



NATURAL RESOURCES OUTLOOK IN LATIN AMERICA AND THE CARIBBEAN | 2023



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Executive summary

Introduction

Latin America and the Caribbean is a region with a significant natural resource endowment, which has been increasingly exploited for both domestic consumption and exports. Natural resources have contributed to regional economic growth and have also helped to address some general social problems. However, the environmental pressure stemming from the exploitation of these resources continues, inequality persists and thus there is a need for a structural change in the region's production and energy mixes.

In view of the above, the first issue of the *Natural Resources Outlook in Latin America and the Caribbean* prepared by the Economic Commission for Latin America and the Caribbean (ECLAC), presents key data, observations and policy guidelines for a regional sustainable development strategy based on natural resources. The outcomes of this report are based on a combined and comparative analysis of the different types of natural resources (renewable and non-renewable), their endowment, their contribution to goods and services production, value added, employment, trade and government revenues, and the socioenvironmental impacts of exploitation of these resources in the period 2000–2021.

Key messages

Latin America and the Caribbean accounts for an important share of global natural resources, which are unevenly distributed across countries. Approximately 20% of all oil reserves, 25% of strategic metals and more than 30% of the world's primary forests are found in the region. Natural resources play an important role in the region's economic development: natural-resource-based economic activities and products account for around 12% at constant prices of 2018 of the regional added value and 16% of total employment. The share of economic activities that focus on the exploitation of natural resources has lost weight compared to other activities, especially services.

In countries where economic activities are dependent on natural resource exploitation, there is also dependency on tax and non-tax revenues from resource-related sectors. This report posits that there is room to increase capture of the economic rent from the exploitation of natural resources. In particular, these rents must be better harnessed with a view to diversifying the economic structure of such countries, thereby reducing natural resource dependency and exposure to market volatility.

In the period under analysis, the extraction and use of natural resources constituted a recurrent cause of socioenvironmental conflicts. The exploitation of the region's endowment of natural resources is not sustainable and the depletion of natural capital continues.

In terms of efficiency, indicators of energy intensity, agricultural land, material use and carbon dioxide (CO₂) emissions per dollar of gross domestic product (GDP) declined until 2019 in countries for which data are available. However, there have been increases in other indicators, such as domestic extraction and domestic material consumption per capita.

Natural resources represent about 50.7% of the region's total exports. There is evidence of regional reprimarization of exports and a loss of productive capacities. Among natural resource exports, exports of primary products with lower technological intensity and economic complexity outweigh natural-resource-based manufactures. Exports were dominated by biomass and mineral-based products throughout the period under analysis, while exports of fossil fuels slowed and the region has been a net importer of fossil fuels since 2015.

During the commodity price boom and post boom, the region made strides in reducing poverty and inequalities, with varying progress across the countries of the region. However, these positive trends were reversed during the coronavirus disease (COVID-19) pandemic and the global economic impacts of the conflict in Ukraine.

In a context of cascading crises, which have exacerbated the region's structural problems, it is critical to rethink the contribution of natural resources to economic recovery, structural change and sustainable development.

Environmental dimension

The prevalence of primary export specialization in several Latin American and Caribbean countries since colonial times adds pressure to the environment and critical ecosystem services, such as waste and gas absorption, CO₂ capture, the water cycle and land recovery, that are crucial for addressing current and future crises. The region is more inefficient than the rest of the world in its use of materials and water relative to GDP and is losing natural heritage.

The intensity in the use of materials declined from 2.4 kg to 1.9 kg per dollar of GDP, but the region's domestic material consumption increased (from 11.94 to 13.36 tonnes per capita). Biomass and minerals (metallic and non-metallic) continue to account for the largest share of domestic extraction in the region, with no significant changes between 2000 and 2019. Material productivity and environmental pressure in the region are thus primarily explained by the extraction of biomass and minerals and, to a lesser extent, fossil fuels. The region's physical trade balance is negative, as it exports more materials than it imports. Furthermore, the net outflow of materials has been increasing over time, and with it, ecological pressure.

Economic dimension

Regional economic growth has been associated with the balance-of-payments constraint, concentration of wealth, limited value addition and low relative investment in economic diversification and industrial policies. Over time, this led to productive and technological asymmetries between developing countries of the region and developed industrialized countries, generating a greater demand in the region for manufactured products and technology imports. Against this backdrop, and given the region's primary export specialization, countries have sought to increase natural resource extraction and trade to boost capital inflows and government revenues, perpetuating this cycle.

At constant 2018 prices, activities related to natural resources contributed 12.1% of the region's total economic value added in 2021, led by agriculture (5.5%), extraction of minerals, oil and gas (4.1%), and electricity, gas, water and sanitation supply (2.5%). This contribution decreased in the period under analysis (from 13.3% in 2000 to 12.1% in 2021), mainly on the back of reduced value added from the extractive sector, while there was sustained growth in the share of value added from agriculture. However, the share of natural resources in regional added value is lower than that of manufacturing (14.3% in 2021) and wholesale and retail trade, accommodation and food service activities (17.6% in 2021).

The analysis of regional natural resource exports and technological intensity confirms the region's reprimarization trend (increased dependency and specialization of natural resources exports). In the period 2019–2021, the combined regional exports of natural resources represented 50.7% of total exports and 10.1% of the region's GDP.

Latin America and the Caribbean is a net exporter of natural resources, particularly of biomass and minerals. Since 2015, the region has become a net importer of fossil fuels.

However, natural resources trade is very uneven across the region. In South America, all countries have a high degree of dependency on natural resource. In Central America and Mexico, dependency ranges from very low to moderate, with trends varying from country to country. In the Caribbean, the dependency indicator varies widely, from very low, as in Saint Kitts and Nevis to very high, as in Belize, Grenada and Guyana. At the same time, natural resource imports as a share of total imports trended upwards in several countries, representing 25.6% on average for the period 2019–2021, up from 19% for the period 2000–2002.

In addition, commodity prices and commodity trade flows are highly correlated. The region benefited from the variation in the net terms of trade considering the trajectory of commodity prices over the period (commodity price boom, subsequent price decline and recovery in the post-pandemic period). Nevertheless, after the commodity boom, falling prices and other (policy) incentives were not enough to bring about a change in production and trade structures.

The region's natural resource endowment is normally associated with a high economic rent potential and an opportunity to generate revenue for the government. Government fiscal revenues from natural resources follow the same trends as economic rents, making national revenues vulnerable to commodity price volatility. Economic rents from fossil fuels (oil, gas and coal) declined on average for the period under consideration. In contrast, there was an upturn in forestry and mineral rents, especially the latter. There is renewed interest in the region's mining capacities and resources, particularly with regard to the availability of minerals that are critical for the transition to renewable energies.

Social dimension

Natural-resource-based activities contribute positively to employment and income in the region. Nevertheless, the unequal distribution of natural resources—and in particular the benefits and costs of their exploitation—continues to generate conflict, especially among populations living in the territories where these activities take place. The exploitation of natural resources sparks disputes over the uses of and impacts on water, biodiversity, land and critical ecosystems, among others.

For most of the period under analysis, the economic growth fuelled by the commodity price boom led a significant reduction in poverty and income inequality. Between 2000 and 2021, the poverty rate fell from 43.9% to 32.3%, extreme poverty increased from 11.8% to 12.9%, and the Gini index fell from 0.53 to 0.46. However, there was an upswing in poverty (especially in extreme poverty) after the outbreak of the COVID-19 pandemic and a further rise is expected on the back of rising inflation and energy prices due to the conflict in Ukraine.

According to the Environmental Justice Atlas,¹ Latin America and the Caribbean is one of the regions with the highest number of socioenvironmental conflicts associated with mineral and metal extraction, biomass and land use, fossil fuels, water management and biodiversity. Almost one third (28%) of all environment conflicts documented globally occur in the region, with mining production processes and extraction of construction materials being the primary causes, accounting for 30.5% of all conflicts in the region.

¹ See [online] <https://ejatlas.org>.

A sustainable development strategy based on natural resources for Latin America and the Caribbean

Natural resources can play a fundamental role in transforming the productive structure towards more innovative, efficient and sustainable economic activities. This can be achieved both through natural-resource-based industrialization, focused on value addition and technological intensity, and through the channelling of tax revenues and capital flows towards production structure diversification.

The report presents a number of guidelines, which are highlighted below.

A new natural resources governance model is needed. It should be multilevel, multi-stakeholder, transparent, democratic, effective, and incorporate life-cycle and territorial approaches, which would allow for an improved system that prioritizes coordination and integration among countries of the region and among actors within countries.

The region needs effective natural resource management to prevent commodity price volatility from affecting macroeconomic stability and growth, manage exchange rate appreciation and avoid Dutch disease during commodity price booms, enhance the stability of government revenues, increase tax system progressivity and government revenues from natural resources, and ensure transparent investment of natural resource rents to achieve the Sustainable Development Goals (SDGs).

The region needs progressive structural change to eradicate poverty and foster equality, through a comprehensive transformation based on regional potential and natural resources-based industries. This should combine two elements: (i) “top-down” growth to advance the region’s positioning in the technological revolution, making it a frontrunner in the technological frontier by developing technological skills for the external market and by transferring rents from natural-resource-based activities to innovative sectors (biotechnology, nanotechnology, bioelectronics, new materials, renewable energies and electromobility); and (ii) “bottom-up” growth, which targets poverty and inequality through wealth creation and local development through productive clusters, promoting productive investment programmes based on local resources and capacity, and closing technology and productivity gaps between companies within and across sectors.

A socioecological transition and sectoral transformations are crucial. This must focus on improving environmental efficiency and reducing the ecological footprint, including carbon, material and water footprints, the preservation of critical natural heritage, and the transition from a linear to a more circular social metabolism that minimizes entropy and decouples economic growth from the use of natural resources.

I. Towards a just and sustainable energy transition in Latin America and the Caribbean

The transition towards renewable energy for all drives socioeconomic recovery, fostering new, clean and renewable technologies and industries along its value chains. This process is changing development models and transforming the energy mix of all sectors of the economy in the region. The productive development of new sustainable energy and related industries, combined with the creation of much-needed green jobs and an increase in the value added produced and retained in the region, has enormous potential to drive the transition to sustainable development. Therefore, energy, productive development and industrial policies must all be oriented towards sustainable development models in Latin America and the Caribbean.

A. Energy challenges in the region

Latin American and Caribbean countries have been producing renewable energies, in particular hydropower, for decades. More recently, biomass, solar and wind energy have rapidly increased their share in the energy mix, together accounting for 21% of renewable energy installed capacity in the region. While the share of the region's primary energy supply coming from renewable sources (33.2%) is higher than the world average (15%) in 2022, it is still predominantly fossil-based, with a trend towards the substitution of oil by natural gas. Hydropower generation continues to be the most profitable and cost-effective source of energy supply in the region. The price of hydropower remains lower than wind and solar photovoltaic energy, although the gap is narrowing and these renewable sources are all currently cheaper than fossil fuel-generated electricity.

The sectors that consume the most energy are transport (36%), which relies primarily on fossil fuels, the manufacturing industry (29%), and the residential sector (18%), together representing more than 83% of total consumption. Over the past three decades, the energy intensity of GDP in the region declined by 17%, while total energy consumption increased. This means that although economic output and energy use increased over time, the region has been able to produce more goods and services in its economy using the same or less energy per unit, resulting in a slight decoupling of economic production from energy use. However, there is a lag in energy efficiency in most economic sectors in the region as a whole. Only in the transport sector has there been some increase in energy efficiency, possibly in response to rising hydrocarbon prices, as well as technological advances and stricter regulations. Meanwhile, there has been a slight downtrend in energy efficiency in the manufacturing industry, agriculture and trade. Energy efficiency and progressive decarbonization in these three sectors are crucial for accelerating the energy transition in the region.

The growing proportion of renewable sources in electricity grids and the expansion of electrification in passenger transport and other economic activities have huge potential to decarbonize the region's energy mix. In 2021, an average of 59% of electricity was generated with renewable sources in the region, although the percentages varied significantly across countries, with some below 5% and others at 100%. Nevertheless, although the Latin American and Caribbean region accounts for less than 10% of global greenhouse gas (GHG) emissions, and its energy sector emits a lower proportion of said GHG than other regions, the current pace of progress towards renewable and clean energy systems is far below the accelerated transition required to meet the goals of the 2015 Paris Agreement.

In 2020, electricity generation from renewable resources in the region totalled 952 terawatt hours (TWh) of energy, with new installed capacity amounting to 11 gigawatts (GW), of which 53% were based on solar power and 31% on wind power. In 2021, generation capacity from renewable energy, particularly wind and solar, continued to grow; a total of 23.5 GW of new electricity generation capacity was installed, with 81% based on renewable energy. Of this amount, 5.9 GW were from wind power plants, 9.8 GW from photovoltaic power plants, 2.4 GW from hydroelectric power plants, and the remainder from thermal power plants using renewable sources (biogas and biomass).

Renewables and distributed generation systems present an opportunity to accelerate the transition to modern energy services in the region. The falling technology costs for solar photovoltaic energy and its storage (lithium batteries) make this the most cost-effective alternative for electrifying rural, remote or isolated areas that are still without power.

The region has made significant progress in recent decades on universal and equitable access to electricity, with 97.6% of the population having access in 2021, while in 2020, close to 88% of the Latin American and Caribbean population had access to electricity from clean energy sources. However, 16.1 million people remain without a connection to electricity, the majority of whom live in remote rural areas, where the costs of extending networks and infrastructure are high. Notably, access to electricity for the most vulnerable quintile in the region is, on average, nine times less than that of the highest-income quintile, and this gap nearly doubles for rural populations. Pre-pandemic indicators already showed that households were allocating 5% of their expenditure to electricity and 10% to household fuels, and those percentages increased for all population groups in the wake of recent external shocks.

Globally, Latin America and the Caribbean accounts for 9% of total foreign direct investment (FDI) announcements in renewable energy on average. However, renewable energy has been one of the sectors attracting the most investments in the region: it ranks third in investment announcements received and, since 2010, investments in clean energy have surpassed investments in fossil fuels. This trend has been gaining momentum—between 2005 and 2022, solar and wind energy attracted the highest share of investment project announcements in renewable energy, accounting for 40% and 31%, respectively, of total announcements, followed by biomass (12%).

B. Towards a just and sustainable energy transition to drive development in the economies of Latin America and the Caribbean

The regional energy transition aims to transform the energy ecosystem, making it more sustainable through better governance and new coordinated public policies, the adaptation and modernization of institutions and appropriate regulations.

To operationalize the above, ECLAC has proposed five pillars of simultaneous action for the energy transition at the national level: (i) universalize access to electricity based on renewables and reduce energy poverty; (ii) increase the share of renewable energy in the energy mix; (iii) improve energy efficiency in all sectors of economic activity, in particular transport, manufacturing industry and households; (iv) strengthen complementarity, integration and interconnection between the region's energy systems; and (v) enhance regional energy security and resilience against external shocks.

The progressive transition from fossil fuels and polluting energy sources to clean, renewable and sustainable energy sources generates additional benefits. These include: reduction of greenhouse gas emissions, development of productive sectors, protection of energy systems, decentralization and strengthening of infrastructure, creation of new green jobs and reduction of inequalities and energy poverty. This transition also contributes to regional energy security and resilience and helps to protect the environment and public health.

During the last decade, and more recently, technological advances in renewable energy and lower prices (especially for solar, wind and storage), advances in digital technologies and rapid cost reductions, driven in large part by public policy support, have attracted non-traditional foreign investment, which has had positive impacts on the region.

C. Policies and action to promote the energy transition in Latin America and the Caribbean

ECLAC is strongly advocating for public policies to accelerate the inclusive and sustainable energy transition that is much needed in the region.



Some of the key policies and action required for the energy transition in Latin American and Caribbean countries are indicated below.

- New national ecosystems for governance, regulation, collaboration and engagement between the public, private and civil society sectors are essential for a just and sustainable energy transition. Market signals are not enough to accelerate the transformation of energy systems in line with globally and nationally committed sustainable, energy and climate goals.
- Finance and pro-investment policies are needed to boost investment to ensure universal access to electricity through both distributed generation and grid generation to leave no one behind. ECLAC estimates that an annual investment of 1.3% of regional GDP over a decade would help to universalize access and improve regional electrical integration based on renewable generation (up to 80% of renewables in the energy mix, with an increase of solar and wind power from 13% to 39%), reduce CO₂ emissions by 31%, create 7 million new green jobs and generate income.
- Synergize renewable energy and efficiency technologies with industrial and productive policies, by accelerating the deployment of renewable generation, storage, carriers, transmission and distribution via grids (or distributed generation), and simultaneously implementing energy efficiency measures in all productive sectors and residential use in Latin American and Caribbean countries.
- Boost demand for renewables and develop energy value chains. There is enormous potential for the region to foster the development of renewable value chains (solar, wind, critical minerals, energy storage, green hydrogen) not only through long-term national policies and instruments to boost demand for renewable energy but also through the use of its natural resources endowment and engineering and innovation capacities.
- Strengthen long-term national energy planning and regional energy integration to increase economies of scale, address global energy uncertainties, volatility and external shocks, and establish a regional and/or subregional energy security and resilience system. The region is promoting and maintaining energy policy dialogue among policymakers, the private sector and stakeholders in the countries and subregions.

With regard to the paths for the energy transition, there have been four key energy developments in the region that have the potential to transform development models and national economies, as energy literally powers all economic activities and households and buildings: wind and solar energy, lithium and copper production, electromobility and green hydrogen. Growth in wind and solar energies in the region is outpacing that of non-renewables, with diminishing levelized cost of energy prices for both electricity generation and storage solutions. Latin America is home to 56.8% of the world's lithium resources and 36.6% of the world's copper reserves, currently contributing 32% of the world's lithium production and 41% of global copper production. The region is making slow progress in electromobility through vehicle imports, but has not yet sufficiently strengthened its productive capacity, since over 99% of electric vehicles are imported from China. In the region, Mexico and Brazil are the two vehicle manufacturing and exporting hubs, producing 10% of the world's vehicles and around half a million vehicles per month. GHG emissions from transport make up a large proportion of the region's emissions from energy, so electromobility offers an opportunity for reducing emissions in urban areas. It is estimated that renewables-based electromobility in Latin America and the Caribbean could avoid the emission of around 1.34 billion tons of CO₂ by 2050. Meanwhile, green hydrogen plants powered by renewables are well under development

in a number of countries of the region—notably Brazil, Chile, Colombia, Costa Rica and Uruguay—and 12 pilot projects are in operation, albeit not yet at a commercial scale. It is estimated that by 2050, green hydrogen will account for 18% of final global energy demand, reduce emissions by 20% to 25%, generate US\$ 2.5 trillion in annual sales and create more than 30 million green jobs worldwide.

Many challenges must therefore be overcome to accelerate the energy transition in Latin America and the Caribbean. This requires strengthening government capacities to invest in the necessary infrastructure and to regulate and align public policies with a view to encouraging private sector investment in renewable energy and stimulating demand.

II. Towards a just and sustainable water management transition in Latin America and the Caribbean

Most Goal 6 targets will not be met by 2030 in the countries of the region unless decisive action is taken towards a water transition. Progress has been made but it is insufficient, as many challenges persist in terms of water management in Latin America and the Caribbean. Key public policy recommendations and guidelines presented below include strengthening governance, implementing a basin-based approach to water management, water availability assessments—including conservation, efficiency, and reuse in line with the necessary investments—and multi-stakeholder partnerships to foster socioeconomic and environmental sustainability in this key sector.

A. Water challenges in Latin America and the Caribbean

Latin America and the Caribbean faces myriad challenges in the provision of clean water and sanitation, the water cycle and aquatic ecosystems. The region is characterized by significant deficits in the coverage and maintenance of infrastructure for safely managed drinking water and sanitation. Millions of people are being left behind, with their human rights to safe drinking water and sanitation unfulfilled. Specifically, 161 million are without safely managed drinking water and 431 million are without safely managed sanitation. Currently, only 42% of wastewater is safely treated and there are substantial disparities from country to country. In addition, access is highly unequal, with regressive tariff rates across income quintiles.

One central problem is deteriorating water infrastructure that results in water loss of up to 60% in Latin American and Caribbean countries. This is not only inefficient in terms of water extraction but also in terms of energy costs related to transport. This is combined with an uneven spatial distribution of water, particularly in dry urban areas and zones with greater economic activity, where there are high levels of water stress (i.e. high freshwater withdrawal as a proportion of available resources). Although the region as a whole has a relatively low average level of water stress, at 3.5% per year, for the Caribbean subregion it stands at 19%. According to the AQUASTAT database of the Food and Agriculture Organization of the United Nations (FAO)², seven Caribbean countries rank among the nations with the highest water stress, with less than 1,000 m³ of annual fresh water per capita. Another major issue is water use efficiency—in 2019

² See [online] <https://www.fao.org/aquastat/en/>.



the regional indicator (US\$ 12 per m³) lagged behind the world average (US\$ 19.4 per m³) and there is a lack of decoupling between water withdrawal and economic production. Some countries of the region, such as Chile, Haiti and Guyana, register levels below the quintile with the lowest efficiency at global level (equivalent to US\$ 6 per m³).

Water governance is a very complex area involving multiple actors and diverse functions at local and national levels, compounded by a lack of senior political authority in national water agencies, which usually do not have ministerial status. Poor governance has increased conflicts between the various uses and users along water courses with increasing negative externalities, such as pollution and overexploitation. The number of conflicts that broke out between 2000 and 2019 is, in fact, four times the number of conflicts recorded between 1980 and 1999. In addition, the region is lagging behind developed countries in terms of access to quantitative information for decision-making and targeted investment.

The increasing impacts of climate change and water-related disasters such as storms, floods and droughts negatively affect human settlements, infrastructure, water basins and ecosystems. In the region, 87% of disasters that occurred between 1990 and 2020 were related to water and climate change. These water- and climate-related hazards pose a particular threat to the people of the region. Similarly, low levels of wastewater treatment are harmful to human and environmental health, which underscores the importance of water in the areas of health, climate, economy and the environment.

B. Towards a sustainable and inclusive water management transition in Latin America and the Caribbean: governance recommendations and public policy guidelines

To meet Goal 6 by 2030 and address the abovementioned water challenges in the region, a transition in water management is needed to ensure sustainability, efficiency and universal access to water and sanitation. In that regard, ECLAC proposes four pillars of action.

The first pillar is to ensure the human right to safely managed drinking water and sanitation, leaving no one behind. This requires a substantial investment commitment of 1.3% of GDP per year over 10 years to universalize access and improve the quality of water, through efficient management. Such investment could generate up to 3.8 million jobs annually, bringing socioeconomic (gender equality, health, education) and environmental benefits in the short, medium and long term. The second pillar aims to make water more affordable through social tariff rates for the most vulnerable groups, thus promoting equitable access to drinking water and sanitation services to eradicate water poverty. To that end, regulatory and tariffs systems will have to be strengthened, as the first income quintile (lowest income level) currently has 25% less access to these services than the wealthiest quintile and it pays proportionally up to two times more. The third pillar aims to reverse the negative externalities associated with the overexploitation of water resources, pollution and conflicts, while conserving and restoring aquatic and related ecosystems and ecosystem services. In 2016, it was estimated that 5.7 million disability-adjusted life years had been lost in the region as a consequence of illnesses related to lack of access to safe drinking water and sanitation, valued at US\$ 1.8 billion. The fourth pillar is to implement incentives for innovative practices and investment in technologies and ancestral practices that increase productivity and resilience to climate change; ultimately moving from a linear to a circular water management paradigm.

For meaningful progress to be made simultaneously in the four pillars of the water management transition, the first step must be to reform current water governance systems, strengthen water authorities and organize stakeholders within and across basins through transparent coordination between sectoral and community users and local and national governments. Transboundary management of water bodies must also be strengthened. The adoption of a clear framework of priorities aligned with the human right to water is recommended, whereby when water is scarce, priority is given to human consumption, followed by subsistence activities and environmental requirements and lastly for productive uses.

Likewise, water supply management must be strengthened through economic instruments such as charges for use based on availability criteria, and taxes and fines for negative environmental impacts. In addition, promoting investment and regulation policies in the productive sectors that strategically depend on water is strongly encouraged, which would advance the adoption of technologies that promote water reuse and recovery and lead to more sustainable and efficient water systems. These measures can serve as a major catalyst for economic and employment recovery in the region. Technical and institutional innovation is also needed to foster circularity. For example, wastewater treatment can contribute to aquifer recharge, use of methane for biogas production, nutrient recovery, and increased water availability for agricultural, industrial and recreational uses and for human consumption.

A distinction must be made between the delivery models for urban and rural areas in Latin American and Caribbean countries. In urban areas, there are mainly formal providers under centralized systems, while rural areas are served by hundreds or thousands of providers who are primarily responsible for collecting and distributing water, in many cases in informal and quite precarious conditions, with no consideration of wastewater treatment. Improving the quantity and quality of service provision requires innovative alliances, regulatory systems and resource mobilization. Securing long-term sources of financing will be paramount to focus public investment on closing the infrastructure gap, particularly in rural areas and in many urban areas of low-income countries where the returns on such investment are also public and represent social externalities. Furthermore, infrastructure investments in less densely populated areas do not necessarily have to be grey, as there are greater opportunities to integrate nature-based solutions for water conservation and wastewater treatment. Private investment will be most rapidly mobilized in upper-middle-income urban settings, which already have extensive coverage, self-financing tariffs in effect, strong regulatory institutions and favourable public opinion. These service providers can then undertake investments in the treatment and reuse of wastewater, following the principles of the circular economy that allow for business expansion. As infrastructure and subsidies—where the government plays a fundamental role—become available, providers can expand service to the most vulnerable segments.

C. Regional Water Action Agenda

ECLAC has been working hand in hand with the region's governments, non-governmental organizations and the private sector, in cooperation with the United Nations agencies, funds and programmes and international entities operating in the region. The Regional Water Dialogues, convened and held at ECLAC headquarters in Santiago in February 2023, had more than 3,700 online participants and 200 in-person participants, from over 30 Latin American and Caribbean countries. The main outcome of the 2023 Regional Water Dialogues was the collectively drafted Regional Water Action Agenda



for Latin America and the Caribbean, which included voluntary commitments expressed by the countries, civil society and regional institutions and organizations.

The Regional Water Action Agenda for Latin America and the Caribbean³ was circulated at the United Nations Water Conference in March 2023. This Agenda is aligned with and reinforces various international treaties, agreements and strategies pertaining to water management, and is a call to action to mobilize all political, technical and financial resources available in and for Latin America and the Caribbean. It was prepared taking into account the need and opportunity to incorporate the voices of all stakeholders, especially rural communities, the voices of civil society and of people of African descent, Indigenous Peoples, women, girls, boys and young people.

The main lines of action and commitments that emerged in the 2023 Regional Action Agenda for Water were the adoption of democratic water governance through the strengthening of regional, subregional, national and local institutions, building of technical capacities for decision-making, and vigorous efforts to advance in the transition to sustainable and inclusive water management. It was also stressed that the region urgently needs to step up the adoption of integrated water resources management (IWRM) practices to increase resilience to climate change and mitigate the impact of disasters, as well as the adaptation of new investment models and public-private-civil society partnerships involving various civil society and local community stakeholders which seek to access financing and promote a new culture and appreciation of water. It also highlighted the political processes for decision-making, monitoring and management of shared transboundary waters, recognizing community management and Indigenous practices, in a framework of dialogue with a focus on building inclusive water alliances.

III. Biodiversity as the basis for the transition towards sustainability and social, economic and environmental resilience

A. Biodiversity: Latin America and the Caribbean's critical natural heritage

Latin America and the Caribbean is one of the most biologically rich regions of the planet. It is home to the largest number of marine and terrestrial ecoregions (the latter on merely 15% of the world's land surface), 34% of the planet's primary forest, and 51% and 41% of amphibians and birds, respectively. Brazil, Colombia, Ecuador, Mexico, Peru and the Bolivarian Republic of Venezuela are among the 17 countries that are considered megadiverse owing to their great biological richness. However, the region's biodiversity heritage and assets are not taken into account in development planning; instead, the region is also noted for the extent of the threat to biodiversity.

Biodiversity provides essential benefits for humans and nature, and most importantly, it is a direct and indirect source of resources and well-being for the most vulnerable population groups through self-employment and diversified income and consumption options. Without healthy biodiversity, ecosystem services begin to degrade or collapse. Therefore, for regions such as Latin America and the Caribbean, the sustainable use of biodiversity is essential, given that millions of people depend on it as a way of life and

³ See [online] https://www.cepal.org/sites/default/files/events/files/regional_water_action_agenda_lac.pdf.

for their livelihoods. About one fifth of jobs in Latin America and the Caribbean is heavily dependent on ecosystem services (e.g. agriculture and tourism), although the vast majority are in micro-, small and medium-sized enterprises (MSMEs) and subsistence sectors that have little capacity to carry out a sustainable transition without support. Furthermore, those who benefit the most from the unsustainable use of biodiversity are not those who suffer most from its deterioration, which is the root cause of many profound conflicts. The region is known for violent environmental conflicts: between 2012 and 2021, 68% of global murders of environmental and land defenders were committed in Latin America and the Caribbean.

The drivers of biodiversity loss and those that underlie other crises are the same—climate change, pollution, health, insecurity and social conflicts—which is why they can no longer be ignored. In the region, the leading direct cause of degradation and loss of biodiversity is land use change (disappearance of habitat), with overexploitation in second place, followed by pollution and climate change on a similar scale and, lastly, the introduction of invasive alien species. Because of their complexity, the indirect causes of degradation and loss of biodiversity, which are owed to cultural, economic, governance and other factors, such as institutional shortcomings in measuring and counteracting perverse incentives and negative externalities, have not been sufficiently addressed. However, if left unaddressed, there will be no solution to the biodiversity and other crises. The existence of an incomplete environmental institutional framework is a significant indirect driver. In many countries the framework is new, lacks real political weight and has large human, infrastructural and financial resource gaps, as well as gaps in mainstreaming, coherence and coordination with other sectors.

Other key indirect drivers derive from an economy that fails to adequately value or integrate biodiversity, both globally and in Latin America and the Caribbean. For example, globally, government incentives that are potentially harmful to biodiversity (amounting to some US\$ 500 billion) are five to six times higher than biodiversity-friendly incentives provided by governments, international organizations and private sector organizations. Furthermore, investment in biodiversity in the region declined by 35% during the pandemic (based on an average for 11 countries).

B. Biodiversity governance in the region: public policies, instruments and key stakeholders

Development policy decision-making has lacked the information and the political will required to internalize the consequences of biodiversity loss. Difficulties in generating and monitoring biodiversity indicators include: the synergistic relationship between the drivers of biodiversity loss and the resulting complexity of forecasting; the intrinsic complexity and local complexity of ecosystem processes, and how they function and are linked with large-scale processes; the variable timing of response cycles; poor understanding of the role of biodiversity in well-being; and the scarcity of information and systematic follow-up.

All the countries of the region have prepared national biodiversity strategies and associated action plans, 32 of them having done so between 1999 and 2005. Twenty-nine have updated their strategies, while Brazil, Colombia, Cuba and Guyana have finalized their third versions. The countries that have not updated their strategies are in the Caribbean, where institutional capacities are more limited by resource constraints.

One of the main government responses to the environmental crisis has been the creation of protected areas, which, while necessary, are not enough to ensure the health and resilience of biodiversity and have no effect on the trend patterns of the business-as-usual model. At the regional level, just over 24% of terrestrial and marine areas of Latin America and the Caribbean are under some category of protection.



However, there are profound differences between countries: in 11 countries, less than 1% of marine territory is protected, while in 5 countries, more than 20% is protected. At national level, more emphasis has been placed on terrestrial protected areas than marine areas, despite the fact that 23 of the 33 countries of the region have a larger marine area (exclusive economic zone) than land area. Other effective area-based conservation measures have been adopted with a comprehensive vision of the landscape which takes into account local biocultural richness and complementarity in protected areas. Such measures include payment for environmental services, nature-based solutions, ecosystem-based adaptation to climate change, restoration, green-blue infrastructure and land use planning.

Indigenous Peoples are critical agents of change. They occupy one fifth of the surface area of Latin America and the Caribbean (404 million ha) and more than 80% of their territory is covered by forests. Theirs is a crucial role in the stewardship and sustainable use of biodiversity, but the governance needed for this role is yet to emerge. The private sector (producers, academia, young people, women and civil society) is essential to correct the course of unsustainable development models.

C. Policy recommendations for the public sector

States must ensure ecosystem services in good condition for all. In July 2022, the General Assembly of the United Nations, by its resolution 76/300, recognized the human right to “a clean, healthy and sustainable environment”. Priority must be given to stopping the biodiversity crisis and ensuring ecosystem services for the entire population, especially in the territories of marginalized groups such as Indigenous Peoples and local communities.

States must take urgent action to address the direct and indirect causes of biodiversity loss in a cross-cutting manner. Measuring the negative effects of production and economic activity and developing statistics and national accounts that integrate biodiversity are a critical first step, followed by the design and implementation of public policies to reverse those negative effects and promote sustainable development.

Strengthening and completing the institutional framework and fostering compliance with regulatory environmental and biodiversity frameworks both in terms of scope (political power) and capacity (knowledge, human resources and financing), and based on the principle of non-regression, is a turning point towards transformative change. It is vital to adapt international frameworks, national strategies and other policies and programmes at the local level.

Investing in biodiversity is essential to for it to yield multidimensional returns. Investment to increase natural heritage (biodiversity and ecosystem services) calls for the maintenance, sustainable use, and recovery of this heritage, that is, investing in: (i) conservation; (ii) use and regulation; (iii) recovery and restoration of critical habitats; and (iv) redirection of investment that is harmful to biodiversity. There is therefore a return on investment in multiple dimensions —social, environmental (whether valued or not), human rights and market economics— which tends to increase in the long term. This, in turn, helps to promote productive diversification and ensure employment, recover the natural heritage, promote regional productivity and increase social, economic and environmental resilience.

The State, through its role as regulator and promoter of comprehensive, coherent and progressive structural changes, has an opportunity to transform challenges into opportunities in coordination with all stakeholders. For this, clear political will and commitments are needed. Another critical task is to provide access to open, free,

robust and curated biodiversity and environmental data for the benefit of the various levels of government, industry, academia, community groups and society at large. This drives technological innovation, the co-production of knowledge and a common vision centred on multidimensional development.

D. Policy recommendations for the private sector

There is a need to transform the financial system by integrating the value of biodiversity and the risks associated with its loss into capital market regulations to trigger systemic changes. Central and development banks have a critical and rapidly evolving role to play in areas such as the development of environmental and climate taxonomies.

There is a need to strengthen the current and growing trend in which consumers have a greater capacity to influence markets, encouraging them to become more sustainable, for example, through labelling and traceability. This trend seems irreversible. For example, between 2016 and 2020, the popularity of Google searches for sustainable products grew by 71% globally.

The granting of exclusive use of resources and land tenure for sustainable management to women, cooperatives, Indigenous Peoples and local communities has proven to be an excellent tool for reducing inequality, halting biodiversity loss, furthering inclusion and sharing benefits, and is closely aligned with the human rights agenda.

E. Policy recommendations for international stakeholders

Although there are currently sufficient agreements in place for changes to be implemented, they must be aligned and much remains to be done to ensure coordination and consistency. Several international treaties and studies have emphasized that the decade to 2030 is the window of opportunity to change course and recover loss or degradation of natural heritage; beyond then it may be too costly, or too late.

Rapid implementation of the Kunming-Montreal Global Biodiversity Framework (2022–2030), adopted in December 2022, is needed. The linkages with the 2030 Agenda and the role of Indigenous Peoples and local communities, women, young people and companies that transparently disclose their dependencies and impacts on biodiversity are highlighted in the Framework. In the short term, States parties will be required to update or align their national biodiversity strategies and action plans under this new framework.

Countries of the region that have yet to adhere to and implement the Regional Agreement on Access to Information, Public Participation and Justice in Environmental Matters in Latin America and the Caribbean (Escazú Agreement), which entered into force in April 2021, should do so quickly to ensure access to timely and reliable environmental information, public participation in decision-making processes, access to justice and protection for environmental human rights defenders.

Countries should agree on and implement concrete and differentiated methods, with disaggregated data, for measuring progress or setbacks that allow for a more realistic inter- and intraregional comparison, taking into account the different measures implemented by countries. In this regard, the promotion of development indices other than GDP and which incorporate environmental parameters is recommended.



IV. Bioeconomy and agroecological transition: sustainability, diversification and value addition in agriculture

Agriculture contributes significantly to the economy of Latin America and the Caribbean, generating in 2021 22% of the value of total exports, 5.5% of GDP and 14% of employment. Since 2000, the sector has increased its share in global exports, but its contribution to GDP and employment have decreased, in line with the trends in structural change. The sector has been one of the most resilient to the impacts of COVID-19. In 2020, agricultural trade grew 2.8% year-on-year, while trade in other sectors fell by 7.4%.

On average, Latin America and the Caribbean is a net agricultural exporter. However, exports are concentrated in a few commodities and have become increasingly concentrated. In the period 2000–2009, 15 products alone accounted for 60% of the region's total agricultural exports in value terms, compared with 35 globally; that number decreased to 13 products in the period 2010–2019, compared with 39 globally. This is even more pronounced in volume terms, as regional exports were concentrated in six products in the period 2000–2009 and four in the period 2010–2019, compared with 19 globally for both periods. There is a clear predominance of soybean products: in the last decade, soybeans, soybean cake, and soybean oil represented 26% of agricultural exports in value terms and 38% in volume terms.

Compared with the rest of the world, the endowments of agriculture-related natural resources are more than proportional to the population. Latin America and the Caribbean accounts for just over 8% of the world's population and only 4% of the world's rural population. However, its endowment of natural resources related to agriculture is much greater: it has 16% of the world's agricultural land, 33% of its land that is suitable for agriculture but not used, 23% of its forest area, between 40% and 60% of its biodiversity (see section III on biodiversity) and about 30% of its freshwater resources (see section II on water). The challenges for agriculture in the region are to increase production, use resources more efficiently, reduce its environmental footprint (e.g. water and carbon) and address the problems of global environmental change (e.g. climate change and biodiversity loss and degradation).

Cropland has increased, especially in South America. Agricultural land use has remained steady, averaging around 33% of total land use for the region. Between the periods 2000–2002 and 2016–2020, the share of cropland in agricultural land use throughout the region grew from 19% to 22%, that of annual crops remained constant at around 3%, and that of pastureland declined from 78% to 75%. The trend follows a similar pattern in South America, where cropland increased (from 17% to 21%) and pastureland decreased (from 79% to 75%). The most significant development over the last two decades has been the expansion of soybean cultivation in South America, especially in Brazil, driven by demand from the People's Republic of China. Soybeans currently account for 35% of the cropland in the region, which explains the changing trends in land use and the growth in regional agricultural exports.

The intensity of the use of synthetic fertilizers has increased, as has dependence on imports. Synthetic nitrogenous fertilizers are a significant source of nitrous oxide (N₂O) emissions from agriculture. The intensity of fertilizer use (measured in kilograms per hectare of cropland) increased in all regions of the world in the last two decades. While this growth was highest in South America (69%) and Central America (40%), compared with a global rate of 24%, the intensity of use remains highest in Asia and North America. Most of the region's synthetic nitrogenous fertilizers are imported.

In South America, for example, the proportion of those fertilizers that was imported jumped from 70% in 2000–2002 to 95% in 2017–2019.

Globally, agricultural greenhouse gas emissions from Latin America and the Caribbean outweigh the region's share in total emissions. The share of agriculture in total regional GHG emissions fell from 34% in the period 2000–2009 to 31% in the period 2010–2019, making it the second largest source of emissions behind energy. However, at the global level, agriculture accounts for 18% of Latin America and the Caribbean's GHG emissions, which is more than double the region's contribution to total emissions (7%). In addition, over the last two decades, agricultural GHG emissions in the region grew at a marginally faster rate (8.1%) than global agriculture emissions (7.7%).

There has been a significant decrease in CO₂ emissions from agriculture, forestry and land use in Latin America and the Caribbean. The leading source of emissions from Agriculture, Forestry, and Other Land Uses (AFOLU) in the region is carbon CO₂ (43%), followed by methane (CH₄) (41%) and nitrous oxide (N₂O) (16%). At global level, the main source is CH₄ (58%), followed by N₂O (30%) and CO₂ (12%). Over the last two decades, the share of CO₂ emissions has decreased, while those of CH₄ and N₂O have risen both at the global and regional levels. In absolute terms, AFOLU emissions fell by 25% in Latin America and the Caribbean and by 4% globally, primarily due to the reduction in CO₂ emissions, which were down 47% in the region and 45% worldwide. The drop in global AFOLU emissions of CO₂ is almost entirely explained by the decline in Latin America and the Caribbean, as more than 90% of these emissions are from the region.

While emissions of nitrous oxide from manure are high but on the decline, the growth rates of emissions from crop residues and synthetic fertilizers are high. The leading sources of N₂O emissions in Latin America and the Caribbean for the period 2000–2019 were manure (72%) and synthetic fertilizers (16%); in comparison, global emissions were 50% and 30% respectively. The share of emissions from crop residues in the region is low at 7%, but has shown the greatest increase in absolute terms over the last two decades, up 46% compared with 20% globally. There has been a significant increase in N₂O emissions from synthetic fertilizers in the region, which grew at a rate of 45%, compared with 19% globally, while emissions from manure grew at a slower pace than at global level (7% in the region compared with 9% globally). Overall, the growth rate of N₂O emissions from any source in the region is similar to the global increase (13%) from the period 2000–2009 to 2010–2019.

Methane emissions in Latin America and the Caribbean can be attributed almost entirely to livestock. The three principal sources of CH₄ emissions are enteric fermentation, manure and rice cultivation, the first two of which are produced by cattle. In the region, enteric fermentation accounts for the largest share of emissions (93%), while rice cultivation accounts for only 3%; at global level, these account for 71% and 18% respectively. Livestock contributes 95% of regional CH₄ emissions, compared with 78% of global emissions. In absolute terms, the highest growth rates in Latin America and the Caribbean are for emissions from manure (9%) and from enteric fermentation (6%), which stand at 6% and 7%, respectively, at global level; meanwhile emissions from rice cultivation have decreased slightly in the region (-1%) but have risen by 5% globally.

The region's agricultural sector faces important socioeconomic and environmental challenges. Structural challenges exist in at least two areas. First, there are those related to the characteristics of the production model, as expressed in land use patterns, land use change, GHG emissions, structural heterogeneity and productivity gaps; second, there is the productive development dimension, reflected in the fact that while the region is, on average, a net exporter of agricultural products, exports remain concentrated in a few commodities with low value added. New challenges are also emerging from global



environmental change (e.g. climate change, biodiversity loss, and fragmentation and deterioration of ecosystems), new consumer demands (e.g. healthier, more nutritious and safer foods that is produced more sustainably), and the recent crises caused by the COVID-19 pandemic and the conflict between the Russian Federation and Ukraine. Meanwhile, advances in biological sciences and digitalization are opening up new opportunities for the development of the sector and related value chains.

The bioeconomy paradigm allows several structural and new challenges to be addressed simultaneously. One example is the possibility of improving carbon sinks associated with primary productive activities (e.g. forests, soils, seas) as a response to climate change. A second is that the environmental problems caused by the use of nitrogenous synthetic fertilizers and the increase in N_2O emissions offer opportunities for the development of biofertilizers and other inputs based on biological resources, which will also help to reduce the dependence on synthetic fertilizer imports. Third, the prominent role of cattle in N_2O and CH_4 emissions provides opportunities for enhancing the digestibility of pastures and feedstock and for genetic modifications to improve cattle methanogenesis. Fourth, negative externalities associated with the increased generation of agricultural wastes (including manure) can be harnessed for the production of bioenergy and biomaterials, and other bioproducts with high value added. Lastly, changes in consumption patterns create possibilities for productive diversification and the development of higher value added products, such as foods with better nutritional qualities, taste and texture.

The bioeconomy is proposed as a new technological and productive paradigm and an opportunity for social inclusion by fostering the development of agriculture and rural territories. The proposed approach is based on three pillars: (i) agroecology as a model of agricultural production; (ii) digitalization as the technological framework for monitoring the agroecological transition; and (iii) the use of modern biotechnologies, digital technologies and other new technologies to increase productivity, support climate action and enhance sustainable management of water, soil and biodiversity resources. The approach aims to move towards more sustainable and resilient agricultural production processes, productive diversification and sophistication, value addition and social inclusion. It also seeks to achieve a better balance between sustainability and productivity, resilience and profitability in agrifood systems, with greater economic proximity between producers and consumers.

There is a need to build resilience to global shocks. Therefore, six key considerations are proposed to promote the development of agriculture and rural areas in the post-pandemic and post-conflict era. First, the government plays an irreplaceable role in formulating responses to global crises, and the quality of public policies will be decisive for a successful recovery. Second, reduced fiscal space and demands for greater transparency make it essential to give local communities, companies and other civil society stakeholders an active role. Third, recent crises have highlighted the need to reduce the vulnerability of supply chains by improving traceability, logistics, integration with supplier companies and supply through local production. Fourth, the targeting criteria of public programmes must be reassessed to strike a new balance between the provision of public and private goods, with a focus on strengthening small businesses linked to family farming, small and medium enterprises (SMEs) and rural dwellers. Fifth, there is a need for a new generation of knowledge- and evidence-based public policies and the use of community resources to expand the coverage of public programmes, reduce their costs and increase their quality and impact, with an emphasis on nature-based production solutions, short supply chains, and partnerships. Sixth, the private sector should go beyond current corporate social responsibility practices, with greater transparency vis-à-vis society regarding labour and environmental practices and a commitment to collective strategies implemented in coordination with local communities.

V. The contribution of hydrocarbons to an economic and energy transition

A. Context and main global trends in the hydrocarbon industry

This chapter covers the period from 2000 to 2021, marked by various world events—such as the commodity boom, the 2008–2009 global financial crisis, the COVID-19 pandemic and the conflict between the Russian Federation and Ukraine—which have had significant impacts on global markets, particularly hydrocarbon markets. Global energy supply and demand are at the mercy of geopolitics because they are based on commodities such as oil, natural gas and coal, with production relatively concentrated in a small number of countries owing to the existence of the Organization of the Petroleum Exporting Countries (OPEC) cartel. This contributes to the cyclic nature and volatility of fossil fuel prices, the economic and social impacts of which varies in different regions of the world, depending on whether the economies are net exporters or importers of these energy sources.

The dilemma for countries regarding dependence on the prices and international trade in fossil fuels, be they suppliers or consumers or both, has been compounded by commitments to the sustainable development and climate change agendas, in which the transition to low-carbon energy systems plays a fundamental role, and by the search for ways to achieve greater energy security and sovereignty in light of the effects of cascading crises. The succession of the two most recent crises (the pandemic and the war in Ukraine) had a major impact on fossil fuel prices. A sharp rise followed the collapse at the onset of the pandemic. This was caused by imbalances in supply and demand resulting from containment measures, the subsequent rapid recovery of economic activity, and the sanctions against the Russian Federation and its reaction regarding fuel supply to Europe. However, energy geopolitics have played a key role in these price trends, fuel shortages on markets and the global energy crisis. By way of example, the Organization of the Petroleum Exporting Countries Plus (OPEC+), which includes 10 other producing countries, one of which is the Russian Federation, controls the oil production of its member countries through quotas. Those quotas have not been relaxed at the rate that would have been required for the post-pandemic surge in crude oil consumption. Similarly, interventions by the member countries of the International Energy Agency (IEA), while providing some relief to the markets, have not been sufficient.

Fossil fuel prices are highly correlated with investment in the energy industry: prior to the global energy crisis, the post-commodity boom period saw a decline in global investments in fossil fuel supply. Total investment (which includes investment in upstream, midstream, downstream and generation operations) fell by 36% between 2014 and 2022 and the share of fossil fuels in total energy investments fell from 60% to 40%, as investments in renewables (low-carbon fuels and generation) and end-use sectors gained a larger share.⁴

Upstream investment in oil and natural gas, which is related to developing reserves and production capacity, also declined after the commodity boom. Historically accounting for the bulk of investments in fossil fuel supply and, consequently, of the variations in investment in fossil fuel supply and in total energy, upstream investment contracted by about 53% between 2014 and 2022. This downturn has had an impact, for example, on the discoveries of conventional resources, which have been gradually declining since 2010 and have stood at under 15 billion barrels of oil equivalent (BOE) per year since 2013. In the 2000s, these resources were twice as high, on average. This is confirmed by BP data on world oil and natural gas reserves), which grew by 25.8% and 30.4% respectively between 2000 and 2010 and by only 5.8% and 4.5% respectively between 2010 and 2020.⁵

⁴ International Energy Agency (IEA), *World Energy Investment 2022*, Paris, 2022.

⁵ BP, *Statistical Review of World Energy 2022, 71st edition*, 2022 [online] <https://www.bp.com/en/global/corporate/energy-economics/statistical-review-of-world-energy.html>.



B. Overview of the hydrocarbon industry in the region

In Latin America and the Caribbean, the decline in investment in fossil fuel supply following the commodity boom has been somewhat more pronounced in relative terms. Between 2015 and 2019, fossil fuel investments in the region averaged 5.6% of the world total and accounted for as much as 58% of total energy investments, compared with 48% in 2021 and 2022. Investment in end-use sectors in the region fell by 32.0%, counter to global trends, while regional investment in renewables (low-carbon fuels and generation) grew by 36.0%, in line with global trends, but at a higher rate.⁶

Upstream investment in oil and gas in the region is consistent with global patterns, albeit at much higher levels. It accounts for the largest share of investments in fossil fuel supply and in total energy, representing on average 8.9% of global upstream investment. However, upstream investment as a share of fossil fuel investment in the region fell from 79% in 2015 to 71% in 2022.⁷

Most upstream oil and gas investment is led by national oil companies, which have historically played a key role in the investment, development and performance of the hydrocarbon industry in the countries of the region. While they continue to do so, they have been investing less since the end of the commodity boom. Their share of investment in all segments, not only upstream, fell on average by more than 15 percentage points from the period 2015–2017 to the period 2019–2021, based on an estimate for a sample of seven companies. These companies are present not only in countries that have significant reserves of or produce fossil fuels, but their presence, together with the production capacity of fuels (raw materials and derived products), is a key indicator for determining the size of the hydrocarbon industry in each country and classifying it as either a net exporter-producer, a net importer-producer or a net importer and non-producer of oil and gas.

Beyond the differences between countries, the main source of the total energy supply of the region as a whole continues to be fossil fuels, which account for just under 60% of the total supply. This is despite the strong penetration of renewables (hydropower plants of all sizes and various other renewables) in the last 20 years. This expansion of renewables caused the share of fossil fuels in the total supply to shrink by 19 percentage points, notwithstanding the increase of natural gas in electricity generation, with the share of coal remaining stable and the share of oil decreasing sharply. The dependence on fossil fuels means that the countries of the region have to import both fossil fuels, both crude and derivatives, but mainly the latter.

The region has significant oil and natural gas reserves, most of which are concentrated in the Bolivarian Republic of Venezuela, with the rest in a few countries (mainly Argentina, Brazil, Colombia, Guyana, Mexico, Peru, the Plurinational State of Bolivia, Suriname and Trinidad and Tobago). The Bolivarian Republic of Venezuela holds 17.5% of the world's oil reserves and the other countries of the region hold 1.5%. The ratio of reserves to production (R/P ratio) currently indicates that the region could produce crude oil for up to 113 years; excluding the Bolivarian Republic of Venezuela this falls to 9.8 years. In some countries, there is a low R/P ratio, which could indicate a supply problem in the short term in the absence of exploration efforts. Crude oil production has also been declining relative to consumption, which has been more stable. Consequently, after peaking at 4.1 million barrels per day (MBD) in 2004, the oil surplus began to narrow and reached record lows of 0.7 MBD in 2019 and 0.9 MBD in 2021. Crude oil production climbed to a high of 11.2 MBD in 2006 after which it began to slide down to 7.8 MBD

⁶ IEA, *World Energy Investment 2022*, Paris, 2022.

⁷ *Ibidem*.

in 2021, equivalent to 8.7% of world production. Meanwhile, consumption peaked at 8.5 MBD in 2013 before falling, albeit at a slower pace than production, to 7.0 MBD (7.4% of world consumption), which was similar to early-2000s levels. The decline in crude oil production is mostly explained by the negative results of the Bolivarian Republic of Venezuela and Mexico and, to a lesser extent, Argentina, as Brazil increased production between 2000 and 2021.

These variations, taken together with the rate of consumption of fossil fuel derivatives, have resulted in a gradual erosion of the region's positive trade balance in fossil fuels, a trend that confirms the process of reprimarization. As an example, the average oil trade surplus was estimated at 0.8 MBD between 2019 and 2021, but a breakdown of exports and imports by product—crude oil (raw material) or refined oil (derivatives)— shows that crude oil accounted for 85.9% of exports and 10.8% of imports, while refined oil accounted for 14.1% of exports and 89.2% of imports.

In addition, the region's refining capacity of 76 MBD has remained virtually unchanged since 2000, and capacity utilization fell from 83.6% to 56.2% in the period under consideration, due to the lower volume of oil processed, particularly by the Bolivarian Republic of Venezuela and Mexico. The region as a whole relies on imports to cover its domestic consumption of derived products and, given the volume of crude oil exported, could theoretically replace only 60% of purchases of derivatives from outside the region.

The situation is similar for natural gas. The Bolivarian Republic of Venezuela has 3.3% of the world's natural gas reserves and the rest of the region has 1.0%. Here again, the region has a relatively comfortable R/P ratio of 42.4 years, but if Venezuelan reserves is excluded, the ratio falls to 10.8 years. As this is an average, some countries have a lower ratio, which could indicate a supply problem in the short term in the absence of exploration efforts. As opposed to oil, natural gas production is on the rise, but consumption is growing at a faster pace, resulting in a deficit that has been widening since 2010 to reach 69 billion cubic metres (BCM) in 2021. Gas production, which peaked at 227.3 BCM in 2014, began to decline gradually and fell to 182.6 BCM in 2021, equivalent to 4.5% of world production. Consumption, meanwhile, hit a record 261.9 BCM in 2017 before slipping to 251.6 BCM in 2021, equivalent to 6.2% of global consumption. The lower growth in production relative to consumption is explained by the fact the use and penetration of natural gas as an energy transition fuel (with pipelines, interregional interconnections between Mexico and the United States and regasification plants) has outpaced the development of the industry for export and integration (with intraregional interconnections and liquefaction plants). As a result, Argentina's production-to-consumption ratio shifted, transforming the country from an exporter to a net importer, while Brazil and, to a significant extent, Mexico exacerbated their imbalance and vulnerability. The Bolivarian Republic of Venezuela, which has the largest nominal reserves in the region, resorted to occasional imports from Colombia, although both countries have maintained a balance between production and consumption. Three countries (the Plurinational State of Bolivia, Peru and Trinidad and Tobago) maintain significant exportable balances, via pipelines in the case of the first and via liquefied natural gas (LNG) for the latter two.

This illustrates the need for the region as a whole to import fuel to cover consumption. Taking into account the changes in and positions of the different countries, the region's trade balance has shown a constant and worrying downtrend since the end of the 2000s, reaching a deficit of 69.8 BCM in 2021. Of this figure, 84% is explained by Mexico's pipeline trade deficit (with the United States) and 16% by the region's LNG trade deficit, as the combined exports of Peru and Trinidad and Tobago account for only 54% of the



imports of Argentina, Brazil and Chile (and, to a lesser extent, of other countries of the region) from other regions of the world. The deterioration in production and surpluses is concerning for the region as a whole, as evidenced by the negative effects on trade balances, both for primary fossil fuels and their derived products. This, in turn, affects the balance of payments, heightens external constraints and increases countries' risk of energy dependence. For example, in the period 2000–2021, the region's exports of fossil fuels (raw materials and derived products), in dollar terms, increased by 1.5 times, which was much lower than the 4.6-time increase in fossil fuel imports. Thus, fossil fuel exports, which accounted for 15.4% of total exports of goods in 2000–2002 and more than 20% on average between 2005 and 2014 at the height of the price boom, fell to 10% in 2019–2021. In GDP terms, exports of these goods accounted for 2.5% of the region's economic activity in the period 2000–2002 and fell to 2% in 2019–2021. Fuel imports as a share of total imports in dollars at current prices rose from 7.5% in 2000–2002 to 12.3% in 2019–2021, averaging more than 13% between 2005 and 2014. Similarly, fossil fuel imports as a share of GDP increased from 1.3% in 2000–2002 to 2.5% in 2019–2021, the same level as fossil fuel exports in the early 2000s.

The situation varies among the countries of the region. At one end of the spectrum, there are net exporter-producer economies with a history of fossil fuel trade surpluses throughout the period analysed: the Bolivarian Republic of Venezuela, Colombia, Ecuador, the Plurinational State of Bolivia and Trinidad and Tobago. Guyana can be included in this group because of recent developments and future prospects in its hydrocarbon industry, which has fuelled unprecedented growth in the country's economy and exports. The degree of productive specialization makes these six countries, to varying degrees, dependent on fossil fuel exports and highly vulnerable to international price fluctuations. The Bolivarian Republic of Venezuela stands out for its high dependence on this commodity, measured by the share of fossil fuel exports in total exports of goods (72.8%), and for its hedging of its trade balance, measured by fossil fuel exports as a proportion of total goods imports (95.2%). In other words, foreign currency inflows from fuel exports would, in theory, be sufficient to cover almost the entire outflow for imported goods. At the other end, Argentina, Brazil, Mexico, Peru and Suriname are net importer-producers, which run either very low deficits or surpluses in the balance of trade in fossil fuels. The remaining economies of the region, some of which have small extraction and refining capacities, such as Chile, are net importers and have significant trade deficits.

The countries of the region have varying degrees of exposure to the cyclicity and volatility of international fossil fuel prices. Rising prices benefit net exporter-producers and create incentives to develop the industry, while their impact on net importer-producers can vary depending on the status and share of fossil fuels in the trade balance, domestic consumption, tax revenues, subsidies and so on. For countries that are net importers and non-producers, the upward effects are negative. Falling prices have the opposite effect on these economies. Some countries have established sovereign wealth funds that are connected to hydrocarbon rents, but most of them are intended as a means of stabilizing fuel prices and not for savings or investment. In this regard, price vulnerability is also evident in the tax take from hydrocarbon extraction, especially in net exporter-producers, where tax revenues can contribute significantly to total government revenues. For example, in the Plurinational State of Bolivia, Trinidad and Tobago and Ecuador, tax revenues from hydrocarbon extraction averaged 14.6%, 20.6% and 22.4% respectively of the total tax take in the period 2019–2021, whereas in 2010–2012, during the last years of the commodity boom, they averaged 28.4%, 43.3% and 37.3% of total tax revenues.

C. Conclusions and recommendations

The hydrocarbon industry in the region has been affected not only by external factors, such as international prices or geopolitical tensions, but also by internal factors such as economic situations, political decisions, regulatory frameworks or socioenvironmental conflicts. These factors have had repercussions of varying magnitude on the development of the hydrocarbon industry in each country, and have affected on their sustainability performance (economic, environmental, social), be it positively or negatively. Faced with the challenge of reducing exposure to the geopolitics of fossil fuels, the countries of the region must also take into account the commitments under the sustainable development and climate change agendas in their search for energy security and sovereignty. ECLAC proposes that there is a need to invest in a just transformation of the fossil energy sector to a low-carbon energy sector. This would require a progressive shift from systems based on fossil energy sources to systems based on low-carbon sources, to reduce dependence on fossil fuels, increase energy security and sovereignty, and improve access to and coverage of renewable and clean energy sources.

This proposal should be part of an energy policy that provides guidelines for planning an exit strategy, with the gradual reduction of systems based on fossil energy sources, which involves transforming hydrocarbon industries and improving the governance of fossil resources in the countries of the region. The guidelines would include: transforming national oil companies into national energy companies; promoting investment in more sustainable fossil energy and low-carbon energy; adapting tax regimes to increase and improve capture of economic rents from oil and natural gas (with tax regimes that are more progressive, efficient and equal); redirecting sector tax revenues towards investment in the transformation of the fossil energy sector and the hydrocarbon industry; dismantling generalized fossil fuel subsidies, using distributional criteria for targeting; promoting fossil fuel energy integration where infrastructure exists and investment where shared use with other low-carbon energies is possible; institution-building to avoid race-to-the-bottom policies and improve regulation, supervision, control and oversight in environmental assessment and social licensing processes; strengthening information transparency, civil society participation in supervision, control and oversight, and corruption prevention mechanisms; and building the capacities of national energy companies to diversify investments (towards more sustainable and low-carbon energy sources), optimize rent capture, maximize operational efficiency, promote technological innovation, and ensure good corporate governance.

VI. Transition through a new mining model that is more efficient, inclusive and sustainable

A. Prominence of Latin America and the Caribbean in world mining

The region holds a large share of the world's reserves and is a major producer of various minerals. The region is home to 47% of the world's lithium reserves, 36.6% of copper, 34.5% of silver, 23.8% of natural graphite, 20.6% of tin, 18.8% of iron, 16.7% of rare earths and 15.7% of nickel. It also produces more than 50% of the world's silver, 37% of copper, 36% of molybdenum, 37% of lithium, 20% of tin and zinc, and 16% of iron.



Although the region has increased mineral production levels in recent decades, it has lost relative share of world reserves and production of some minerals such as bauxite and alumina, cobalt, lithium and nickel. By contrast, China, which leads global demand for several of these minerals, has gained share both in production and refining, accounting for 49% of global production of refined products and more than 50% of global consumption of refined products of various minerals including copper, aluminium and nickel.

Latin America and the Caribbean has attracted close to one quarter of the world's investment budgets for exploration in the non-ferrous metals mining sector over the past two decades. In 2022, the region attracted US\$ 3.2 billion. Foreign Direct Investment (FDI) project announcements were concentrated in Brazil, Chile and Peru, followed by Mexico. Gold, silver, and copper are the minerals that attract the most attention from investors in mineral exploration. The bulk of the announced investments in mineral exploration in the region, particularly in Mexico and Chile, comes from Canada.

B. Performance of the mining sector in Latin America and the Caribbean

World economic growth since the early 2000s, driven largely by China, spurred a mineral price “super cycle” between 2003 and 2011, with a brief decline associated with the 2008 global financial crisis and a subsequent recovery around 2011. The global recession of 2020 and the slowdown of economic activity triggered by the COVID-19 pandemic dragged down mineral prices with the exception of gold. In 2021, the prices of copper, tin, iron and gold returned to the highs registered in 2011 on the back of the recovery in global demand, particularly from China. In early 2022, the armed conflict between the Russian Federation and Ukraine reinforced the upward price trends. Aluminium, nickel, titanium and palladium prices, in particular, rose sharply in this period given the significant participation of these two countries in the production of these minerals.

Latin America and the Caribbean has a positive trade balance in mining resources. Mining exports increased significantly between 2000 and 2021 both in value terms and in volume. In that period, the volume and value of exports grew at an average annual rate of 9.3% and 3.2% respectively. The commodity price boom in mineral commodity prices products that occurred between 2003 and 2011 drove a sharp increase in export values. However, the region exports mainly raw minerals, with limited processing or industrialization.

Value added from the mining industry is an important contributor to the GDP of several countries of the region: in 2021, it stood at 8.4% in the Plurinational State of Bolivia; 16.2% in Chile; and 8.7% in Peru. The number of mining concessions granted is another indicator of the sector's dynamism. While there is currently a lack of comparable official information for the countries of the region, in Peru, during the “super cycle” of mineral prices, more than 20% of the country's total land area was under mining concession for exploration and exploitation. Increased mining activity—and the resulting additional pressure on land, water, forests and populations—has exacerbated socioenvironmental conflicts. According to the Environmental Justice Atlas database, Peru is the country with the most socioenvironmental conflicts related to mining activities, with 50 registered cases. It is followed by Mexico with 36, Colombia (34), Brazil (33) and Argentina (28).

The region's mining industry is heterogeneous, as large-scale operations coexist with medium-scale, small-scale and artisanal mining, and there are significant disparities in productivity and impact. Large- and medium-scale mining are capital intensive and require skilled labour; small-scale and artisanal mining, however, tend to generate

low-skilled employment and do not ensure minimum conditions of income, job security and labour rights. It is estimated that around 2.4 million people in Latin America and the Caribbean are directly employed in small-scale, informal, or illegal mining —most of them concentrated in the exploitation of gold— and this figure does not include the families of these workers or suppliers of goods and services to these mines.

The fiscal contribution of the mining sector is important for several countries. Tax revenues from mining represent 3.01% of GDP in Chile, 1.66% in Peru and 0.95% in the Plurinational State of Bolivia. On average, mining tax revenues account for close to 0.68% of GDP in Latin America and the Caribbean. In addition, these tax revenues are closely tied to international price trends, which means that government budgets are vulnerable during price cycles.

C. Mining outlook for in Latin America and the Caribbean

The global energy transition and electromobility will have a decisive impact on the type and volume of minerals that the region will export. According to estimates from the International Agency of Energy (IEA), in the sustainable development scenario required to meet the Paris Agreement objectives, global demand for lithium may grow up to 42 times from 2020 to 2040, graphite 25 times, cobalt 21 times, nickel 19 times and copper 2.7 times.

In particular, the demand for lithium is picking up due to the surge in the use of batteries for electric vehicles and electronic devices. This provides a great opportunity for producing countries, both in terms of extraction and in terms of added value or industrialization of lithium. Nevertheless, the entire process from lithium extraction to the manufacture a car battery is long and complex. Currently, the region's production chains in the lithium value chain for electric vehicle (EV) batteries are weak. Argentina and Chile remain focused on the initial (upstream) segments of the global value chain, which correspond to the resource extraction and concentration phases, while most of the downstream refining and industrialization segments are concentrated in China.

D. The governance of mining activities in Latin America and the Caribbean

In general, regulatory frameworks in the region establish that non-renewable natural resources in the subsoil, including minerals, belong to the State. The central government is the administrative body, except in Argentina, which delegates authority to the provincial governments. Private investment is predominant in the mining sector, including Chile, where the National Copper Corporation of Chile (CODELCO) is the world's largest State-owned copper mining company. Existing legal norms on mining property indicate that concessions are the most widely used mechanism in the region to enable decision-making on investment, production and destination of the extracted mineral.

The tax regime for the mining sector is governed by national tax systems, although in Argentina some taxes are implemented and collected by provincial authorities. The income or profit tax is the main fiscal instrument used to capture part of the economic rents from mining, with rates that tend to be the same as those applied to all other business activities. Argentina, Brazil, Colombia, Mexico, Peru and the Plurinational State of Bolivia levy mining royalties based on the volumes extracted or the value of sales. Some countries of the region have established stabilization, savings and investment funds. The distribution of funds also varies from country to country: in some cases, part of the revenue goes to various stakeholders, such as the army, local governments or universities; in others, it may be earmarked for certain purposes, such as environmental protection.



In recent decades, a number of mining countries have set up environmental authorities and included provisions in their regulations for mandatory environmental impact studies. The content of national regulations also varies significantly, and in some cases, gaps have been identified, including a lack of effectiveness or of a human rights approach. In this regard, 14 Latin American and Caribbean countries constitutionally recognize the existence of Indigenous People in their territories, and 13 of them recognize their territorial rights. It is also the region with the highest number of countries that have ratified International Labour Organization (ILO) Indigenous and Tribal Peoples Convention, 1989 (No. 169). The Bolivarian Republic of Venezuela, Ecuador, Mexico and the Plurinational State of Bolivia have enshrined the principle of prior consultation in their constitutions (in line with article 6 of Convention No. 169), and several others have created specific regulatory frameworks for its implementation. However, there is a regulatory and implementation vacuum that has undermined the legitimacy of community consultation processes and has increased socioenvironmental conflict.

Although there has been progress in terms of transparency in mining activities in the region, there is still significant room for improvement. ECLAC has proposed guidelines for Argentina, Chile Peru and the Plurinational State of Bolivia on fiscal transparency in the exploitation of mining resources. The first is to making progress in the disclosure of tax information on mining companies, disaggregated by company and by tax instrument. Second, the true beneficiaries of mining investments must be disclosed. Third, the provision of timely and complete information must be improved. Fourth, rules must be introduced that enable and encourage companies in the sector to disclose their financial statements.

E. Public policy messages to advance the transition of the mining sector

There are three main challenges for mining in the region. The first is the transition towards a model that is more efficient, sustainable and inclusive. This requires multilevel, transparent, democratic and effective governance with a territorial approach, combined with greater technological innovation to improve energy and water efficiency, the circular economy, management of tailings and the closure of mines to avoid and reduce environmental liabilities. The second is how the industry can contribute to national transitions to achieve the SDGs. This calls for stronger environmental institutions and citizen participation, and improving the economic and social impacts on the populations of mineral-rich areas. The third is its contribution to regional integration, which would require a regional consensus on fiscal, social and environmental standards and procedures, and the development of regional value chains.

Another challenge for the region's mining industry is the new mining cycle associated with the global energy transition. New strategies will be needed from private companies and governments. For private companies, the proposals include: (i) investing in technological innovation to increase productivity; (ii) protecting natural ecosystems and reducing GHG emissions and the ecological footprint; (iii) improving tax contributions and addressing tax avoidance and evasion; (iv) increasing transparency through initiatives such as the Extractive Industries Transparency Initiative (EITI) and Open Government Partnership (OGP); and (v) creating backward, forward and horizontal linkage strategies, and sharing value in the territories. The proposals for governments include: (i) improving the taxation, distribution and destination of economic rents: collection, progressivity, efficiency and equity; (ii) designing policies for value addition,

diversification, regional integration and regional value chains; (iii) strengthening the economic, social and environmental regulation and control of the sector and the governance of State companies; (iv) establishing legitimate consultation and social participation mechanisms and improving the management of socioenvironmental conflicts; (v) increasing transparency and raising awareness of the Escazú Agreement; and (vi) establishing strategies for climate change mitigation and adaptation, water management and energy transition in the sector.

Lastly, any new regulations, strategies or public and private policies must go hand in hand with the strengthening of the institutions tasked with implementing them and capacity-building for citizens to monitor compliance. In addition, decision-making must include and involve other sectors beyond the central government, such as subnational governments (e.g. regional, departmental, provincial, as appropriate), local governments and citizens. In short, polycentric governance —governance that is multisectoral, multilevel and multi-stakeholder— is essential for the proposed transition to be achieved.

This document is a summary of the *Natural Resources Outlook in Latin America and the Caribbean*, a forthcoming publication which aims to raise awareness and promote debate on the role of renewable and non-renewable natural resources in the transition to a more sustainable development model.

Natural resources play an important role in the economic development of Latin America and the Caribbean. The region is home to almost 20% of the world's oil reserves, at least 25% of its reserves of certain strategic metals and more than 30% of its primary forests. Natural-resource-based economic activities account for 12% of added value, 16% of employment and 50% of exports in the region. Renewable resources such as water and energy are key transformative vectors for economic growth with sustainable development and have great potential to create new industries and improve the well-being of local communities.

In the current context of cascading crises, it is essential to rethink the contribution of natural resources to economic recovery and structural change. The region must shift towards a more sustainable and equitable development model that incorporates this reconsidered role of natural resources.



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