The economics of climate change in Latin America and the Caribbean, 2025

Climate action to overcome development traps

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Foreword

Ten years on from the adoption of the Paris Agreement, one of the main trends in the global economic environment is the impact of climate change and the urgent need for more ambitious and effective climate policies. In 2024, CO_2 concentrations in the atmosphere climbed to historic levels, while global temperatures crossed the 1.5 °C threshold above pre-industrial levels for the first time. In Latin America and the Caribbean, these changes exacerbate development challenges: they reduce the capacity for growth, worsen inequalities and put pressure on fragile governance structures.

Not only is the region increasingly bearing the brunt of climate change, particularly in the small island States of the Caribbean, but it is also highly dependent on nature and ecosystem services. Their loss or degradation reduces our adaptation capacity and amplifies the climate impacts on agriculture, water, fisheries and human settlements. Against this backdrop, there is an urgent need to strengthen compliance with international commitments and accelerate the implementation of comprehensive policies covering all sectors and all greenhouse gases, consistent with the goal of keeping the temperature increase below 1.5 °C.

The increase in temperature under current climate policies would lower regional GDP by at least 6% in 2030 compared with a scenario without climate change. However, extreme weather events, which have not been factored in, have caused damage and losses of more than 100% of GDP in some island States. The growth potential of many countries will also be limited, impeding improvements in their human development levels. These effects compound the development traps already weighing on the region, especially in the most vulnerable countries, which are hardest hit by climate change despite having contributed the least to it. It is therefore essential to make progress on a just and equitable carbon transition that phases out fossil fuel subsidies, promotes clean energy and sustainable mobility, harnesses the potential of the circular economy, the bioeconomy and nature-based solutions, and ensures that the opportunities and costs of decarbonization are distributed fairly.

Faced with this scenario, Latin America and the Caribbean must aspire to greater well-being for its populations and demand that those who bear the greatest historical responsibility for this crisis honour their commitments and mobilize the necessary resources. We at the Economic Commission for Latin America and the Caribbean trust that climate action will bring about the structural changes needed to address the risks of climate change and modernize the region's economies. Climate investments generate not only environmental benefits, but also social and economic returns: they can drive growth, employment and development, insofar as there is cooperation, technology transfer and sufficient, affordable and accessible international financing for developing countries.

Achieving this big push for sustainability requires policies that shift incentives and relative returns, redirecting funding towards investments that incorporate climate and nature in a transparent manner. In a context where misinformation and the manipulation of data undermine public trust and collective action, strengthening the integrity of information and evidence-based communication is a precondition for effective progress.

This document outlines how climate change and development traps feed into each other in the region, underscoring the need for coordination between economic and climate policies and for alignment of the financial system with transformative sectors that integrate ecological resilience. It also shows that new activities based on low-carbon technologies represent an opportunity to better position the region in the international economy, strengthen its production structures and boost competitiveness. Investments can yield greater returns if regional economic integration is deepened by increasing the regional density of value chains. But these transformations will only be sustainable if the most vulnerable populations reap the benefits thereof and if we recognize that climate and nature are inextricably linked: it is not enough to reduce emissions if we do not protect, restore and preserve the ecosystems that sustain us today.

ECLAC reiterates its commitment to working towards a future of environmental sustainability, social inclusion and greater economic productivity and competitiveness in Latin America and the Caribbean, recognizing that the region's ecological and climatic vulnerability is a clarion call for decisive, coordinated and just action with integrity.

José Manuel Salazar-Xirinachs
Executive Secretary
Economic Commission for Latin America and the Caribbean (ECLAC)

Introduction

The environmental dimension and the effort to combat climate change are integral to the strategy proposed by the Economic Commission for Latin America and the Caribbean (ECLAC) to achieve sustainable development in Latin America and the Caribbean and address the development traps that hinder progress: low capacity for growth; high inequality and low levels of social mobility and cohesion; and weak institutional capacities and ineffective governance.

Climate change must therefore be viewed as an opportunity for structural transformation. The region has competitive advantages with respect to the energy transition, sustainable mobility, the bioeconomy and nature-based solutions and the circular economy, which —especially if it commits to regional integration— could win it a stronger international position in fast-growing sectors of the future. Climate action thus holds the potential to be a driver of innovation, competitiveness, quality jobs and the development of new value chains.

The fight against climate change hinges crucially upon concerted and decisive multilateral action to facilitate just transitions in line with the principle of common but differentiated responsibilities. But recent geopolitical events have created a complex landscape for multilateral action. The war in Ukraine, the new wave of trade protectionism and rising international tensions have sidelined climate urgency from the global agenda, just as science has confirmed that recent years have been the hottest on record and the effects of climate change are intensifying —including rapid glacial melt, ocean acidification, wildfires and more frequent and intense extreme weather events. The Intergovernmental Panel on Climate Change (IPCC) warns that global greenhouse gas (GHG) emissions must be cut by 43% by 2030 and by 84% by 2050 compared to 2019 levels.[1] This calls for rapid and decisive action.

Yet, several developed economies have backtracked on their climate commitments, prioritizing short-term concerns such as energy security, rapid investments at the expense of lower socioenvironmental standards and national security, economic autonomy over development assistance, fair trade and technology transfer. Pending the new climate commitments (NDCs 3.0) that countries are expected to adopt this year, the existing targets would allow a temperature rise of close to 2.7 °C, well above the 1.5 °C threshold. This year, 2025, could very well be the last opportunity to keep the world's emissions trajectory below this limit. Meanwhile, international climate finance remains insufficient, narrowing the scope for action for middle-income countries such as those in Latin America and the Caribbean, despite their high vulnerability.

Under this scenario, Latin American and Caribbean countries must adjust their climate strategies:

(i) Mitigation efforts must be in synergy with development plans to keep the region committed to climate action while pragmatically leveraging its comparative advantages and capacities to tackle the transition.

(ii) Adaptation and resilience must now be urgent priorities.

1 Intergovernmental Panel on Climate Change. (2023). *Climate Change 2023: Synthesis Report. Contribution of Working Groups I, II and III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change.* H. Lee and J. Romero (Eds.). http://doi.org/10.59327/IPCC/AR6-9789291691647.

(iii) Local public financing will be key, but mobilizing the private sector with enabling regulatory frameworks will be even more so. Every firm and every industry must recognize its own climate vulnerability and treat adaptation as part of its business strategy, while also seizing its own opportunities to innovate, invest, transform and develop in the process of transitioning to low-carbon economies.

(iv) The climate agenda needs strengthened multilateralism. As with other global challenges, no country can address the risks and opportunities of climate change alone. International cooperation must strengthen trust, equity, and common but differentiated responsibilities, ensuring that countries with greater capacities support the most vulnerable.

After almost three decades of climate negotiations, progress remains insufficient. The thirtieth session of the Conference of the Parties to the United Nations Framework Convention on Climate Change in Brazil offers a historic opportunity to make progress on the above-mentioned points, secure more ambitious commitments from all parties, link climate action definitively with biodiversity conservation, put a human face on climate change, strengthen the link between environmental protection and the guarantee of human rights and, above all, to act by genuinely implementing those commitments already made. The challenge is no longer merely to agree on new commitments, but to bring them to fruition with effective policies, investments and regulatory frameworks.

This document first presents the current manifestations of climate change in Latin America and the Caribbean, the likely trends under current climate policies, and the estimated impacts for the region. It then offers an analysis of the linkages between climate change and the three development traps mentioned above. Chapter II describes the region's emissions profile, especially from the energy sector, with a view to identifying key sectors for mitigation policies in the region. Here, international climate policies are referenced as a key factor in achieving a competitive position in renewable technologies. The role of public policies in accelerating large-scale sustainable transformations is also briefly discussed, considering that economies with more complex structures have a greater capacity for decarbonization. Chapter III presents a more detailed analysis of various instruments and policies for driving the climate transition, emphasizing the need for greater coordination and coherence among various actors —public, private and the financial system— to make action more effective. Chapter IV addresses the relationship between climate change and biodiversity loss. An exercise is presented on the regional economy's dependencies and impacts on ecosystem services and it is concluded that, albeit with differences between countries, the region's economic structure is highly vulnerable to nature loss. It is therefore essential to incorporate nature and the climate into macroeconomic and financial risk analysis. The document concludes with reflections on the immense challenge and opportunity posed by turning the climate crisis into a driver of a new, more productive, inclusive and sustainable development model.

Chapter I

Climate change: an overview

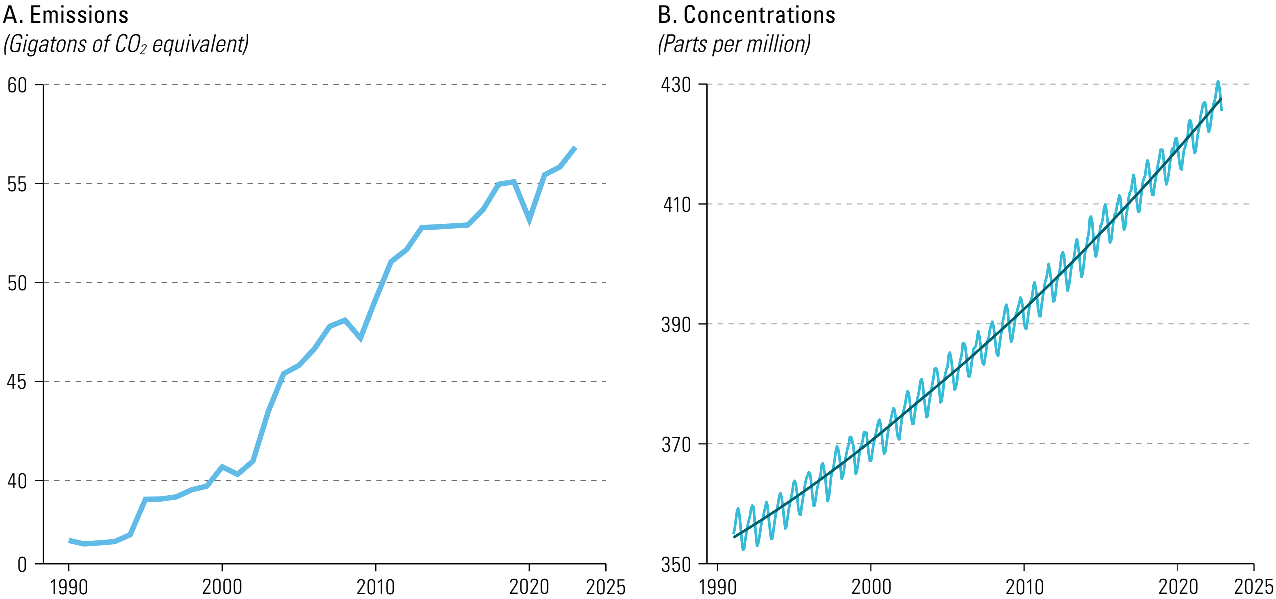
A. The state of the climate is worsening

The impacts of climate change and the responses to them are shaping the global economy. The transition to a low-carbon economy will require a structural transformation of unprecedented scale, scope and speed (Intergovernmental Panel on Climate Change [IPCC], 2023; Pisani-Ferry and Mahfouz, 2023). For this transformation to occur, changes must be policy-driven (Acemoglu et al., 2024).

The scientific community has estimated that the world must decarbonize rapidly to keep the temperature rise below 2 °C, and preferably below 1.5 °C. The 1.5 °C scenario requires greenhouse gas (GHG) emissions to be cut by 43% by 2030 and 84% by 2050, compared to 2019 levels. The 2 °C target would need a reduction of 21% by 2030 and 64% by 2050 (IPCC, 2023). However, although emissions growth has slowed, they continue to increase year on year.

In 2023, annual emissions reached 57 $GtCO_2eq$, 16% above their 2010 level.[1] As emissions have continued to grow, GHG concentration in the atmosphere has continued to accumulate at a rate at least 10 times higher than in the past 800,000 years (Friedlingstein et al., 2025). In 1750, before the Industrial Revolution, GHG concentrations were 280 parts per million (ppm); today they exceed 420 ppm,[2] with the global limit for this indicator set at 350 ppm (Richardson et al., 2023).

Figure 1
World: greenhouse gas emissions and concentrations, 1990–2023
(Gigatons of CO_2 equivalent and parts per million)



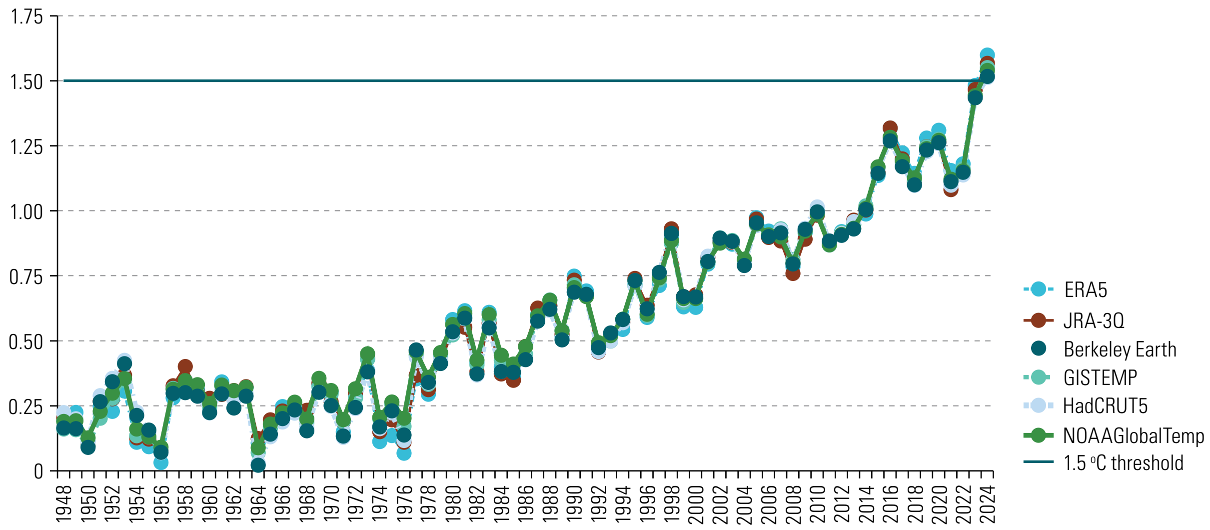
Source: Prepared by the authors, on the basis of Joint Research Centre. (2025). EDGAR - *Emissions Database for Global Atmospheric Research*. https://edgar.jrc.ec.europa.eu; National Aeronautics and Space Administration.

The progressive increase in the concentration of atmospheric emissions has increasingly sharpened the rise in average global temperature. The year 2024 was the Earth's warmest since at least 1850. It was the first year in which temperatures exceeded a 1.5 °C increase relative to the pre-industrial era average, driven primarily by an intense El Niño phenomenon (Copernicus Climate Change Service, 2025; World Meteorological Organization [WMO], 2025b). However, the long-term average temperature rise still remains below 1.5 °C (WMO, 2025b).

1 The data used were from the Emissions Database for Global Atmospheric Research (EDGAR), including CO_2 emissions from deforestation (Joint Research Centre [JRC], 2025).

2 In 2024, CO_2 concentrations reached 422 ppm (Copernicus Climate Change Service, 2025).

Figure 2
Global surface temperature: rise above pre-industrial levels, 1948–2024
(Celsius above the period 1850–1900)



Source: Prepared by the authors, on the basis of Copernicus Climate Change Service.
Notes: JRA-3Q: Japanese Reanalysis for Three Quarters of a Century. GISTEMP: Goddard Institute for Space Studies (GISS) Surface Temperature Analysis. NOAAGlobalTemp: National Oceanic and Atmospheric Administration (NOAA) Global Surface Temperature.

There is evidence that the temperature is rising faster. In the period 1970–2010, the temperature increased by an average of 0.18 °C per decade, but in 2010–2023 this rate almost doubled, to 0.33 °C per decade (Hansen et al., 2025). At this rate of warming, the 2 °C threshold would be reached within the next 20 years (Rockström, 2024). The acceleration of global warming is bringing climate tipping points closer. Exceeding these points could trigger large-scale, often sudden and irreversible changes. However, these negative tipping points may be avoided by taking measures to change socioeconomic systems and technologies that would have positive outcomes for the climate (see box 1).

Box 1
Climate tipping points

A **climate tipping point** is a critical threshold in a natural, climatic or socioeconomic system, beyond which sudden changes will occur that are highly likely to be irreversible (Lenton et al., 2023).

Such tipping points have the potential to trigger interconnected effects, in both adverse contexts (e.g. increased warming from permafrost melting) and more positive ones (such as rapid adoption of sustainable technologies).

Negative tipping points

- **Negative tipping points** are threats that exacerbate climate change, generating feedback loops that accelerate global warming or its impacts. Their activation could destabilize ecosystems and human societies.

  Main examples (Lenton et al., 2022; Caesar et al., 2024; Smith et al., 2023):

- **Thawing of Arctic permafrost**: Permafrost (the permanently frozen ground in the Arctic) contains twice as much carbon as the atmosphere. Rising temperatures thaw permafrost, releasing methane, a greenhouse gas far more potent than CO_2. This creates a positive feedback loop, where warming releases more methane, which in turn causes more warming.

- **Collapse of the Atlantic Meridional Overturning Circulation (AMOC)**: This ocean current transports warm water northward, keeping the climate of Europe and the east coast of North America temperate. Greenland ice melting releases cold freshwater, which could disrupt AMOC, causing regional cooling in the North Atlantic and rising temperatures in the Southern Hemisphere, as well as affecting rainfall patterns and sea level.
- **Loss of the Amazon rainforest**: The Amazon creates its own climate, recycling moisture to generate rainfall. Deforestation and rising temperatures could lead to severe drought and wildfires. If tree loss exceeds a certain threshold, the rainforest could turn into savanna, releasing enormous amounts of carbon and reducing biodiversity.
- **Melting Greenland and West Antarctica ice sheets**: These ice sheets contain enough frozen water to raise global sea levels by several metres. As they melt, the darker surface below (land or ocean) absorbs more solar heat, further accelerating the melting. Should this process spiral out of control, the collapse of the ice sheets would be inevitable.
- **Death of tropical coral reefs**: Rising temperatures and ocean acidification are causing mass coral bleaching, affecting biodiversity and coastal livelihoods.

At the current rate of warming entails, several tipping points are at risk of being breached: collapse of the Greenland and West Antarctic ice sheets; abrupt thawing of permafrost; and mass die-off of tropical coral reefs (Caesar et al., 2024).

Positive tipping points (socioeconomic and technological)

- **Positive tipping points** are critical thresholds at which a small measure can trigger positive, large-scale and self-sustaining change in complex systems such as society, the economy and the environment. These changes drive emissions reduction, resource savings and resilience.

  Main examples:
- **Adoption of renewable energies**: As renewable energy sources (such as solar and wind) become cheaper than fossil fuels, they will be adopted more quickly, reducing fossil fuel dependence and profitability and incentivizing greater clean technology investment and development. This domino effect will create a cycle of rapid, self-sustaining growth.
- **The transition to electric vehicles**: This lowers battery prices, reduces transportation emissions, and improves infrastructure; energy efficiency in buildings improves insulation and technologies, saving costs and normalizing green standards.
- **Sustainable agriculture and dietary changes**: This will reduce agricultural emissions and deforestation, improving soils and food security; and ecosystem restoration will capture carbon, restore biodiversity and build climate resilience through community employment (Lenton, 2020; Smith et al., 2023).

Source: Prepared by the authors, on the basis of T. M. Lenton, D.I. Armstrong McKay, S. Loriani, J.F. Abrams, S.J. Lade, J.F. Donges, M. Milkoreit, T. Powell, S. R. Smith, C. Zimm, J. E. Buxton, E. Bailey, L. Laybourn, A. Ghadiali, J. G. Dyke (Eds). (2023). *The Global Tipping Points Report 2023*. University of Exeter; Caesar, L., Sakschewski, B., Andersen, L., Beringer, T., Braun, J., Dennis, D., Gerten, D., Heilemann, A., Kaiser, J., Kitzmann, N., Loriani, S., Lucht, W., Ludescher, J., Martin, M. A., Mathesius, S., Paolucci, A., Te Wierik, S. and Rockström, J. (2024). *Planetary Health Check Report 2024*. Potsdam Institute for Climate Impact Research; Smith, S. R., Fesenfeld, L., Constantino, S. M., Gaupp, F., Spaiser, V., Bailey, E., Powell, T., Zimm, C., Barbrook-Johnson, P., Bhowmik, A., Pereira, L. and Stadelmann-Steffen, I. (2023). Understanding and acting on positive tipping points. In T. M. Lenton, D. I. Armstrong McKay, S. Loriani, J. F. Abrams, S. J. Lade, J. F. Donges, M. Milkoreit, T. Powell, S. R. Smith, C. Zimm and J. E. Buxton (Eds.), *The Global Tipping Points Report 2023* (pp. 10-19). University of Exeter; Lenton, T. M. (2020). Tipping positive change. *Philosophical Transactions of the Royal Society B: Biological Sciences, 375*(1794). https://doi.org/10.1098/rstb.2019.0123.

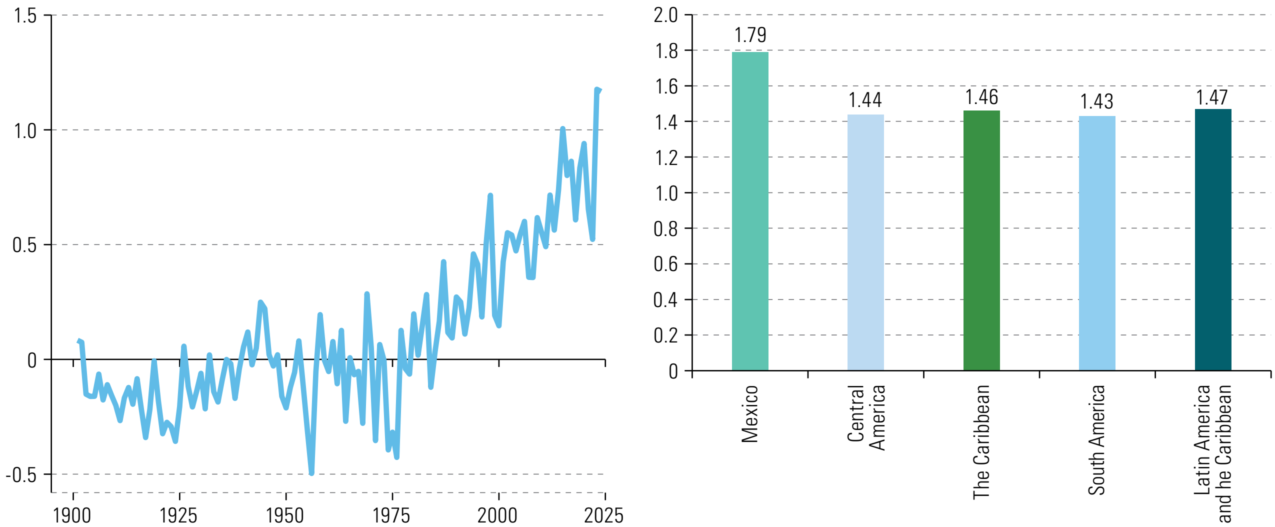
Temperatures have also become progressively higher for the Latin American and Caribbean countries, with 2024 either the warmest or second warmest year on record (WMO, 2025a). In 2024, the average temperature was 1.47 °C above the 1961–1990 average (see figure 3).

In 2024, extreme weather events caused the highest number of human displacements recorded in a single year since 2008 (WMO, 2025b). Tropical cyclones were the largest cause of high-impact events in 2024, particularly in Asia. In the Americas, Hurricane Helena caused at least 219 deaths, the most attributable to this type of event in the United States since Hurricane Katrina in 2005 (WMO, 2025b).

Figure 3
Latin America and the Caribbean: average temperature, 1901–2024, and anomalies in 2024 compared to 1961–1990

A. Average temperature, 1901–2024
(Difference with respect to the average 1961–1990, degrees Celsius)

B. Temperature anomalies in 2024 compared to 1961–1990
(Degrees Celsius)



Source: Economic Commission for Latin America and the Caribbean, on the basis of World Bank. (2025). *Climate Change Knowledge Portal*. https://climateknowledgeportal.worldbank.org/download-data; World Meteorological Organization. (2025). *State of the Climate in Latin America and the Caribbean 2024*.

Latin America and the Caribbean is one of the regions most exposed to disasters worldwide, surpassed only by Asia–Pacific. Between 2000 and 2022, the region experienced over 1,500 disasters, affecting more than 190 million people. Floods and storms made up around two thirds of these events, with the impact of storms having increased the most in recent years. The region also accounted for 53% of global economic losses from disasters during that period. These figures reflect a growing vulnerability to climate change, which is expected to intensify the frequency and severity of these extreme events (United Nations Office for Disaster Risk Reduction [UNDRR] and United Nations Office for the Coordination of Humanitarian Affairs [OCHA], 2023).

Latin America also experienced extreme events in 2024. Atypical warming, linked to El Niño conditions, resulted in severe droughts that primarily affected the Amazon and the Pantanal, which experienced their worst drought in 70 years, bringing the Paraná and Paraguay rivers to record low levels and affecting 745,000 people (WMO, 2025a). Furthermore, severe droughts in Mexico and parts of Central America in 2023 continued into the early months of 2024. Grenada and Trinidad and Tobago also experienced significant droughts (WMO, 2025a). In Colombia, droughts were reported in the Orinoco region, with rainfall significantly below normal.

Severe drought paved the way for wildfires. Severe forest fires occurred in Belize, the Bolivarian Republic of Venezuela, Brazil, Chile, Mexico and the Plurinational State of Bolivia (see box 2). Chile saw some of the most destructive blazes, the most significant in Viña del Mar, which resulted in at least 134 deaths and the destruction of 6,500 homes. Mexico experienced its most active fire season ever, affecting 1.64 million hectares (WMO, 2025b).

Global emissions from fires represented 2.8 $GtCO_2eq$ in 2023 (see figure 4), which was around 5% of total emissions and 42% of all emissions from deforestation and fires (JRC, 2025). On average, emissions from forest fires in Latin America and the Caribbean accounted for around 7% of global emissions from this source from 1990 to 2023. From 2020 to 2022, they averaged 10% of the global total. Fire-related emissions were exceptionally high in 2023, driven by fires in the Asia–Pacific and North American regions.

Box 2

The economic impact of wildfires in Latin America and the Caribbean

Forest fires are one of the problems that climate change has exacerbated. There are number of different factors that are putting the region at greater risk. Steadily rising temperatures and the greater frequency of compound drought and heatwave extreme weather events have lengthened critical fire seasons and led to an increase in the number of days during which extreme fire conditions exist, which are now between 88% and 152% more likely to occur than they were during the pre-industrial era (Abatzoglou et al., 2025). Other contributing factors include soil degradation and the loss of organic carbon, which reduce soil water retention capacity and increase the risk of erosion (Intergovernmental Panel on Climate Change, 2019), and the increasingly homogenous nature of productive landscapes and ecosystem fragmentation, which also increase fire risk (Galizia and Rodrigues, 2019; Valladares-Castellanos et al., 2025; Laurance et al., 2011).

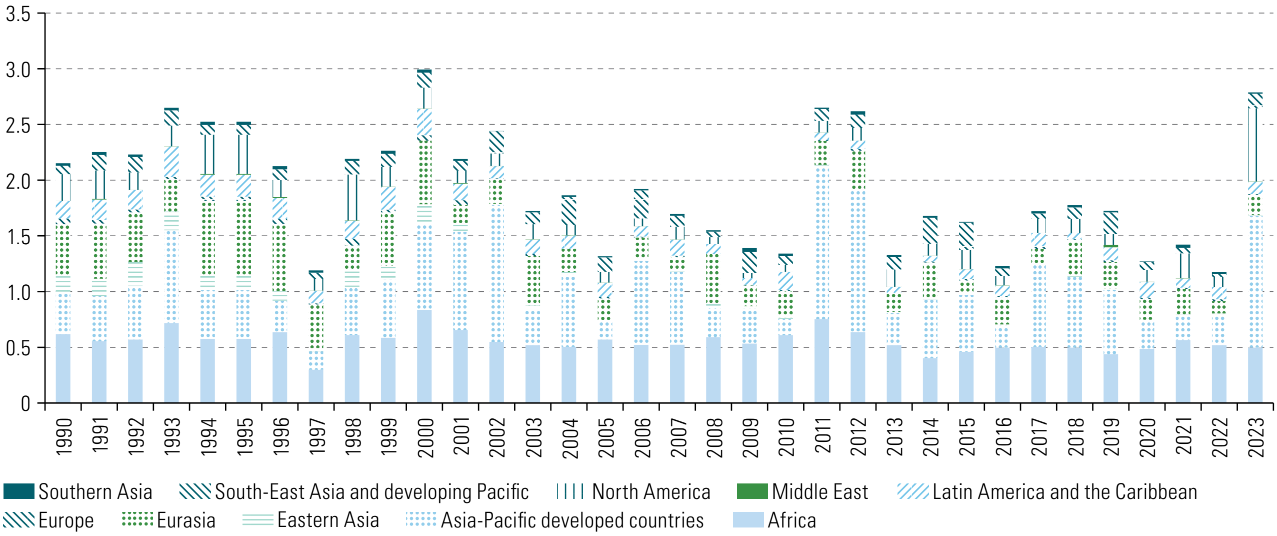
On average, wildfires burn some 65 million hectares of land in Latin America and the Caribbean each year, but in 2024 a record-breaking 85.8 million hectares (more than the total area of Chile) burned (Global Wildfire Information System [GWIS], 2025). The intensity of these fires and the difficulty of bringing them under control have increased to record levels in 2025 as these events become ever more destructive (World Meteorological Organization [WMO], 2025; GWIS, 2025). South America has been the site of most of these fires in absolute terms, accounting for nearly 89% of the total burn area, but, in relative terms, fires in Mesoamerica and the Caribbean have burned similar or even greater percentages of the land (2.8% and 3.6%, respectively, as compared with 3.5% in South America) (GWIS, 2025). In 2023–2024, land burned by wildfires represented half of the total tree cover loss in the region (Global Forest Watch, 2025).

The impact of wildfires in Latin America and the Caribbean can be estimated using the national calculations of fire damage (in hectares) carried out by Argentina, Brazil, Chile and Mexico (Sobreira et al. 2025; Hernández Arzate, n.d.; Risso, 2022; González and Lara, 2024; Ministry of Finance, 2023). The average cost for these countries is US$ 1,558/hectare, which for a total burnt area of 85.8 million hectares in 2024, yields a total impact in monetary terms of US$ 134 billion, or 1.8% of the region's GDP. And these estimates do not even include the value of the natural capital that is lost, the restoration costs or the impact of the associated carbon emissions.

Fires in the region cause three different kinds of losses: the GHG emissions resulting from the destruction of the carbon stock in biomass and soil; the loss of future carbon sequestration capacity; and, when the affected areas are part of a nature-based solution project, additional losses in the form of unfulfilled carbon-offset commitments and invalidated carbon credits. Preventive landscape management can reduce the severity of wildfires and increase the operational effectiveness of efforts to combat them (Rigolot et al., 2009). Redirecting policies and funding towards integrated fire management schemes —for which nature-based solutions are the backbone— can align climate resilience, rural employment and efficiency in expenditure, while internalizing the value of ecosystem services in government decision-making. Nature-based solutions offer a strategic path to prevention by reducing risk, creating rural jobs and fortifying the ecosystem services that underpin territorial resilience and the economy as a whole.

Source: Prepared by the authors, on the basis of Abatzoglou, J. T., Kolden, C. A., Cullen, A. C., Sadegh, M., Williams, E. L., Turco, M. and Jones, M. W. (2025). Climate change has increased the odds of extreme regional forest fire years globally. *Nature Communications, 16*, 6390. https://doi.org/10.1038/s41467-025-61608-1; Galizia, L. F. C. and Rodrigues, M. (2019). Modeling the influence of eucalypt plantation on wildfire occurrence in the Brazilian savanna biome. *Forests, 10*(10). https://doi.org/10.3390/f10100844; Global Forest Watch. (2025). *Global Forest Review 2024*. World Resources Institute. https://www.globalforestwatch.org/; Global Wildfire Information System. (2025). *Annual area burnt by wildfires*. Our World in Data. https://archive.ourworldindata.org/20250911-094014/grapher/annual-area-burnt-by-wildfires.html; González, L. E. and Lara, I. (2024). *Incendios forestales 2024: perspectivas*. Latin American Center for Economic and Social Politics; Hernández Arzate, I. (n.d.). *Valorización económica por el impacto de los incendios forestales en el municipio de Mineral del Monte, estado de Hidalgo, México*. Mexican Geological Survey and UNIGIS América Latina; Intergovernmental Panel on Climate Change. (2019). *Climate Change and Land: an IPCC special report on climate change, desertification, land degradation, sustainable land management, food security, and greenhouse gas fluxes in terrestrial ecosystems*, P. R. Shukla, J. Skea, E. Calvo Buendia, V. Masson-Delmotte, H.-O. Pörtner, D. C. Roberts, P. Zhai, R. Slade, S. Connors, R. van Diemen, M. Ferrat, E. Haughey, S. Luz, S. Neogi, M. Pathak, J. Petzold, J. Portugal Pereira, P. Vyas, E. Huntley … J. Malley, (Eds.). Cambridge University Press; Laurance, W. F., Camargo, J. L. C., Luizão, R. C. C., Laurance, S. G., Pimm, S. L., Bruna, E. M., Stouffer, P. C., Williamson, G. B., Benítez-Malvido, J., Vasconcelos, H. L., Van Houtan, K. S., Zartman, C. E., Boyle, S. A., Didham, R. K., Andrade, A., Lovejoy, T. E. (2011). The fate of Amazonian forest fragments: a 32-year investigation. *Biological Conservation, 144*(1), 56–67. https://doi.org/10.1016/j.biocon.2010.09.021; Ministry of Finance. (2023, 17 July). *Ministerio de Hacienda cifra en US$759 millones el daño económico de los temporales en zona centro sur del país*. https://www.hacienda.cl/noticias-y-eventos/noticias/ministerio-de-hacienda-cifra-en-us-759-millones-el-dano-economico-de-los; Rigolot, E., Fernandes, P. and Rego, F. (2009). Managing wildfire risk: prevention, suppression. In Y. Birot (Ed.), *Living with Wildfires: What Science Can Tell Us*, EFI Discussion Paper (15), 87–104. European Forest Institute; Risso, N. (2022, 19 February). *El impacto económico de los incendios*. Página 12. https://www.pagina12.com.ar/402490-el-impacto-economico-de-los-incendios; Sobreira, E., Lázaro, W. L., Vitorino, B. D., Boas da Frota, A. V. B., Young, C. E. F., Campos, D. V. S, Viana, C. R. S., Oliveira, E., López-Ramírez, L., Souza, A. R., Silva, D. J., Ignotti, E., Hacon, S., Ignácio, A. R. A., Muniz, C. C., Santos, M. (Filho) and Bogoni, J. A. (2025). Wildfires and their toll on Brazil: who's counting the cost? *Perspectives in Ecology and Conservation, 23*(3). https://doi.org/10.1016/j.pecon.2025.06.003; Valladares-Castellanos, M., Shao, G. and Jacobs, D. F. (2025). Landscape heterogeneity and transition drive wildfire frequency in the central zone of Chile. *Remote Sensing, 17*(15), 2721. https://doi.org/10.3390/rs17152721; World Meteorological Organization. (2025). *State of the Climate in Latin America and the Caribbean 2024*. (WMO-No. 1367).

Figure 4
World: greenhouse gas emissions linked to wildfires, 1990–2023
(Gigatons of CO_2eq)



Source: Prepared by the authors, on the basis of Joint Research Centre. (2025). *EDGAR - Emissions Database for Global Atmospheric Research*. https://edgar.jrc.ec.europa.eu.

Flooding in Rio Grande do Sul caused by heavy rainfall produced over 180 fatalities, displaced more than 420,000 people and generated losses in the agricultural sector particularly, amounting to around 8.5 billion Brazilian reais (WMO, 2025a).

Another impact of these climate phenomena is increased risk of a food security crisis. In 2023, some 197 million people faced critical levels of food insecurity accentuated by droughts, floods and hurricanes. The crisis grew more accurate in 2024, particularly affecting the Lempa River area, Honduras and Haiti (WMO, 2025a).

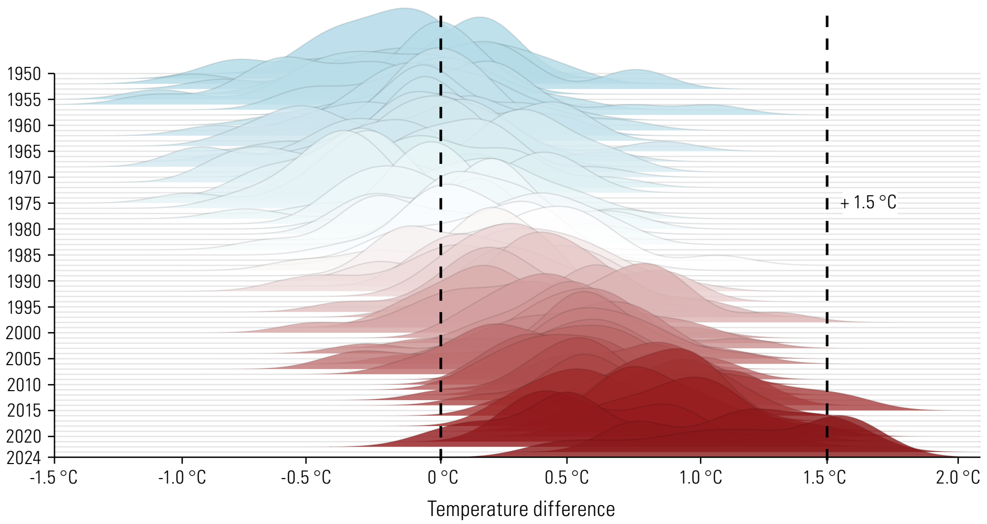
With regard to the Atlantic hurricane season, Hurricane Beryl caused great devastation in the Caribbean islands, particularly in Grenada and Saint Vincent and the Grenadines, as well as in Barbados, the Bolivarian Republic of Venezuela, the Dominican Republic, Jamaica, Mexico, Saint Lucia, and Trinidad and Tobago (WMO, 2025b).

Finally, with the disappearance of the Humboldt Glacier, the Bolivarian Republic of Venezuela has become the second country to lose all its glaciers in modern times, after Slovenia (WMO, 2025a).

Heat waves have become increasingly frequent across the region. Argentina, Brazil, Cuba, Mexico, and Peru were among the countries most affected. In early 2024, 60% of Mexico experienced monthly temperature anomalies of over 3 °C, and anomalies in Brazil were over 7 °C above average (WMO, 2025a). Cuba experienced its warmest May since 1951, Buenos Aires saw temperatures above 38 °C, and the Peruvian Amazon reached record temperatures of 40.6 °C (WMO, 2025a).

High temperatures directly affect labour productivity. Lost potential income associated with the heat-related decline in working hours was estimated at an average of 1.3% of regional GDP in 2022 (Hartinger et al., 2024). The countries experiencing the greatest potential losses were the Bolivarian Republic of Venezuela, Nicaragua, El Salvador and Honduras, where the agricultural sector suffered the most, with 40% of total losses occurring in this category (Hartinger et al., 2024). These changes will be accentuated as the temperature distribution shifts to the right (see figure 5).

Figure 5
Latin America and the Caribbean: distribution of average temperatures, 1950–2024
(Difference from the average for 1961–1990, degrees Celsius)



Source: Prepared by the authors, on the basis of Gortan, M., Testa, L., Fagiolo, G. and Lamperti, F. (2024). A unified dataset for pre-processed climate indicators weighted by gridded economic activity. Scientific Data, 11. https://doi.org/10.1038/s41597-024-03304-1.

B. The future climate depends on mitigation efforts

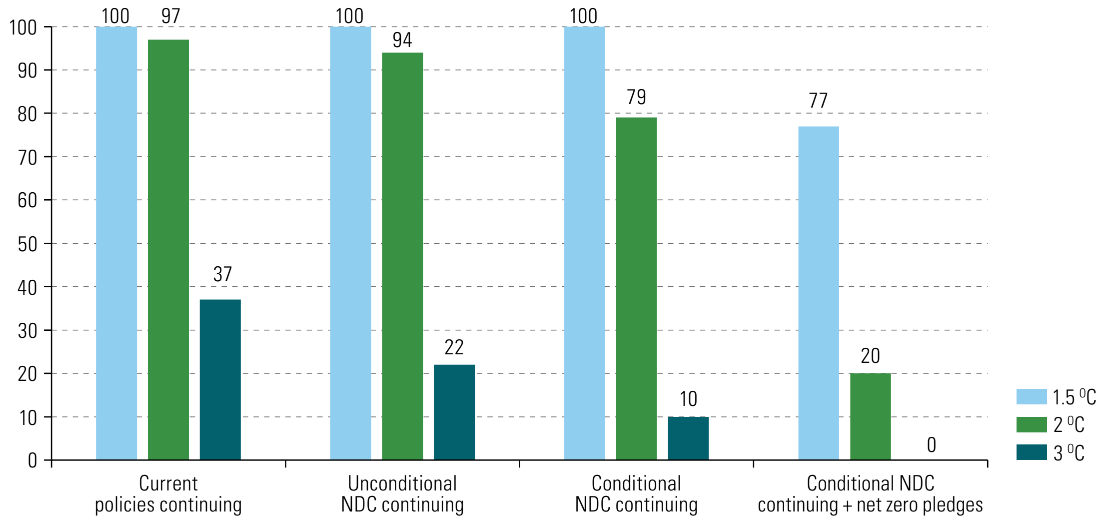
Although the growth rate of GHG emissions has slowed and various emissions reduction commitments have been made, emissions have nevertheless continued to rise. This means that the system's inertia will keep pushing temperature increase upwards, regardless of the measures undertaken now. In fact, it is estimated that there is a 70% probability that global temperatures in the coming years, 2025–2029, will be between 1.2 °C and 1.9 °C above the 1850–1900 average (WMO, 2025c).

At the global level, continuing with current mitigation policies implies a temperature rise of 3 °C[3] above the pre-industrial period. Furthermore, in a scenario in which national emissions reduction commitments actually occur, the temperature level would be between 2.0 °C and 2.9 °C[4] above pre-industrial levels, so that the probability of limiting the temperature rise to 1.5 °C is practically zero (United Nations Environment Programme [UNEP], 2024) (see figure 6). Thus, the goal established in the Paris Agreement of limiting the temperature increase to 1.5 °C or 2 °C requires immediate deep decarbonization of the global economy. The updated nationally determined contributions (NDCs 3.0) that the parties to the United Nations Framework Convention on Climate Change are to submit by 2025 may be the last opportunity to achieve this.

Meeting the climate target of limiting temperature rises to 1.5 °C requires a 43% reduction in emissions compared to 2019 by 2030 and net-zero emissions by 2050. The 2 °C target requires reductions of 21% by 2030 and 64% by 2050, compared to 2019, and net-zero emissions by 2070 (IPCC, 2023). Considering that the only year in which emissions have decreased since 2019 was 2020 —owing to the pandemic— and that they resumed growth immediately in 2021, achieving the 2 °C threshold requires an annual drop in global emissions equivalent to 3.7%. This rate must more than double to achieve the 1.5 °C target (see figure 7). At the current level of emissions, the carbon budget would be depleted within 6 years for the 1.5 °C threshold and by mid-century for the 2 °C threshold (see figure 8).

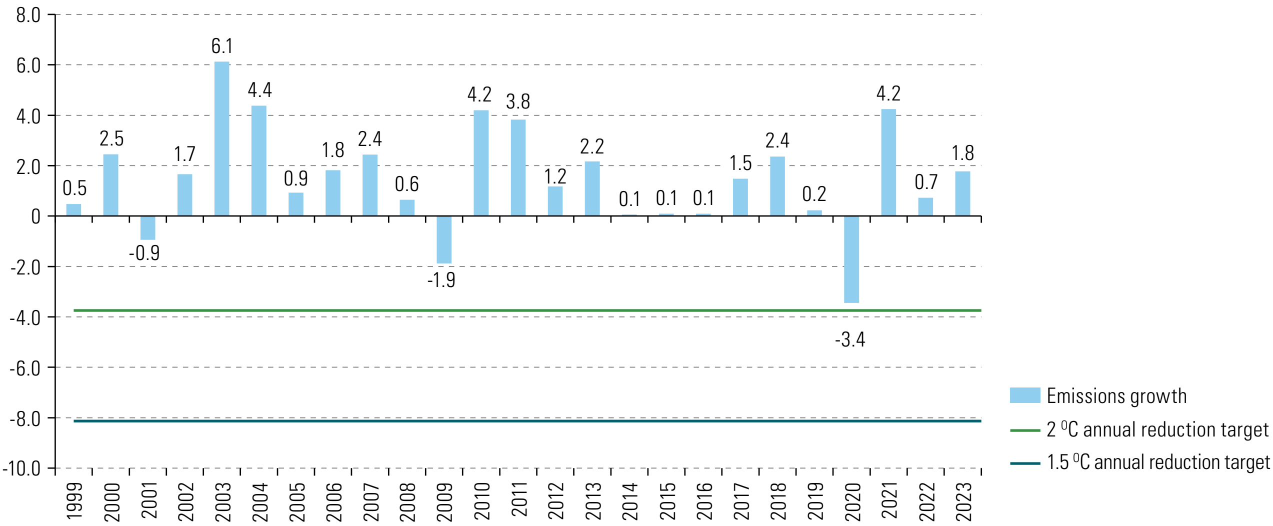
3 With a 66% probability that the temperature increase will fall within the range of 1.9 °C to 3.8 °C.
4 With a 66% probability that the temperature increase will fall within the range of 1.8 °C to 3.7 °C.

Figure 6
Probability of exceeding temperature limits
(Percentages)



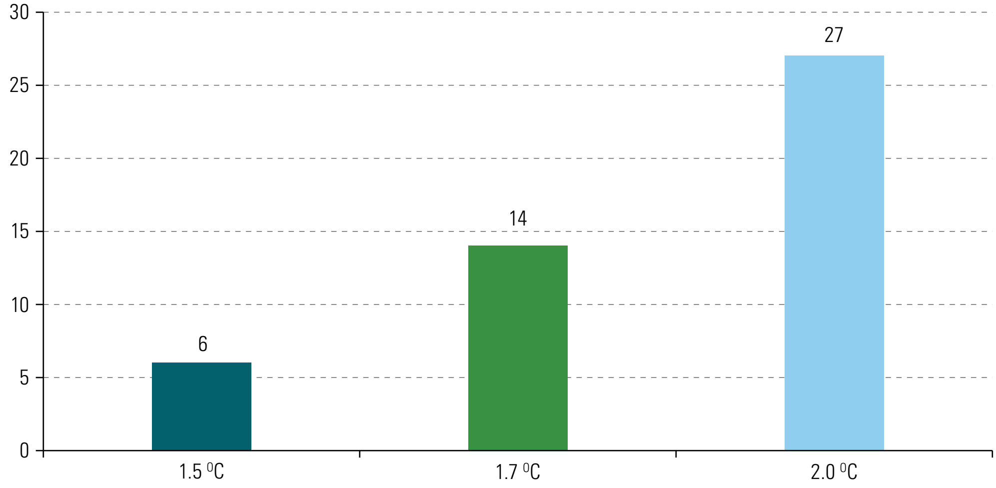
Source: Prepared by the authors, on the basis of United Nations Environment Programme. (2024). *Emissions Gap Report 2024: No More Hot Air … Please! With a Massive Gap between Rhetoric and Reality, Countries Draft New Climate Commitments*. https://doi.org/10.59117/20.500.11822/46404.

Figure 7
World: annual growth in greenhouse gas emissions, 1999–2023
(Percentages)



Source: Prepared by the authors, on the basis of Joint Research Centre. (2025). EDGAR - Emissions Database for Global Atmospheric Research. https://edgar.jrc.ec.europa.eu.

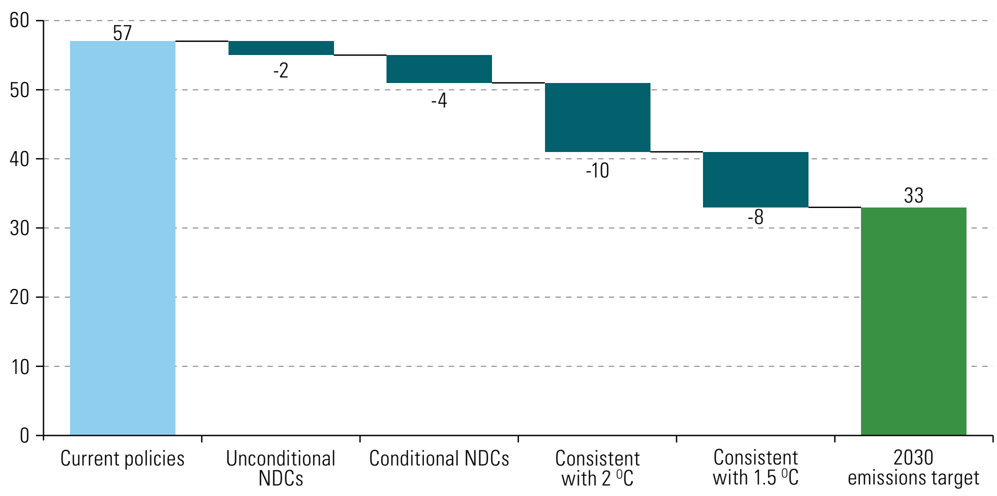
Figure 8
Years from 2025 until the carbon budget is depleted with respect to temperature rise limits



Source: Prepared by the authors, on the basis of Friedlingstein, P., O'Sullivan, M., Jones, M. W., Andrew, R. M., Hauck, J., Landschützer, P., Le Quéré, C., Li, H., Luijkx, I. T., Olsen, A., Peters, G. P., Peters, W., Pongratz, J., Schwingshackl, C., Sitch, S., Canadell, J. G., Ciais, P., Jackson, R. B., Alin, S. R., … Zeng, J. (2025). Global Carbon Budget 2024. *Earth System Science Data, 17*(3). https://doi.org/10.5194/essd-17-965-2025.
Note: The carbon budget is calculated considering a 50% probability of keeping the temperature rise below the level specified in the graph.

Thus, two emissions gaps exist: the first derives from insufficient ambition and is equivalent to the difference between emissions commitments under NDCs and those consistent with the Paris Agreement. The second is an implementation gap: the emissions path observed, associated with current policies, is not in line with NDCs, so that the measures being taken are permitting emissions above those projected in national commitments (IPCC, 2022b; UNEP, 2022 and 2024). While the world requires an emissions reduction equivalent to 24 $GtCO_2eq$, the NDCs through the end of 2024 set a reduction target of up to 6 $GtCO_2eq$, and the measures taken to date are not consistent with even these proposed reductions (see figure 9). The situation has further worsened in recent months as the energy security agenda has taken precedence over climate action, disregarding the growing evidence that the best economic decision for security is to pursue renewables.

Figure 9
World: emissions and emissions reductions by scenario to 2030
(Gigatons of CO_2eq)



Source: Prepared by the authors, on the basis of United Nations Environment Programme. (2024). *Emissions Gap Report 2024: No More Hot Air … Please! With a Massive Gap between Rhetoric and Reality, Countries Draft New Climate Commitments.* https://doi.org/10.59117/20.500.11822/46404.
Note: Unconditional NDCs are measures that countries will take using their own resources and capabilities, and conditional NDCs are additional measures that would be implemented if international support (funding, technical assistance, etc.) were provided.

C. Potential impacts of climate change

Global decarbonization must be an imperative since the rise in impact risk is not linear in relation to rising temperature (Diffenbaugh and Burke, 2019; IPCC, 2022a; Richardson et al., 2023). For example, it is estimated that warming of 1.5 °C would produce a decline of between 70% and 90% in marine corals, while a 2 °C scenario would bring them to the brink of extinction. Similarly, in the 1.5 °C scenario, average months of drought are estimated to increase to 2 and forest fires by 41%, compared to 4 months of drought and a 62% increase in fires in a 2 °C scenario and 10 months of drought and a 97% increase in forest fires with an increase of 3 °C (IPCC, 2023).

The current policy scenario in Latin America and the Caribbean is associated with an increase of around 3 °C, under which 65% of the region's territory would be affected by high temperatures, days of drought would increase by between 2 and 8 days, and tropical glaciers would shrink by between 66% and 97% in volume (Reyer et al., 2017). Dengue and malaria would be more widespread, and biodiversity severely disrupted. However, keeping the temperature rise to a limit of 1.5 °C would significantly lower these risks (see table 1).

Table 1
Latin America and the Caribbean: climate change impacts on key sectors under various temperature rise scenarios

		1.5 °C	2 °C	3 °C	4 °C
Land area and drought	Longer droughts *(Number of additional days)*	1 to 4		2 to 8	8 to 17
	Land area affected by unusual heat *(Percentages of affected land area)*	30	30 to 40	65	90
Sea	Fish catch potential *(Percentage decrease or increase in catch)*			-50 to 100	
	Probability of annual coral reef bleaching in the Caribbean *(Percentages of probability)*	20 to 60	60 to 100		
	Sea level rise *(Centimetres)*		27 to 39		46 to 66
Glaciers	Glacier volume loss in the southern Andes *(Percentages of glacier volume loss)*		21 to 52	27 to 59	44 to 72
	Volume loss of tropical glaciers *(Percentages of glacier volume loss)*		78 to 94	66 to 97	91 to 100
Biodiversity	Variation in annual damages due to river overflow *(Percentages compared to 1986–2006)*	19	33	62	
	Increase in run-off in the Río de la Plata *(Percentages)*			10 to 30	
Health	Increase in dengue *(Percentages of cases)*	12 to 22		40	
	Increased risk of diarrheal disease *(Percentage increase in risk)*	5 to 13		14 to 36	
Food	Variation in annual wheat yields *(Percentages compared to 1986–2006)*	1.2	1.2	-3.5	
	Variation in annual soybean yields *(Percentages compared to 1986–2006)*	4.2	7.8	3.7	
	Variation in annual maize yields *(Percentages compared to 1986–2006)*	-1.9	-2.1	-10.6	
	Variation in annual rice yields *(Percentages compared to 1986–2006)*	2.1	4	0.5	
	Decrease in beef cattle production in Paraguay *(Percentage decrease in production)*		-16	-27	
Work	Change in labour productivity due to heat stress *(Percentages compared to 1986–2006)*	-5	-8	-13.7	

		1.5 ºC	2 ºC	3 ºC	4 ºC
Economy	Acute impact of drought on GDP *(Percentage decrease in GDP)*	4.2	5.8		
	Acute impact of floods on GDP *(Percentage decrease in GDP)*	0.8	1.0		
	Acute impact of heatwaves on GDP *(Percentage decrease in GDP)*	0.8	1.7		
	Acute impact of tropical cyclones on GDP *(Percentage decrease in GDP)*	0.4	0.5		

Source: Economic Commission for Latin America and the Caribbean, on the basis of Reyer, C. P. O., Adams, S., Albrecht, T., Baarsch, F., Boit, A., Canales Trujillo, N., Cartsburg, M., Coumou, D., Eden, A., Fernandes, E., Langerwisch, F., Marcus, R., Mengel, M., Mira-Salama, D., Perette, M., Pereznieto, P., Rammig, A., Reinhardt, J., Robinson, A., Thonicke, K. (2017). Climate change impacts in Latin America and the Caribbean and their implications for development. *Regional Environmental Change, 17*. https://doi.org/10.1007/s10113-015-0854-6; Climate Analytics. (2022). *Climate Impact Explorer*. https://climate-impact-explorer.climateanalytics.org.

Food production will also be affected. In the case of yields of rice, maize, soybeans and wheat crops, maize shows losses in all scenarios, while in the extreme scenario of 3 °C, all crop yields show losses except for soybeans, which nevertheless also see an inflexion point in yields above 2 °C (see figure 10).

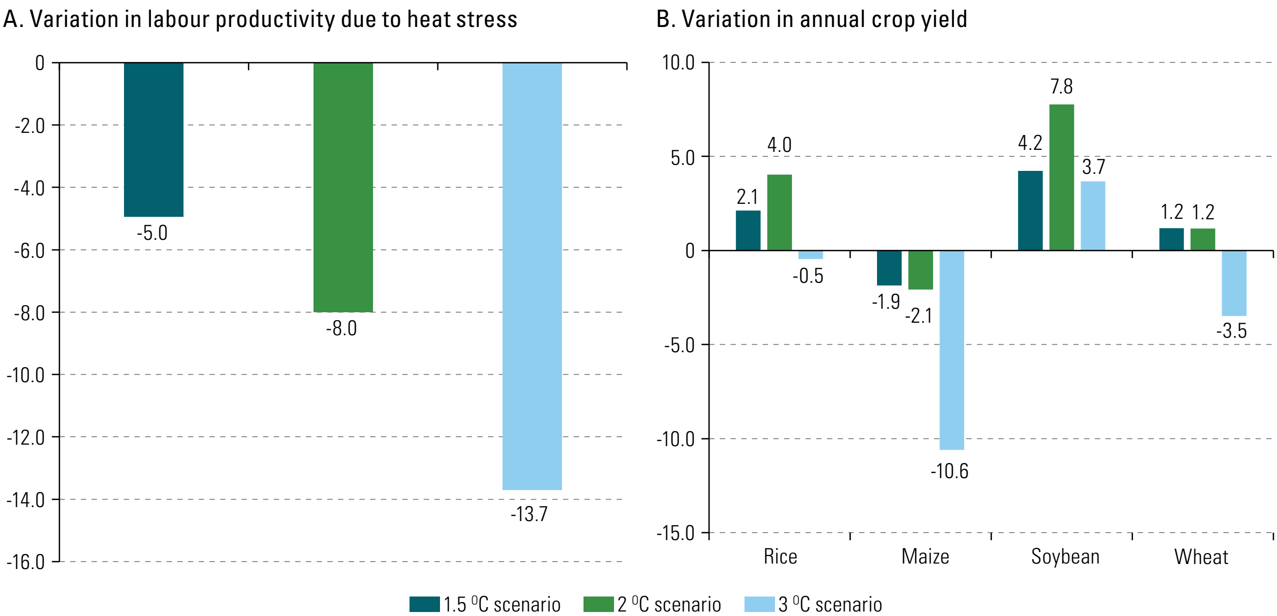
As a result of heat stress, the region's labour productivity would decline by 5% under the 1.5 °C scenario, and almost triple under the 3 °C scenario, compared to levels from the 1986–2006 period (see figure 10). These impacts vary significantly by country; Suriname, Guyana, the Bolivarian Republic of Venezuela and Brazil are among the most affected, with losses approaching 20%.

Extreme events are also expected to become larger and more frequent. If climate targets are met, flood-related impacts from river surges are estimated to increase by 19% compared to average damages sustained during the 1985–2006 period; this figure would triple in a 3 °C scenario. Similarly, annual damages from tropical cyclones would increase by 9% under a 1.5 °C scenario and almost sixfold in a 3 °C scenario (see figure 10). The Caribbean is especially affected by these phenomena (see box 3).

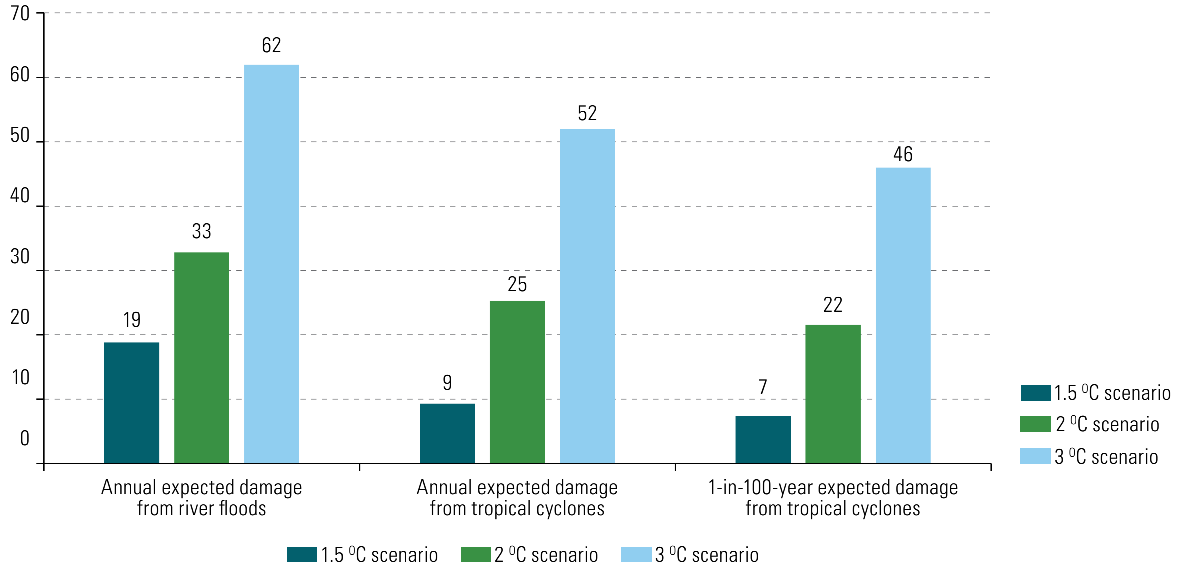
Figure 10

Latin America and the Caribbean: impact on labour productivity and on crop yields, and annual damages from extreme events, by temperature rise scenario

(Percentages, in relation to 1986–2006)



C. Variation in annual damages from river flooding and tropical cyclones



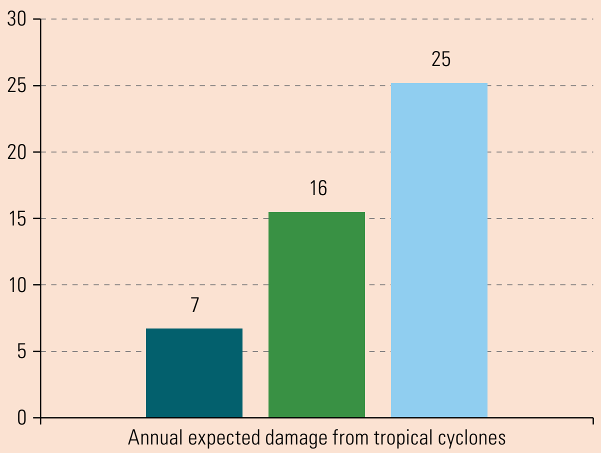
Source: Prepared by the authors, on the basis of Climate Analytics. (2022). *Climate Impact Explorer*. https://climate-impact-explorer.climateanalytics.org.
Note: Average annual crop yields were calculated assuming that the areas planted with rainfed and irrigated maize remain constant throughout the twenty-first century. Therefore, projected changes only reflect future climate developments, not agricultural management practices. Country-level productivity and yield indicators were aggregated spatially, and expected damage was rendered as a simple average.

Box 3
Impacts in the Caribbean

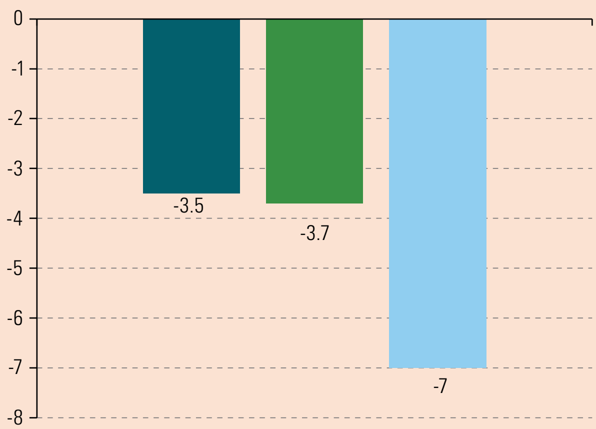
The Caribbean is one of the world's most vulnerable areas to climate risk. By 2023, 78% of Haitian farmers faced water shortages, while 44% saw a decline in their harvest. Irregular rainfall and high temperatures in 2023 are estimated to have reduced maize and rice production by 4% and 5%, respectively. Hurricane Idalia damaged crops when it hit Cuba. Heavy rains and flooding in the Dominican Republic affected more than 7,000 farmers, causing damages exceeding US$ 460 million (WMO, 2024).

The magnitude and frequency of extreme events are expected to increase. The damage from tropical cyclones will increase by an estimated 7% under a 1.5 °C scenario and by over 25% under a 3 °C scenario, compared to 2015 (figure).

A. The Caribbean: changes in annual damages expected from tropical cyclones at different levels of global warming
(Percentages, in relation to base year, 2015)



B. The Caribbean: changes in precipitation at different levels of global warming
(Percentages, in relation to reference period, 1986–2006)



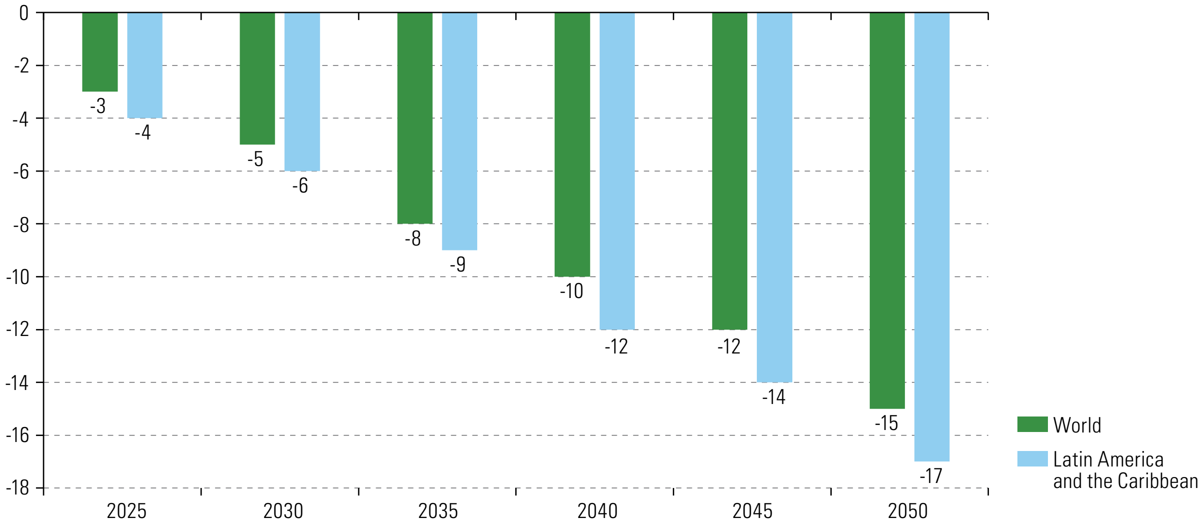
1.5 °C 2.0 °C 3.0 °C

Source: World Meteorological Organization. (2024). *State of the Climate in Latin America and the Caribbean 2023*.
Source: Prepared by the authors, on the basis of Climate Analytics. (2022). Climate Impact Explorer. https://climate-impact-explorer.climateanalytics.org.

While it is not possible to account for all the potential impacts of climate change, various economic estimates exist at the global level. Estimated impacts differ in scope, methodology and time horizon, and they show that losses in global GDP per capita vary between 4.6% and 30% for the 3 °C scenario. This is six times greater than the range of estimates for the 1.5 °C scenario, which show a loss of between 0.8% and 5% in per capita GDP (Alatorre and Fernández Sepúlveda, 2022; Economic Commission for Latin America and the Caribbean [ECLAC], 2024b). However, these estimates should be treated as the lower bound for potential impacts, because they typically consider only the impacts of temperature on GDP, not other transmission channels and consequences of extreme events.

Reference is often made to the region's particular vulnerability to climate change, because it is exposed to greater losses than the global average under different scenarios: with warming of 1.5 °C, the region's annual GDP loss from physical hazards stands at 6%, which would materialize over the coming decade at the current rate of emissions. By mid-century, when temperature rises exceed 2 °C, annual GDP loss would triple to 17% (see figure 11).

Figure 11
Latin America and the world: GDP losses due to chronic physical impacts, 2025–2050
(Percentage losses under the current policy scenario relative to a baseline scenario without climate change)



Source: Prepared by the authors, on the basis of Central Banks and Supervisors Network for Greening the Financial System.
Note: The latest version (2024) of the damage function used by the Central Banks and Supervisors Network for Greening the Financial System (NGFS) is based on the methodology developed by Kotz, Levermann and Wenz (2024). This new function incorporates a wider range of climate variables (annual mean temperature, daily temperature variability, total annual precipitation, annual number of rainy days and daily extreme precipitation events) and uses more up-to-date data.

As is well known, the physical impacts of climate change spill over into the social and economic spheres, affecting the drivers of growth, food and energy security and human health, among other factors. Its effects will thus intensify both poverty and pressure on public services, public finances and debt levels. Depending on the sectoral impacts, the potential for greater volatility in inflation could jeopardize the stability of the financial system (Breckenfelder et al., 2023).

D. Climate change and development traps

The effort to combat climate change forms an integral part of the ECLAC strategy to achieve sustainable development in Latin America and the Caribbean and address the traps that impede it: low capacity for growth; high inequality and low levels of social mobility and cohesion; and weak institutional capacities and ineffective governance. This section will show how global warming acts as an echo chamber, exacerbating existing problems and making them harder to overcome.

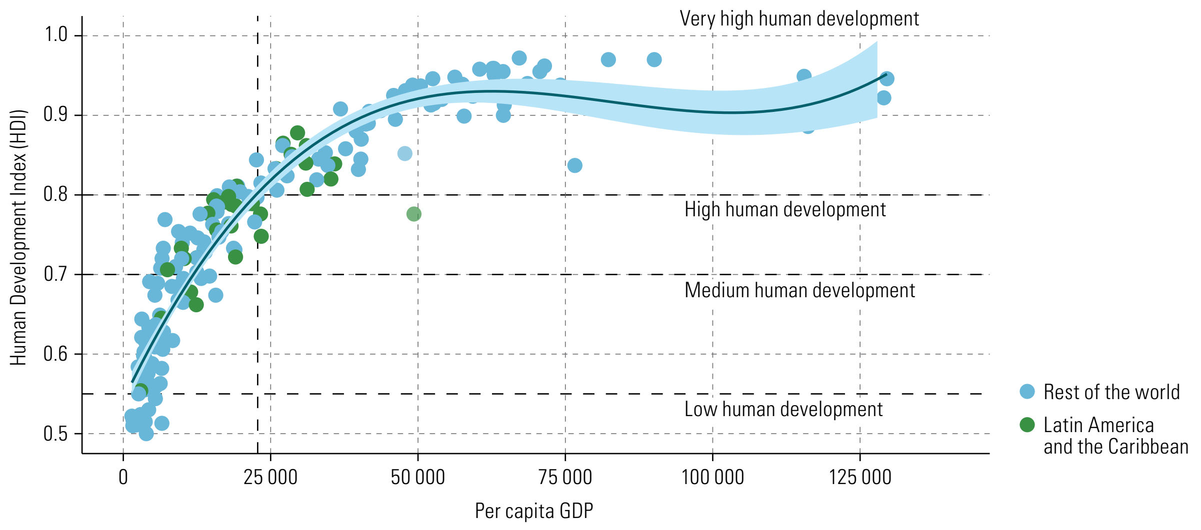
1. The trap of low capacity for growth

The trap of low capacity for growth in Latin America and the Caribbean is reflected in the fact that over the past 25 years (1998–2023), annual per capita GDP growth averaged 1.25%, lower than in any other world region, below the global average of 2.2% and clearly insufficient to meet the region's needs (ECLAC, 2023 and 2024a). Productivity growth has followed a similar pattern. Climate change interacts with this trap through the physical impact described in the previous section.

For each country, the impact of physical risk on economic growth is presented using the results of phase 5 of the Central Banks and Supervisors Network for Greening the Financial System (NGFS) scenarios, which is based on a fusion of projected damages from temperature and precipitation, taking into account daily variability and extremes (Kotz, Levermann and Wenz, 2024). The results for the region (see in figure 11) show that the estimated impacts are close to the highest estimates reported in previous studies (ECLAC, 2023).

Given the acknowledged limitations of GDP as an indicator of development and well-being, above a certain income threshold —identified at between US$ 15,000 and US$ 25,000— economic growth is not associated with significant well-being gains (Collste et al., 2021; Max-Neef, 1992). Accordingly, a regression was performed between per capita GDP and the human development index (HDI) to calculate the per capita GDP threshold above which countries reach a very high HDI, which was found to be US$ 22,800. To date, of the 31 countries in Latin America and the Caribbean that were included in this exercise, two thirds have yet to reach that threshold (United Nations Development Programme [UNDP], 2025) (see figure 12).

Figure 12
World: per capita GDP and human development index (HDI), 2023
(International PPP dollars at 2021 prices and index)



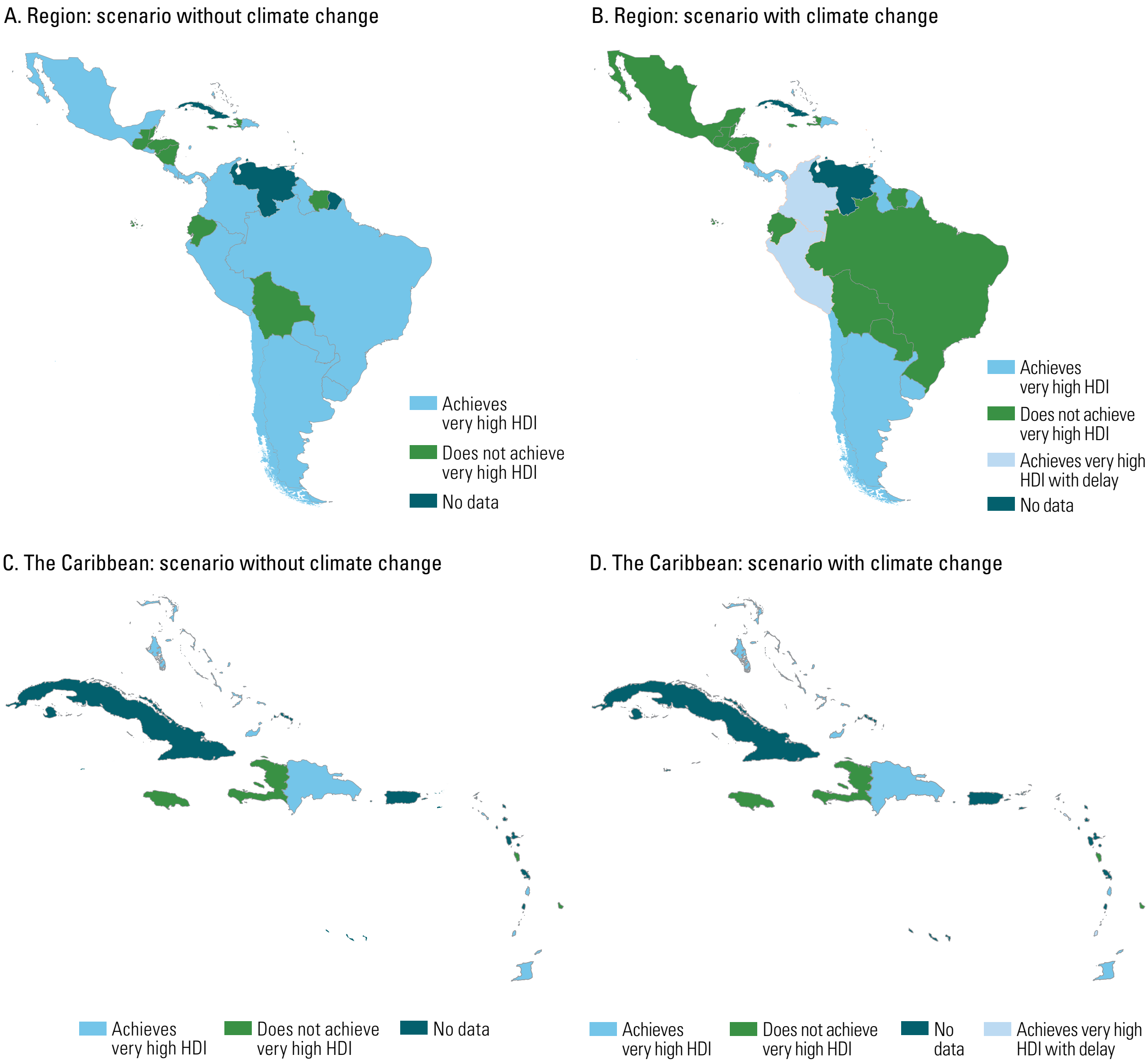
Source: Prepared by the authors, on the basis of World Bank. (2025). *World Development Indicators*. https://databank.worldbank.org/source/world-development-indicators; United Nations Development Programme.

The time it would take for each country to achieve a very high HDI may be calculated, assuming it continues to grow at the same rate as in the period 1998–2023. Climate change limits the pace of growth and delays the achievement of this threshold, even preventing some countries from reaching it at all by 2050. In a trend scenario based on current climate policies,[5] countries such as Brazil, Dominica, Mexico and Paraguay

[5] In this scenario, the temperature rise exceeds 1.5 °C during the 2030s and reaches 2 °C by 2050.

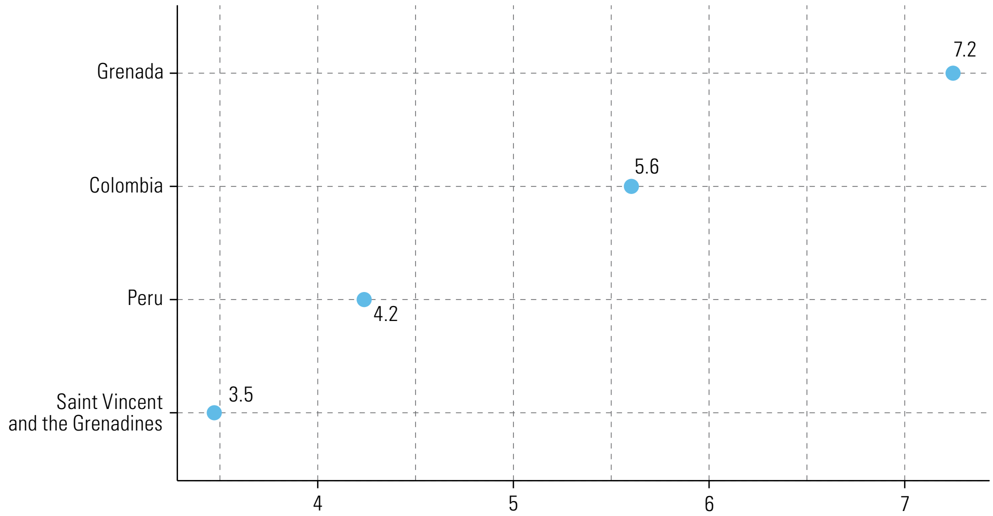
do not achieve a very high HDI by 2050, which they would have done in the absence of climate change effects (see map 1). The four countries that should manage to pass the threshold by 2050 despite the effects of climate change will take on average five more years to do so (see figure 13). Finally, a group of 13 countries would not reach the threshold by 2050 in any of the scenarios analysed.

Map 1
Latin America and the Caribbean: countries that will achieve a very high human development index by 2050



Source: Prepared by the authors, on the basis of World Bank. (2025). *World Development Indicators*. https://databank.worldbank.org/source/world-development-indicators.

Figure 13
Countries that achieve a very high human development index (HDI) between 2025 and 2050
(Additional years to reach the threshold owing to climate change)



Source: Prepared by the authors, on the basis of World Bank. (2025). *World Development Indicators.* https://databank.worldbank.org/source/world-development-indicators; Central Banks and Supervisors Network for Greening the Financial System.

2. Additional risks to growth

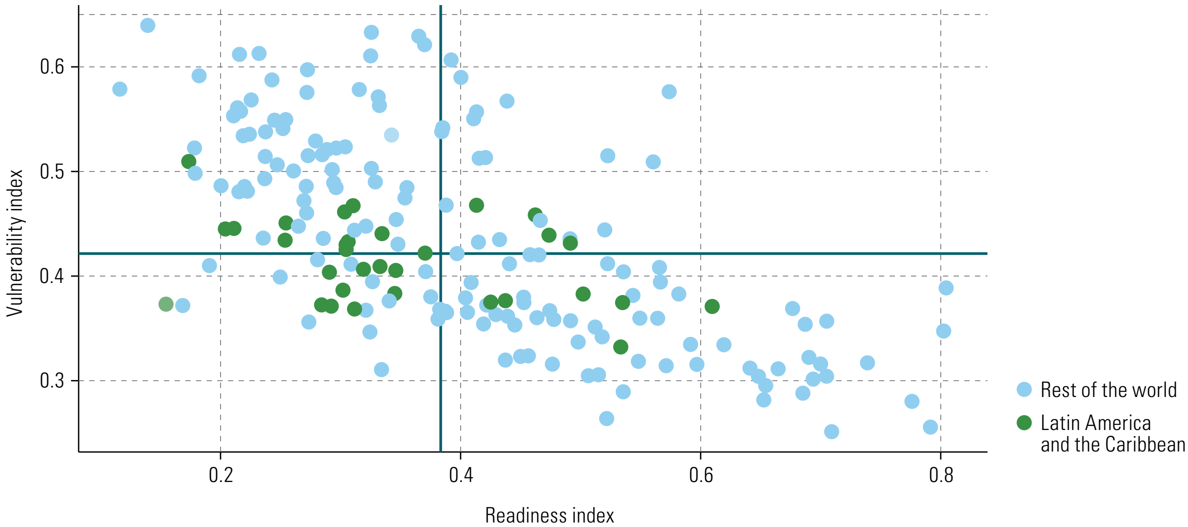
In addition to the effects on growth resulting from changes in temperature and precipitation patterns —which can be estimated relatively straightforwardly and should be taken as a minimum threshold— there are additional risks associated with both climate change and the transition to low-carbon economies. On the one hand, some countries risk becoming trapped in an adverse climatic-financial feedback loop, if their comprised macroeconomic position is worsened by the effects of adverse climate conditions, in turn limiting their capacity to respond to and prepare for future events. On the other hand, risk is associated with each economy's exposure to the low-carbon transition, which will depend on its economic structure and activities and its ability to take advantage of the opportunities the transition offers. Managing both factors calls for proactive adaptation (Giddens, 2011), both to reduce the risks of the impacts and to drive the structural changes necessary to achieve sustainable development goals (Alatorre et al., 2025; Magacho et al., 2023).

Depending on the threat associated with the impacts, the level of exposure, vulnerability and capacity to find solutions, some countries may face greater risk from the effects of climate change. According to the ND-GAIN Country Index (Notre Dame Global Adaptation Initiative, 2025), by 2023, readiness was below the global median in 22 of the 33 countries in the region, and of these, 12 were exposed to a level of vulnerability above the global median (see figure 14).

This situation is sometimes combined with high macro-financial vulnerability, i.e. tight fiscal space and high levels of debt relative to GDP, which limit countries' capacity to respond to emergencies of different sorts (Bedossa, 2023). Some countries are already experiencing this climatic-financial "double vulnerability", and others are likely to under future climate conditions.

Before the pandemic, the region had the highest levels of public debt among emerging countries, albeit with better debt structure (Ocampo and Eyzaguirre, 2023). Since 2020, public debt has risen, and some countries risk unsustainability in the advent of certain adverse growth conditions and rising real interest rates (Ocampo and Eyzaguirre, 2023). The effects of climate change are one of the factors that could bring those adverse conditions about (Chamon et al., 2022).

Figure 14
World: vulnerability and readiness for climate change, 2023
(Indexes)



Source: Prepared by the authors, on the basis of World Bank. (2025). *World Development Indicators*. https://databank.worldbank.org/source/world-development-indicators; Notre Dame Global Adaptation Initiative. (2025). *Country Index*. https://gain.nd.edu/our-work/country-index.

Note: The vulnerability index refers to a country's exposure and sensitivity to the impacts of climate change, as well as its capacity to adapt to them. The readiness index refers to a country's overall capacity to leverage investment and translate it into effective adaptation measures. It measures the quality of the system for implementing solutions (Notre Dame Global Adaptation Initiative, 2025).

Of the 33 countries in Latin America and the Caribbean, 17 are highly vulnerable to extreme weather events and 18 to chronic deterioration of climate conditions. Most of these cases coincide and most are located in the Caribbean and Central America (see table 1). Of this group of countries, almost all are highly vulnerable to macroeconomic shocks, although there are also countries that have a solid macroeconomic position, yet are threatened by climate risks (see table 2).

Table 2
Latin America and the Caribbean: climate vulnerability and macrofinancial vulnerability

Macrofinancial vulnerability	High vulnerability to extreme weather events	High vulnerability to chronic deterioration of climate conditions
High	Antigua and Barbuda, Barbados, Belize, Cuba, Dominica, El Salvador, Grenada, Haiti, Nicaragua, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines.	Antigua and Barbuda, Barbados, Belize, Cuba, Dominica, El Salvador, Grenada, Haiti, Nicaragua, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines.
Medium	Dominican Republic, Honduras, Jamaica.	Dominican Republic, Honduras, Jamaica.
Low	Colombia and Guatemala.	

Source: Bedossa, B. (2023). Climate-financial trap: An empirical approach to detecting situations of double vulnerability. *Macroeconomics and Development*. (51). Éditions AFD.

The transition to low-carbon economies needs a structural transformation in global production and consumption patterns at an unprecedented pace. The impact of climate policies on socioeconomic variables is another source of risk (and opportunities) that must be considered. These are known as transition risks. Insufficient global climate action, coupled with geopolitics that hinder cooperation, increase the likelihood of an abrupt transition to low-carbon economies. As with the physical impacts, economies' levels of exposure and vulnerability to the transition vary, and this is where economic structure plays a fundamental role.

The transformations that are required in production and consumption patterns imply the decline of industries associated with the current pattern and the emergence of new industries in keeping with the new one. Exposure to transition risk will depend on the mix between emerging activities and those most likely to disappear or decline.

Dependence on declining activities or industries is analysed by drawing upon indicators such as the level of employment and the related tax collection and exports (Magacho et al., 2023). Countries with hydrocarbon industries face a higher transition-related risk: the Bolivarian Republic of Venezuela and Ecuador show high vulnerability in all three indicators analysed (see table 3) (Alatorre, Lalane and Lavalleja, 2023).

Table 3
Latin America: degree of vulnerability by dimension

	Dimension		
Degree of vulnerability	External Exports	Fiscal Tax collection	Socioeconomic Employment
High	Venezuela (Bolivarian Republic of), Colombia, Bolivia (Plurinational State of) and Ecuador	Venezuela (Bolivarian Republic of), Ecuador, Guyana, Trinidad and Tobago, and Bolivia (Plurinational State of)	Ecuador, Venezuela (Bolivarian Republic of), Chile and Colombia
Medium	Mexico and Peru	Chile, Peru and Mexico	Brazil, Bolivia (Plurinational State of), Peru and Argentina

Source: Alatorre, J. E., Lalane, A. and Lavalleja, M. (2023). Exposición macroeconómica de los países de América Latina en la transición verde. *Studies and Perspectives series*. (60) (LC/TS.2023/187). Economic Commission for Latin America and the Caribbean; United Nations Conference on Trade and Development and Eora (2025). *UNCTAD-Eora Global Value Chain Database*. https://worldmrio.com/unctadgvc; and regional input-output tables prepared by the Economic Commission for Latin America and the Caribbean.

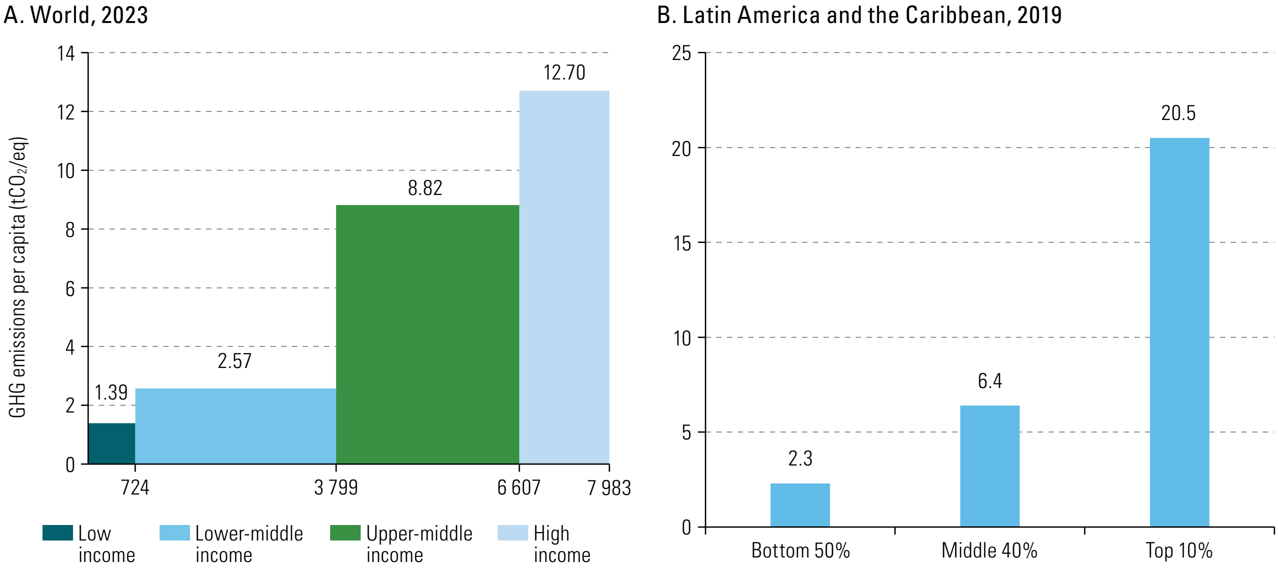
To achieve the transition, significant amounts of investment must be directed towards sectors and activities that will be priorities in the future. For Latin America and the Caribbean, the magnitude of the investment needed is considerable. Meeting climate action commitments is estimated to require cumulative investment of between US$ 2.1 trillion and US$ 2.8 trillion between 2023 and 2030, equivalent to an average annual investment of between 3.7% and 4.9% of regional GDP until 2030 (ECLAC, 2024b).

However, in a context of limited climate finance, financing climate action is significantly more costly for countries in the region than for developed economies, owing to their higher levels of sovereign risk. In this connection, there is evidence that transition risks are already priced into sovereign bond yields, such that the cost of financing the transition is higher for developing economies, whose fiscal space and implementation of financial policies to drive the low-carbon transition are both limited (Anyfantaki et al., 2025). These could be indications of greater difficulties in obtaining financing in the future unless rapid action is taken to shift towards sectors conducive to change, resilience and adaptation. And while there is no evidence that physical impacts have long-term consequences for bond yields, short- and medium-term impacts do arise from the increased frequency and intensity of disasters (Anyfantaki et al., 2025).

3. Climate change and inequality

Attribution of GHG emissions is unevenly distributed between and within countries. High-income countries produce 1.5 times more emissions per capita than upper-middle-income economies, and up to 10 times more than low-income economies. Furthermore, the richest 1% of the global population is responsible for 15% of total emissions, while the poorest 50% emits only 10% (Bruckner et al., 2022). The unevenness is replicated within countries, as the carbon footprint of higher-income households is several times that of lower-income households. In Latin America and the Caribbean, the population at the top 10% of the income distribution produces nine times the per capita GHG emissions of the lowest 50% and about three times more than the upper-middle 40% of the distribution (see figure 15) (Alatorre et al., 2024).

Figure 15
World and Latin America and the Caribbean: per capita greenhouse gas emissions
(Tons of CO_2eq per capita)



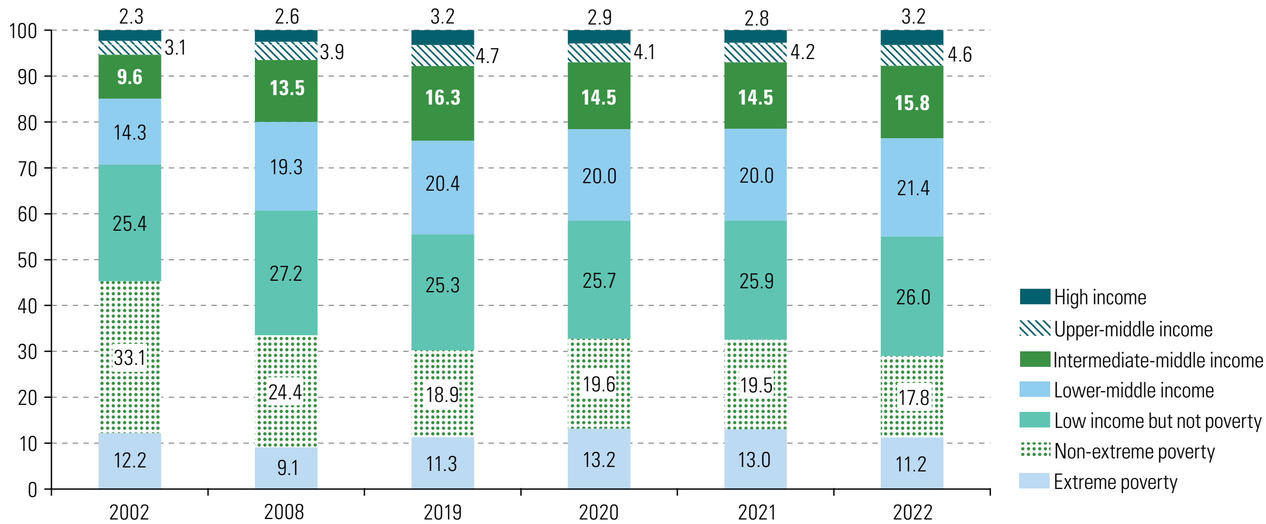
Source: Joint Research Centre. (2025). *EDGAR - Emissions Database for Global Atmospheric Research*. https://edgar.jrc.ec.europa.eu; Economic Commission for Latin America and the Caribbean. (2022). *Towards transformation of the development model in Latin America and the Caribbean: production, inclusion and sustainability* (LC/SES.39/3-P).

The adverse impacts of climate change are also unevenly distributed and contrast with the attribution of emissions. At the country level, lower-income nations tend to be more vulnerable, limiting their development capacity and widening the gap vis-à-vis more developed countries. Within countries, too, as the lowest-income population is worst affected, the income gap widens as a function of climate impacts (Diffenbaugh and Burke, 2019). In Latin America and the Caribbean, nearly 55% of the population lives on an income below or just above the poverty line (see figure 16). This group is thus highly vulnerable to poverty, especially when income is considered alongside high levels of employment precariousness and informality and limited access to social protection, particularly among low- and lower-middle-income groups (ECLAC, 2024a). Any exogenous impact, whether meteorological or economic, disproportionately affects these segments of the population and thereby sharpens inequality (Alatorre et al., 2024).

Furthermore, as emissions continue to rise, their impacts will only increase, exacerbating inequality. For example, the detrimental effect of heat waves on labour productivity will be sharper in developing regions and will hit those in more exposed —typically lower-paid— jobs the hardest. Under a scenario of net-zero emissions by 2050, labour productivity in Latin America and the Caribbean is projected to decline by 4%–5% compared to 1986–2006 levels. These impacts vary significantly across countries, with Suriname, Guyana and the Bolivarian Republic of Venezuela experiencing the most significant losses in the region, approaching 10%. By contrast, regions such as Europe and Oceania are expected to experience losses of no more than 3% (see figure 17).

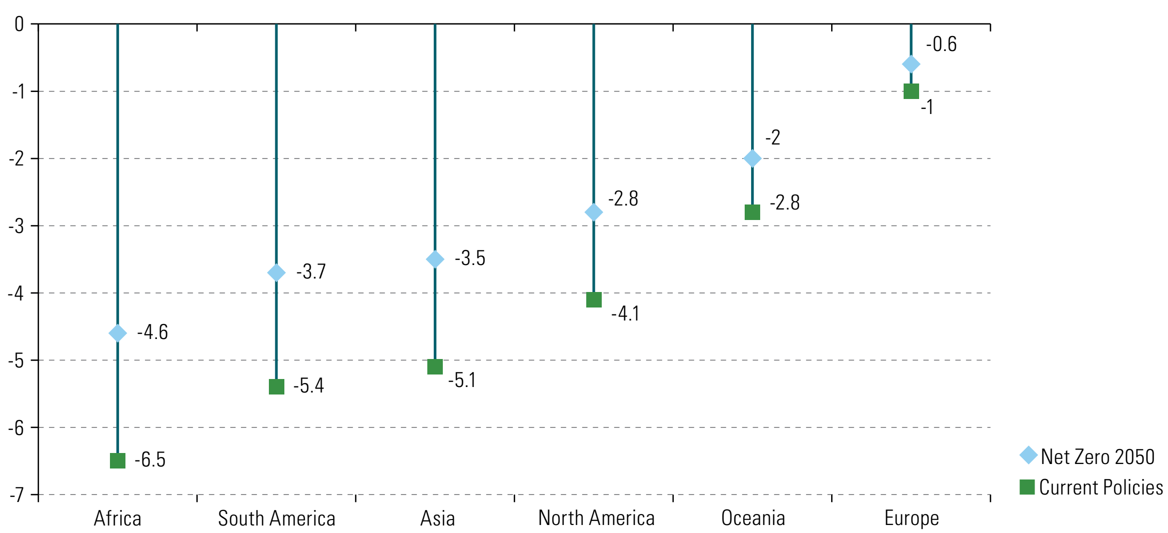
As a result, lower-income countries —which face fiscal constraints and high levels of debt— also have the greatest adaptation needs. Today, 3.3 billion people reside in countries whose interest payments exceed spending on health or education (United Nations Conference on Trade and Development [UNCTAD], 2023). Interest payments in Latin America average 2.6% of GDP and consume 16% of tax revenues, often exceeding allocations for education, health and social protection, and more than doubling public investment spending (ECLAC, 2023 and 2024a). This is compounded by the macrofinancial vulnerability and the issues discussed earlier concerning access to finance.

Figure 16
Latin America and the Caribbean: distribution of the population by income level, 2002–2022
(Percentages)



Source: Economic Commission for Latin America and the Caribbean. (2023). *Social Panorama of Latin America and the Caribbean, 2023* (LC/PUB.2023/18-P); (2022). *Household Survey Data Bank.* https://badehog.cepal.org.

Figure 17
World: relative change in labour productivity by 2050 as a result of heat waves compared to the reference period 1986–2006
(Percentage points)



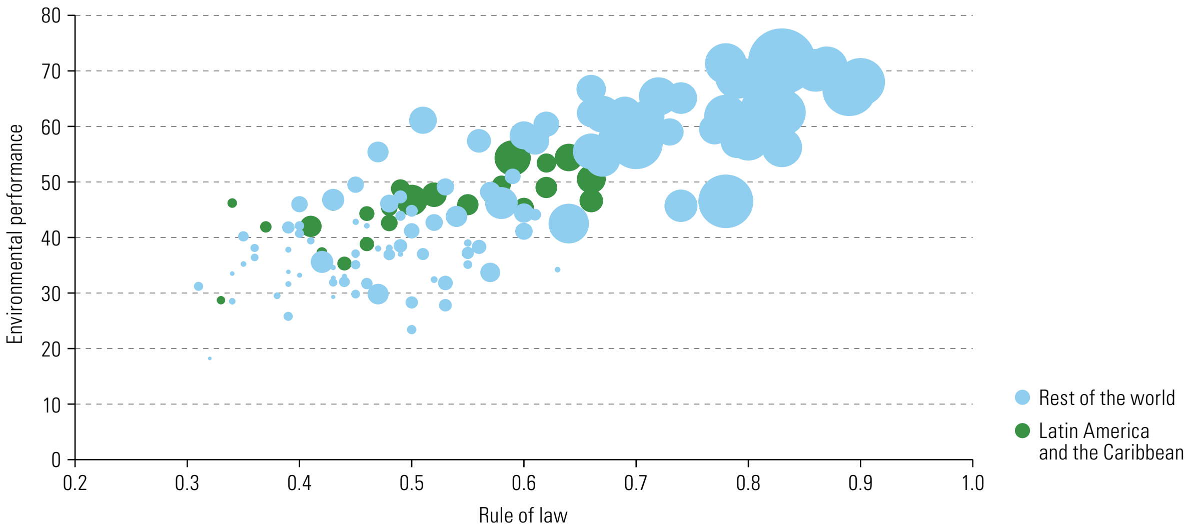
Source: Climate Analytics. (2023). *Climate Impact Explorer.* https://climate-impact-explorer.climateanalytics.org.
Note: Spatial aggregation method using a population-weighted average. Scenarios are based on Network for Greening the Financial System (NGFS) Net Zero 2050 and current policies.

Lastly, policies for transitioning to low-carbon economies can themselves be another potential source of inequality between and within countries. Like any technological and productive development in fast-growing new sectors, green transition plans have the potential to widen existing productivity gaps in the absence of equitable access to financing and technology transfer, and unless they are implemented progressively.

4. Climate change and governance

The transformations needed to address current challenges, including climate change, require consensus on far-reaching and lasting policies. They require collaborative institutional mechanisms that remain stable over the long term. In a divided social milieu, such consensus is less likely to be achieved (Dixson-Declève et al., 2022). There are various channels through which the generation and absorption of technological solutions, environmental performance and the institutional and social environment interact with one another (De Miguel and Sánchez, 2024), as a result of which countries which have better rule-of-law and governance indicators also achieve better environmental and economic performance (see figure 18). Therefore, institutional capacities, the rule of law, good governance and social dialogue are essential to achieve a just and lasting transition that will enable an escape from the traps of low capacity for growth, high inequality and low levels of social cohesion, looking towards the challenges of climate change.

Figure 18
Latin America and the rest of the world: relationship between environmental performance, the rule of law and per capita GDP
(Rule of law indicator, environmental performance index, and per capita GDP)



Source: Prepared by the authors, on the basis of World Bank. (2025). *World Development Indicators*. https://databank.worldbank.org/source/world-development-indicators; Block, S., Emerson, J. W., Esty, D. C., de Sherbinin, A. and Wendling, Z. A. (2024). *2024 Environmental Performance Index*. Yale Center for Environmental Law & Policy; World Justice Project. (2024). *WJP Rule of Law Index*. https://worldjusticeproject.org/rule-of-law-index.

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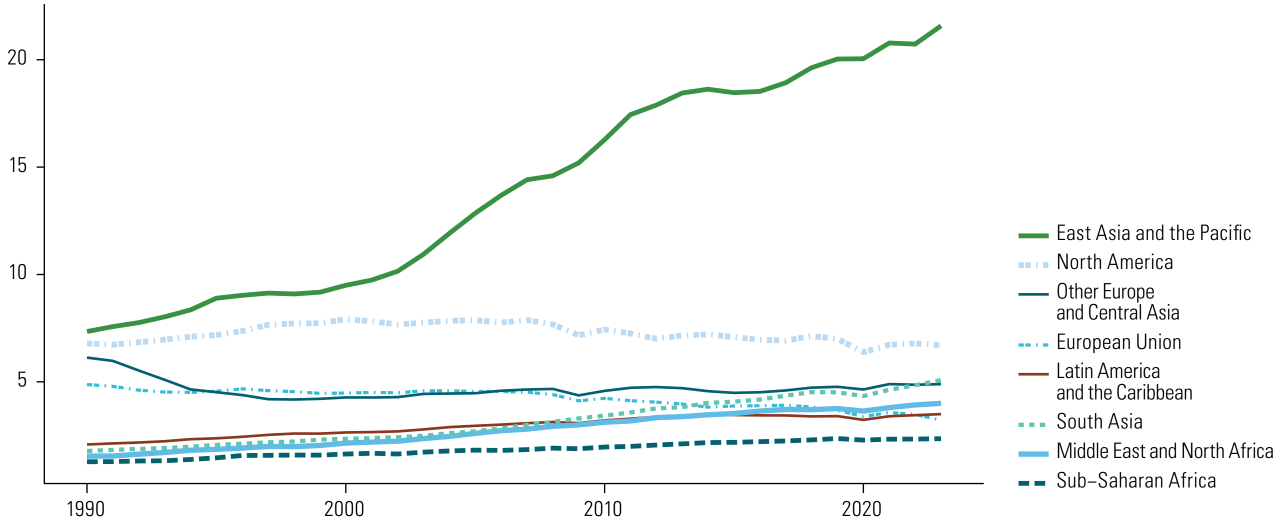
Chapter II

Emissions in Latin America and the Caribbean: an overview

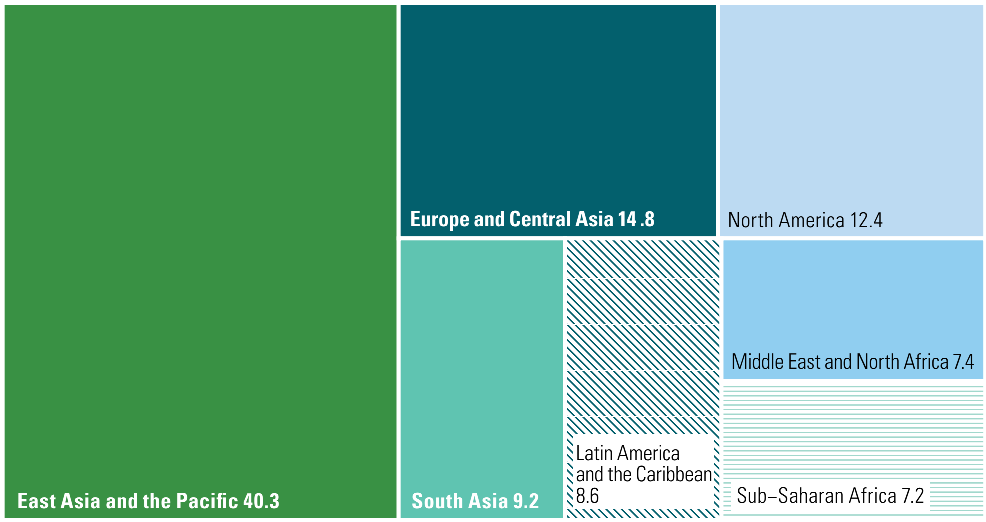
In 2023, the region's emissions[1] amounted to 4.8 gigatons of carbon dioxide equivalent ($GtCO_2$ eq), which is equal to 8.6% of its total GDP.[2] The comparative totals for the different world regions have varied a great deal over time because they are closely linked to economic growth rates and to energy and production mixes, among other factors. Excluding emissions from changes in land use and forestry, between 1990 and 2023 emissions from the regions of East Asia and the Pacific, South Asia, and the Middle East and North Africa rose by approximately 3% per year; emissions have held relatively steady in North America and have been declining by 1% per year in the European Union. Meanwhile, the emissions of Latin America and the Caribbean climbed by 1.8% per year during this period (see figure 19).

Figure 19
Emissions, by region and as a share of global emissions

A. Emissions, by region, 1990–2023
($GtCO_2eq$)



B. Shares of total global emissions (57 $GtCO_2eq$), 2023
(Percentages)



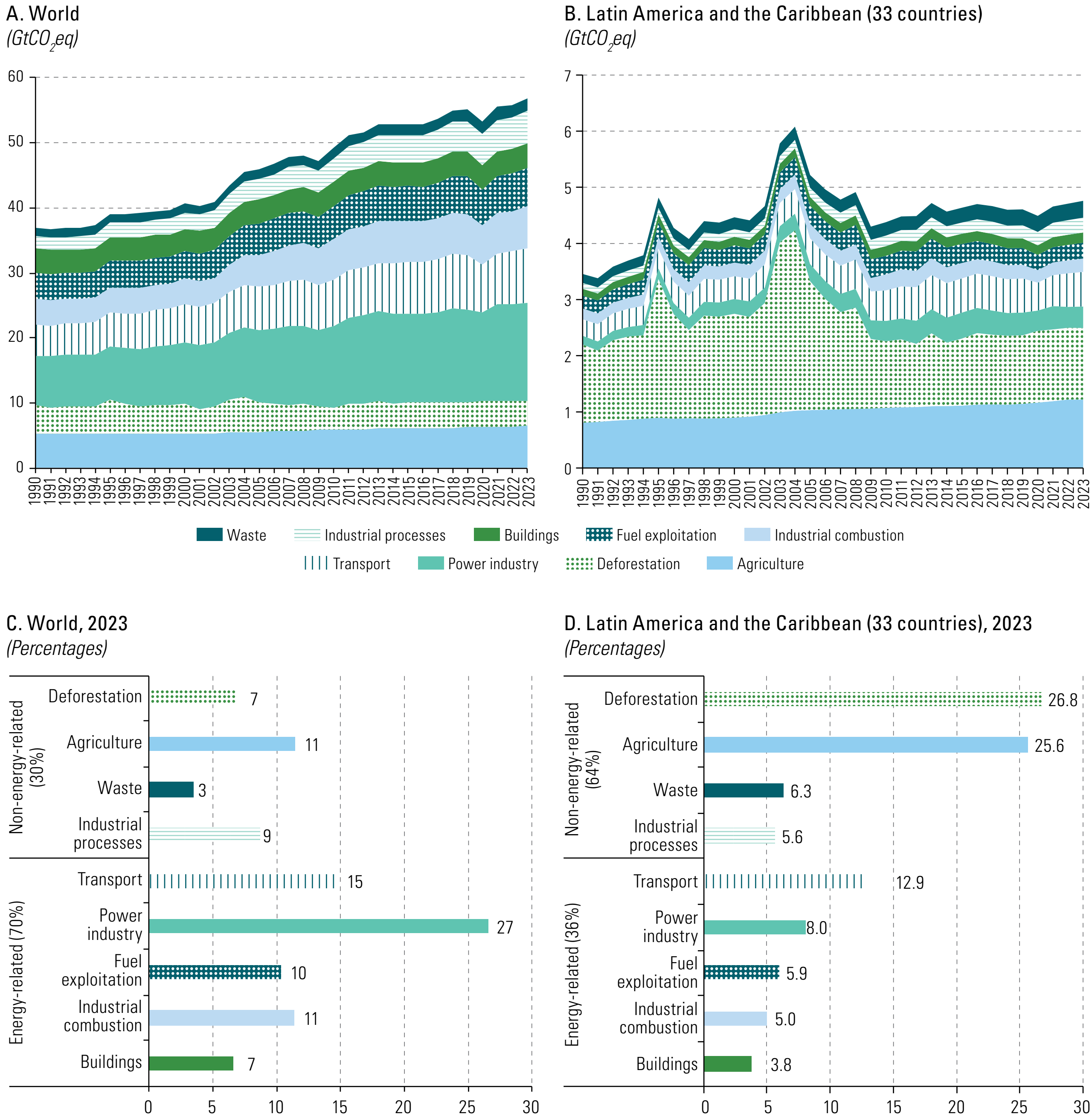
Source: Prepared by the authors, on the basis of Joint Research Centre. (2025). *EDGAR - Emissions Database for Global Atmospheric Research*. https://edgar.jrc.ec.europa.eu.

1 Antigua and Barbuda, Argentina, Bahamas (The), Barbados, Belize, Bolivarian Republic of Venezuela, Brazil, Chile, Colombia, Costa Rica, Cuba, Dominica, Dominican Republic, Ecuador, El Salvador, Grenada, Guatemala, Guyana, Haiti, Honduras, Jamaica, Mexico, Nicaragua, Panama, Paraguay, Peru, Plurinational State of Bolivia, Saint Kitts and Nevis, Saint Vincent and the Grenadines, Saint Lucia, Suriname, Trinidad and Tobago, and Uruguay.

2 Emissions Database for Global Atmospheric Research (EDGAR). The figures include emissions from regional deforestation.

At the world level, energy-related activities (generation of electricity and heating, oil extraction and refining, energy consumption in industry, transport and buildings) represent 70% of total greenhouse gas (GHG) emissions. In the case of Latin America and the Caribbean, however, this source accounts for just 36% of emissions, but emissions from deforestation exceed 26%, with 90% of that volume being accounted for by the expansion of agricultural and livestock activities. The agricultural sector's emissions amount to a similar percentage (see figure 20) (Joint Research Centre [JRC], 2025; Food and Agriculture Organization of the United Nations and United Nations Environment Programme [FAO and UNEP], 2020).

Figure 20
World and Latin America and the Caribbean: greenhouse gas emissions, by sector, 1990–2023
($GtCO_2eq$)

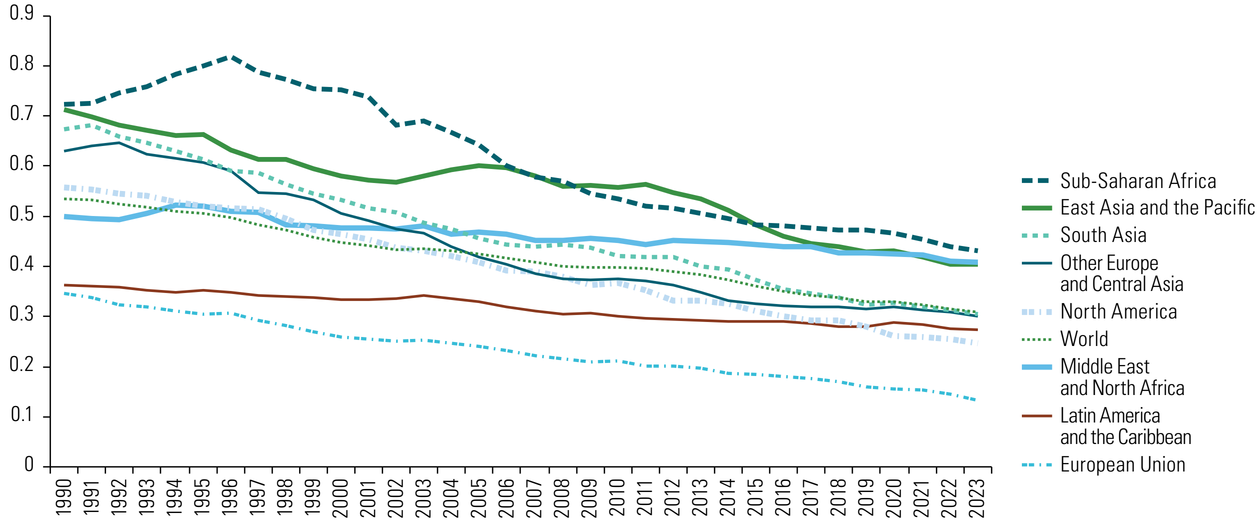


Source: Prepared by the authors, on the basis of Joint Research Centre. (2025). *EDGAR - Emissions Database for Global Atmospheric Research*. https://edgar.jrc.ec.europa.eu.

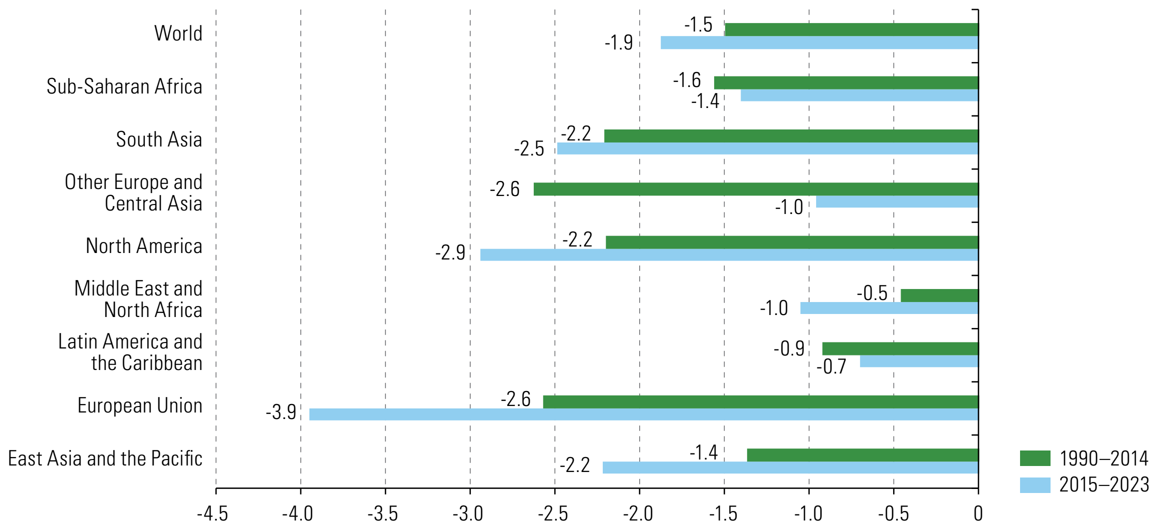
In 2023, worldwide emissions averaged 0.3 kg of carbon dioxide equivalent per dollar ($kgCO_2eq$/dollar at purchasing power parity (PPP) in dollars at 2021 prices), as compared to 0.5 kg per dollar in 1990, and the carbon footprint is therefore tending to shrink. Since the Paris Agreement was signed in 2015, the pace of decarbonization of the world's economies has accelerated: between 1990 and 2014, the global economy's decarbonization rate stood at 1.5% per year but, since 2015, that rate has risen to 1.9% (see figure 21). The Latin American and Caribbean region's emissions per unit of GDP are practically the same as the world average, but its rate of decarbonization is less than half the world economy's rate and, in fact, has actually slowed since the adoption of the Paris Agreement (see figure 21).

Figure 21
Carbon intensity, by region

A. Carbon intensity of GDP
(Emissions per unit of GDP in kg/dollar at purchasing power parity in dollars at 2021 prices)



B. Increase in carbon intensity, 1990–2023
(Percentages)



Source: Prepared by the authors, on the basis of World Bank. (2025). *World Development Indicators*. https://databank.worldbank.org/source/world-development-indicators; Crippa, M., Guizzardi, D., Pagani, F., Banja, M., Muntean, M., Schaaf E., Becker, W., Monforti-Ferrario, F., Quadrelli, R., Risquez Martin, A., Taghavi-Moharamli, P., Köykkä, J., Grassi, G., Rossi, S., Brandao De Melo, J., Oom, D., Branco, A., San-Miguel, J. and Vignati, E. (2023). *GHG Emissions of All World Countries 2023*. http://doi.org/10.2760/953322.

Note: The figures for emissions do not include emissions from changes in land use.

Under a scenario of a projected global economic growth rate of 3% to 2030 (International Monetary Fund [IMF], 2024), achieving the target of holding the global temperature increase to 1.5 °C will require speeding up the annual decarbonization rate from the current 1.9% to 11% or, in other words, multiplying the decarbonization rate registered between 2015 and 2023 by a factor of six. Holding the temperature increase to 2 °C would entail boosting the rate to 7%, for a threefold increase over the historical rate. Although the transition to a low-carbon economy is under way —thanks to the greater use of renewable energy sources, more sophisticated storage technologies, e-mobility and the growing use of hydrogen fuels— the scale and speed of the transition still fall far short of what is required.

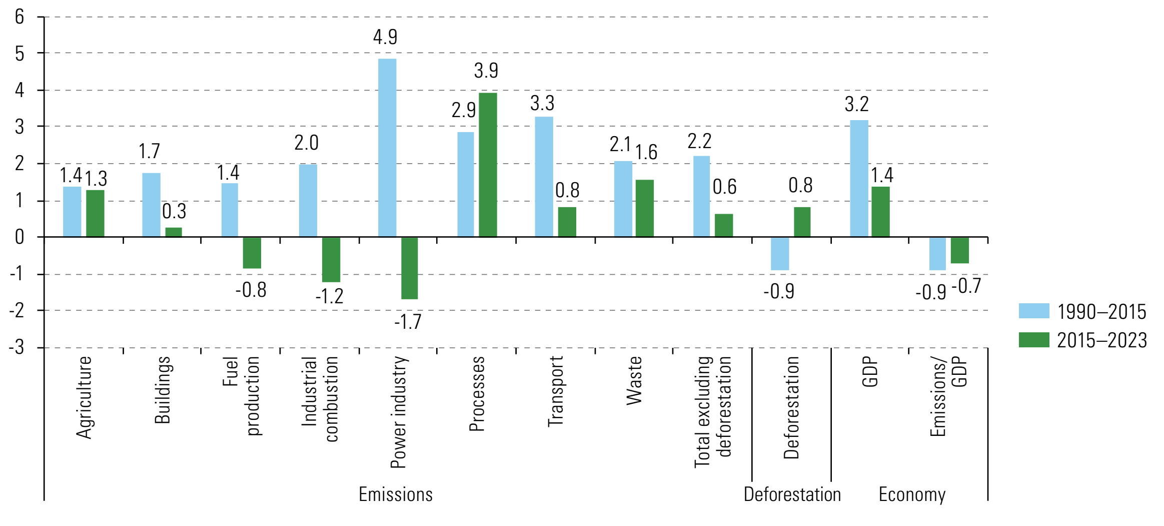
Since the adoption of the Paris Agreement, a turnaround has been observed in the electricity sector's emissions in Latin America and the Caribbean, as well as in the emissions from fuel use and industrial production. The expansion of the use of renewable sources to generate electricity accounts for part of this decrease, but the slowing pace of economic activity has also played a part in the decline in the growth of emissions in practically all categories. On the other hand, whereas emissions from deforestation trended downward between 1990 and 2015, this trend has been reversed in recent years (see figure 22).

Major differences exist across the countries of the region owing to differences in the energy mix, the size of the agricultural and livestock sectors and the rate of loss of forest cover (see figure 23). Consequently, although they all share certain challenges, their mitigation strategies also differ. For example, the agricultural and livestock sector accounts for over 60% of emissions in Uruguay, Paraguay and Nicaragua and for around 50% in the Plurinational State of Bolivia and Brazil, while the generation of electricity is the biggest source of emissions in the small island States of the Caribbean and in Mexico. The transport sector is also a major source of emissions, especially in countries such as Costa Rica, El Salvador, Ecuador and Chile (see figure 23).

Figure 22

Latin America and the Caribbean: rate of increase in emissions, by sector, 1990–2023

(Percentages)



Source: Prepared by the authors, on the basis of Joint Research Centre. (2025). *EDGAR - Emissions Database for Global Atmospheric Research*. https://edgar.jrc.ec.europa.eu; World Bank. (2025). *World Development Indicators*. https://databank.worldbank.org/source/world-development-indicators.

Figure 23

Latin America and the Caribbean (33 countries): share of total greenhouse gas emissions other than from land-use change and forestry, by sector, 2023

(Percentages)

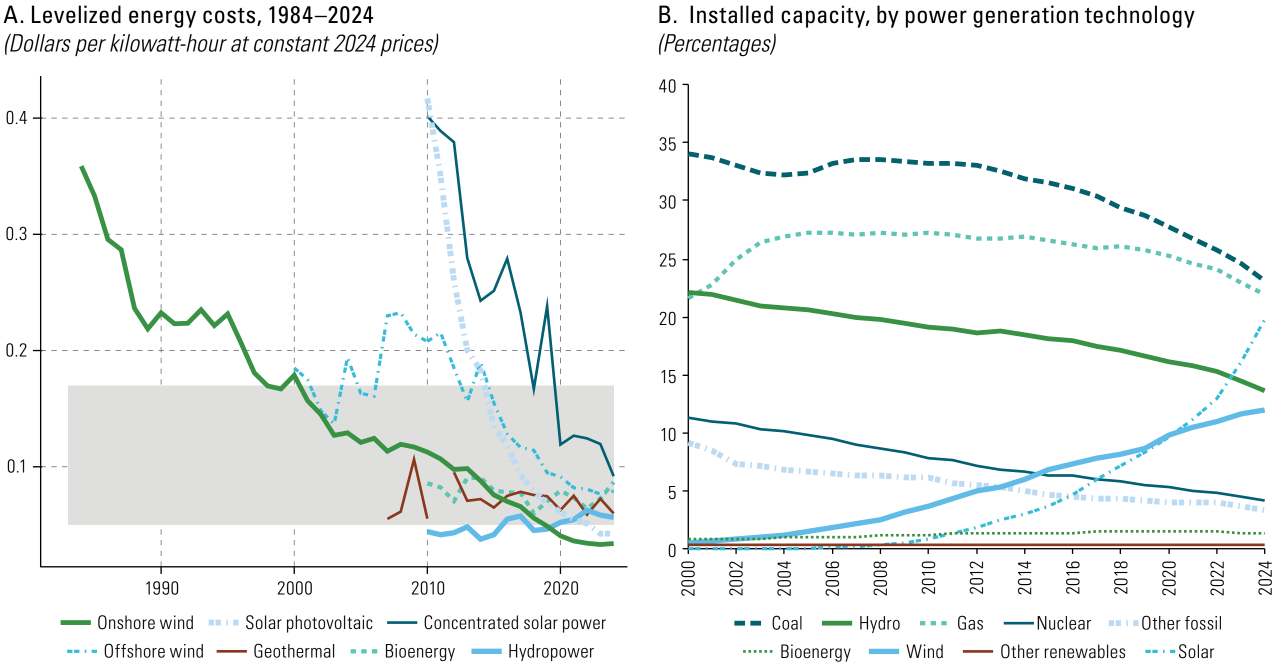
Source: Prepared by the authors, on the basis of Joint Research Centre. (2025). *EDGAR - Emissions Database for Global Atmospheric Research*. https://edgar.jrc.ec.europa.eu.

The energy transition is under way throughout the world. In the last 10 years, the installed power generation capacity of renewable sources has expanded as a percentage of the total. In 2024, solar power systems represented 20% of the total, as against a mere 3% just 10 years earlier, and it is expected to be the power source with the greatest installed capacity by the end of this decade (International Energy Agency [IEA], 2024b). Meanwhile, wind energy accounts for a 12% share, which is double what it was 10 years ago (see figure 24B). At the same time, the levelized cost of energy from solar and land-based wind power technologies has fallen below the cost range for fossil fuel technologies (see figure 24A).

In 2022, at the twenty-eighth session of the Conference of the Parties to the United Nations Framework Convention on Climate Change, 133 countries pledged to work towards a threefold increase in the installed capacity of renewables by 2030 (United Nations Framework Convention on Climate Change [UNFCCC], 2023) to, as a minimum, 11,000 gigawatts (GW). In 2024, the installed capacity of solar power, wind power, hydropower and other renewable sources amounted to approximately 4,500 GW. Under existing policies, however, there is still a gap between the pledged levels of installed capacity and the target figures for 2030 (IEA, 2024a), and a concerted policy effort is therefore needed to create an appropriate ecosystem for the necessary changes.

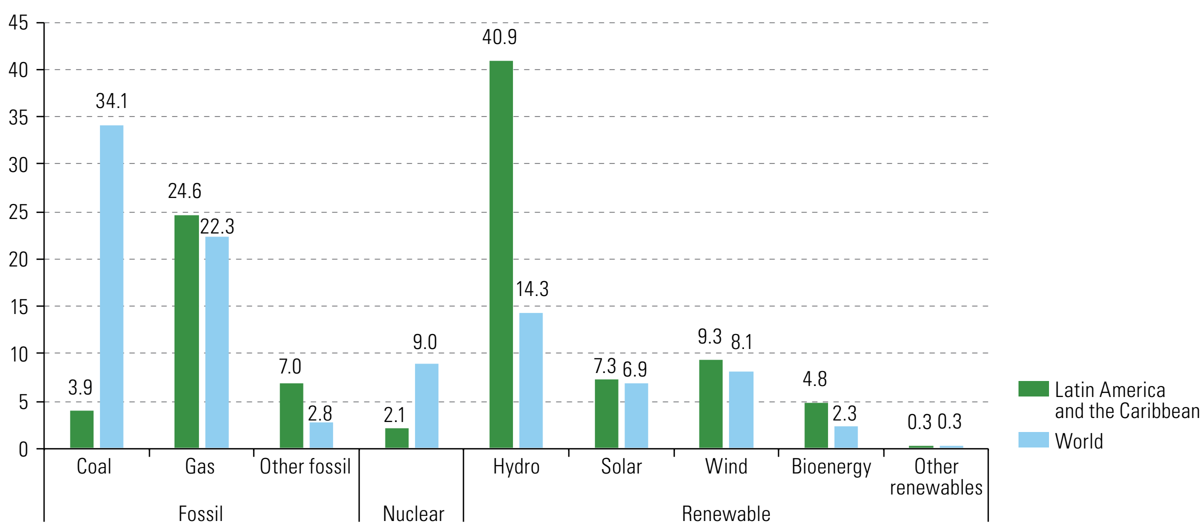
In Latin America and the Caribbean, the installed capacity for the generation of renewable energy represented 61% of the total in 2024. While hydropower capacity is the largest renewable source, the installed capacity for wind and solar power generation has jumped to 9% and 14% of the total from just 2.7% and 0.25% a decade ago. Integration and investment in storage systems will help to sustain this trend. Thanks to the types of installed capacity that are in place, over 62% of power generation is from renewable sources, as compared with a world average of 32% (see figure 25). The marked differences across the countries of the region call for transition policies that take this heterogeneity into account (see figure 26).

Figure 24
World: levelized costs of power and installed capacity



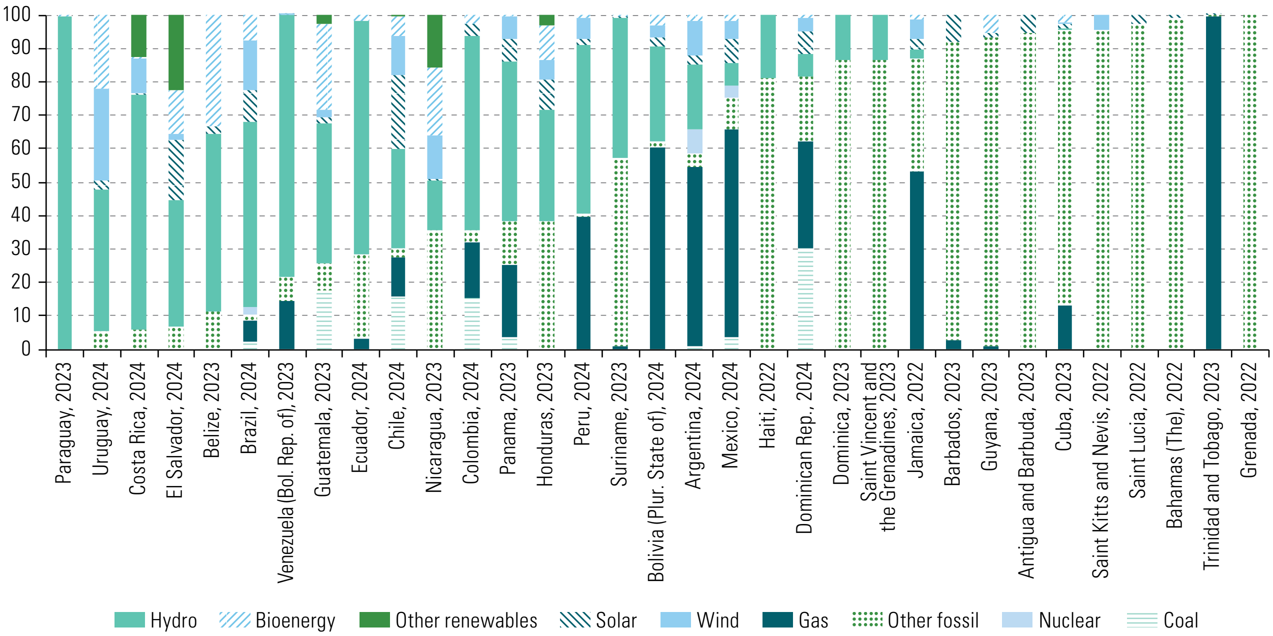
Source: Prepared by the authors, on the basis of Global Change Data Lab and University of Oxford. (2025). Levelized cost of energy for renewables, World. *Our World in Data*. https://ourworldindata.org/grapher/levelized-cost-of-energy; Ember. (2025). *Electricity Data Explorer*. https://ember-energy.org/data/electricity-data-explorer.

Figure 25
World and Latin America and the Caribbean: power generation, by source, 2024
(Percentages)



Source: Prepared by the authors, on the basis of Ember. (2025). Electricity Data Explorer. https://ember-energy.org/data/electricity-data-explorer.

Figure 26
Latin America and the Caribbean: energy mix, 2024
(Percentages)



Source: Prepared by the authors, on the basis of Ember. (2025). *Electricity Data Explorer*. https://ember-energy.org/data/electricity-data-explorer.

Thanks to the higher share of renewable energy, the region's emissions per kilowatt hour of electricity production come to 254 grams of CO_2, whereas, at 473 grams, the figure for the world as a whole is nearly double that amount (see figure 27). However, the emissions of the country in the region with the highest volume of emissions per kilowatt hour are 27 times greater than those of the country with the lowest.

In addition to expanding the share of renewables in the energy mix, it is important recognize that, in order to speed up the reduction in greenhouse gas emissions, measures aimed at expanding the electrification of economic activities and efforts to boost energy efficiency need to be accompanied by changes in the transport sector. Currently, electricity use makes up only about 21% of total energy consumption in the region and corresponds primarily to the use of electricity by households and commercial and industrial activities. Meanwhile, the transport sector continues to rely heavily on fossil fuels. This sector accounts for 41% of total energy consumption, yet electricity represents less than 1% of its energy use (see figure 28).

The use of electric vehicles (EVs) has increased exponentially in recent years, with sales in China and European countries leading the way, but EVs still do not make up even 5% of the world's vehicle fleet (see figure 29). EV penetration in the countries of Latin America and the Caribbean is still at a very early stage, but the region's light vehicle fleet expanded by a factor of 25 between 2020 and 2024 to nearly a half million units (Latin American Energy Organization [OLADE], 2025). Major strides have been made in the electrification of the public transport fleet, especially in Chile and, to a somewhat lesser extent, in Colombia, Mexico and Uruguay (OLADE, 2025).

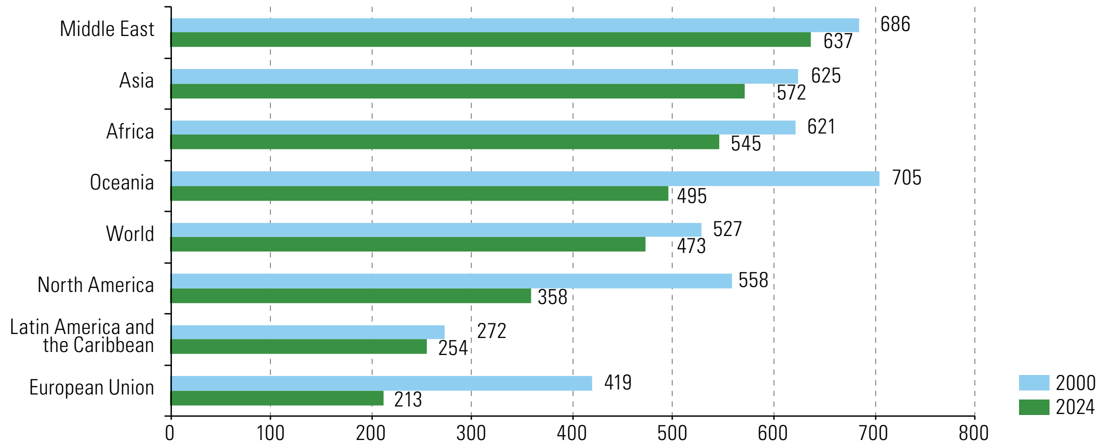
The growing shares of solar and wind power and of EVs in the vehicle fleet reflect concerted policy efforts to align incentives for promoting alternative technologies that can replace fossil fuels. These efforts are imperative because green innovations do not simply appear spontaneously owing, in particular, to the existence of path dependency or "carbon lock-in", whereby, in a world that has specialized in technologies based on fossil fuels, clean technologies will, at least initially, be less productive and less profitable than their fossil fuel counterparts (Acemoglu et al., 2024).

Figure 27

World regions and Latin America and the Caribbean: emissions associated with power generation, 2000 and 2024

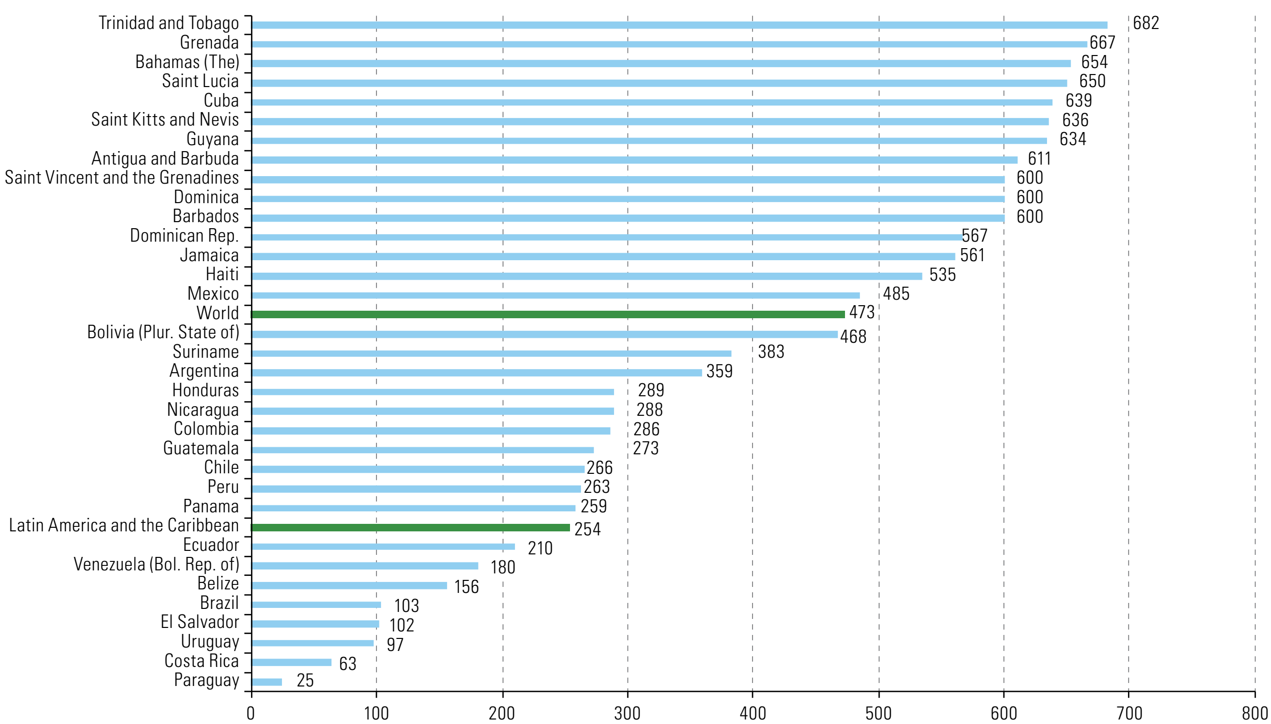
A. World regions: CO_2 emissions per unit of electricity, 2000 and 2024

(g CO_2 per kilowatt-hour)



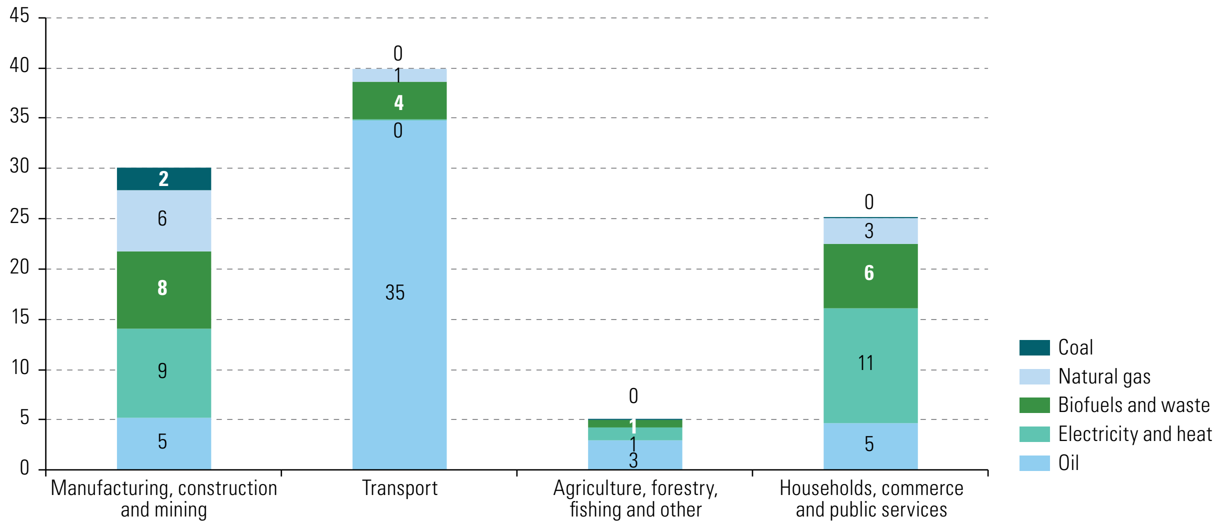
B. Latin America and the Caribbean: CO_2 emissions per unit of electricity

(g CO_2 per kilowatt-hour)



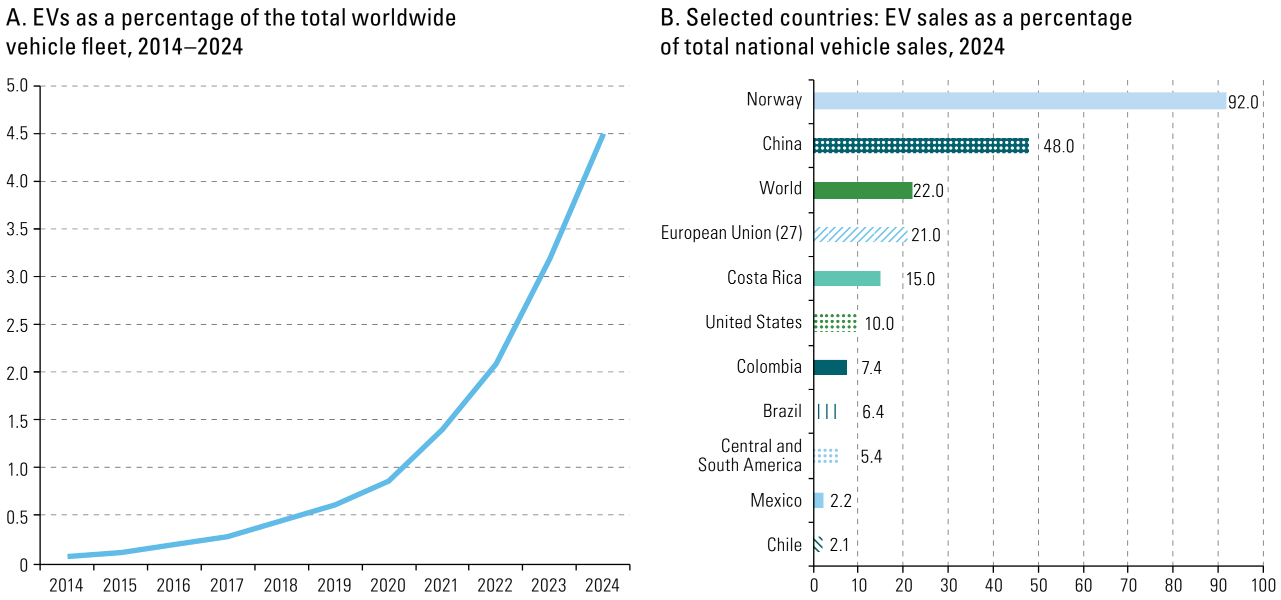
Source: Prepared by the authors, on the basis of Ember. (2025). *Electricity Data Explorer*. https://ember-energy.org/data/electricity-data-explorer.

Figure 28
Latin America and the Caribbean: shares of total energy consumption, by activity and type of fuel, 2022
(Percentages)

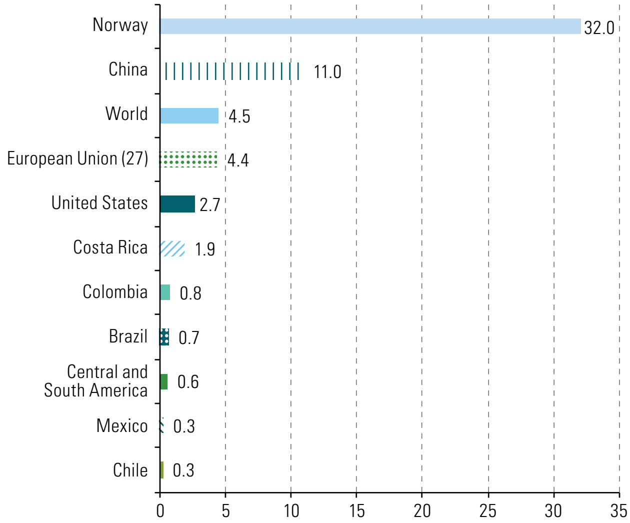


Source: Prepared by the authors, on the basis of United Nations. (2025). *Energy Statistics*. https://unstats.un.org/unsd/energystats.

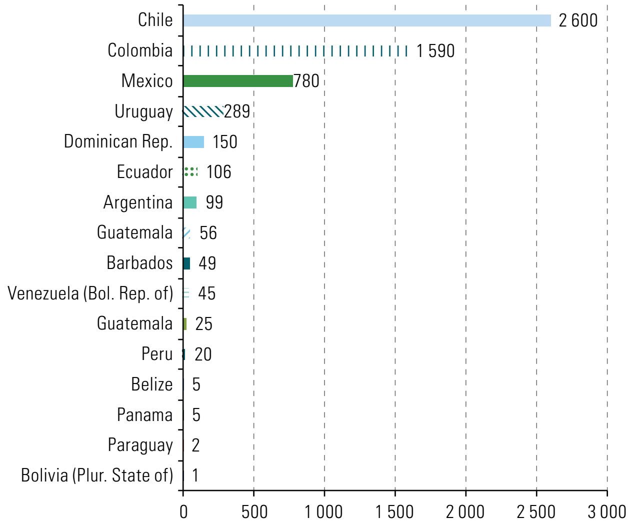
Figure 29
World, selected countries and regions and Latin America and the Caribbean: electric vehicle penetration and use



C. Selected countries: stock of EVs as a percentage of national totals, 2024



D. Latin America and the Caribbean: number of EV buses, 2024
(Units)



Source: Prepared by the authors, on the basis of International Energy Agency. (2025). *Global EV Outlook 2025*; Latin American Energy Organization. (2025). Electric Mobility in Latin America and the Caribbean: monitoring electromobility. *Technical Note*. (8).

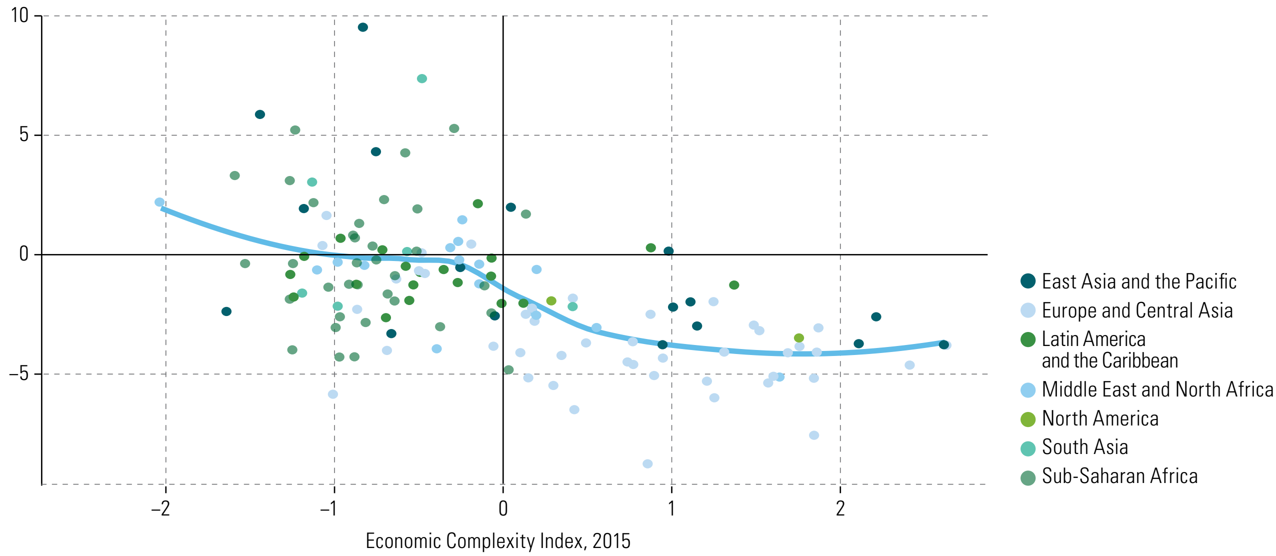
As discussed in chapter I, there are positive tipping points for climate action, understood as critical thresholds beyond which large-scale sustainable transformations accelerate significantly. These tipping points are strategic points in time when well-designed policy interventions —public policies, investments or technological innovations— can trigger rapid, positive systemic change. There is evidence that these tipping points have been reached in the case of solar and wind power (Nijsse et al., 2023), which have become the most competitive option in a number of countries. And, at least in China and Europe, it appears that e-mobility is on the verge of reaching its tipping point as well (Lenton et al., 2023). This is a reflection of the learning curve effect, or Wright's Law, which states that, for every cumulative doubling of units produced using a given technology, the cost per unit decreases. The costs of solar and wind energy, batteries and electrolysers follow this pattern (Way et al., 2022). For example, the price of photovoltaic solar panels has fallen by 99.6% since 1976, and it is estimated that it will decrease by 28% with every doubling of global production. The corresponding cost reduction is estimated at 15% for wind power (Sharpe, 2023), between 9% and 13% for electrolysers and between 20% and 30% for lithium batteries (Usher, 2022).

Research and development to create or improve technologies, increased investment, learning curves as production levels rise, the expansion of the cost-competitive supplier base and economies of scale driven by growing demand all play into reinforcing feedback loops (Sharpe, 2023; Zenghelis et al., 2024). These loops will take hold more quickly if a country has sufficient technical, operational, political and prospective (TOPP) capabilities for seizing these opportunities for improving production processes. Accomplishing this calls for coordinated action in key production sectors and across a range of different actors.

Given the comparative advantages enjoyed by Latin America and the Caribbean in renewable energy generation (Economic Commission for Latin America and the Caribbean [ECLAC], 2024), promoting investment in expanding that generating capacity, extending and upgrading the power grid and furthering the electrification of economic activities is crucial in order to enable the region to realize its potential, whether through the electrification of transportation systems or for the production of energy-intensive inputs such as ammonia (McWilliams et al., 2025). In fact, decarbonizing the economy by reconfiguring not only the energy system but also the food, transport and production systems in ways that are aligned with climate goals will open the way for building a more complex and more suitable economic structure for the transition that will also have a greater capacity for economic growth (Gala et al., 2018; Porcile et al., 2023).

The evidence shows that the pace of decarbonization is faster in economies with a higher economic complexity index, which reflects the level of accumulated productive knowledge embedded in their export structures (Hidalgo and Hausmann, 2009) (see figure 30). This suggests that more complex economies are in a better position to make the transition to low-carbon development and have a greater capacity for doing so (Romero and Gramkow, 2021).

Figure 30
World regions: economic complexity and decarbonization, 2015–2023
(Indices and percentages)



Source: Prepared by the authors, on the basis of Growth Lab at Harvard University. (2024). *The Atlas of Economic Complexity*. https://atlas.hks.harvard.edu; World Bank. (2025). *World Development Indicators*. https://databank.worldbank.org/source/world-development-indicators.

Note: The Economic Complexity Index (ECI) is a measure of the knowledge in a society as expressed in the products it makes. The economic complexity of a country is calculated based on the diversity of the exports that a country produces and their ubiquity or on the number of countries able to produce them (and those countries' complexity).

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Chapter III

Policies and tools for the climate transition

To bring about the economic transformations necessary to drive a transition towards low-carbon economies that are resilient to the impacts of climate change, different ministries, financial authorities and central banks will have to take concerted action that translates into coherent public policies. There is no getting away from the need to align national economic strategies with nationally determined contributions (NDCs) and long-term climate strategies. Economic and fiscal policy must therefore increasingly build in measures and criteria that will help to fulfil climate commitments, manage the risk of climate change, promote investments in low-carbon and climate-resilient sectors, and enable access to financing for the transition towards decarbonization. There are still many hurdles to achieving this convergence, however, in the realms of regulation, finance, policy coherence and sense of urgency (Group of 20, 2024). In addition to harmonizing the short- and long-term objectives of public policy —which implies combining productivity with sustainability— there is undeniable evidence that environmental degradation undermines the achievements of economic development (Economic Commission for Latin America and the Caribbean [ECLAC], 2023).

Hence the importance of working a strong enough systemic change in financial markets and taxation criteria to break the tragedy of the horizon and reshape the business environment to include climate change in all private decisions (ECLAC, 2024; De Miguel et al., 2024). Given the scale of the investments required to meet climate targets, the private sector must not only be more involved as a source of financing, but must also adapt its economic activities and investment and business strategies to a low-emissions world.

This section examines the coherence between the climate goals expressed in NDCs and the development plans and strategies of the countries in the region, and goes on to look at the different economic, financial, regulatory and institutional tools that serve to align public and private endeavours in the effort to combat climate change.

A. Policy coherence and climate goals

The global economy, including the economy of Latin America and the Caribbean, has an opportunity to drive transformative investments to foster the transition to a productive, inclusive and sustainable future. There are already initiatives in place aimed at including sustainability and climate change criteria in economic activities, but progress has been uneven across countries and sectors and there is considerable scope to mainstream climate change more deeply into public policies and the financial system.

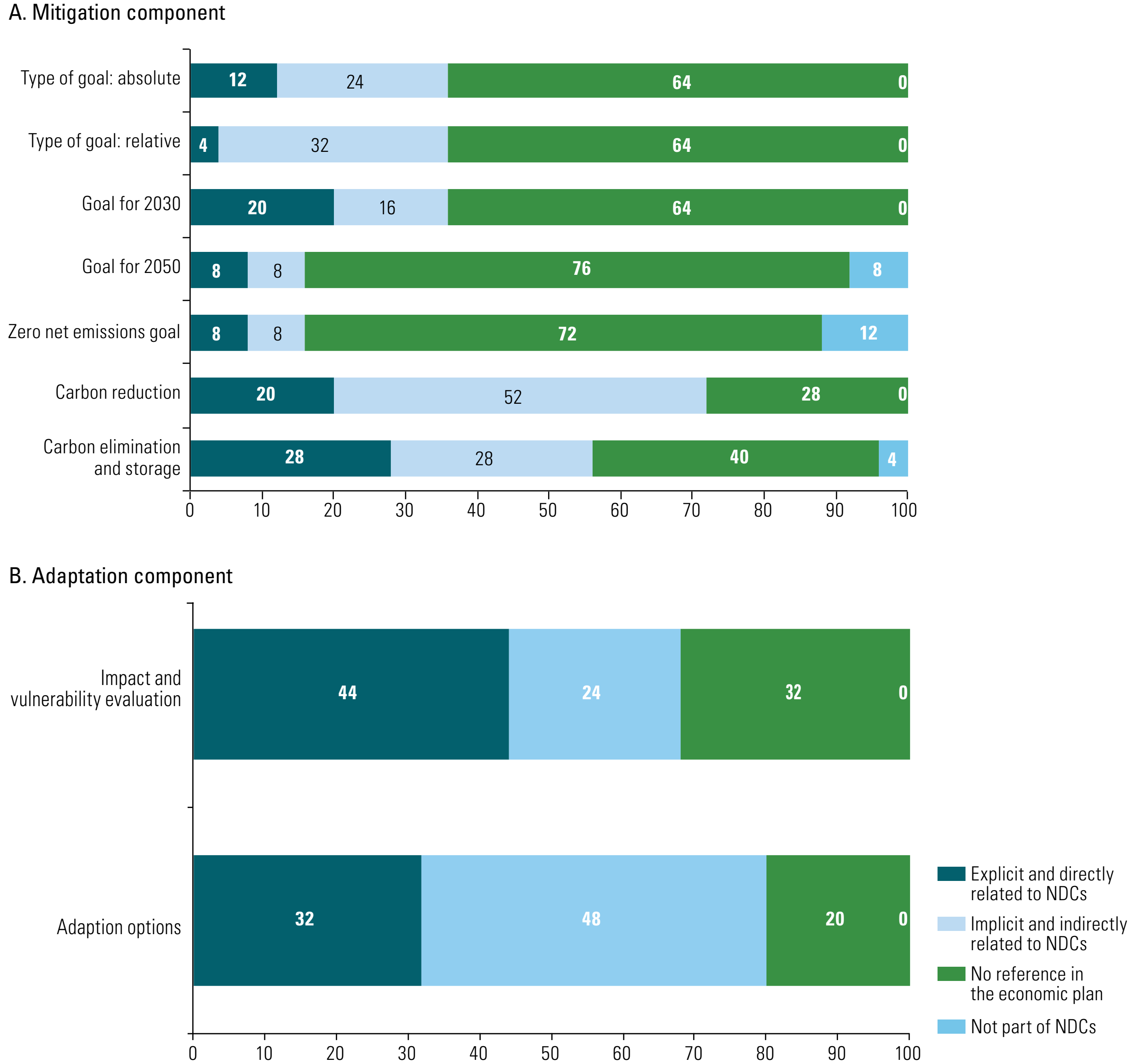
A comparison between the economic plans and strategies of 25 Latin American and Caribbean countries[1] and the climate goals in their NDC commitments shows that stronger links need to be crafted between economic policies and decarbonization commitments.[2] The two are still insufficiently coordinated with regard to development and implementation, and their content is inconsistent.

Looking first at matters concerning climate change mitigation, only 36% of economic plans are linked, explicitly or implicitly, to the absolute mitigation goal contained in the respective NDC. A similar proportion are related to time-bound 2030 emission reduction targets, but only 16% have some relation to emission reduction targets for 2050 and net-zero emissions (see figure 31A). Only 32% of economic plans have an explicit link to options for climate change adaptation, while the economic plans of 20% of the countries analysed make no mention of adaptation. Climate change impact and vulnerability assessments are mentioned explicitly in 44% of plans, and implicitly in 24% (see figure 31B). Most economic plans do refer to the equity and just transition considerations raised in NDCs.

1 The analysis looked at development, productive development, economic recovery and other types of plans from Argentina, The Bahamas, Barbados, Bolivarian Republic of Venezuela, Brazil, Chile, Colombia, Costa Rica, Cuba, Dominican Republic, Ecuador, El Salvador, Guatemala, Guyana, Honduras, Jamaica, Mexico, Nicaragua, Panama, Paraguay, Peru, Plurinational State of Bolivia, Saint Lucia, Trinidad and Tobago, and Uruguay.

2 The analysis used the most recent NDCs submitted by each country to the United Nations Framework Convention on Climate Change, as of 26 September 2025.

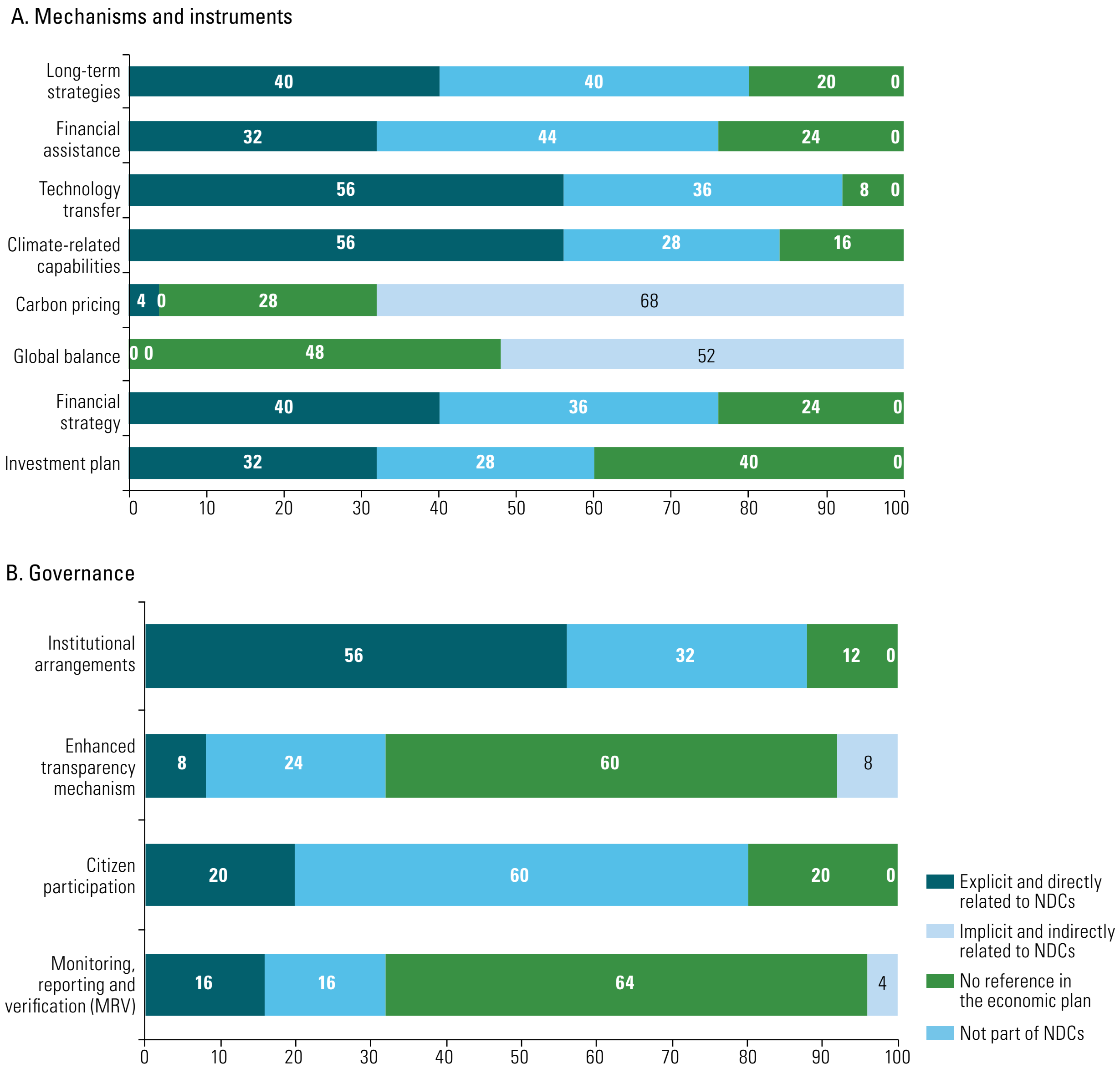
Figure 31
Latin America and the Caribbean: mitigation and adaptation components of nationally determined contributions included in economic plans
(Percentages)



Source: Prepared by the authors, on the basis of official documents.

When it comes to advancing the climate agenda, it is also important to consider the mechanisms and instruments for implementation and how its governance will be configured. The review of economic plans and programmes showed that the closest mechanisms and instruments were technology transfer and climate-related technical capabilities (56%), together with financial and long-term strategies (40%) (see figure 32A). Institutional arrangements and citizen participation were among the key governance mechanisms for advancing the climate agenda in a coordinated manner that were most commonly incorporated into the economic plans of the countries of the region (see figure 32B).

Figure 32
Latin America and the Caribbean: inclusion of instruments and governance systems of nationally determined contributions in economic plans
(Percentages)



Source: Prepared by the authors, on the basis of official documents.

In preparation of the new nationally determined contributions to be submitted in 2025 (NDC 3.0), several countries are developing "country platforms" to facilitate their implementation. This effort requires various ministries to collaborate in structuring the financial architecture behind investment plans for mitigation and adaptation measures, which can go a long way towards aligning economic and climate strategies. However, other measures can be taken to support convergence between the economic and climate agendas, as will be seen below.

B. Public sector decision-making

Numerous steps are being taken in the public sector to integrate climate and economic agendas. These measures range from action focusing on policy harmonization to the use of a wide array of different management tools, including regulations, economic incentives and many others. The development of coherent strategies and the coordination of action among the different sectors, while at the same time dealing with the institutional inertia that may at times hinder convergence, should be undertaken in consultation with the other main stakeholders (the private sector, civil society, academia and others). Climate action entails a major transformation, and the legitimate concerns of all those involved must be addressed. Consequently, the process is just as important as the goals.

1. Fiscal policy: taxes, expenditure and investment

Fiscal policy is one of the key tools for effective climate action within the public sector domain, where the management of public finances, including the budget, is crucially important. Broad-ranging environmentally focused fiscal reforms have not yet been carried out in Latin America and the Caribbean, but many countries of the region are using environmentally related economic tools (taxes, rates, etc.) to expand their fiscal space and/or as part of their climate change, air quality, biodiversity and environmental policy packages. Table 4 lists some examples of the kinds of environmental taxes that are being levied in the region.

Table 4
Use of environmental taxes in Latin America and the Caribbean

Tax / economic instrument	Countries
Taxes on motor vehicles	Antigua and Barbuda, Argentina, The Bahamas, Belize, Brazil, Chile, Colombia, Costa Rica, Dominican Republic, Ecuador, El Salvador, Guatemala, Guyana, Jamaica, Mexico, Nicaragua, Panama, Paraguay, Peru, Trinidad and Tobago, Uruguay
Fuel taxes	Antigua and Barbuda, Argentina, The Bahamas, Barbados, Brazil, Chile, Colombia, Costa Rica, El Salvador, Guyana, Honduras, Jamaica, Mexico, Nicaragua, Paraguay, Peru, Saint Lucia, Uruguay
Carbon taxes	Argentina, Chile, Colombia, Mexico, Uruguay
Tax on electricity	Argentina, Costa Rica
Tax on liquefied petroleum gas (LPG)	Argentina
Tax on hydrocarbons	Dominican Republic,[a] Plurinational State of Bolivia
Tax on municipal solid waste	Barbados
Tax or royalty on petroleum and petroleum products	Belize, Brazil, Chile, Panama
Local pollution tax (particulate matter (PM), nitrogen oxides (Nox), sulphur dioxide (SO2))	Chile
Tax on plastic sacks or bottles	Colombia, Ecuador, Peru
Forestry tax or charge	Colombia, Costa Rica
Sector-specific taxes on fisheries	Chile, Costa Rica
Water-use or wastewater-discharge taxes or charges	Colombia, Costa Rica
Mining royalties or taxes	Colombia, Honduras, Mexico

Source: Prepared by the authors, on the basis of Organisation for Economic Co-operation and Development. (2025). *Policy Instruments for the Environment (PINE) Database*. https://oecd-main.shinyapps.io/pinedatabase.

[a] The tax on motor vehicle CO_2 emissions applies to new or used vehicles when they are first registered. It is a one-time tax that is not levied on the volume of emissions per amount of fuel consumed and is therefore not a carbon tax as such.

As shown in the above table, the use of these policy instruments in Latin America and the Caribbean is concentrated in the areas of energy and transport, with most of these instruments taking the form of fuel taxes, vehicle taxes and taxes on electricity use, although some carbon taxes are now beginning to be applied. The use of green taxes has not gained much ground in the countries of the region, and this is reflected in the level of fiscal revenues generated by environmental taxes. In 2023, environmental taxes in the region yielded fiscal revenues representing just 0.9% of GDP, which is only half as much as such taxes provide in the member countries of the Organisation for Economic Co-operation and Development (OECD) (1.75%) (Organisation for Economic Co-operation and Development [OECD] et al., 2025) and is actually even less than what they yielded in the region in 2015 (1.1% of GDP).

A more detailed review of environmentally related tax revenues shows up differences in the levels of fiscal revenues across countries and in the mix of the various types of taxes that are levied. As the situation now stands, there is fiscal policy space in the countries of Latin America and the Caribbean for expanding the tax base to include goods, production processes and industries that release greenhouse gas (GHG) emissions and damage the environment and to reduce subsidies that run counter to climate and environmental protection objectives. This would generate resources that could be used to fund programmes designed to help the countries to honour their climate commitments and improve the environmental quality or to introduce offsets or more general public policies while at the same time sending the message that polluters need to pay the social costs of their actions.

The introduction of carbon taxes and the phase-out of fossil fuel subsidies can influence the inflation rate and may have regressive effects. These types of measures should therefore be paired with measures for mitigating the negative impacts on vulnerable segments of the population, including possible offsets should they prove necessary. These fiscal policy measures should therefore be part of a larger package of incentives for producing substitute or alternative goods and services that will help to make certain that these taxes or subsidy cuts will trigger a major change in the environmental performance of the region's economies while minimizing economic impacts.

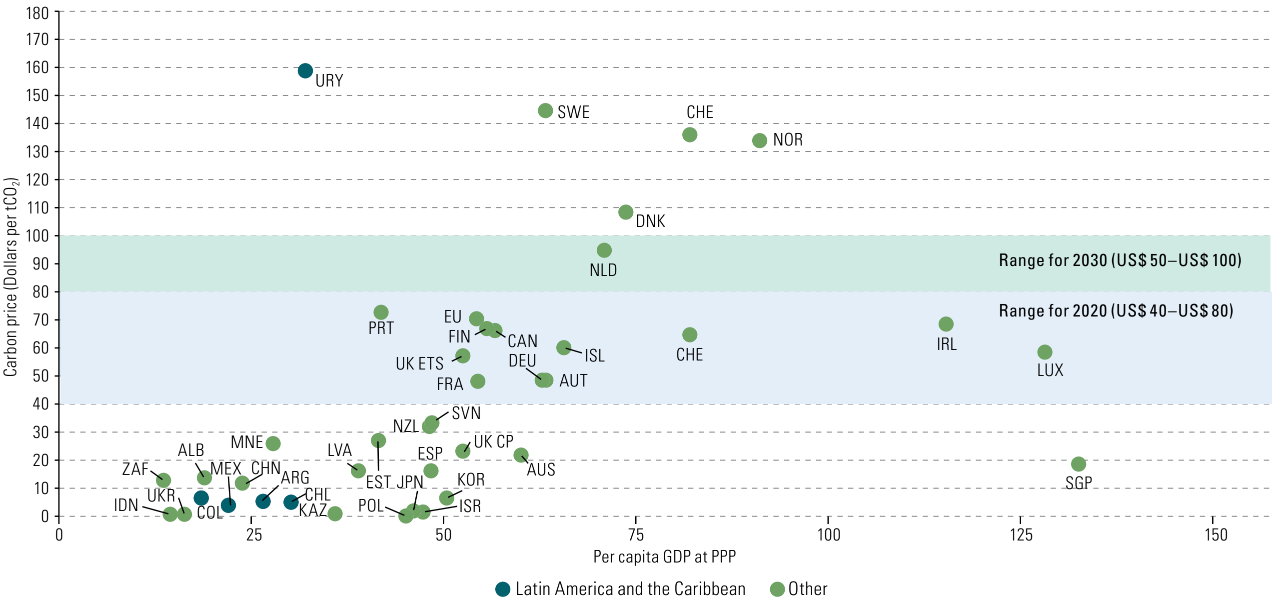
2. Carbon pricing

The GHG emissions driving climate change are regarded as a negative externality in economic terms (Stern, 2007), and this means that the inefficiencies associated with these emissions can be corrected using price signals. The international literature contains various analyses and recommendations concerning carbon pricing. According to the High-Level Commission on Carbon Prices, "the explicit carbon-price level consistent with achieving the Paris temperature target is at least US$ 40 – US$ 80/t CO_2 by 2020 and US$ 50 – US$ 100/t CO_2 by 2030" (High-Level Commission on Carbon Prices, 2017). This price range is similar to the price levels suggested by the Intergovernmental Panel on Climate Change (IPCC), which has said that, in order to limit global warming to 2 ºC, carbon prices should be between US$ 60 and US$ 120 per tCO_2 by 2030 and that, in order to hold it to 1.5 °C, carbon prices should be between US$ 170 and US$ 290 per tCO_2 (Intergovernmental Panel on Climate Change [IPCC], 2022).

The International Monetary Fund (IMF) has proposed a minimum international carbon price floor for large-scale emitters, along with differentiated pricing scenarios. That proposal includes a scenario in which advanced economies would be subject to a floor price of US$ 50 per ton of CO_2 and one in which they would apply a price of US$ 75/t CO_2, middle-income countries would have a price of US$ 50/tCO_2 and low-income economies one of US$ 25/tCO_2 (Parry, Black and Roaf, 2021). Figure 33 plots the carbon prices applied in different countries in relation to those countries' income levels, measured in terms of per capita GDP. Only a few of those carbon price levels are within the price range that is consistent with the Paris Agreement.

There are various ways in which carbon prices can be introduced. One option is to do so explicitly using a carbon tax or emissions trading system. Another is to set carbon prices implicitly by levying fuel taxes, reducing fuel subsidies and integrating shadow pricing (social carbon pricing) mechanisms into financial instruments and incentives that support low-emissions programmes and projects (High-Level Commission on Carbon Prices, 2017). Carbon taxes and emissions trading schemes are the most commonly used options and have shown themselves to be the most effective low-cost tools for reducing GHG emissions (IPCC, 2022). These different ways of setting carbon prices are not mutually exclusive. They can be used to reinforce incentives and commitments to change the relative returns on different investments, alter the production structure and reconfigure consumption patterns in order to internalize the cost of emissions.

Figure 33
Selected countries: per capita GDP and carbon pricing, 2025
(Dollars per tCO_2 and purchasing power parity (PPP) in thousands of constant international dollars at 2021 prices)



Source: Prepared by the authors, on the basis of World Bank. (2025). *State and Trends of Carbon Pricing Dashboard*. https://carbonpricingdashboard.worldbank.org/compliance/price; (2025). *World Development Indicators*. https://databank.worldbank.org/source/world-development-indicators.

Note: The price ranges of US$ 40–US$ 80 /tCO_2 and US$ 50–US$ 100 /tCO_2, differentiated in the figure by the differently shaded grey bands, represent the price ranges suggested by the High-Level Commission on Carbon Prices for 2020 and 2030, respectively, for alignment with the Paris Agreement goals.

(a) Carbon taxes in Latin America and the Caribbean

In theory, the carbon tax should be set at a level that corresponds to the marginal social cost of the damage caused (known as the social cost of carbon), thereby internalizing that externality. Estimating the cost of the damage caused by climate change is a formidable technical challenge, however. One complication is that the marginal social cost is global whereas the cost of reducing emissions is local. This means that the optimum tax at the global level may be considerably higher than what a given country or subnational state can sustain economically (United Nations, 2021). Consequently, given the possible distributive impacts and effects on economies' competitiveness, among other factors, carbon taxes are set at different levels in different countries. In the case of Latin America and the Caribbean, the use of carbon taxes is still in its very early stages, with their initial introduction dating from 2014 and only five countries of the region currently levying a carbon tax. In Argentina, Chile, Colombia and Mexico, this tax is quite small, but Uruguay applies a carbon tax rate of US$ 159/tCO_2, which is one of the highest carbon tax rates in the world (Ferrer et al., in press).

The amount of revenues afforded by carbon taxes in the region is quite small, since not only are the carbon tax rates in the region low, but the tax base is very narrow. The tax revenues of the countries with the lowest carbon tax rates were less than 0.04 percentage points of GDP in 2024 and, even in Uruguay, where the carbon tax rate is high but GHG coverage is lower, fiscal revenues were under 0.4% of GDP (Ferrer et al., in press). In sum, the use of carbon taxes in the region is limited, and the tax rates are far below the levels recommended by IPCC if the warming of the planet is to be kept in the 1.5 °C–2.0 °C range. The main features of the carbon taxes used in the region are outlined in table 5.

Mexico is an interesting case. It has a national carbon tax but there are also subnational carbon pricing systems. These subnational taxes were first introduced in 2017 in Zacatecas and, to date, 11 carbon taxes are in place at the subnational level (Durango, Morelos, Querétaro, Colima, Tamaulipas, San Luis Potosí, Yucatán, Guanajuato, Mexico City, the State of Mexico and Zacatecas). The subnational tax rates vary a great deal, ranging from US$ 2.7/tCO_2 in Guanajuato to US$ 33.9/tCO_2 in Querétaro. All the subnational carbon taxes apply to CO_2 emissions from stationary sources, and some states establish minimum emissions thresholds.

In addition to CO_2, these subnational taxes also apply to other gases, such as methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF_6). Some states also tax other pollutants such as black carbon, suspended particulate matter (PM_{10}, $PM_{2.5}$) y ammonia (NH_3). The allocation of the revenues from carbon taxes also differs between the two levels. The receipts from the national carbon tax are not earmarked but instead simply flow into the general budget, whereas revenues from the subnational taxes are used to fund climate action (mitigation and adaptation) and environmental protection measures.

Table 5

Features of carbon taxes in Latin American countries

Country	Year introduced	Design	Regulation point[a]	Tax base	2025 tax rate *(US$/tCO$_2$)*	Coverage *(Percentage of GHG emissions)*	2024 tax receipts *(Percentage of GDP)*	Destination of revenues
Mexico	2014	Levied on excess carbon emissions from fossil fuels[b]	Upstream	Levied on the production, importation, purchase and sale of fossil fuels for use in combustion processes, with the exception of natural gas	1–4[c]	44	0.03	General national budget
Chile	2017	Emissions tax	Downstream	Levied on emissions of 25,000 tons of CO_2 or more from stationary sources (boilers or turbines)	5	55	0.04	National budget
Colombia	2017	Levied on carbon content of fuels	Upstream	Applied to the first activity in the supply chain involving sales on Colombian territory, importation or own consumption of fossil fuels	6.5	20	0.03	80% allocated for climate action and 20% for the National Illicit Crop Substitution Programme
Argentina	2018	Tax on carbon content of fuels	Upstream	Levied on a variety of liquid fuels and on solid fuels such as coal and petroleum coke	5.3	38	0.02	Shared out among the different levels of government; in some cases, funds are earmarked
Uruguay	2022	Tax on CO_2 emissions from gasoline	Upstream	Applied to the first sale or transaction conducted by manufacturers and importers of fuel; levied per ton of CO_2 emissions	158.8	4	0.37	The executive branch may apportion a percentage of the revenues for funding climate policies

Source: Prepared by the authors, on the basis of official documents.

[a] The placement of the regulation point (the point at which the tax is levied) depends on the approach being taken. A distinction is sometimes drawn in the economic literature among upstream, midstream and downstream regulations points.

[b] This is not a tax on the carbon content of fuels as such but rather is a tax levied on the portion of emissions from fossil fuels that are in excess of the emissions from a corresponding volume of natural gas.

[c] The carbon tax rate in Mexico is different for different fuels and is based on each type of fuel's carbon content. The rate ranges from approximately US$ 1 to US$ 4/tCO_2e.

(b) Carbon markets

In regulated carbon markets such as emissions trading systems and voluntary markets, carbon permits, or allowances, are bought and sold to offset emissions. This system is a policy tool used by some countries to fund climate action and help them to fulfil their emissions reduction commitments. These tradable allowances are essentially another type of carbon pricing instrument whereby a maximum limit (cap) for total emissions is set and defined allowances are distributed to emitting sources, which can then buy or sell allowances in order to ensure that they remain under the emissions cap.

The implementation of carbon markets in the Latin American and Caribbean region is in its very early stages. To date, the only pilot emissions trading system in place is in Mexico. That system is now in the process of transitioning to a fully operative status. There are also a number of initiatives that are under development or in the process of becoming formalized (Brazil, Colombia, Argentina, Chile and the Dominican Republic). Their implementation will no doubt galvanize investment in low-carbon technological innovations which will speed up the pace of emissions reductions.

The adoption and implementation of article 6 of the Paris Agreement holds out an opportunity for cooperative mechanisms and greater participation by the private sector to reinforce climate action and its financing. This can boost the region's carbon markets and help it to establish trade relationships with other world regions, gain access to investments that it would not have had in the absence of that article and build capacity in different economic sectors and activities. In short, article 6 of the Paris Agreement enables international cooperation that could give rise to more ambitious commitments in the next NDCs and more financing. Article 6 offers three tools that the countries could choose to use in order to achieve the goals set out in their NDCs: (i) article 6.2 provides a way for parties to the Agreement to use internationally transferred mitigation outcomes to honour their commitments; (ii) article 6.4 provides a way to trade carbon credits under the supervision of the United Nations Framework Convention on Climate Change; and (iii) article 6.8 provides for support for and the provision of means of implementing technology transfers, promoting capacity-building, and securing and offering financing with the support of the secretariat of the Convention without involving the trading of carbon credits.

The countries of the region have been working to develop implementing regulations for article 6 and to put its provisions into practice with a view to bolstering their carbon markets. As part of that effort, bilateral agreements and memorandums of understanding have been signed with European and Asian countries that are seeking to take advantage of all the opportunities offered by carbon markets (see table 6).

Table 6
Pilot projects under article 6 of the Paris Agreement conducted by countries of Latin America and the Caribbean

Buyer country	Host country
Japan	Costa Rica, Chile, Mexico
Singapore	Costa Rica, **Chile**, Colombia, Dominican Republic, **Paraguay**, **Peru**
Switzerland	**Chile**, **Dominica**, **Peru**, **Uruguay**
Sweden	Dominican Republic
United Arab Emirates	Paraguay

Source: Prepared by the authors, on the basis of United Nations Environment Programme. (2025, 15 September). *Article 6 Pipeline*. https://unepccc.org/article-6-pipeline.
Note: Countries whose names appear in bold print are those that have signed or negotiated a bilateral agreement with the buyer country.

In order to implement the provisions of article 6 in ways that will strengthen their carbon markets, the countries will have to overcome a number of challenges in the areas of governance, transparency and social equity. In order to do so, they will have to make institutional arrangements for their effective implementation and take steps to ensure the proper governance of that process, clearly delineate the areas of responsibility of each relevant government ministry and build the capacity of the ministries' teams involved in running their carbon markets. They will also need to have robust monitoring, reporting and verification systems to ensure transparency in the trading of emissions allowances. The accompanying social and environmental safeguards that will be needed to avoid violating affected communities' rights or harming environmental and ecosystemic services are another very important component of these kinds of initiatives.

3. Fossil fuel subsidies

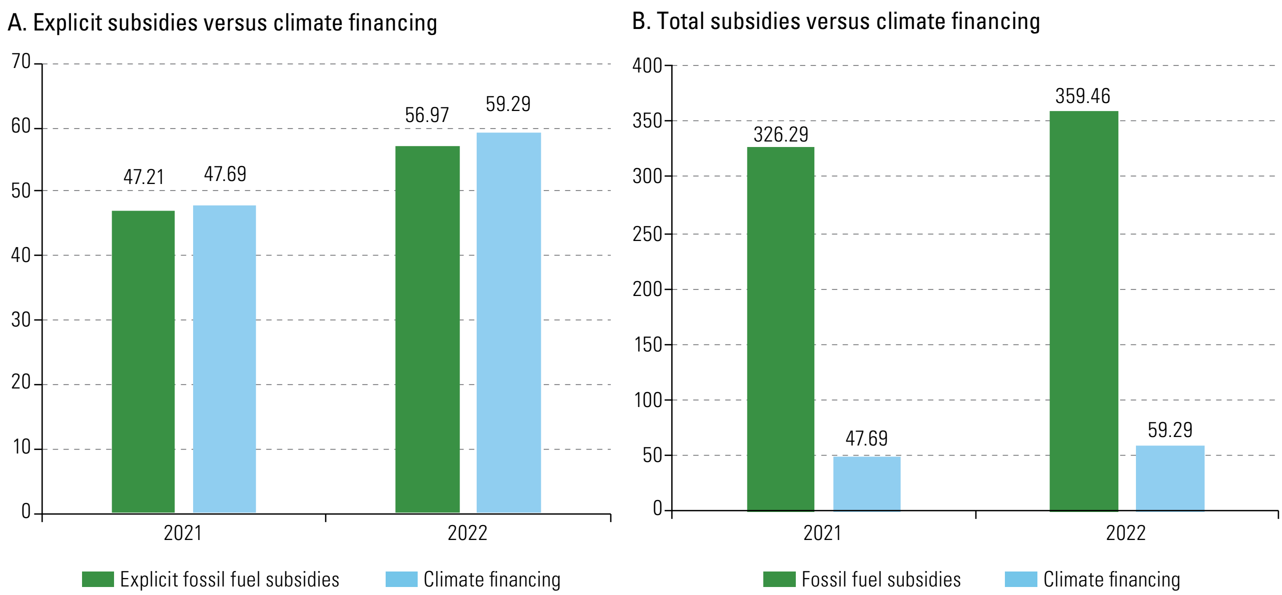
Fossil fuel subsidies are similar to a *negative* price for emissions (High-Level Commission on Carbon Prices, 2017), and phasing down these subsidies is therefore an essential step in correct carbon pricing.

Nevertheless, data compiled by the International Monetary Fund (IMF) indicate that the worldwide total of explicit and implicit fossil fuel subsidies amounted to around US$ 6.6 trillion in 2024, or 6.4% of world GDP (Black et al., 2023). In Latin America and the Caribbean, fossil fuel subsidies are also often used as a policy tool, although these practices vary widely across countries. In the region, these subsidies amounted to some US$ 314.4 billion in 2024, or 5.2% of the region's GDP (International Monetary Fund [IMF], 2024a). Of all of these subsidies in the region, 12% are explicit subsidies, i.e. they go directly to producers and, when the retail price of such fuels falls below suppliers' costs, to the general public. The other 88% are implicit subsidies, which embody the external costs that are not incorporated into the retail sale price (climate change, impacts on health, traffic congestion, etc.).

Fossil fuel subsidies not only work to the detriment of the Paris Agreement; they also are a burden on the public treasury. The resources used for fossil fuel subsidies have a high opportunity cost, since they could otherwise be used to finance social policies (education, health, housing, water and sanitation), build infrastructure or make the investments needed to cope with the challenges of climate change. Dismantling these subsidies will, of course, be politically challenging, and they should therefore be coupled with supplementary measures that will minimize the negative impacts on the population groups affected by this change.

Even though climate financing is fairly robust and the region is making good use of innovative policy tools, closer coordination is needed between climate policies and goals and decision-making concerning fossil fuel subsidies. The available data on climate financing and explicit fossil fuel subsidies indicate that, in 2021 and 2022, for every dollar used in Latin America and the Caribbean to finance climate action, another dollar went to the explicit subsidization of fossil fuels (support for producers and bridging the gap between lower retail sales prices and the real cost of supplying the public with fuel) (see figure 34A). If the external costs of climate change, poor air quality, accidents and traffic congestion were taken into account, then, the figures show that, for every dollar spent in 2021 and 2022 to finance climate action, US$ 6.4 dollars were spent on (explicit and implicit) fossil fuel subsidies (figure 34B).

Figure 34
Fossil fuel subsidies and climate financing in Latin America and the Caribbean, 2021–2022
(Billions of dollars at 2021 prices)



Source: Prepared by the authors, on the basis of International Monetary Fund. (2024). *Fossil Fuel Subsidies*. https://climatedata.imf.org/datasets/d48cfd2124954fb0900cef95f2db2724_0/about; Climate Policy Initiative. (2024). *Global Finance Tracking*.

Similarly, incentives for investment in renewable energy in the region have not been increasing at the pace needed to further decarbonization. Data compiled by IMF and by the International Renewable Energy Agency (IRENA) and Climate Policy Initiative (CPI) show that, in Latin America and the Caribbean, 2.4 times more resources were used to finance explicit fossil fuel subsidies than to drive investments in renewable energy sources in 2015–2020.

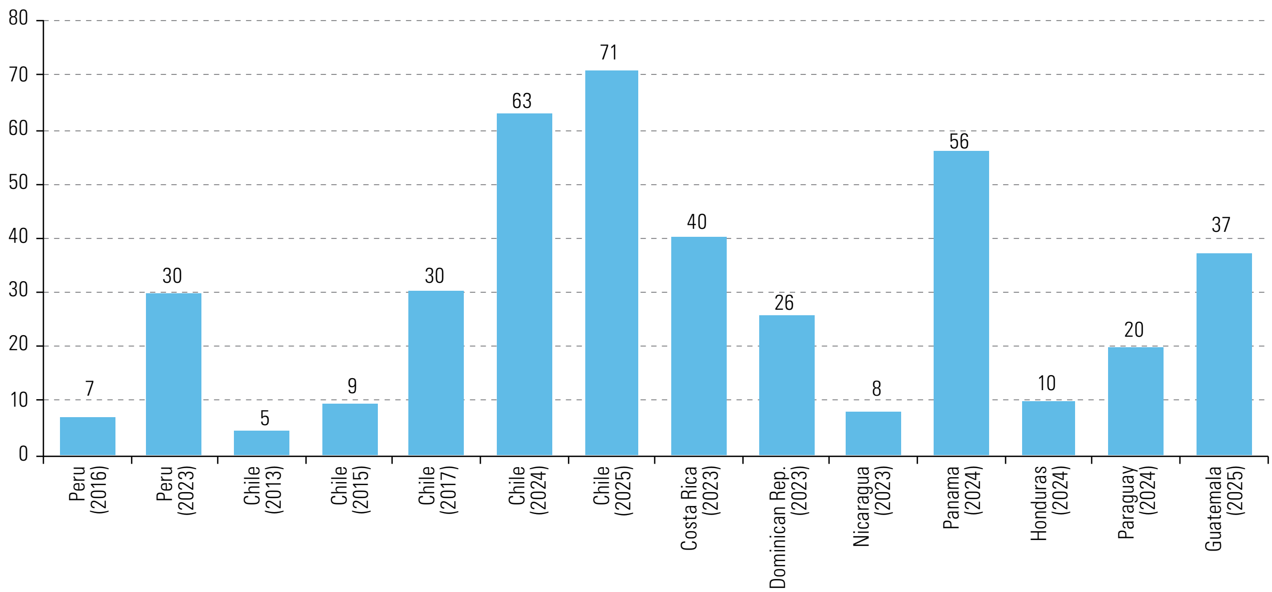
The data presented above provide even further evidence of the urgent need to modify fiscal policy incentives in order to boost investment in ways that will enable the countries to work towards more productive, inclusive and low-carbon economies. The relevant government ministries, working in coordination with environmental, planning and financial authorities, have a crucial role to play in bringing about these changes.

4. The social price of carbon and public investment

Another way of setting carbon prices is to do so implicitly by placing a monetary value on emissions, just like any other externality, as part of the financial sector's investment evaluation process or the public sector's investment project evaluation methodologies. Accordingly, it is important for the countries to define a social price for carbon so that they can create enabling frameworks for investment decisions that promote low-carbon activities and sectors and that will help to decouple emissions from economic growth.

Including the social price of carbon in the public investment evaluation process will help to shift the profitability equation for different investment options towards low-emissions projects. This will, in turn, help to ensure that public funds are used in a more cost-efficient manner and that government budgets are aligned with the countries' climate commitments. Establishing a social price for carbon will also facilitate access to financing from the multilateral banking system, on soft terms in at least some cases, for low-emissions projects. Figure 35 shows the social price of carbon currently applied in public investment evaluation processes in Chile, Peru and Costa Rica; the values shown for the other countries are estimates of the social prices that are soon to be introduced. Nonetheless, as has been shown, carbon pricing is not the only way forward for the countries as they seek to forge public policies that will enable them to achieve the Paris Agreement goals.

Figure 35
Estimated social price of carbon in countries of Latin America and the Caribbean
(Dollars at 2021 prices per ton of tCO_2eq)

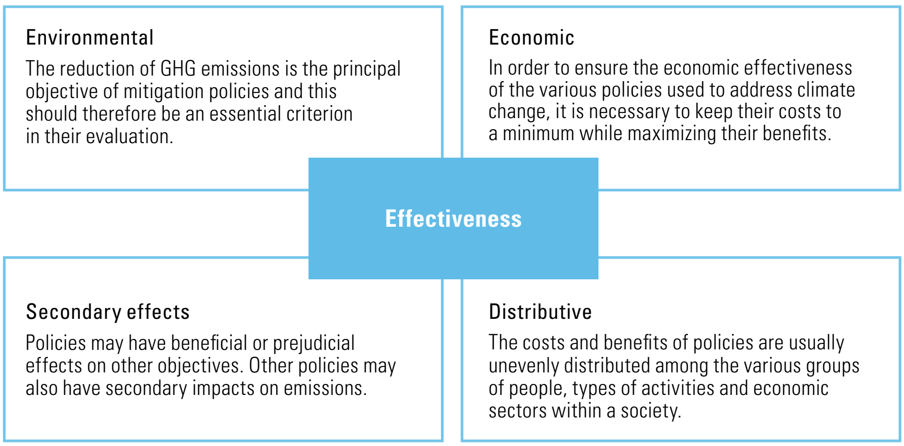


Source: Regional Observatory on Planning for Development in Latin America and the Caribbean. (2020). *Social Price of Carbon in the Evaluation of Public Investment Projects in Latin America*. https://observatorioplanificacion.cepal.org/en/note/social-price-carbon-evaluation-public-investment-projects-latin-america.

5. Policy tool effectiveness

Given the attendant institutional and technological requirements, the level of technical capabilities that the relevant teams must possess, the amount of funding that is needed and existing political economy constraints, the implementation of the various policy tools is a challenge in and of itself. The region has made strides in many of these areas thanks to the varied array of initiatives, policies and instruments being implemented by countries of the region. Nevertheless, in order to meet the targets they have set for the decarbonization of their economies, the available policies and policy tools need to be implemented effectively, and doing so entails giving careful consideration to how effective each policy and policy tool can be in helping to reduce emissions, generate net positive benefits, avoid regressive impacts and keep undesirable secondary effects to a minimum (see diagram 1).

Diagram 1
Criteria for evaluating policies and policy tools for addressing climate change



Source: Prepared by the authors, on the basis of Intergovernmental Panel on Climate Change. (2022). *Climate Change 2022: Mitigation of Climate Change. Contribution of Working Group III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change.* P. R. Shukla, J. Skea, R. Slade, A. Al Khourdajie, R. van Diemen, D. McCollum, M. Pathak, S. Some, P. Vyas, R. Fradera, M. Belkacemi, A. Hasija, G. Lisboa, S. Luz and J. Malley (Eds.). Cambridge University Press. https://dx.doi.org/10.1017/9781009157926.

The chances of successfully implementing policy instruments, securing their acceptance and ensuring their viability (and hence their effectiveness in environmental terms) can be increased by designing them in a way that incorporates such considerations as the specific features of those instruments, their capacity for reducing emissions, the national context, the composition of the population, its spending pattern distribution by income decile and the possible impacts the policy instruments may have on other environmental, economic and/or social development objectives. In planning what policy tools are to be used to address climate change, ex ante technical studies and assessments should therefore be undertaken in order to provide the authorities with inputs that will help them to make informed decisions about those tools' effectiveness in achieving their specified objectives.

Decisions indirectly related to economic instruments, such as, for example, decisions about the use of revenues generated by carbon pricing, may have an impact on the results of those instruments' implementation. In general, the use made of carbon tax revenues is a co-determinant of the net economic benefits of those taxes (apart from their direct environmental benefit) and can influence their distributive impacts and spur support for their introduction or intensification (United Nations, 2021).

With regard to the question of environmental effectiveness, while carbon taxes are certainly characterized in the international literature as a cost-effective tool for helping to reduce greenhouse gas emissions and for promoting technological change, not enough evidence has yet been gathered around the environmental effectiveness of the carbon taxes applied in countries of Latin America and the Caribbean. It has, however, been found that, in the cases of Argentina, Chile, Colombia, Mexico and Uruguay, the carbon tax rates and their entry into force are statistically related with a reduction in emissions (Ferrer et al., in press). Thus, an increase of US$ 1.00 in the carbon tax rate is associated with a 0.5% decrease in per capita CO_2 emissions, and the implementation of that tax is associated with a 2.9% reduction in emissions. The extent of their effectiveness does, however, depend on a variety of factors, including the level of the rate, the relevant elasticities and the nature of complementary policies.

Studies on the environmental effectiveness of carbon taxes in the region indicate that pricing mechanisms are a necessary and useful part of decarbonization strategies, but they are not sufficient in and of themselves to achieve large enough reductions to keep the rise in the planet's temperature below 1.5 ºC. A public policy package of other measures that will complement carbon pricing is also needed in order to achieve more ambitious decarbonization goals. Table 7 provides a partial list of policies that could be implemented together with carbon pricing as part of an overall policy package.

Table 7
Policies that may interact with carbon taxes

Complementary	Overlapping	Countervailing
– Implementing electric energy reforms – Introducing energy efficiency packages that allow for fuel switching – Facilitating energy trading and daily contracts – Regulating and incentivizing smart grids – Promoting flexible demand-side responses – Encouraging electricity storage – Supporting the quality and availability of weather forecasting to make renewable generation more predictable – Regulating methane emissions in the oil and gas sector – Phasing out coal-based energy production – Providing incentives for electric vehicle (EV) use – Increasing vehicle emission standards – Providing subsidies/ investment in the charging stations and other infrastructure needed to support wide-scale adoption of transformative zero-emissions options – Introducing standards for energy-efficient buildings – Introducing regulations or incentives concerning land management practices – Establishing offset markets for GHG reductions from waste sites	– Emission trading systems – Fuel and energy taxes – Renewable energy support measures – Vehicle fuel efficiency standards – Feed-in tariffs or green certificates – Environmental emissions regulations and standards – Inclusion of social carbon prices – in investment projects – Internal carbon pricing in businesses – Taxes on high- emission passenger vehicles – Payments for ecosystem goods and services (e.g., paying farmers to retire marginal agricultural land)	– Fossil fuel subsidies – Fuel taxes that create a price wedge across fuels which is not proportional to their carbon content – Land use change subsidies (forest clearing) – Private motor vehicle and transport subsidies – Tax rebates on high-emission passenger vehicles (e.g. diesel) – Public transport taxes

Source: Based on United Nations. (2021). *United Nations Handbook on Carbon Taxation for Developing Countries.*

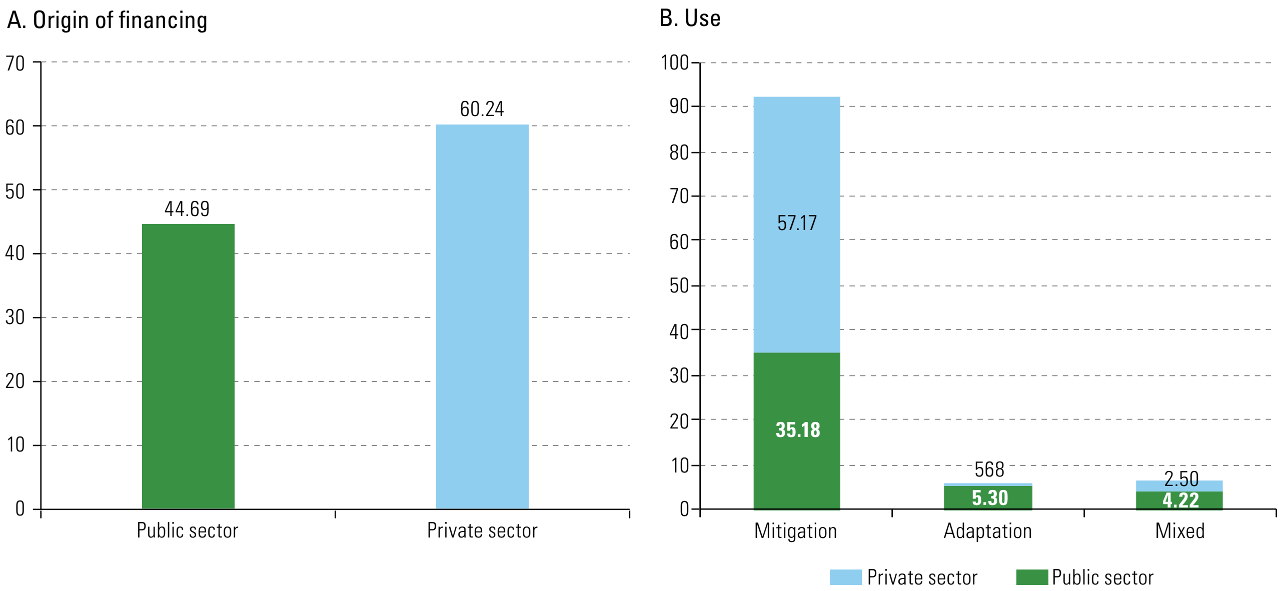
C. Policies for the transition: the link with the private sector

Climate action calls for engagement by non-State actors, and the private sector is crucial. Its importance is twofold: on the one hand, it is an agent of change in its business sector role in generating the organizational and technological changes that are needed to build low-carbon and climate-resilient production processes and distribution systems. On the other hand, the private sector acts as a financier of key investments for the climate transition. In this second role, the part it plays in the financial system is also crucial for ensuring that investments find their way to low-emission economic activities and sectors.

1. The financial system and the climate

One of the hurdles to stepping up climate action in developing countries is financing the investments needed to meet climate goals. Data from the Climate Policy Initiative show that global climate finance flows amounted to US$ 1.9 trillion in 2023, of which only 5.5% went to Latin America and the Caribbean (Climate Policy Initiative [CPI], 2025). Financing for climate action in the region thus amounted to US$ 105.3 billion that year, of which 57.2% was mobilized through private parties, and 42.5% by public sector actors (see figure 36). Climate finance is going primarily (88%) to projects that contribute to emissions reduction, and the remainder to adaptation actions and mixed projects.

Figure 36
Climate financing in Latin America and the Caribbean in 2023, by origin and use
(Billions of dollars)



Source: Prepared by the authors, on the basis of Climate Policy Initiative. (2025). *Global Landscape of Climate Finance 2025*. https://www.climatepolicyinitiative.org/publication/global-landscape-of-climate-finance-2025.
Note: There is US$ 320 million in funding for mixed projects for which it is unknown whether it was provided by public or private actors. This value is not shown in the chart.

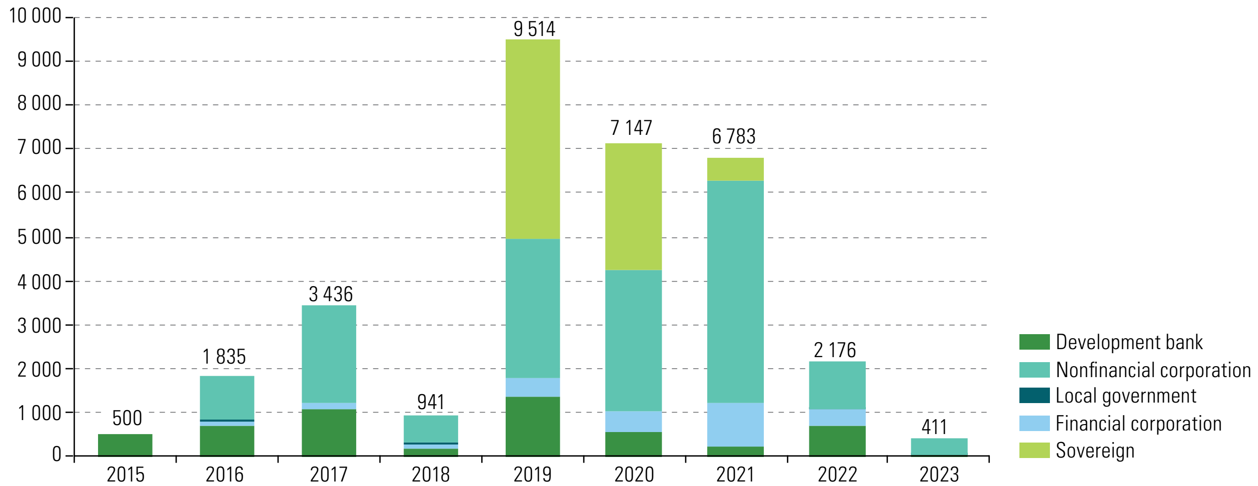
Among the public actors, development finance institutions (multilateral, bilateral and national) contributed 67% of climate finance, while corporations and commercial institutions together provided 80%. The financing flows reflect the priority that countries have afforded to the energy sector to meet the emissions reduction commitments contained in their NDCs. Thus, 68% of climate finance in the region in 2023 went to investments in renewable energy for transforming the energy mix. Investments with an impact across several sectors and investments in improving transportation systems also claimed a significant share. In the case of financing for adaptation measures, a significant share went to the water and wastewater sector (CPI, 2025).

Although climate finance has increased somewhat in Latin America and the Caribbean, the resources still fall short of the investments needed to meet the goals of the Paris Agreement (ECLAC, 2023). According to the Climate Policy Initiative, Latin America and the Caribbean would need an average of at least US$ 248 billion in climate finance annually between 2024 and 2030 to avoid the worst impacts of climate change —this is three times the financing flow currently allocated to mitigation (CPI, 2025).

To meet these financing needs and close the gap, innovative sources of funding will have to be found to support investments in the key sectors that each country has prioritized for the transition to a low-carbon economy, and this cannot be done without both private and public actors. Such funding sources include carbon pricing instruments in countries that have yet to adopt them and the adjustment of carbon prices to rates that include the externalities of GHG emissions. With the mechanisms and tools included in article 6 of the Paris Agreement, carbon markets also provide access to funds and the means to attract the private sector as a key player in project development. Significant opportunities are also emerging in financing through green or thematic bonds.

In the current low-growth context in the region's economies, green, climate-related or sustainability-linked bonds could prove useful tools for stimulus programmes and investment financing to galvanize economic activity, while also contributing to projects that help to meet climate commitments and move towards more sustainable development patterns. The green bond market dates back to 2014 in Latin America and the Caribbean and, according to the Green Bond Transparency Platform, the regional market was worth US$ 32.7 billion between 2015 and 2023 (see figure 37), 70% of which was issued by Chile and Brazil. The region's growing market has led some countries to issue bonds at discounted rates, which has lowered borrowing costs.

Figure 37
Latin America and the Caribbean: green bond market and type of issuer, 2015–2023
(Millions of dollars)



Source: Prepared by the authors, on the basis of Inter-American Development Bank. (2025). *Green Bond Transparency Platform.* https://www.greenbondtransparency.com.

The resources raised through green bonds have been put to quite diverse purposes in the region. While the energy sector has received a significant amount from these investments, the transportation sector also stands out as a driver of long-term investments financed through green bonds between 2019 and 2021. Accordingly, renewable energy and sustainable mobility projects receive the most allocations from green bonds (CPI, 2025).

One of the main incentives for using green bonds is the interest rate differential. The green premium —the "greenium", as it is also known in the international literature— represents the difference in yield between a green bond and a comparable conventional bond. Thus, from the perspective of the issuing country, the greenium may compensate for the stricter uses that may be made of funds and more stringent requirements, such as additional reporting and third-party certification, and may therefore reduce financing costs for the issuer. From the investor's perspective, the greenium may be thought of as the premium that investors are willing to pay to hold a green bond, rather than a conventional one, in their portfolio. This often has to do with sustainable investment policies that require investors to hold a given portion of their portfolio in environmental, social, and governance (ESG) bonds (Nederkoorn and Scholten, 2024).

The rate differential is determined by the attributes of the green bond itself, compared with the reference bond, including type of issuer, sector and country of domicile, as well as variations in supply and demand. The green bond market is relatively new, and there is insufficient evidence of a greenium. Nevertheless, studies conducted by the Climate Bonds Initiative (CBI) and the International Monetary Fund (IMF) document the existence of a green premium in these financing instruments.

IMF has noted that the growing popularity of green bonds may enable governments to issue bonds with longer maturities and at a lower borrowing cost relative to conventional bonds. The Fund's findings show that green bonds are issued with a relatively low spread, averaging 4.06 basis points, and that the average greenium is higher in emerging market economies (11.55 basis points) than in advanced economies (2.74 basis points) (Ando et al., 2023). The paper gives country-by-country estimates for a sample of 15 countries, finding that the greenium is generally positive in 12 of them. The results are mixed and range from a relatively high greenium in Egypt and Hungary (30 and 20 basis points, respectively) to a negative one in Austria (-5.3 basis points). Chile, the only Latin American country included in the sample, was found to have a positive greenium of 8.0 basis points.

2. Investment, innovation and climate change

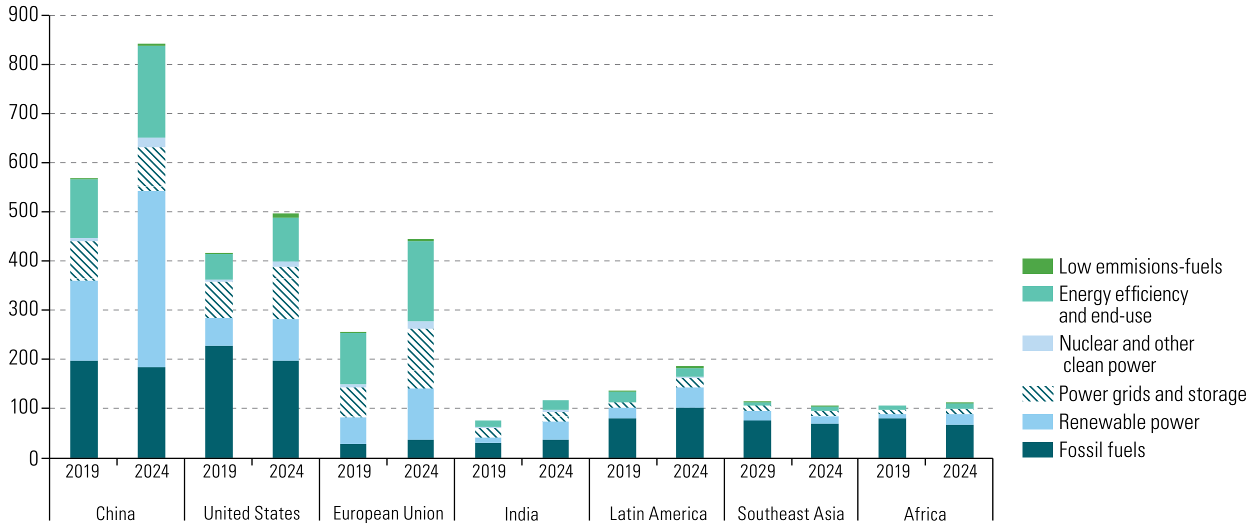
The transformation to decarbonized economies requires innovation and significant investment in research and technological development. The global transition is estimated to need annual investments of around US$ 9.2 trillion up to 2050, which is an additional US$ 3.5 trillion annually compared to current investments (McKinsey Global Institute, 2022). For developing countries alone, annual energy investment needs are estimated at US$ 2.2 trillion (United Nations Conference on Trade and Development [UNCTAD], 2024). For Latin America and the Caribbean, as noted earlier, meeting climate action commitments will take a yearly investment of between US$ 215 billion and US$ 284 billion, representing an average of between 3.7% and 4.9% of regional GDP annually until 2030 (ECLAC, 2023). And this investment effort is needed in a context of low regional and global growth (IMF, 2024b; Salazar-Xirinachs, 2023), which has major implications in terms of attracting new investments.

In this context of low economic growth, climate investments are emerging as an opportunity not only to meet climate commitments but also to stimulate the economy, drive innovation and boost productivity (ECLAC, 2022; World Bank, 2023; Zenghelis et al., 2024). Some countries have ambitious plans, as exemplified by the European Union's European Green Deal (2019), the 14th Five-Year Plan (2021–2025) for National Economic and Social Development of the People's Republic of China, and the Ecological Transformation Plan within Brazil's Growth Acceleration Programme (2024). The United States Inflation Reduction Act (2022) also held out an opportunity in this direction, which still has transformative potential.

Within the landscape of investments needed for climate action, one essential category is investment in technology innovation such as in renewable energy (solar and wind) and inputs for electromobility, such as retrofitting or batteries. Although the world invests almost twice as much in clean energy as in fossil fuels, these investments are regionally uneven (see figure 38). Emerging market and developing economies, with the exception of China, account for only around 15% of global spending on clean energy (International Energy Agency [IEA], 2024), as reflected in the number of patents by country and region (see figure 39).

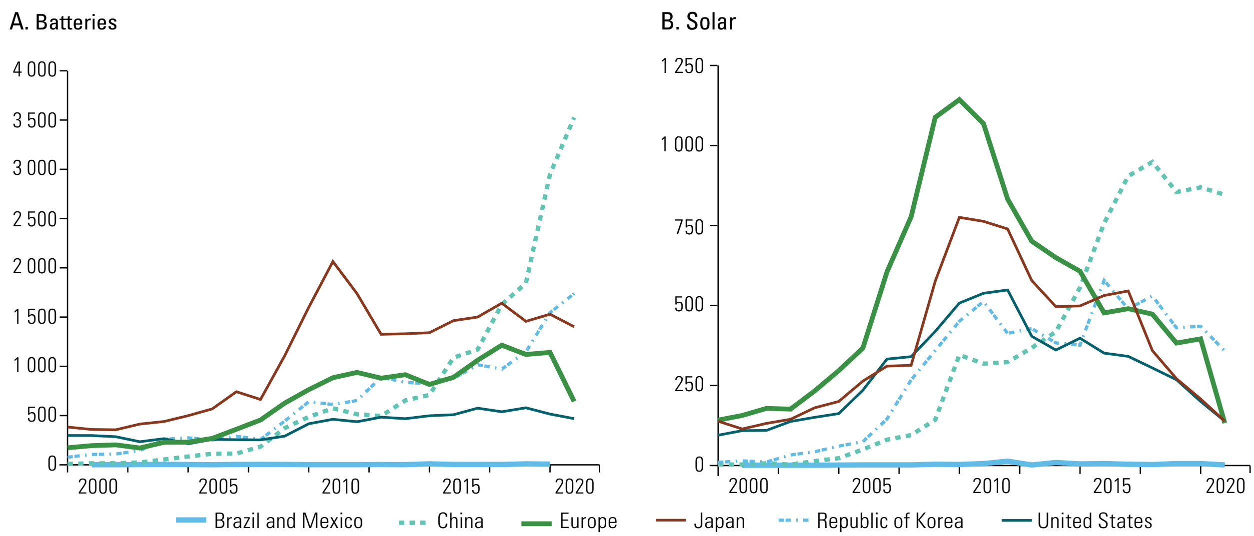
These initiatives and investments suggest that climate action can be a catalyst for economic growth by attracting investment in key sectors. Typically, these sectors, at the very least, promote faster growth in either quality employment or production while also reducing their environmental footprint. Investments of this sort also have the potential to reduce pressure on the balance of payments by replacing fuel import demand with local production. The relatively low investment and, in particular, the limited number of patents in these sectors in Latin America and the Caribbean will impact its future economic growth and competitiveness, so it is essential to invest in public-private partnerships to give them more drive.

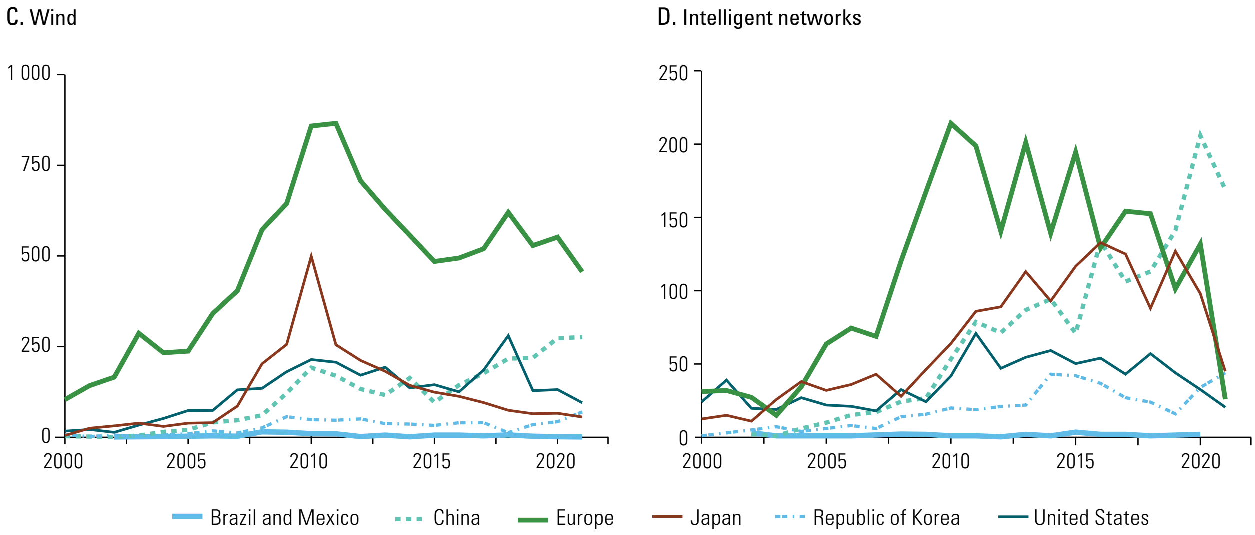
Figure 38
Annual investment in clean energy, by selected countries and regions, 2019 and 2024
(Billions of dollars)



Source: International Energy Agency. (2024). *World Energy Investment 2024.*

Figure 39
Selected countries and regions: clean energy patents, 2000–2021
(Number of patents)





Source: Prepared by the authors, on the basis of International Energy Agency. (2025). *Energy Technology Patents Data Explorer*. https://www.iea.org/data-and-statistics/data-tools/energy-technology-patents-data-explorer.

3. Taxonomies

Transparency and sound information are essential for making investment decisions. Sustainable finance taxonomies have been developed as a key tool for providing investors with information on which assets are truly green (or, more broadly, sustainable). These classification systems define environmentally sustainable economic activities using technical criteria, such as carbon intensity standards, and therefore provide information to guide financing and investments toward sectors and activities aligned with the Sustainable Development Goals and the Paris Agreement (United Nations Environment Programme [UNEP], 2023). They also act as risk mitigation tools, helping to avoid investments that could risk becoming stranded assets. Taxonomies are thus a tool for risk management and for identifying opportunities in emerging market niches, but they are also an industrial policy instrument for competitive economic transformation in the emerging markets of carbon-neutral societies (De Miguel et al., 2024). Taxonomies send signals to markets, which can lead to faster maturing of new low-carbon sectors and activities, issuance of thematic bonds and construction of projects categorized as green.

The European Union taxonomy for sustainable activities has been the main methodological reference for the development of sustainable finance taxonomies in the region. However, to adopt this taxonomy, countries have to adapt to differences in both economic structure and development, as well as their own environmental reality. Some countries in Latin America and the Caribbean already have a taxonomy of their own, but the issue is fast-moving enough to indicate that soon the entire region will have some type of taxonomy. There are still challenges in using these taxonomies, however, particularly their mainstreaming throughout the financial system, interoperability to facilitate cross-border flows, and comparability between them to provide certainty for investors. Accordingly, the Working Group on Sustainable Finance Taxonomies for Latin America and the Caribbean has developed a Common Framework for Sustainable Finance Taxonomies for Latin America and the Caribbean to serve as a guide for the region. This common framework made emissions mitigation the priority as the main parameter of the taxonomy.

Recently, however, in response to strong demand from the region's financial authorities, the Working Group also prepared an analysis of existing antecedents that could be relevant for developing a methodology for a sustainable finance taxonomy focused on biodiversity, which is a particularly important asset in Latin America and the Caribbean. However, developing a taxonomy with biodiversity as its primary concern poses challenges that require a different approach from the taxonomy used for climate change mitigation. Biodiversity loss is driven by several factors, but of those linked to the performance of economic activities that are of interest to capital markets, the most predominant are land use change and water consumption in water-scarce environments. There are other factors too, such as the overexploitation of native species and exotic species incursions, but these are less systemic than those related to land use change and water scarcity.

Furthermore, taking, for example, the increase in units of output per unit of land used or unit of water consumed as the primary parameter for economic performance in relation to biodiversity is no guarantee that pressure on the ecosystem will be alleviated. On the contrary, enhanced efficiency could make it more attractive to expand activities that put pressure on biodiversity. A more complex primary parameter is therefore required to better reflect the reduction in pressure. Combining one of the above —making more efficient use of a resource that is precious for biodiversity— with another signalling abstention from expansion would be the best way to construct the main parameter. Be that as it may, more information is needed for each specific case. So, any biodiversity taxonomy should foster efficient resource use in the short term, while starting a process to improve the specific activity's georeferencing —an attribute to which the financial system attaches great value. Once the asset being financed is localized, it can be linked with another indicator to testify to the reduction in pressure on biodiversity. Several financial regulators are currently considering imposing more stringent requirements for georeferencing of financial flows. This will enable better oversight of the financial system, provide higher-quality data to support the analysis of the risks at hand (including the physical risks of climate change), and supply information that is better suited to an effective biodiversity taxonomy.

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Chapter IV

The role of biodiversity in supporting regional responses to inaction

The region's high vulnerability to the impacts of climate change makes it imperative to take adaptation measures. Firstly, the principle should be engrained that mitigation is the best form of adaptation and that the international community is obliged to take measures to keep the temperature rise below 1.5 °C under the principle of common but differentiated responsibilities. The *Special Report* of the Intergovernmental Panel on Climate Change (IPCC) concerning the 1.5 °C threshold (IPCC, 2018) provides solid evidence of the serious consequences of exceeding this threshold for human activities and life on the planet. Furthermore, mitigation measures have co-benefits, including improving air quality in cities and thereby boosting the conditions for productivity enhancement in many value chains that are vulnerable to climate change.

Notwithstanding this evidence, the current path of greenhouse gas (GHG) emissions is not promising. Latin America and the Caribbean must therefore prepare for even more of what is already happening: more extreme temperatures and more intense and frequent weather events.

On the other hand, the region stands out for its great biological wealth. Adaptation, then, cannot be construed other than on the basis of the restoration and conservation of healthy ecosystems. The region's biological wealth not only offers insurance against climate change, but is also an underutilized natural asset that holds great potential (Economic Commission for Latin America and the Caribbean [ECLAC], 2024). Biodiversity loss and climate change are processes that feed into each other, both positively and negatively. So, although the current trend is not positive, a virtuous relationship could be forged between biodiversity protection and the fight against climate change (Expert Review on Debt, Nature and Climate, 2025), improving well-being both present and future.

A. Adaptation and nature-based solutions

In the context described, adaptation measures are becoming more and more important. While adaptation is increasingly being included in nationally determined contributions (NDCs), measures and funding are still aimed primarily at mitigation. The interest of the private sector is deflected by the difficulty of devising good indicators to identify and prioritize the best adaptation measures for investing in, together with the fact that investment outcomes materialize only in the medium and long terms and, in any case, are not all easily monetized. Consequently, adaptation efforts depend almost exclusively on the availability of already very scarce fiscal resources.

There are three types of adaptation measures: (i) investments in grey and green infrastructure; (ii) local social-network- and capacity-building (including early warning systems); and (iii) restoration and sustainable management of ecosystems. These sorts of measures do not usually yield a business return that could attract private sector investment. However, as business strategies and value chains become compromised by the effects of climate change and the risks to business activities increase, the private sector will have greater incentives to invest in adaptation (PwC, 2025). In some sectors, such as food production, this is already happening (Crumpler et al., 2024).

Investment needs for restoration, rehabilitation and conservation have been set from a floor of 0.29% of annual GDP in the region (Economic Commission for Latin America and the Caribbean [ECLAC], 2023). Although the public sector has an acknowledged and unavoidable role to play in overcoming the "tragedy of the horizons", it still needs to incentivize private investment, which is more elusive given that expected investment return cycles are much shorter than the time that nature needs to recover its productive capacity.

Adaptation supporting ecosystem restoration and sustainable management may be partially financed by nature-based solutions. However, a market-based approach can lead to priority being given to those ecosystem services that can be marketed. Therefore, apart from well-founded exceptions, the aim should be to seek "actions to protect, sustainably manage and restore natural or modified ecosystems that effectively and adaptively address societal challenges, while simultaneously providing human well-being and biodiversity benefits" (Cohen-Shacham et al. 2016). In this report, therefore nature-based solutions are understood to refer to the conservation of the ecosystem where they are applied.

The benefits of nature restoration and conservation in megadiverse countries are numerous. A wide range of ecosystem services are generated: provision of material goods, regulation of natural phenomena, cultural services that provide identity and a sense of belonging to local inhabitants, as well as support for life. The type of ecosystem service will also determine potential sources of financing (see table 8). But biodiversity and ecosystem services also play an essential role in regulating GHGs and as natural barriers to extreme climate events, such as changes in precipitation patterns, droughts, storms and landslides. They are thus fundamental not only for mitigating climate change but also for adapting to its effects (ECLAC, 2024). Accordingly, financing must take into account the real potential of ecosystem services.

Table 8
Ecosystem services and type of financing

Ecosystem service	From ecosystem to economy	Source of financial resources for the ecosystem service
Provision Resources and goods extracted from ecosystems to build, manufacture and craft all kinds of things useful to society. For example, the wood extracted from a forest to make houses or paper, and the fibres used to make baskets.	Historically, traditional markets have developed for plants, animals and fungi.	**Predominantly private**. Through market transactions, but resource extraction does not take into account sustainability concerns.
Regulation Processes regulating natural phenomena, for example, pollination, which enables the reproduction of many species essential for the human diet. Regulating water flow in watersheds is vital for agriculture and for preventing erosion.	Various economic activities have benefited from these open-access services. Recently, some payment schemes have been established for environmental services.	**Public and private**. Payment for environmental services provides part of the necessary resources.
Cultural Ecosystems are the foundation for the development of cultures, providing inhabitants with identity and a sense of belonging.	Some natural parks have been founded based on this service.	**Public and private**. Entrance fees.
Support Ecosystems maintain larger-scale processes that provide support for other services. Examples include the cycles of essential nutrients that ensure soil fertility and oxygen produced by plants.	These are fundamental to all human activity, but are not, nor should they be, commodified.	**Public**. Agreements are in place (e.g. the Global Environment Facility (GEF), the Green Climate Fund (GCF) and Tropical Forest Forever Facility (TFFF)). Global governance needs to be strengthened to support the sovereignties that safeguard key ecosystems.

Source: Economic Commission for Latin America and the Caribbean, on the basis of Millennium Ecosystem Assessment. (2005). Ecosystems and Human Well-being: Synthesis. Island Press.

Nature-based solutions for climate change are designed to profit from the carbon sequestration potential of biomass while ecosystems maintain or improve their GHG sink capacity. This can be used to generate emission reduction certificates that can be traded on carbon markets in exchange for financial resources from economic activities that, for whatever reason, need to offset their emissions (article 6 of the Paris Agreement offers growing opportunities in this area, as discussed in previous chapters). So, in addition to its mitigation benefits, sink capacity can also contribute to adaptation by safeguarding ecosystems, provided it is managed with best practices, native species and biodiversity protection. Building climate resilience through nature-based solutions needs a regulatory framework based on best practices, in which all stakeholders from investor to consumer —including those working to bring the ecosystem to optimum service generation conditions— hold responsibility for forging a virtuous cycle between the economy, the fight against climate change and the protection of biodiversity.

B. Interdependence between the economic system and ecosystem services

By identifying the dependencies of economic activities on ecosystem services, the importance of these services to the economy can be assessed and the potential risks of their degradation or potential disappearance may be managed. These considerations are crucial when it comes to involving the financial system in nature-based solutions.

Using a 2014 regional input-output table for 18 countries[1] disaggregated into 40 economic sectors (ECLAC, 2016; Durán Lima and Banacloche, 2022) and the Exploring Natural Capital Opportunities, Risks and Exposure (ENCORE) database (United Nations Environment Programme [UNEP], 2025), this section explores the structural dependencies of the region's main economic sectors with respect to 25 ecosystem services, as well as the impact of 13 types of environmental pressures exerted by these sectors.[2] In addition to direct relationships, the analysis considers the productive interdependence of economic activities, connecting ecosystem services with supply chains. This enables the assessment of total dependency, which includes both direct and indirect dependencies.

The primary agricultural sectors are the most dependent on ecosystem services, particularly on those associated with water, climate regulation, biological control, pollination and soil. Secondary sectors show mixed dependence on most ecosystem services, although water purification is highly important for a significant number. Mining and processed food industries benefit more from ecosystem services, primarily hydrological services, than the rest of the heavy and light manufacturing sectors. Water flow regulation, flood mitigation, soil retention and global climate regulation services are particularly relevant to the electricity sector (see table 9).

Service sectors, such as education, commerce and tourism, are highly dependent on climate regulation, including precipitation patterns, and, notably, on the nexus between ecosystems and science and culture, which they use for educational, science and research purposes, as well as in connection with spirituality, art, symbolism and visual amenities. Financial and corporate services generally show the lowest direct dependence on almost all ecosystem services. As may be seen in table 9, the most crucial ecosystem service for the economy is water flow regulation and purification.

Environmental pressures are more unevenly distributed across the economy. Given their extensive land use, agricultural activities exhibit high or very high environmental impacts, including impacts associated with various types of pollutant emissions, water and land use, and the introduction of invasive species. The greatest impacts of mining occur in emissions of toxic soil and water pollutants, solid waste generation, and water and seabed use. In the manufacturing sector, environmental impacts depend more on the specific activity. GHG emissions are concentrated in agriculture, mining, the energy sector and, to a lesser extent, some manufacturing activities (see table 9).

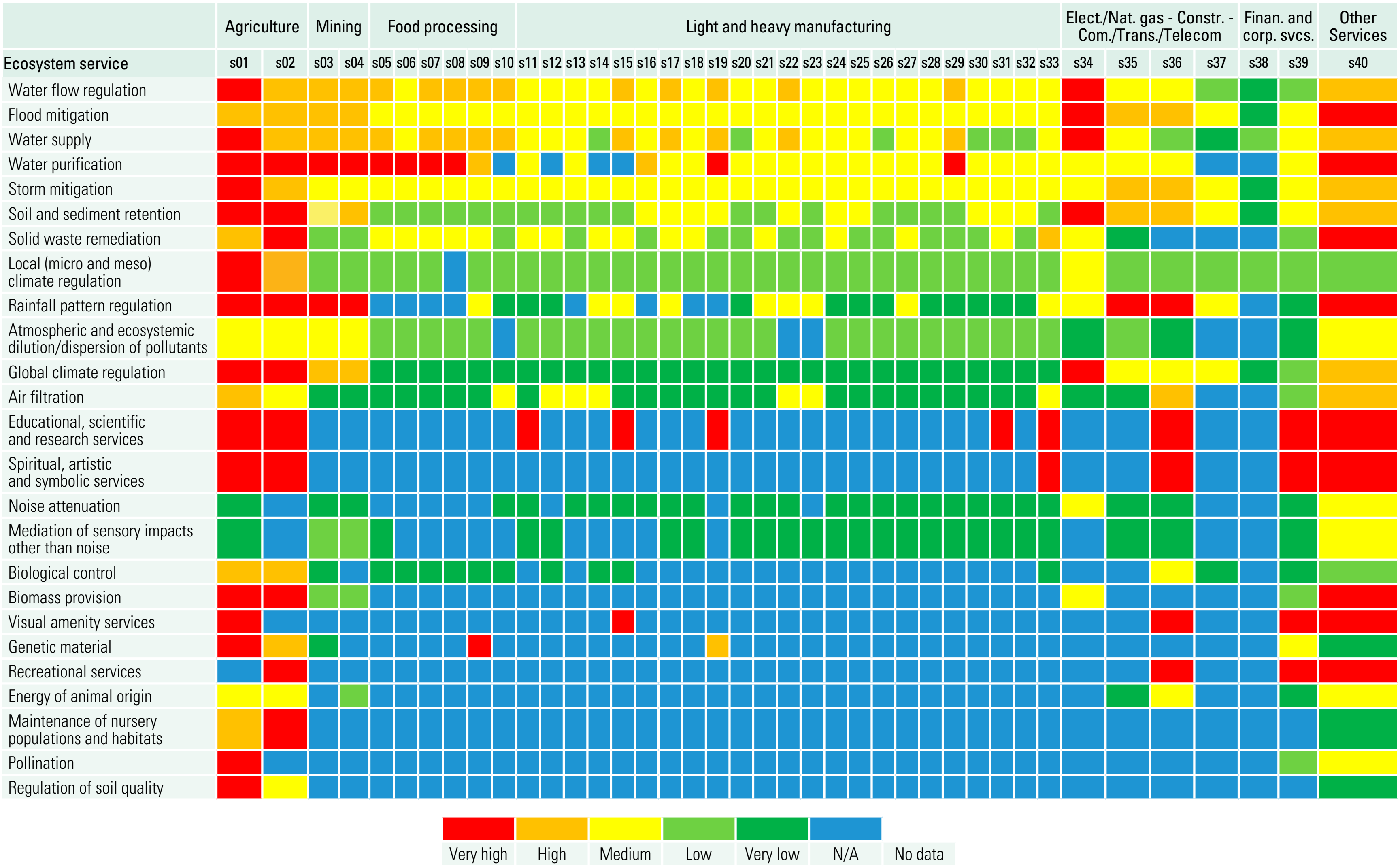
Tables 9 and 10 present the dependencies and total impacts on ecosystems for the 18 economies included in the Latin American and Caribbean regional input-output table. A priori, some patterns may be identified:

- Indirect channels through supply chains increase ecosystem dependence in virtually all sectors, so that the distribution of values in the table veers towards "high" and "very high" levels. The same is true for the environmental impacts of economic activities.
- Analysis of supply chains clearly shows that all economic activities depend to some extent, directly or indirectly, on ecosystem services. It is also clear that no sector produces no environmental impacts.
- The South American economies depend more on ecosystem services, mainly hydrological and soil-related services.
- A differentiated pattern of impacts may be distinguished between the South American economies, although less so than for Mexico and Central America.

[1] Argentina, Bolivarian Republic of Venezuela, Brazil, Chile, Colombia, Costa Rica, Dominican Republic, Ecuador, El Salvador, Guatemala, Honduras, Mexico, Nicaragua, Panama, Paraguay, Peru, Plurinational State of Bolivia and Uruguay.

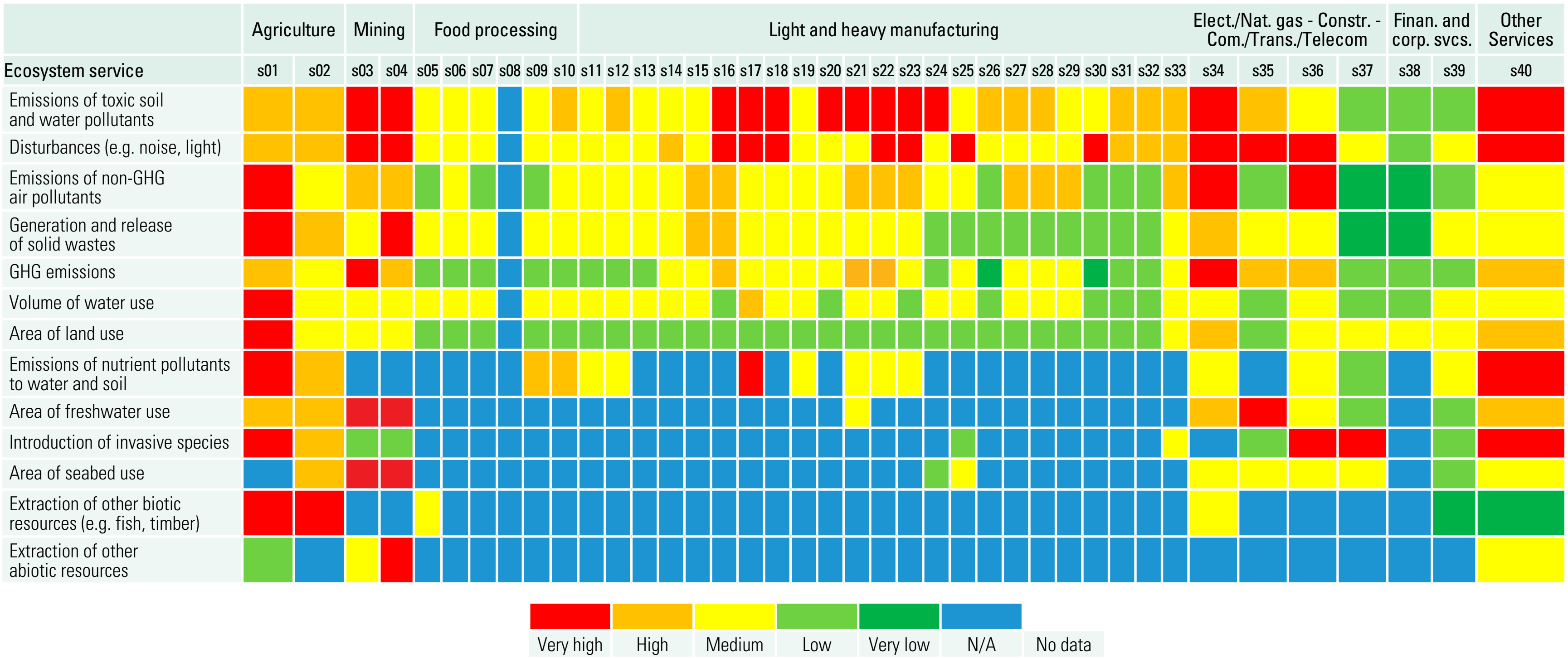
[2] Since the sectoral classification is standardized for all countries in the regional input-output tables, and the ENCORE database assigns dependency or impact magnitudes generically (i.e. not specifically to each economy), the resulting heat maps are identical for the economies included in the regional tables. The coefficients for each economy in the regional input-output tables are then used to translate this common impact and dependency structure to specific national situations in the subsequent input-output analysis.

Table 9
Direct dependencies of economic sectors, regional input-output table, 2014



Source: Economic Commission for Latin America and the Caribbean, on the basis of United Nations Environment Programme. (2025). ENCORE: Exploring Natural Capital Opportunities, Risks and Exposure. https://www.encorenature.org/en; and regional input-output table.

Table 10
Direct impacts of economic sectors, regional input-output table, 2014

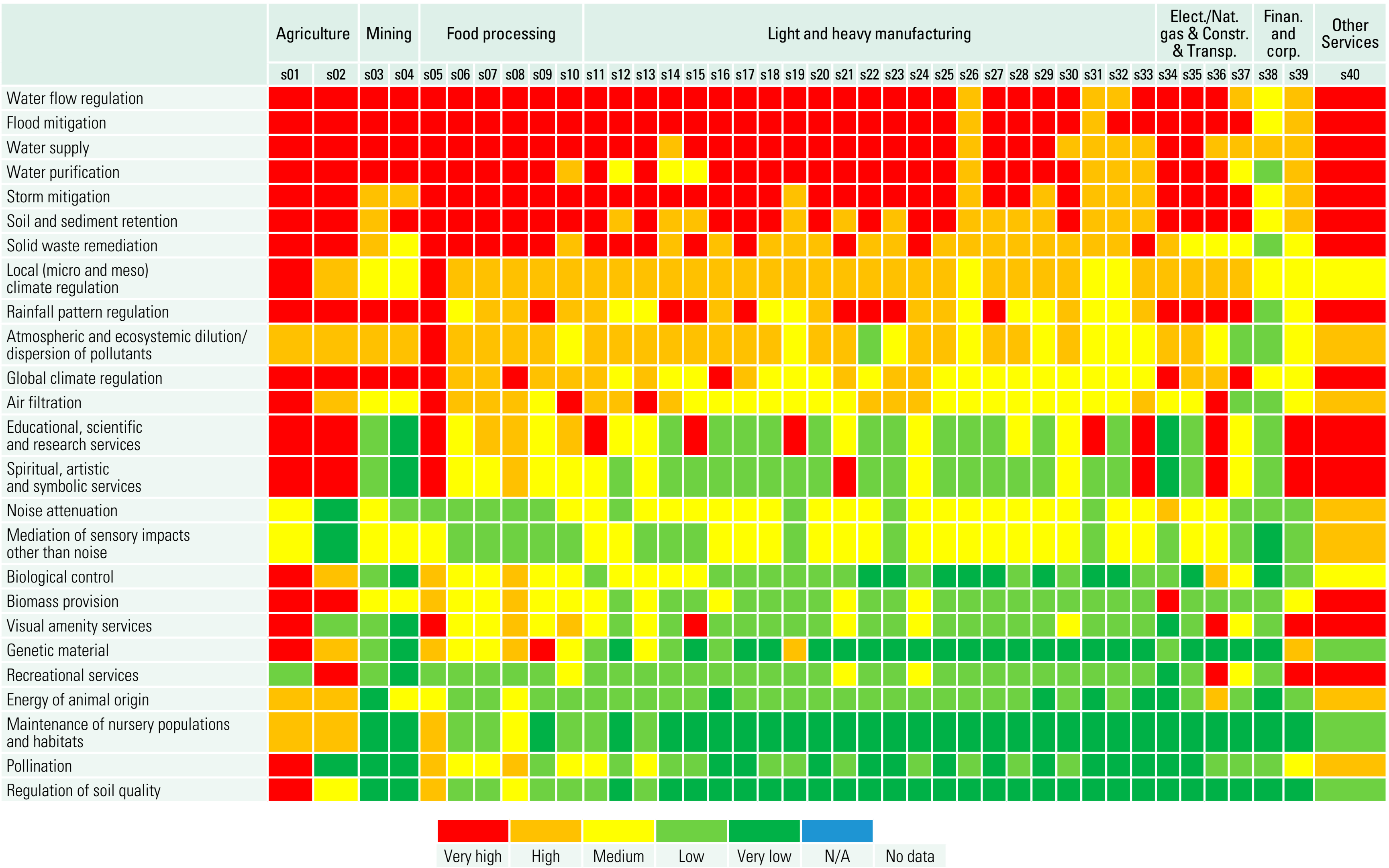


Source: Economic Commission for Latin America and the Caribbean, on the basis of United Nations Environment Programme. (2025). ENCORE: Exploring Natural Capital Opportunities, Risks and Exposure. https://www.encorenature.org/en; and regional input-output table.

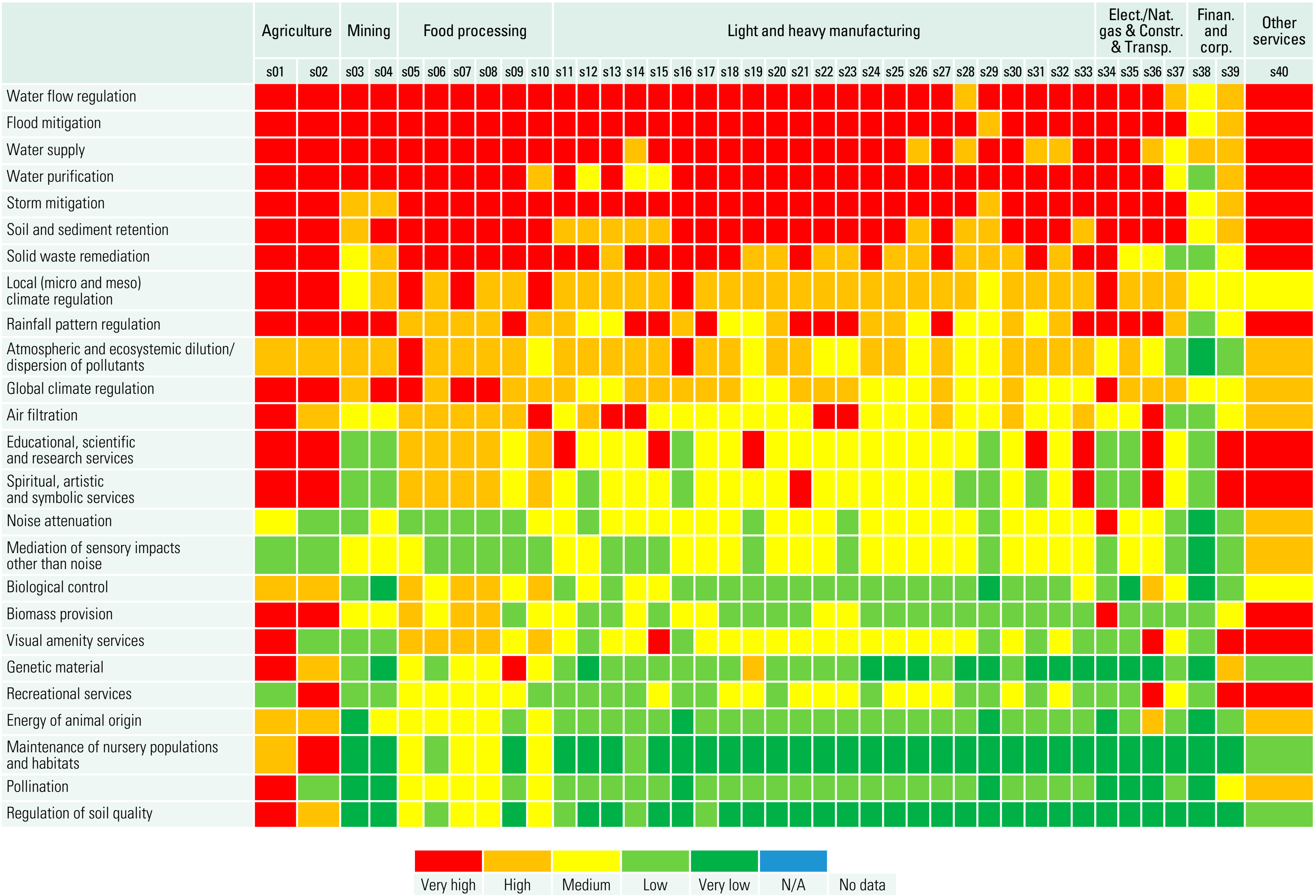
Table 11

Total dependencies of economic sectors (25 ecosystem services), regional input-output table, 2014

A. Argentina



B. Brazil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Other services
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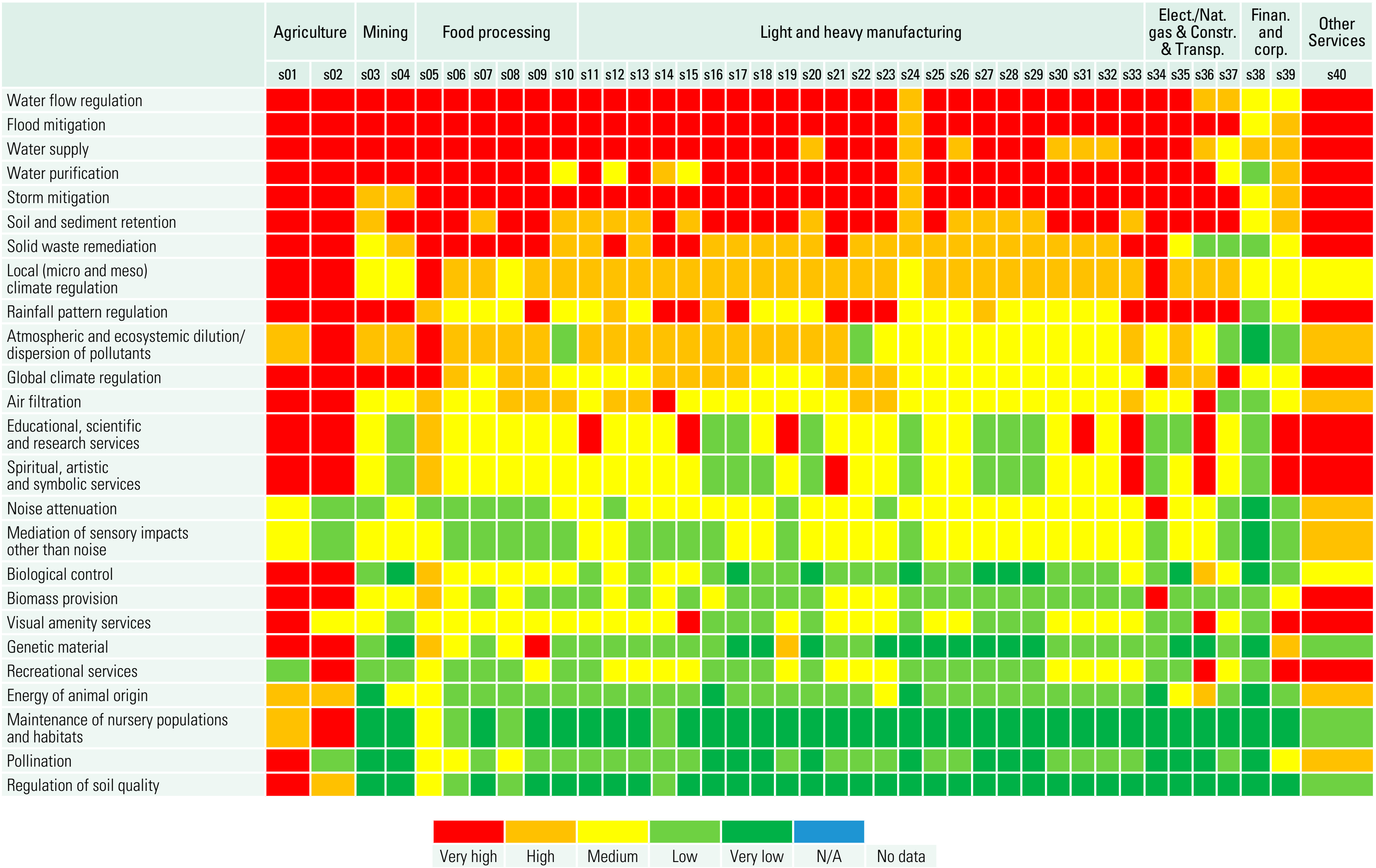
Water flow regulation
Flood mitigation
Water supply
Water purification
Storm mitigation
Soil and sediment retention
Solid waste remediation
Local (micro and meso) climate regulation
Rainfall pattern regulation
Atmospheric and ecosystemic dilution/ dispersion of pollutants
Global climate regulation
Air filtration
Educational, scientific and research services
Spiritual, artistic and symbolic services
Noise attenuation
Mediation of sensory impacts other than noise
Biological control
Biomass provision
Visual amenity services
Genetic material
Recreational services
Energy of animal origin
Maintenance of nursery populations and habitats
Pollination
Regulation of soil quality
Very high
High
Medium
Low
Very low
N/A
No data

C. Chile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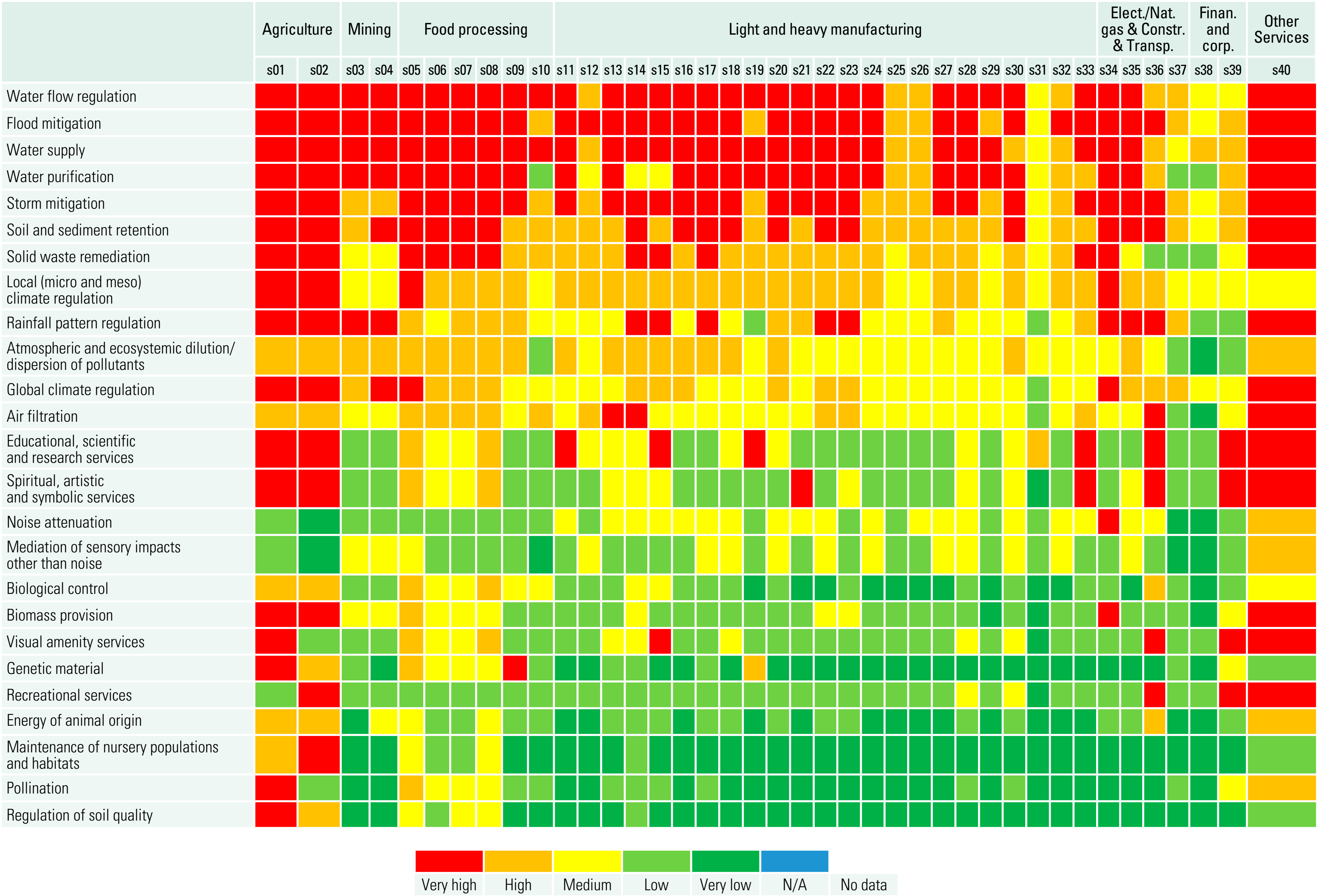
Mediation of sensory impacts other than noise
Biological control
Biomass provision
Visual amenity services
Genetic material
Recreational services
Energy of animal origin
Maintenance of nursery populations and habitats
Pollination
Regulation of soil quality
Very high
High
Medium
Low
Very low
N/A
No data

D. Colombia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Water flow regulation
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Local (micro and meso) climate regulation
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Educational, scientific and research services
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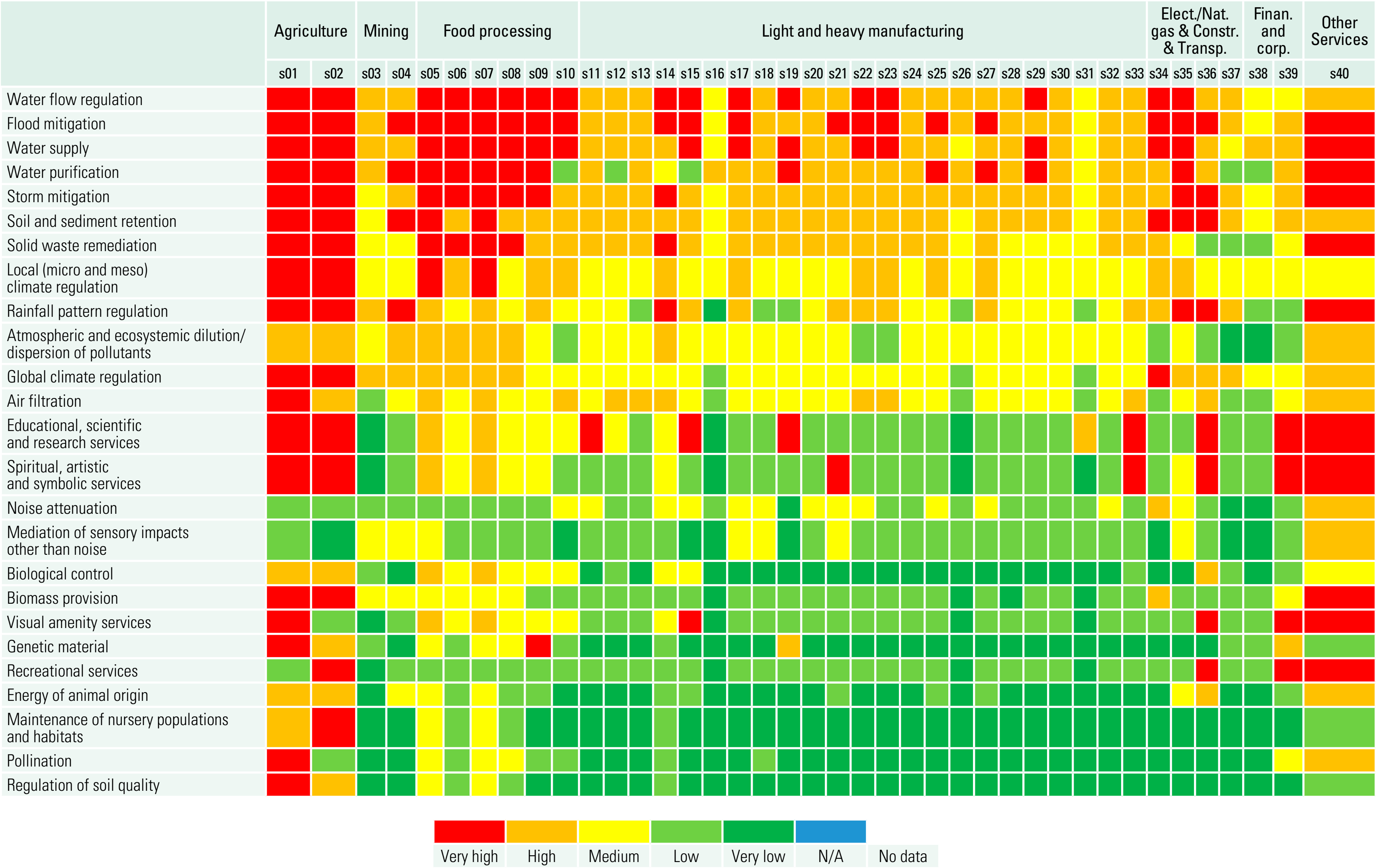
Biomass provision
Visual amenity services
Genetic material
Recreational services
Energy of animal origin
Maintenance of nursery populations and habitats
Pollination
Regulation of soil quality
Very high
High
Medium
Low
Very low
N/A
No data

E. Costa Rica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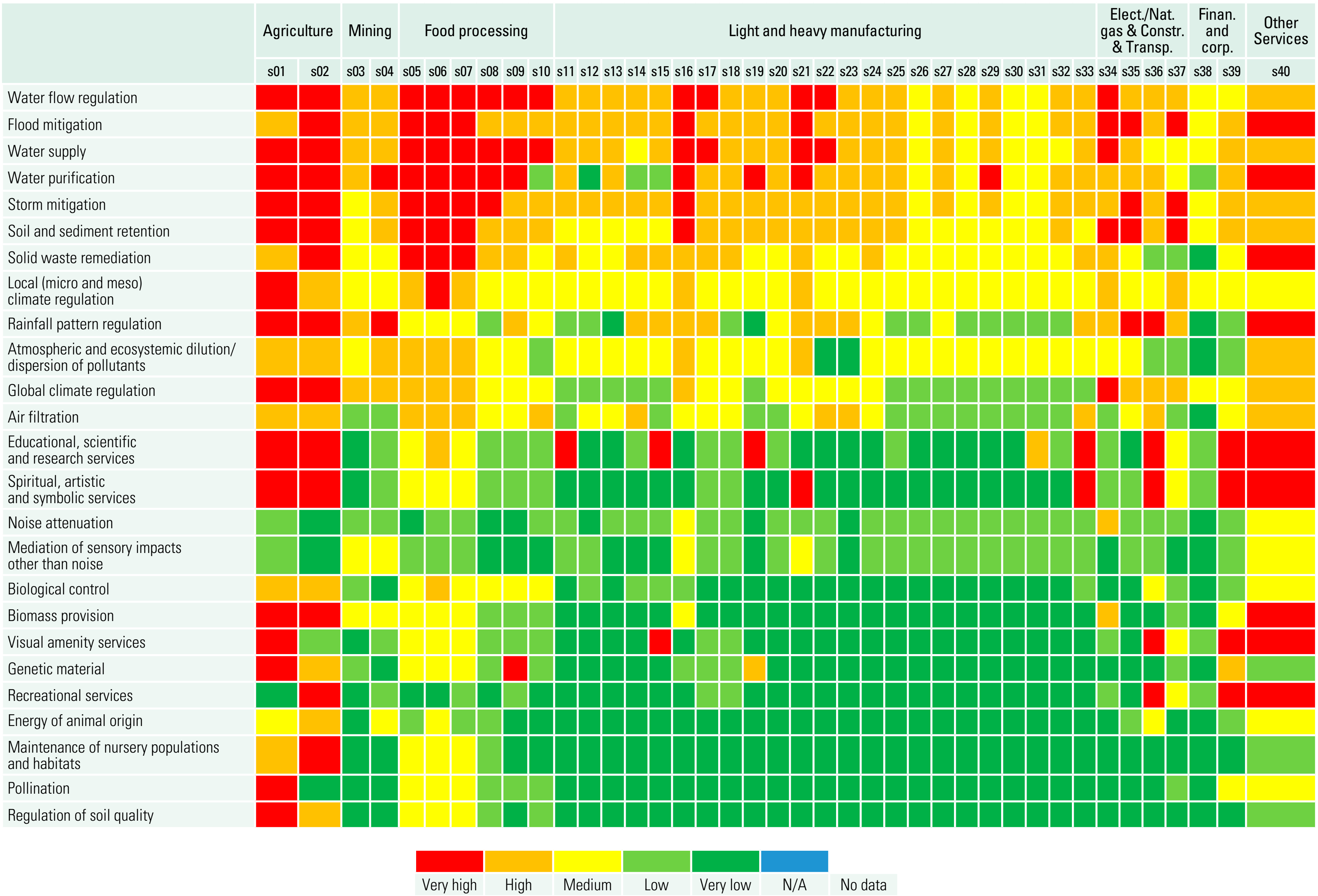
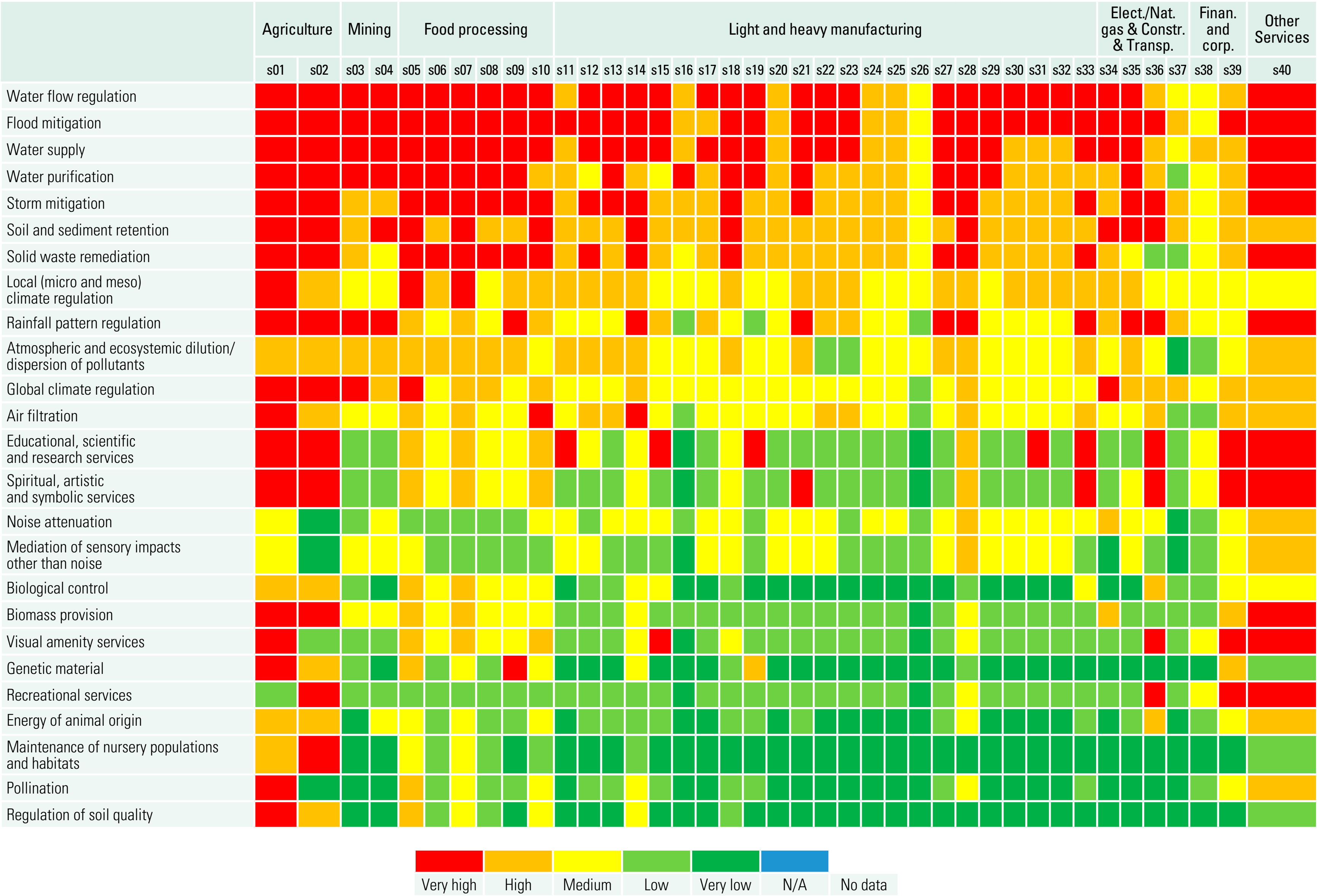
Energy of animal origin
Maintenance of nursery populations and habitats
Pollination
Regulation of soil quality
Very high
High
Medium
Low
Very low
N/A
No data

F. Dominican Republic



G. Guatemala



Agriculture
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Light and heavy manufacturing
Elect./Nat. gas & Constr. & Transp.
Finan. and corp.
Other Services
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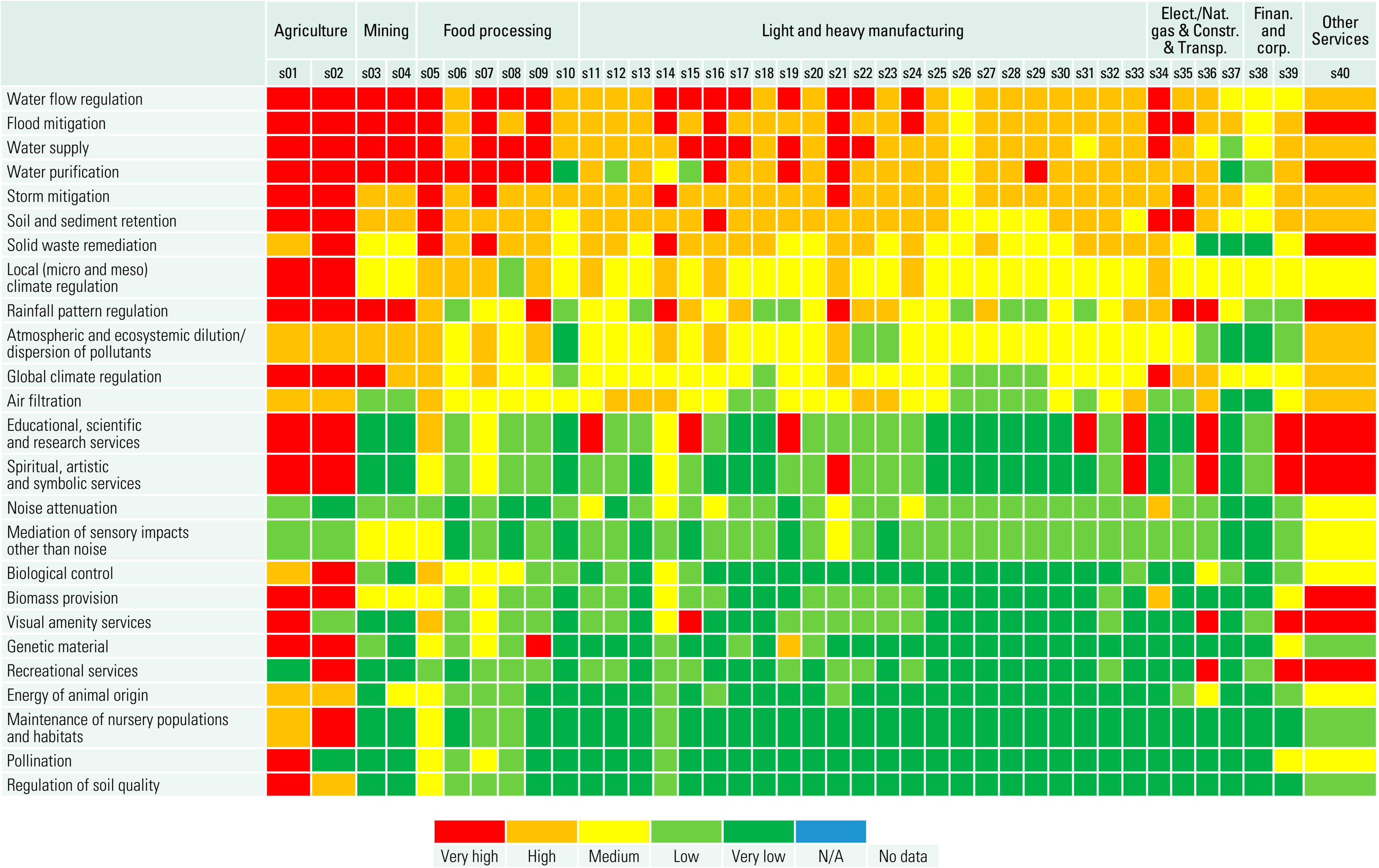
Storm mitigation
Soil and sediment retention
Solid waste remediation
Local (micro and meso) climate regulation
Rainfall pattern regulation
Atmospheric and ecosystemic dilution/ dispersion of pollutants
Global climate regulation
Air filtration
Educational, scientific and research services
Spiritual, artistic and symbolic services
Noise attenuation
Mediation of sensory impacts other than noise
Biological control
Biomass provision
Visual amenity services
Genetic material
Recreational services
Energy of animal origin
Maintenance of nursery populations and habitats
Pollination
Regulation of soil quality
Very high
High
Medium
Low
Very low
N/A
No data

H. Mexico

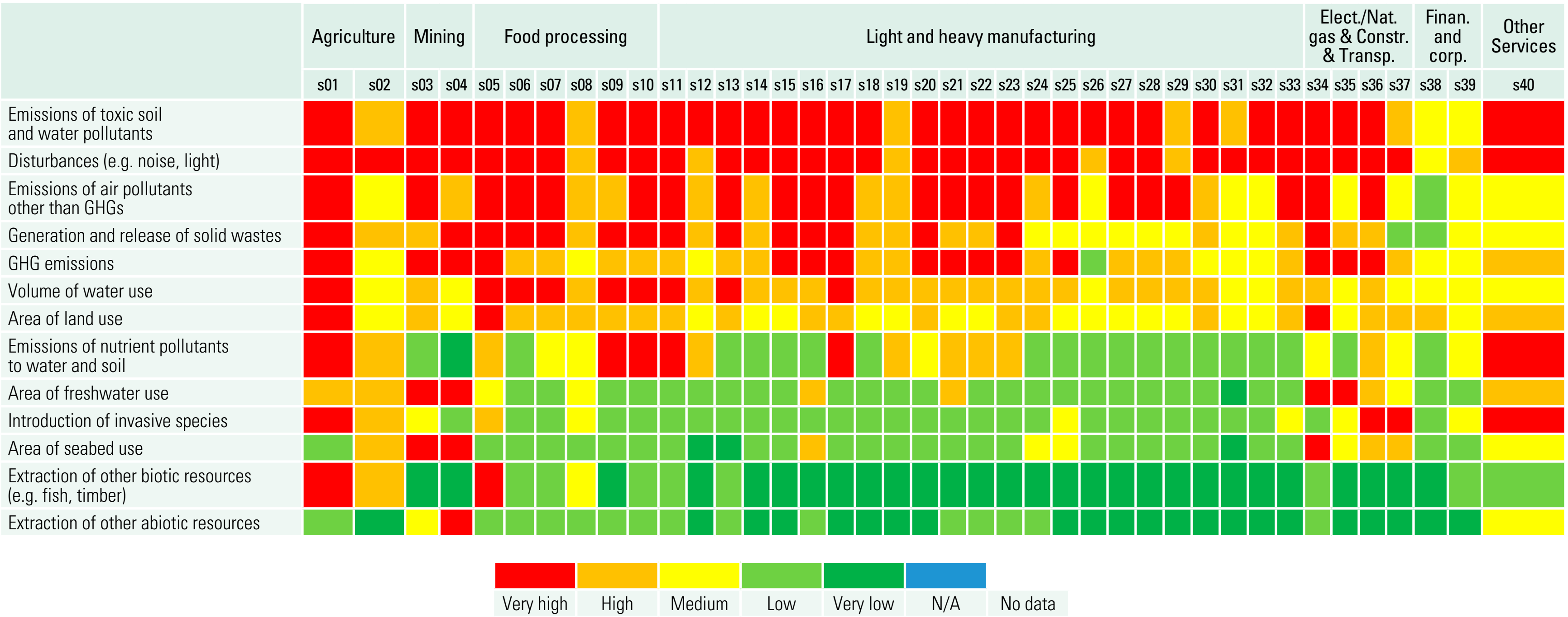


Source: Economic Commission for Latin America and the Caribbean, on the basis of United Nations Environment Programme. (2025). *ENCORE: Exploring Natural Capital Opportunities, Risks and Exposure.* https://www.encorenature.org/en; and regional input-output table.

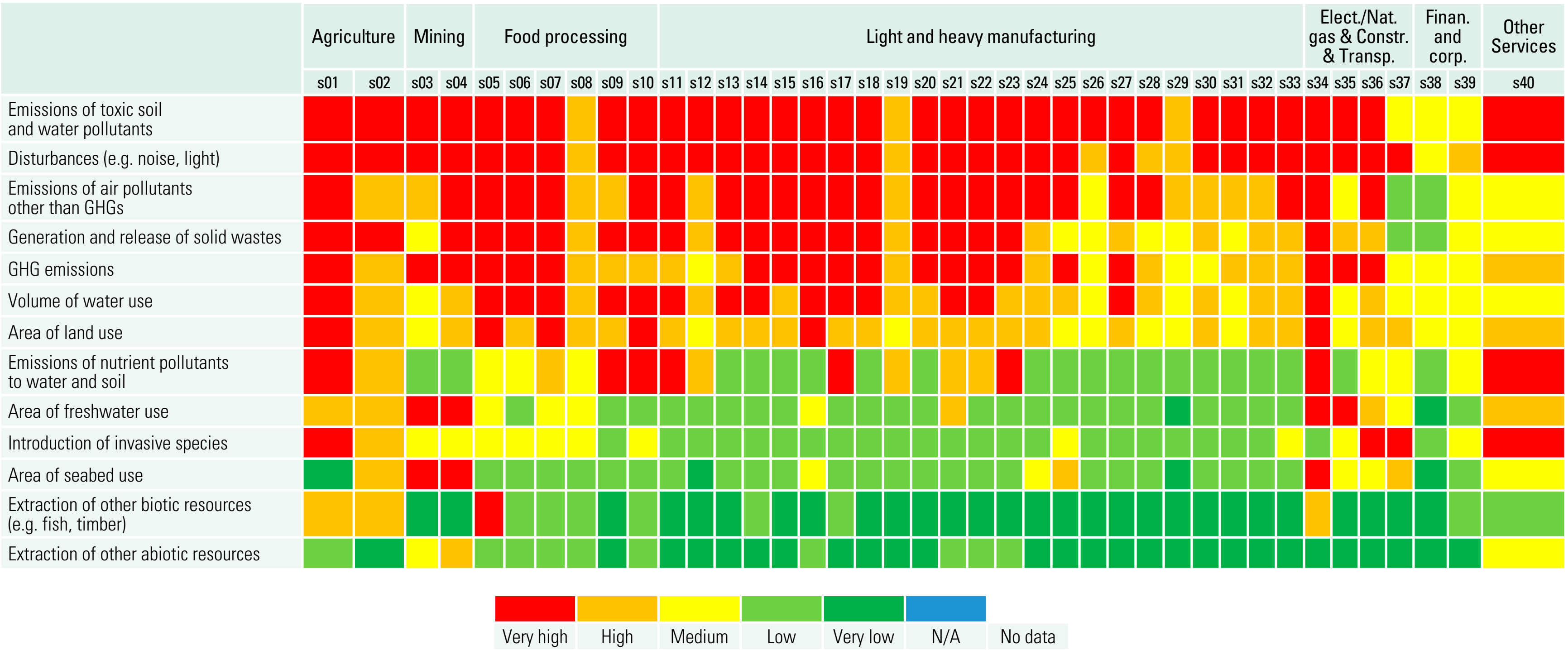
Note: Owing to space limitations, only 8 of the 18 countries included in the analysis are shown in the table.

Table 12
Matrix of economic sectors' total impact (13 sources of environmental pressure), regional input-output table

A. Argentina

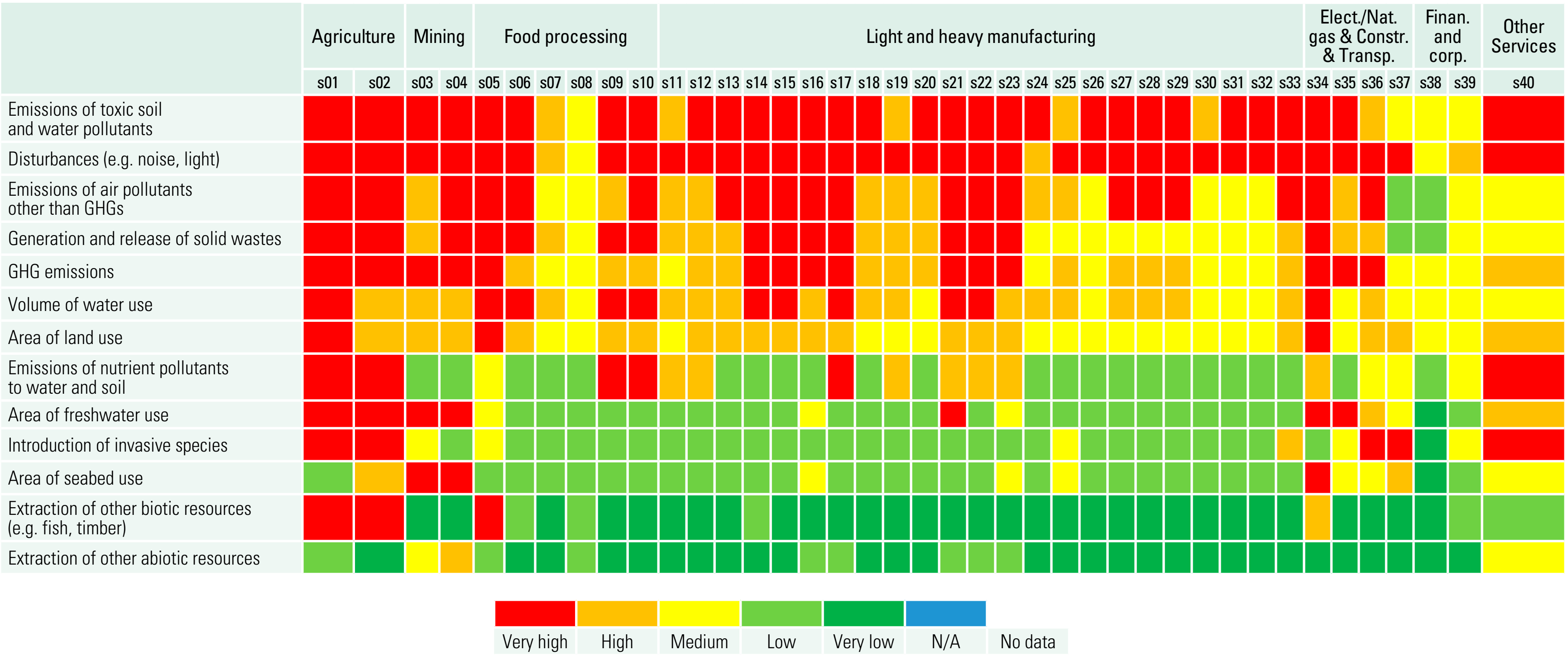


B. Brazil

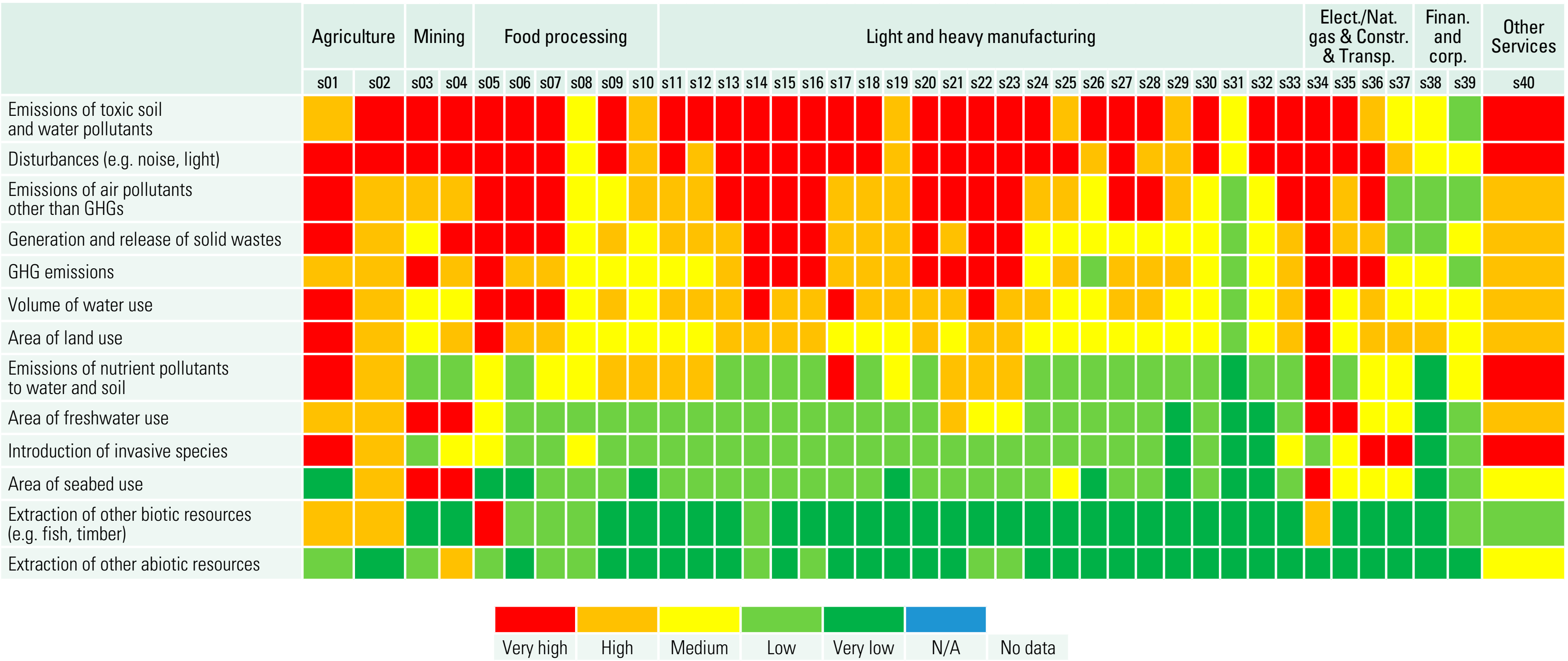


Agriculture
Mining
Food processing
Light and heavy manufacturing
Elect./Nat. gas & Constr. & Transp.
Finan. and corp.
Other Services
s01 s02 s03 s04 s05 s06 s07 s08 s09 s10 s11 s12 s13 s14 s15 s16 s17 s18 s19 s20 s21 s22 s23 s24 s25 s26 s27 s28 s29 s30 s31 s32 s33 s34 s35 s36 s37 s38 s39 s40
Emissions of toxic soil and water pollutants
Disturbances (e.g. noise, light)
Emissions of air pollutants other than GHGs
Generation and release of solid wastes
GHG emissions
Volume of water use
Area of land use
Emissions of nutrient pollutants to water and soil
Area of freshwater use
Introduction of invasive species
Area of seabed use
Extraction of other biotic resources (e.g. fish, timber)
Extraction of other abiotic resources
Very high
High
Medium
Low
Very low
N/A
No data

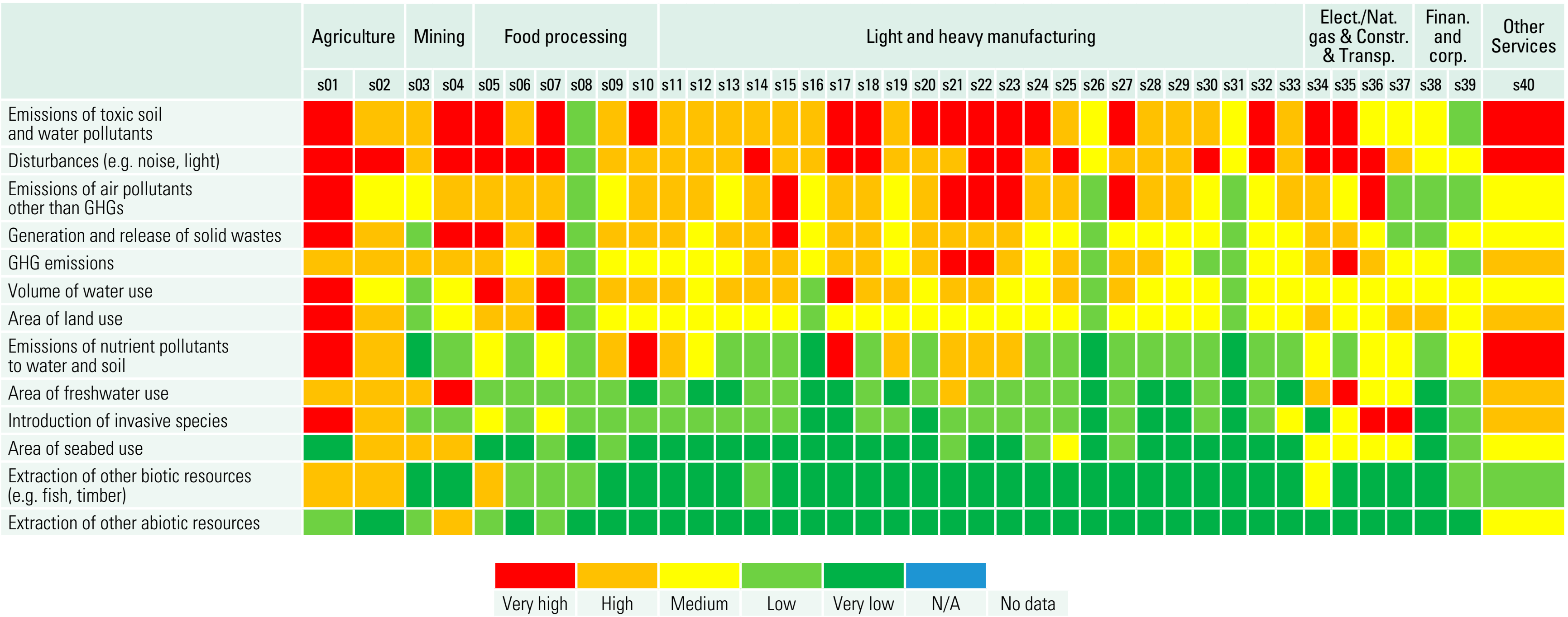
C. Chile


Agriculture
Mining
Food processing
Light and heavy manufacturing
Elect./Nat. gas & Constr. & Transp.
Finan. and corp.
Other Services
s01 s02 s03 s04 s05 s06 s07 s08 s09 s10 s11 s12 s13 s14 s15 s16 s17 s18 s19 s20 s21 s22 s23 s24 s25 s26 s27 s28 s29 s30 s31 s32 s33 s34 s35 s36 s37 s38 s39 s40
Emissions of toxic soil and water pollutants
Disturbances (e.g. noise, light)
Emissions of air pollutants other than GHGs
Generation and release of solid wastes
GHG emissions
Volume of water use
Area of land use
Emissions of nutrient pollutants to water and soil
Area of freshwater use
Introduction of invasive species
Area of seabed use
Extraction of other biotic resources (e.g. fish, timber)
Extraction of other abiotic resources
Very high
High
Medium
Low
Very low
N/A
No data

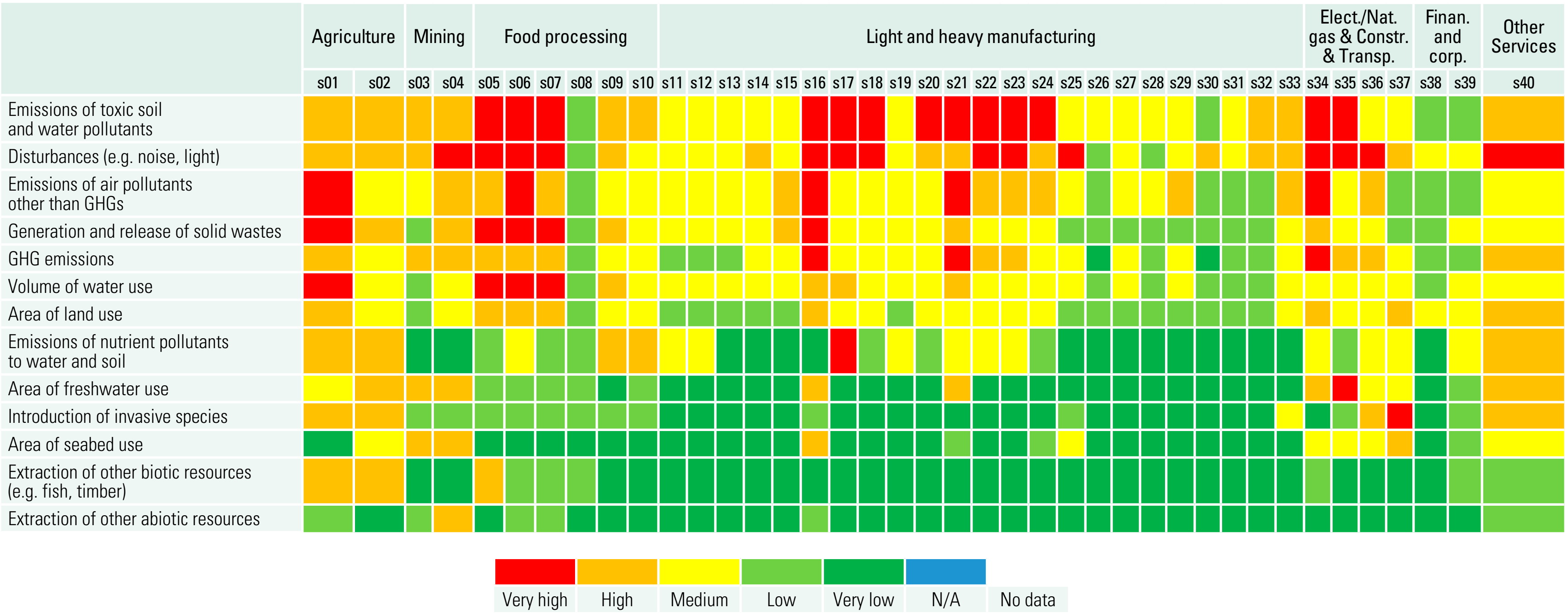
D. Colombia


Agriculture
Mining
Food processing
Light and heavy manufacturing
Elect./Nat. gas & Constr. & Transp.
Finan. and corp.
Other Services
s01 s02 s03 s04 s05 s06 s07 s08 s09 s10 s11 s12 s13 s14 s15 s16 s17 s18 s19 s20 s21 s22 s23 s24 s25 s26 s27 s28 s29 s30 s31 s32 s33 s34 s35 s36 s37 s38 s39 s40
Emissions of toxic soil and water pollutants
Disturbances (e.g. noise, light)
Emissions of air pollutants other than GHGs
Generation and release of solid wastes
GHG emissions
Volume of water use
Area of land use
Emissions of nutrient pollutants to water and soil
Area of freshwater use
Introduction of invasive species
Area of seabed use
Extraction of other biotic resources (e.g. fish, timber)
Extraction of other abiotic resources
Very high
High
Medium
Low
Very low
N/A
No data

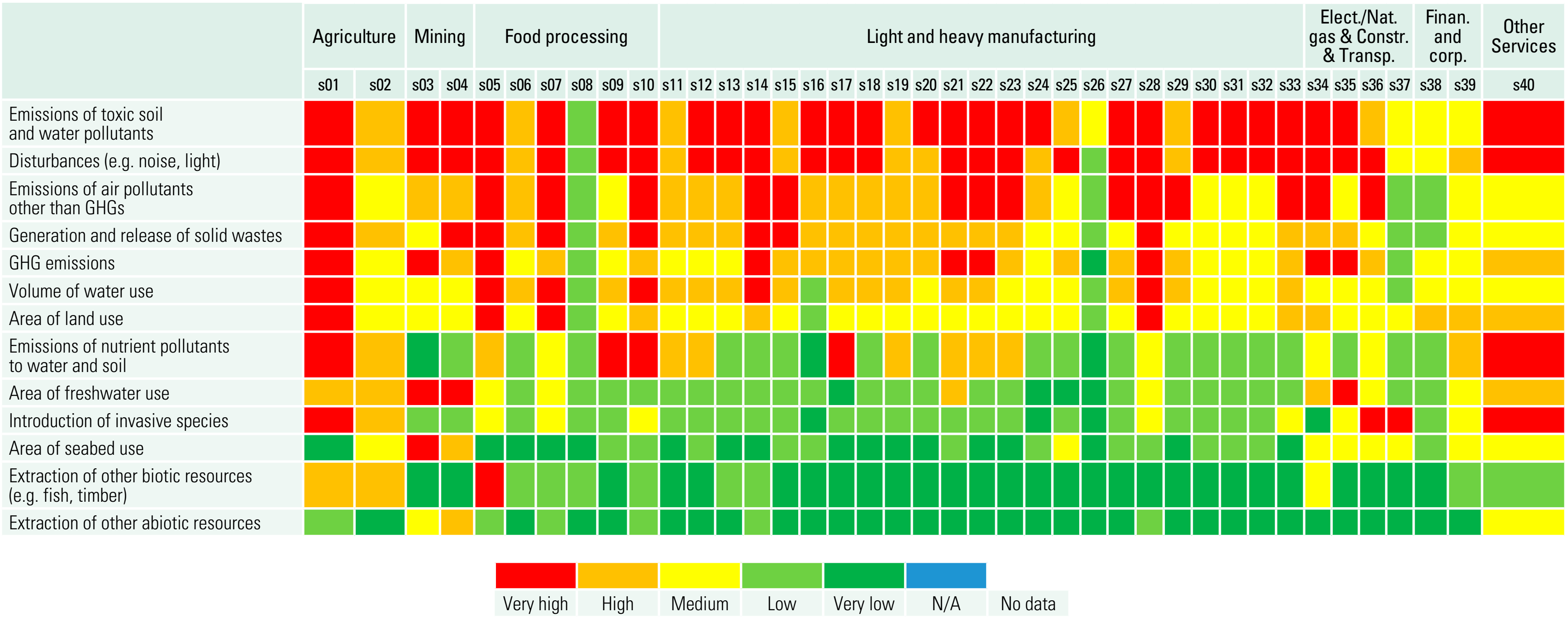
E. Costa Rica


Agriculture
Mining
Food processing
Light and heavy manufacturing
Elect./Nat. gas & Constr. & Transp.
Finan. and corp.
Other Services
s01 s02 s03 s04 s05 s06 s07 s08 s09 s10 s11 s12 s13 s14 s15 s16 s17 s18 s19 s20 s21 s22 s23 s24 s25 s26 s27 s28 s29 s30 s31 s32 s33 s34 s35 s36 s37 s38 s39 s40
Emissions of toxic soil and water pollutants
Disturbances (e.g. noise, light)
Emissions of air pollutants other than GHGs
Generation and release of solid wastes
GHG emissions
Volume of water use
Area of land use
Emissions of nutrient pollutants to water and soil
Area of freshwater use
Introduction of invasive species
Area of seabed use
Extraction of other biotic resources (e.g. fish, timber)
Extraction of other abiotic resources
Very high
High
Medium
Low
Very low
N/A
No data

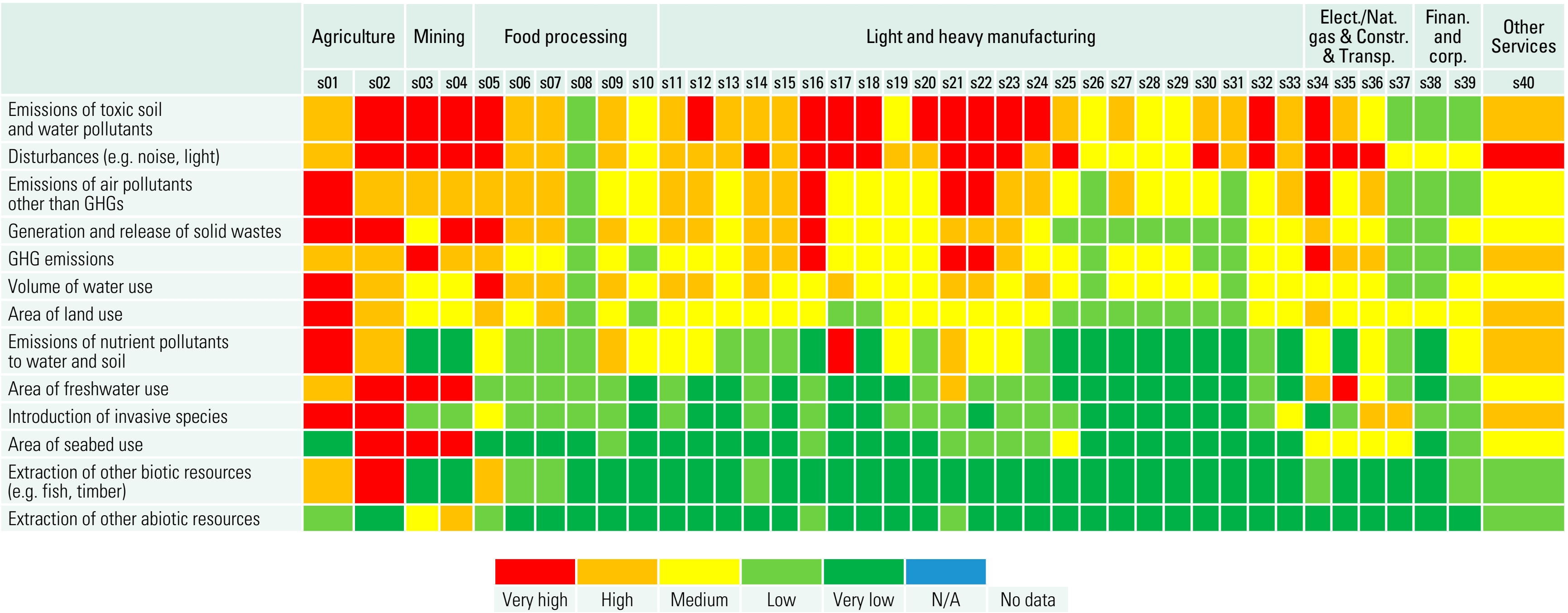
F. Dominican Republic



G. Guatemala


Agriculture
Mining
Food processing
Light and heavy manufacturing
Elect./Nat. gas & Constr. & Transp.
Finan. and corp.
Other Services
s01 s02 s03 s04 s05 s06 s07 s08 s09 s10 s11 s12 s13 s14 s15 s16 s17 s18 s19 s20 s21 s22 s23 s24 s25 s26 s27 s28 s29 s30 s31 s32 s33 s34 s35 s36 s37 s38 s39 s40
Emissions of toxic soil and water pollutants
Disturbances (e.g. noise, light)
Emissions of air pollutants other than GHGs
Generation and release of solid wastes
GHG emissions
Volume of water use
Area of land use
Emissions of nutrient pollutants to water and soil
Area of freshwater use
Introduction of invasive species
Area of seabed use
Extraction of other biotic resources (e.g. fish, timber)
Extraction of other abiotic resources
Very high
High
Medium
Low
Very low
N/A
No data

H. Mexico



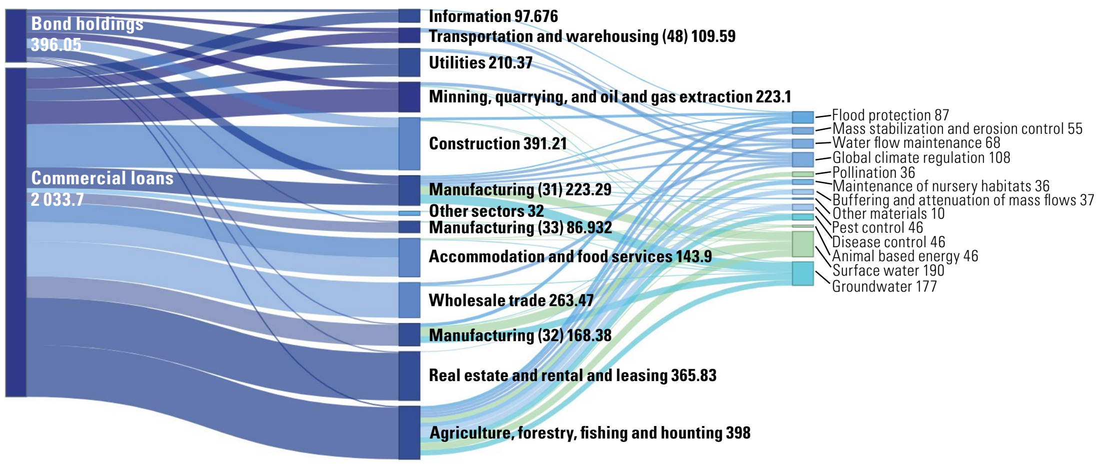
Source: Economic Commission for Latin America and the Caribbean, on the basis of United Nations Environment Programme. (2025). *ENCORE: Exploring Natural Capital Opportunities, Risks and Exposure*. https://www.encorenature.org/en; and regional input-output table.

Note: Owing to space limitations, only 8 of the 18 countries included in the analysis are shown in the table.

C. Translating dependence on ecosystem services into risks for the financial system

Dependence on ecosystem services and the direct and indirect environmental impacts of economic activities can be associated with the financial system through asset portfolios (loans, stocks and bonds), identifying which may be subject to greater risks from the impacts of climate change or the transition to lower-carbon economies. For example, in the case of Mexico, figure 40 shows the type of exposure of the banking system, based on its links with different economic sectors and their dependence on various ecosystem services (Martínez-Jaramillo et al., 2024).

Figure 40
Mexican banking sector: exposure to ecosystem dependencies

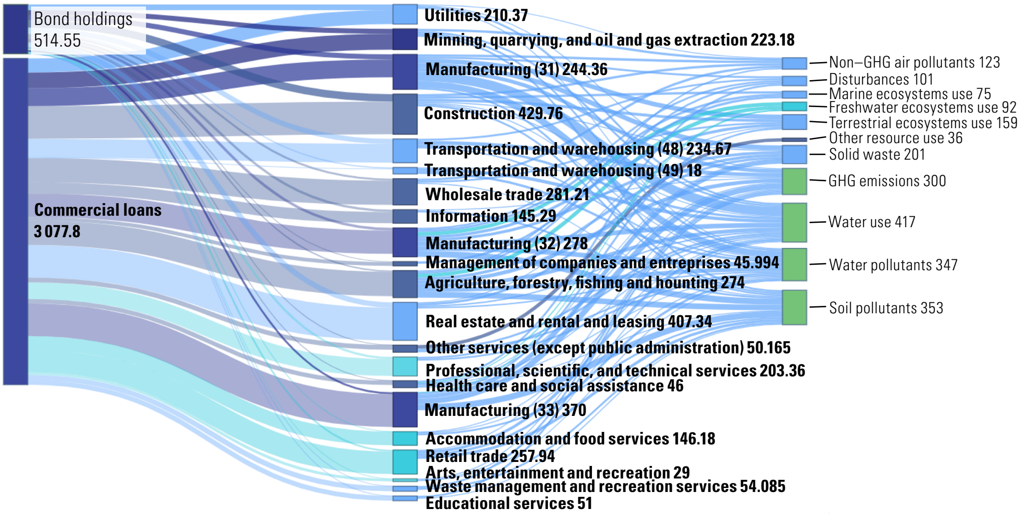


Source: Martínez-Jaramillo, S., Mora, F., Escobar-Farfán, L. and Montañez-Enríquez, R. (2024). *Dependencies and impacts of the Mexican banking sector on ecosystem services*. Bank of Mexico.

Similarly, high and very high environmental impacts from economic activities may be associated with financial risks (see figure 41). These relationships, as well as climate risk atlases, such as those being developed by Chile (Ministry of the Environment of Chile, 2020a) and Mexico (National Institute of Ecology and Climate Change and Secretariat of the Environment and Natural Resources, n.d.), allow businesses and the financial sector to develop clearer strategies for climate change adaptation, including ecosystem-based strategies. For more granular strategies, finer georeferencing of assets and investments is needed to afford a clearer picture of the scale of financial risk. The relationship between the financial sector, the economic activities in which it invests and nature can be improved through several means, the most immediate being social and environmental safeguards in operational financing. The proliferation of nature-based solutions opens up another interesting avenue for strengthening this relationship.

However, biodiversity is a more complex topic. As noted earlier, safeguarding biodiversity requires nature-based solutions to be designed to maintain ecosystem integrity. Furthermore, many biodiversity services are not subject to ownership rights, so it is difficult to capture their benefits on the market and, as a result, they are generally less desirable for investors. The State therefore bears a greater responsibility in biodiversity conservation. Recognition is also owed to local communities and Indigenous Peoples for their historical role in maintaining the health of ecosystems by including them in the design and implementation of different solutions. In some cases, such recognition may imply, for example, land titling and the elimination of asymmetries in information, power and bargaining power between these communities and financial institutions and their intermediaries.

Figure 41
Mexican banking sector: impact of economic sectors on ecosystems



Source: Martínez-Jaramillo, S., Mora, F., Escobar-Farfán, L. and Montañez-Enríquez, R. (2024). *Dependencies and impacts of the Mexican banking sector on ecosystem services*. Bank of Mexico.

The nexus between the state of nature and economic activities permeates all sectors (ECLAC, 2024; Expert Review on Debt, Nature and Climate, 2025). As discussed, the links between climate change, biodiversity and economics and finance extend far beyond the broadest, most obvious perception of their link to the primary sector. Biodiversity loss is also linked to increased GHG emissions, greater vulnerability to climate change, and a higher financial cost of the investments needed for resolute climate action (Expert Review on Debt, Nature and Climate, 2025; Bedossa, 2023; Volz, 2022). To end this vicious cycle, decision makers need the right tools to provide them with the information for designing and implementing policies and measures to steer investments capable of transforming economies. It is therefore imperative to enhance analytical capacities by embedding climate change and nature into economic scenarios.

The Expert Review on Debt, Nature and Climate (2025), in addition to including nature and the climate in macroeconomic and fiscal analysis, recommends reducing debt pressures to facilitate investments in nature conservation and climate action. It also proposes scaling up the use of tried-and-tested tools for simultaneously improving metrics on debt, the climate and nature, including affording a more active role to multilateral development banks, promoting private sector engagement in these investments and improving countries' readiness for more sustainable debt and investment management.

In this regard, investments in adaptation and resilience should be seen as pro-financial-stability measures, insofar as they reduce the economy's vulnerability to nature degradation and climate change.

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Concluding remarks

Sustainable development in Latin America and the Caribbean is taking shape against the backdrop of climate change, which determines the challenges and opportunities for the region. In this context, the region must move towards improving its population's well-being by strengthening competitiveness, inclusion and resilience in an increasingly fragmented world.

The good news is that climate action —aimed at both mitigation and adaptation— offers a landmark opportunity for transforming the region's economies. Investment and innovation in mitigation, adaptation and resilience not only reduces the risks associated with the impacts of climate change but also spurs growth, boosts productivity and strengthens social justice. This, however, will require sound institutions, effective governance and coherent intersectoral policies geared towards the effective fulfilment of the commitments that have been made.

Multilateralism and international cooperation are a mainstay of ambitious, coherent and just climate action. Without them, the region would have no choice but to concentrate on adaptation.

A failure to seize the opportunities for making the necessary transition that are offered by this new international economic environment also entails a risk. Transitioning to low-carbon economies and assimilating new technologies such as artificial intelligence will reshape economic structures, giving rise to new sectors while displacing others. This is why ECLAC has been calling for a big push for sustainability as a framework for a different development style, one that provides for social inclusion, environmental sustainability and productive innovation in value chains in which the region has a comparative advantage. Given the situation as it stands today, the region needs to further its development and position itself in the international arena based on its strengths: its renewable, low-cost energy potential, its endowment of critical minerals that will play a strategic role in the transition, its vast biodiversity that can drive its bioeconomy and nature-based solutions, its capacity for manufacturing new types of products, its efforts to promote circular economy measures and many more.

Realizing this potential will take a concerted effort, however. In order to successfully manage the complexity and speed of the changes that are taking place, the region will have to muster the necessary institutional capabilities and put in place effective systems of governance to support cooperation between the public and private sectors. A coherent package of pricing, regulatory, industrial and financial policies will be needed to facilitate the adoption of clean technologies and activities at the speed and on the scale demanded by global changes and climate goals.

In order to transform the region's economies in the ways required to make the transition to low-carbon, climate-resilient economies, the region will have to harmonize all the various measures needed to alter incentives and relative profitability ratios so as to redirect financing towards investments that are aligned with a decarbonized, inclusive, productive and dynamic world. Moving in this direction will demand the coordination of coherent sectoral policies, development strategies and climate goals.

Carbon pricing, adjustments in fossil fuel subsidies, new regulatory frameworks, greater expertise in analysing climate-related financial risk, climate-based criteria for assessing public and private investment projects and sustainable financial taxonomies to inform investors will all be part of the key policy package needed to enable the countries to honour the commitments they have made in their nationally determined contributions. The effective implementation of this package of measures will require the countries to take a close look at those measures' potential not only for reducing emissions, but also for avoiding regressive impacts and minimizing undesirable side effects.

Climate change and biodiversity loss are closely linked and mutually reinforcing. They must therefore be addressed together, especially in the Latin American and Caribbean region, where biodiversity is an important component of its abundant endowment of natural capital and the potential for using that endowment to enhance the well-being of its entire population.

In addition to curbing the loss of biodiversity and contributing to climate change adaptation and mitigation, nature-based solutions can further the economic and social development process, particularly in marginalized rural communities. In seeking to increase the as-yet meagre flow of fresh finance to biodiversity-rich areas, however, careful consideration must be given to the constraints imposed by the need to conserve those natural resources and ensure the sustainability of any use that is made of them in order to maintain the integrity of those ecosystems. One increasingly critical aspect of nature-based solutions relates to the prevention and control of forest fires, as the cost of inaction may be very high in terms of GHG emissions, biodiversity loss and economic impacts.

Ten years on from the adoption of the Paris Agreement and as nationally determined contributions 3.0 are being presented, the thirtieth session of the Conference of the Parties to the United Nations Framework Convention on Climate Change marks a turning point in terms of both ambition and implementation. The new targets need to go hand in hand with a solid proposition for multilateral cooperation and financing that will make more ambitious goals viable. The coordinated use of multilateral funds, the international and national development banking systems, and public expenditure and investment, together with the mobilization of local capital, must all be brought together with a focus on climate justice and shared responsibility. Efforts such as those dealing with the development of country platforms for financing the climate transition of the region's economies are strategic options that should be promoted.

All forms of climate action need to combine the focus on environmental sustainability, particularly in relation to the effort to combat climate change, with a consideration of the day-to-day concerns of the population in order to ensure that global strategies translate into local solutions that will improve people's quality of life and strengthen social cohesion.

Climate justice must be a guiding principle for public and collective action in order to ensure that the costs and benefits of the transition to low-carbon economies are distributed equitably, without leaving the most vulnerable communities behind or deepening existing inequalities. The Escazú Agreement is an essential tool for making headway in that direction because it upholds access to information, public participation and environmental and climate justice, particularly for vulnerable people and groups, while strengthening the transparency and legitimacy of the process and engendering confidence in the climate action taken by States.

Only through concerted, participatory and rights-based action will it be possible to translate international commitments into real change on the ground. The time to act upon the commitments that have been made and to honour those commitments is now.

The manifestations of climate change are becoming increasingly evident, and their negative effects are already being felt. The Latin American and Caribbean region is no exception and, in fact, is one of the most vulnerable regions of the world. Droughts, forest fires and powerful storms are intensifying and becoming more frequent. This is unfolding in a context in which the region is facing a number of development traps that could jeopardize the progress it has made thus far and limit the countries' ability to overcome the challenges of improving their population's well-being on a sustainable basis.

At this critical juncture, climate action offers an opportunity for spurring growth and innovation, creating jobs and enhance the region's international positioning. The investments, plans and policies needed to address the climate crisis can, at the same time, also help the region to advance its economic and social goals.

This document discusses the aggregate economic impacts of climate change and their relationship with the development traps faced by the region. It then goes on to examine the specific policies being deployed in the region to help countries to overcome these development traps.

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