terms of planning, prevention and control, experts agree that vector-borne viruses may become increasingly important public health problems.

### IMPACTS ON THE STATE

The accelerated transmission of any infectious disease has a negative impact on a country's health and economic systems. As a reference, with an incidence between three and four million confirmed cases per year, dengue costs Latin American governments around 3 billion dollars annually.

Because of their epidemic potential, Mayaro, Oropouche, and equine encephalitis are viruses considered of relevance by the Pan American Health Organization. Laboratory diagnosis of Oropouche, Mayaro, and equine encephalitis is not routinely performed, making it difficult to predict which country they may spread from or to at any given time. The symptoms of these infectious diseases can be confused and, therefore, can coexist undetected.

Despite the need to prevent and control the transmission of these viruses, their risks receive insufficient attention from central and local governments. Camino Verde, a community-based intervention in Mexico and Nicaragua significantly reduced dengue cases, implying that integrated dengue control in the primary health care system could have an effect. The problem is that health facilities in our region are too busy with the daily demands of the population and their attention is focused on more serious or higher-incidence diseases, such as dengue itself or yellow fever. Effective vector control and the expansion of diagnostic capacity in health systems require providing them with additional human and physical resources.

Even if more investments were made in the health sector in the region's, it would not be able to cope alone with the consequences of neglect in other areas of public management, such as the provision and safe management of drinking water, sanitation and garbage collection, and management, which are the most direct solutions to any vector-borne infectious disease. Similarly, just as governments create incentives and protection mechanisms for industry and the business sector, it becomes

pertinent for them to declare the proliferation of vector-borne viruses as a priority area of government investment. In the face of forest loss, environmental ministries could create more and better incentives to combat the active fronts of illegal deforestation or mining. To control land trafficking for housing, federal and central governments should at a minimum require and support effective management of urban sprawl in cities; ideally, they should actively fight organized crime.

In the absence of direct interventions to control the proliferation of mosquitoes and other dipterans, known and unknown fevers will continue to affect human populations. Governments should, in parallel, identify the infectious diseases that are of relevance in the region, continue to increase the provision of basic services, and expand the actions of other sectors that have influence in areas of relevance for vector proliferation.

#### Irene Torres

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# THE INSEPARABLE CONNECTIONS BETWEEN CLIMATE CHANGE, MIGRATION, AND THE ENVIRONMENT

*Hilario Espinosa*



**M**ichael Yon, a renowned war correspondent, traveled to the Province of Darien, in the Republic of Panama, in September 2023. He wanted to explain to the world the reality of migration through the jungle which is characteristic of the so-called Darien Gap. Yon reports two facts that caught his attention: the increase in migrants from countries as far away as Afghanistan, Nepal, China and multiple countries in Africa, and the environmental devastation that the environment is suffering in the Darien region due to pollution and destruction caused by people on their way to North America.



### **MIGRATION FROM ASIA AND AFRICA TO NORTH AMERICA**

According to the International Organization for Migration, in 2020 some 17.5 million people migrated from Asia to North America, the equivalent of the entire population of the city of Los Angeles. In parallel, the Migration Policy Institute states that migration from Africa to North America is on the rise and that in 2019 alone, 5,000 apprehensions were reported at U.S. borders of people from 35 nationalities, mainly Cameroon, Democratic Republic of Congo, Eritrea, Ghana, and Somalia.

In May 2023, the UN reported a significant increase in migrants through the Darien. The same document details a significant increase in migrants

with nationalities from countries such as Haiti, Nepal, Afghanistan, Bangladesh, China, and others from the African continent. Coincidentally, the first four countries mentioned are among the most directly and indirectly affected by climate change according to the Global Climate Risk Index 2021.

### **CLIMATE CHANGE AND MIGRATION**

The consequences of climate change, such as droughts, river floods and storms, are becoming increasingly frequent in the above-mentioned countries.

These natural disasters force citizens to see migration as a solution. To that end, they choose the Latin American route that starts in South American countries such as Brazil, Ecuador or Venezuela, passes through the Darien and continues through Central America to reach the United States of America.

There are countless testimonies of tragedy, sadness, and death from those who have already completed this journey searching for a better life for themselves and their families. But the impact is not only on people's mental and physical health. The large number of migrants who use the Darien route are causing great pollution and environmental damage which, if they continue at their current rate, in the short term, could lead to irreversible environmental consequences.

### **DARIEN NATIONAL PARK: MORE THAN JUST A PROTECTED AREA**

Darien National Park was created by the Panamanian government in 1980 and immediately after, in 1981, UNESCO declared it part of the Biosphere Reserve of Humanity, the largest protected area in Central America and the Caribbean. With flora, fauna, and environmental conditions unique in the world, it is also home to ancestral indigenous communities that struggle to maintain their cultural identity and depend on these territories for their livelihoods.

«*[...] Before the Darien was established as a migratory route, this ecosystem was already facing serious human threats.*»



Before the Darien was established as a migratory route, this ecosystem was already facing serious human threats. Actions such as logging, arson, illegal mining, fraudulent land titling, monocultures and intensive agricultural activities have put the Darien at risk. And the current migration along this route is considerably worsening the environmental reality of this unprotected but environmentally and culturally important region of Panama.

### ENVIRONMENTAL PROBLEMS CAUSED BY MIGRATION

Pollution caused by solid waste — estimated by the Panamanian Ministry of Environment at 9 kilos per person — abandoned along the road, which includes at least 37 streams and 20 rivers in the Darien National Park, is one of the main problems caused by the migratory route. The Presidency of the Republic of Panama announced in August 2023 that an estimated 9,000 tons of garbage is scattered along the routes used by migrants in and around the park. This reality has created a national emergency in Panama that has not been properly addressed due to the lack of resources and technical capacity of public institutions in the region.

A second problem, but no less important, is the erosion caused by the passage of migrants. In 2023, more than half a million people crossed the Darien, who, together with those from previous years, would be responsible for the removal of no less than 391,803 cubic meters of soil, which would be equivalent to 6,530 marine cargo containers 12 meters long. Erosion at such levels affects ecosystem productivity and causes significant losses to the biological diversity of the area.

« [...] In 2023, more than half a million people crossed the Darien, who added to those of previous years, would be responsible for the removal of no less than 391,803 cubic meters of soil. »

Although at present a significant part of migration is due to political reasons in the countries of origin, it is already recognized that migration from Asia and Africa is on the rise, and one of the main reasons is the impact of climate change. While no country is exempt from suffering its consequences, countries like Panama will also suffer the collateral environmental



damage that forced migration is causing in areas of global environmental importance such as the Darien rainforest.

It is urgent to step up international efforts to find ways to combat climate change in the medium and long term, as well as to address the short-term needs of populations in their places of origin in the face of direct or indirect risks related to climate change. The people affected, mostly from the global South, who seek hope in countries located in North America or Europe, on their way, can cause other environmental problems in vital conservation areas in the fight against climate change.

#### Hilario Espinosa

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# COLLECTIVE SOLUTIONS FOR AN INTERCONNECTED WORLD

*Nicole Arbour*



Everything is interconnected, but understanding these interconnections and interdependencies is not easy. Many of us have learned to process information by compartmentalizing and siloing individual pieces of a problem, hoping to solve it in isolation then returning to the larger picture to solve the next piece. As societies, we have developed entire governance systems based on this idea of compartmentalizing or siloing our respective systems (as often seen in government ministries) - to divide and engage in our challenges in smaller and more bite-sized pieces. Unfortunately, as a result of this, we often fail to recognize the interdependencies of these various systems and how changes to some impact others. Not only is it not a very efficient use of resources; it often also leads to unintended consequences. Everything is a system; very little functions in isolation.



In the international sustainable development landscape this has become glaringly evident as the global community struggles to make progress on SDGs. The interdependencies, linkages and trade-offs that need to be considered to make any real progress are increasingly obvious. In addition to the interdependencies within SDGs themselves, another set of interdependencies that we often fail to take into consideration when looking to tackle the global environmental change challenges that we

have brought upon ourselves is the need to bring everyone with us, in an evidence-based process, if we are to succeed.

### WE NEED TO TRANSFORM OUR APPROACHES

To continue as a species on this planet, we need to succeed. As homo sapiens, we are members of the species that has made fundamental and possibly irreversible changes to the earth's systems. These changes have significantly impacted our climate and environment and ultimately our health -as individuals and collectively. For us to make any tangible impacts towards mitigating and adapting to these global changes, we also need to fundamentally transform our approaches.

We need to recognize that the global changes we are seeing do not respect any geopolitical borders, that not everyone has contributed to the mess we find ourselves in, and that often those who are feeling the biggest impacts are from the communities who are the least to blame for the problems we are facing. We need to understand that in order to make the changes needed to truly transform society as we know it, we need to engage directly with our humanity, and to recognise that we are all in this together.

This is where the importance of taking on a truly transdisciplinary approach is critical. It is critical because it starts from the place of equity, which is a place of co-development, and a recognition that expertise comes in many different forms. A transdisciplinary approach recognizes that to truly understand and engage with a societally relevant challenge we need to involve those who are being impacted by it, and frame it in a way that is relevant to the community it will impact.

It needs to share ownership and bring everyone along as part of the process, taking into consideration the human condition and how we

« [...] In order to make the changes needed to truly transform society as we know it, we need to engage directly with our humanity, and to recognise that we are all in this together. »

interact with one another. It needs to think about all the soft skills that have often been neglected in modern times –emotional intelligence, trust, empathy, self-awareness, compromise– and acknowledge that these factors play a fundamental role.

### THE PAST AND THE PRESENT

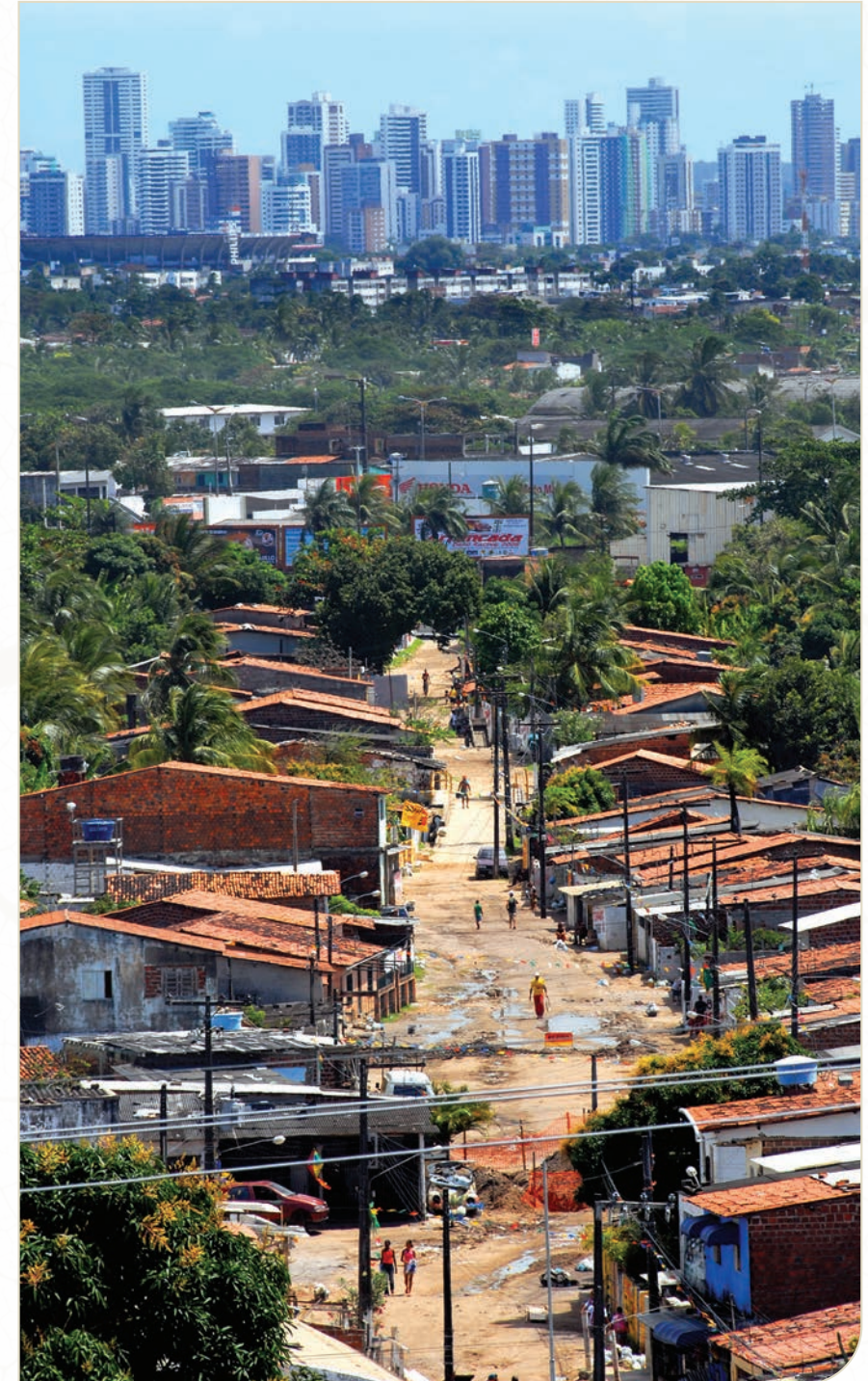
History, and its impact on the present, also needs to play a leading role in considering how we develop our dialogues, on how we work to rebuild trust in our relationships, and understanding the real and perceived power dynamics that we have built our societies around.

Time is of the essence. But time is also a key component of these discussions. and we need all the time we can get. We need to take time to redevelop relationships, to build equitable partnerships, to take the steps we need to rebuild trust. We must create bridges between science and society, but so much more than that since we often forget how to work together without conflict.

Making a conscious decision to tackle our common challenges stemming from global change through a transdisciplinary lens is a first step forward, as is making the conscious decision to act together, as equals. We must also remember that we are all part of a greater interconnected system and need to frame our problems in real-world contexts. It is not easy, but nothing worth doing ever is, especially if we wish to continue as a species, on this planet, and to live well. It is all interconnected: the climate, our environments and our health. Nothing can be tackled in isolation.

#### Nicole Arbour

*Is the Executive Director of the Belmont Forum, an active knowledge broker, she has spent her career in international relations at the science-society-policy interface.*



## POSTFACE

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# CLIMATE INACTION COSTS LIVES AND IS DESTROYING THE PLANET

*María Villarreal*

Climate change is a reality that causes loss and damage to people and ecosystems with devastating and unequal effects that particularly harm the countries of the Global South. The latest report of the Intergovernmental Panel on Climate Change (IPCC), published in 2023, shows that the threat to life posed by global warming is growing year by year due to the steady increase in greenhouse gas emissions. The document also emphasizes that efforts made so far to address climate change have been insufficient, but that “if we act now, it is still possible to ensure a sustainable and liveable future for all”.

Inspired by these findings, the compendium “Health, Climate and Environment in Latin America and the Caribbean” - jointly published by the Inter-American Institute for Global Change Research (IAI) and Latinoamérica21, with the support of the World Meteorological Organization (WMO) - is a valuable tool for information, analysis and recommendations for policy action for one of the regions most vulnerable to the effects of climate change. The Latin American and Caribbean region is responsible for only 10% of greenhouse gas emissions, but phenomena such as rising temperatures, receding glaciers, rising sea levels and a large increase in the number of natural disasters are causing unprecedented damage throughout the region. It should be noted that in this case, the effects of climate change are intensified by the conditions of poverty, inequality, violence and limited resources that characterize the region.

Beyond the impacts on ecosystems, this compendium, which brings together the inter-, multi- and transdisciplinary views of sixteen



researchers from the region, makes it clear that the problem in question is not exclusively environmental or climatic in nature. Rather, it is a phenomenon with multidimensional impacts that directly affect the population and the socioeconomic development of the region. One of the most serious effects of climate change is the direct threat to public health, through phenomena such as increased heat waves, hunger, and food and water insecurity, but also through the reinforcement of risk factors and amplification of their effects, as in the case of infectious diseases or obesity.

Natural disasters, exacerbated by climate change, also threaten people's lives, livelihoods and health, disproportionately affecting developing countries. According to the United Nations Office for Disaster Risk Reduction (UNDRR), Latin America and the Caribbean is the second most disaster-prone region in the world. In the period 2000-2020, more than 190 million people, or 3 out of every 7 inhabitants of the region, were affected by natural disasters. In addition to the countless human and economic losses, the phenomenon is associated with the forced displacement of populations. In this regard, the World Bank forecasts that, as a result of climate change, by 2050, more than 17 million Latin Americans will have relocated in search of survival and better livelihood opportunities.

Faced with these challenges, the authors of the compendium recognize that there is no time to lose and that the time has come for decisive and effective political action. Today more than ever, it is necessary for Latin America and the Caribbean to comply with its international commitments and pursue the United Nations 2030 Agenda, which establishes as its

Sustainable Development Goal (SDG) 13 “Take urgent action to combat climate change and its impacts”. Our region has quality data, information and analysis on the multidimensional impacts of climate change. Furthermore, policy recommendations and action plans for Latin America have been developed, aiming to combat the effects of climate change, increase communities’ resilience and promote formulae for mitigating and adapting to this phenomenon. However, it is necessary to go further and establish the adoption and implementation of these proposals as a regional priority in all spheres of government.

Rethinking our individual decisions and lifestyles is a first step towards a more sustainable world, but multi-scale political action is urgently needed to address the effects of climate change and to promote true ecosocial transitions that place life and notions such as social and environmental justice at the center. Considering the effects of climate change on the health of Latin Americans and Caribbeans, it is crucial, for example, to design strategies for prevention, planning, control and health surveillance, as well as the establishment of Early Warning Systems (EWS) for natural disasters, the creation of green areas in urban spaces, the establishment of integrated waste management systems, and the limitation and control of the use of pesticides.

Climate change is already here and climate inaction is costing lives and destroying the planet. Thanks to the efforts of publications such as “Health, climate and environment in Latin America and the Caribbean” we can learn about the relationship between these elements in Latin America and the Caribbean, as well as some of the best practices and strategies for mitigation of and adaptation to the effects of climate change and environmental degradation. This knowledge must now become a political, economic and social priority.

Respecting the principle of common but differentiated responsibilities – established in 1992 by the United Nations Framework Convention on Climate Change – which assigns greater obligations to the countries of the Global North, it is imperative that all governments act and develop effective responses to the climate emergency.

In this regard, the UN Climate Change Conference (COP-28), held in Dubai in 2023, confirmed that abandoning the use and production of fossil fuels is an indispensable condition for curbing global warming. In addition, the event emphasized that the financing of the fight against climate change has so far been insufficient, and that countries need to allocate funds commensurate with their responsibilities, as well as commensurate with the magnitude and severity of this phenomenon. Along with funding, it is crucial to increase international cooperation in various areas and to enhance the benefits that scientific diplomacy offers for the resolution of global problems such as climate change.

The countries of Latin America and the Caribbean cannot remain oblivious to this challenge: they must fulfill their commitments and, autonomously and with international cooperation, undertake comprehensive climate action. As this compendium shows, the situation is dramatic and continues to worsen. However, away from pessimism, doomsday defeatism and the belief that climate collapse is our destiny, we still have time to avoid the destruction of our own home and to guarantee a livable and sustainable future for the benefit of all.

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