Climate Action and the Paris Agreement:

the role of cities in Latin America and the Caribbean

Felipe Vera
María Camila Uribe
Sofía del Castillo

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Authors: Felipe Vera, María Camila Uribe, Sofía del Castillo.

Research Assistants: Amen Fátima, Emanuel Ayala, Leandro Vigna, Rolando Girodengo, Tanushri Dalmiya and Tomás Quaglia.

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Graphic designer: Belén Zabala
Creative production: Sofía Szelske

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Climate Action and the Paris Agreement:

the role of cities in Latin America and the Caribbean

More than six years after the entry into force of the **Paris Agreement** and the 2030 Agenda for Sustainable Development, it is necessary to accelerate the implementation of the agreed consensus to guarantee the achievement of the ambitious climate objectives. Acknowledging that local governments have competence over the potential for climate change mitigation and the execution of adaptation strategies in **Latin America and the Caribbean,** this report emphasizes the importance of translating and adapting global and national climate goals and needs to local contexts in a collaborative way. This report provides recommendations for the localization of climate initiatives in cities and for improving the capacities for multi-level climate governance in local contexts. This publication discloses the potential cities have to lead a transformative climate action when considering the major **climate change** challenges, the greenhouse emissions generated by the region, and the climate commitments reached at the national and local scales. It assesses the **Nationally Determined Contributions** (NDCs) of the countries in the region and the cities' climate action plans, offering a pragmatic approach to the implementation of the Paris Agreement's global objectives at every scale. Finally, the publication showcases more than 20 climate solutions led by **cities** in Latin America and the Caribbean, thus setting precedents and providing ideas and experiences so that more cities contribute to the required **climate action.** This publication serves as a useful reference for multiple climate action practitioners in Latin America and the Caribbean, especially those interested in promoting and facilitating coordinated climate action at all levels.

Keywords

Climate Action, Paris Agreement, Cities, Latin America and the Caribbean, Resilience, Adaptation, Mitigation, Nationally Determined Contribution, NDC.

Content

00

Introduction 08

01

Climate Change Challenges in Latin America and the Caribbean 12

02

Latin America and the Caribbean: A Key Actor to Move Towards the Goal of Net-Zero Emissions 38

03

Understanding the Paris Agreement and the NDCs of Latin America and the Caribbean 54

04

Towards Increasing Climate Ambition: the Opportunity for Cities 80

05

Climate Solutions in the Cities of Latin America and the Caribbean 100

A | Resilience and risk management 104

B | Sustainable mobility 110

C | Clean energy and green buildings 122

D | Waste management and circular economy 130

E | Sustainable urban growth 138

F | Green finance for climate action 144

G | Urban green infrastructure 150

H | Community participation, education and sustainable habits 156

06

Bibliographic References 164

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Introduction

Climate change has a widespread impact on all regions of the world, affecting the lives of billions of people, driving displacement and involuntary migration, causing conditions of acute food insecurity, as well as reduced safe access to water[1]. With 81% of its population living in urban areas and being the most urbanized developing region[2], climate change is one of the great challenges for growth and development in Latin America and the Caribbean. The high rate of urbanization has led to a greater demand for energy - today almost 75% is supplied by fossil fuels[3] - to serve activities such as transportation, electricity generation, building construction, and industrial processes. There is also evidence of greater demand for natural resources[4] and waste generation driven by the growth of the population and the consumption of goods. In addition, the region's economy is characterized by its high degree of primary activity based on the exploitation of natural resources which, under a model lacking criteria for sustainably managing natural capital, tends to generate social, environmental, and economic tensions associated with land use.

In addition, large populations in Latin America and the Caribbean live in highly vulnerable conditions, especially where poverty, governance challenges, limited access to basic services, and violent conflicts are commonplace and where the main livelihoods are climate sensitive (e.g, farming and fishing communities). The Sixth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC) defines Latin America and the Caribbean as a region ***"highly exposed, vulnerable and strongly impacted by climate change, a situation amplified by inequality, poverty, population growth and high population density, land use change particularly deforestation with the consequent biodiversity loss, soil degradation, and high dependence of national and local economies on natural resources for the production of commodities"***[5]. The IPCC report provides evidence that these conditions of vulnerability and the impacts projected for the rest of the century will worsen as the planet's average global temperature continues rising[6]. To address these challenges, unprecedented action is required at international, national and local levels.

1. IPCC, 2022: Summary for Policymakers. In: Climate Change 2022: Impacts, Adaptation, and Vulnerability. Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change.
2. United Nations, Department of Economic and Social Affairs, Population Division, 2019. World Urbanization Prospects: The 2018 Revision (ST/ESA/SER.A/420). New York: United Nations.
3. IDB Group, 2021. IDB Group Action Plan on Climate Change.
4. ECLAC, 2023. International Trade Outlook for Latin America and the Caribbean 2022: the challenge to stimulate manufacturing exports.
5. Castellanos, E., MF Lemos, L. Astigarraga, N. Chacón, N. Cuvi. C. Huggel, L. Miranda, M. Moncassim Vale, JP Ometto. PL Peri, JC Postigo, L. Ramajo. L. Roco, and M. Rusticucci, 2022: Central and South America. In: Climate Change 2022: Impacts, Adaptation, and Vulnerability.. Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [H.-O. Pörtner, DC Roberts, M. Tignor. ES Poloczanska. K. Mintenbeck, A. Joy, M. Craig, S. Langsdorf, S. Löschke. V. Möller, A. Okem, B. Rama (eds.)]. Cambridge University Press, Cambridge, UK and New York, NY, USA, p. 1689-1816, doi:10.1017/9781009325844.014.

More than six years after the entry into force of the Paris Agreement and the 2030 Agenda for Sustainable Development, it is necessary to accelerate the implementation of the agreed consensus to guarantee the achievement of the ambitious climate objectives. In order to move forward towards net-zero emissions by 2050, countries and cities must undertake profound socioeconomic transformations immediately[7]. As exposed in the last chapter of this publication, many cities in Latin America and the Caribbean are implementing multiple strategies, actions, and initiatives for climate action. The concretion of these international treaties in urban centers is an opportunity to improve the population's quality of life, particularly in the most vulnerable sectors, reduce inequalities, create decent jobs, favor peaceful social environments, and contribute to human development.

Acknowledging that local governments have competence over the potential for climate change mitigation and the execution of adaptation strategies in the region, this report emphasizes the importance of translating and adapting global and national climate goals and needs to local contexts in a collaborative way. This report provides recommendations for the localization of climate initiatives in cities and for improving the capacities for multi-level climate governance in local contexts. This publication discloses the potential cities have to lead a transformative climate action when considering the major climate change challenges, the greenhouse emissions generated by the region, and the climate commitments reached at the national and local scales. This publication assesses the Nationally Determined Contributions (NDCs) of the countries in the region and the cities' climate action plans, offering a pragmatic approach to the implementation of the Paris Agreement's global objectives at every scale.

Finally, the publication showcases more than 20 climate solutions led by cities in Latin America and the Caribbean, thus setting precedents and providing ideas and experiences so that more cities contribute to the required climate action. Ranging from integrated active mobility and green building tax rebates to urban agriculture and environmental education for schools, the region has produced various climate solutions and, at the same time, brought valuable benefits to communities, economies, and health. These case studies emphasize the ability of subnational governments and mayors to be agents of change and demonstrate that reducing greenhouse gas emissions and building resilience are possible and often bring socioeconomic benefits that contribute to a better quality of life for citizens. Recognizing that many local governments still have weaknesses and gaps that prevent them from leading concerted climate action, these cases inspire and invite us to be creative in finding solutions to these barriers. In the belief that everyone has a role to play in the fight against the climate crisis, the actions carried out at the local level call for the strengthening of innovative inter-governmental relations to improve governance, coordination, and vertical integration for the achievement of ambitious climate goals.

This publication serves as a useful reference for multiple climate action practitioners in Latin America and the Caribbean, especially those interested in promoting and facilitating coordinated climate action at all levels. Some key messages emerging from this publication are summarized below.

6. IPCC, 2022: Summary for Policymakers. In: Climate Change 2022: Impacts, Adaptation, and Vulnerability. Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change.
7. IDB Group, 2021. IDB Group Action Plan on Climate Change.

Key Messages

Cities are a **necessary actor to limit the increase in average temperature** and achieve the climate objectives and the Paris Agreement´s commitments. With adequate support, local governments can design measures and actions for climate change mitigation and adaptation based on the particular characteristics of their territories and their population and join efforts between municipalities and among actors of society, supporting in this way the achievement of global and national climate objectives.

Despite the growing number of local and regional climate action initiatives, the current climate-related efforts at a subnational level are not often linked to national governments or surrounding cities and regions. **This prevents them from taking full advantage of their potential to make a significant difference** in the transition toward a zero-carbon economy and the strengthening of its resilience.

As countries update and implement their NDCs, there is **an opportunity for cities to integrate their climate commitments** and improve the coordination of their climate actions, with the potential to accelerate and scale climate ambitions.

Including and communicating regional and local climate efforts in NDCs offer an opportunity to increase the ambition of the NDCs, facilitate their implementation, and scale climate action at all levels. At the same time, by formalizing their climate commitments in NDCs, cities could benefit from increased visibility, recognition of their climate efforts and opportunities for climate finance.

It is proposed to advance in the translation and adaptation of global and national climate goals and plans to local contexts and needs in a collaborative manner. This is what can be understood as "localization of NDCs in cities", which requires:

• **The subnational governments´ participation** in the design, update and implementation of NDCs as well as improved dialogue between the national and subnational levels.

• The incorporation of **climate efforts of subnational governments** in developing and updating the NDCs and during their implementation.

• The improvement of **vertical integration and coordination** between levels of government to ensure articulation with development plans, improve **policy coherence and increase climate ambition.**

• Making visible the **multiplying effect** that urban initiatives have when prioritizing projects to implement climate commitments, **thus influencing national budgets and initiatives.**

To support this process, this publication includes an analysis of the NDCs presented by the countries of Latin America and the Caribbean, identifying the region's NDCs common aspects and trends and detecting entry points for national climate action coordination with cities. Based on the analysis, recommendations are identified to strengthen the countries' NDCs highlighting the opportunity to involve subnational governments in the design, updating, and implementation of NDCs to increase climate ambition.

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01

Climate Change Challenges in Latin America and the Caribbean

The world is dealing with the physical and economic consequences of above 1 °C warming, and the impacts on nature and human systems are evident throughout the region.

According to the World Meteorological Organization, the global annual mean temperature in 2021 was 1.11 ± 0.13 °C higher than the pre-industrial mean of 1850-1900. In addition, the seven years from 2015 to 2021 were the seven warmest years on record, and the ocean heat content in 2021 was the highest ever recorded[8].

The increase in the global average temperature is altering the intensity and frequency of extreme events related to atmospheric conditions, water, and climate. In Latin America and the Caribbean, the impacts of climate change and extreme weather events have been recorded throughout the region ***(box 1)***. These can cause or aggravate other high-impact events such as floods, landslides and forest fires. The consequences of these phenomena are especially overwhelming for the low-lying small island states bordering the Caribbean. In addition to heavy rainfall and tropical cyclones, observed trends indicate an increase in the intensity and frequency of extreme heat events and a decrease in the intensity and frequency of extreme cold events. Drought also affects several countries in the region, and trends show that in Mexico, central Chile, and the Paraná-Plata basin, there is a greater frequency and severity of meteorological droughts[9,10]. The IPCC has concluded that the rise in temperature, aridity, and drought has increased the frequency and intensity of fires in the region, and so has the people's exposure to fire danger .

In cities, climate change affects different urban contexts in a differentiated way. For example, floods and landslides in the Brazilian states of Bahia and Minas Gerais caused estimated losses of US$3.1 billion in 2021[12]. For many Andean cities, the melting of glaciers represents the loss of an important source of freshwater that is currently used for domestic consumption, irrigation, and hydroelectric power. Coastal cities are threatened by rising sea levels and coastal erosion. On the other hand, the impact of rising temperatures and heat waves in cities is aggravated by the heat island effect, a phenomenon by which cities tend to be warmer than the surrounding rural and suburban areas as a result of the characteristics, morphological and material properties of the urban landscape. This makes urban centers more susceptible to extreme heat, which can worsen air quality and cause dehydration, heat stroke, cardiovascular complications, kidney disease, and death[13].

8. World Meteorological Organization, 2022. The state of the climate in Latin America and the Caribbean 2021 (WMO-No. 1295).
9. Meteorological drought occurs when a region's precipitation is significantly below the historical average for that area and time period. The trends included here refer to drought due to a lack of precipitation and not due to other causes that can cause water scarcity or water stress related to resource management, pollution, excessive use, among others.
10. World Meteorological Organization, 2022. The state of the climate in Latin America and the Caribbean 2021 (WMO- Nº 1295).
11. Castellanos, E., M.F. Lemos, L. Astigarraga, N. Chacón, N. Cuvi, C. Huggel, L. Miranda, M. Moncassim Vale, J.P. Ometto, P.L. Peri, J.C. Postigo, L. Ramajo, L. Roco, and M. Rusticucci, 2022: Central and South America. In: Climate Change 2022: Impacts, Adaptation, and Vulnerability. Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [H.-O. Pörtner, D.C. Roberts, M. Tignor, E.S. Poloczanska, K. Mintenbeck, A. Alegría, M. Craig, S. Langsdorf, S. Löschke, V. Möller, A. Okem, B. Rama (eds.)]. Cambridge University Press, Cambridge, UK and New York, NY, USA, pp. 1689-1816, doi:10.1017/9781009325844.014.
12. World Meteorological Organization, 2022. The state of the climate in Latin America and the Caribbean 2021 (WMO-No. 1295).
13. Felipe Vera, Jeannette Sordi, 2020. Ecological Design: Strategies for the Vulnerable City: Adapting Precarious Areas in Latin America and the Caribbean to Climate Change.

Box 1. **Climate trends, meteorological phenomena, and impacts in Latin America and the Caribbean**

THE WARMING TREND

in Latin America and the Caribbean continued in 2021, with an average rate of temperature increase of about **0.2°C per decade** between 1991 and 2021.

MEAN PRECIPITATIONS

in 2021 **were below normal** in many areas of the region, with rainfall anomalies between 20-60% in regions of Chile and -30 to -50% of normal in the Andes of southwestern Peru. In the Caribbean region, below-normal rainfall was registered in Cuba, the Dominican Republic, and the small Caribbean islands. Conversely, above-normal rainfall was recorded in central Mexico, Costa Rica, Panama, the western side of Colombia, the central Amazon, French Guiana, Suriname, and Guyana.

THE GLACIERS

of the tropical Andes have lost between 30% and 50% of their surface since the 1980s. The retreat of the glaciers and the corresponding **loss of ice mass have increased the risk of water scarcity** for the population and the Andean ecosystems.

SEA LEVEL

in the region continued to rise in 2021 at a faster rate than globally, especially along the Atlantic coast of South America south of the equator (3.52 ± 0.0 mm per year, from 1993 to 2021) and in the subtropical North Atlantic and Gulf of Mexico (3.48 ± 0.1 mm per year, from 1993 to 1991).

HEAT WAVES AND HIGH TEMPERATURES

Heat waves were recorded in many parts of the region. For example, Chile recorded 18 episodes of heat waves throughout 2021. In addition, in 2021, **historical maximum temperatures reached their record in several cities in the region:** Cipolletti, Argentina (43.8 °C); Cuiabá, Brazil (41.0 °C); Aragarças, Brazil (43.0 °C); Valdivia, Chile (37.3 °C); Pedro Juan Caballero, Paraguay (38.2 °C); Jepelacio, Peru (34.2 °C), to name a few.

EXTREME RAINFALL

in 2021 reached record levels in many places, triggering **flooding and landslides,** resulting in hundreds of lives lost, tens of thousands of homes destroyed or damaged, and hundreds of thousands of people displaced.

METEOROLOGICAL DROUGHTS

More than 50% of Mexico was affected by a severe to exceptional magnitude drought in 2021 caused by a negative precipitation anomaly.

The drought in the central region of Chile continued in 2021, its 13th year until now, making it the longest in a thousand years, exacerbating a trend of increasing dryness and putting Chile at the top of the region's water crisis.

A multi-year drought in the Paraná-Plata basin, the worst since 1944, affected south-central Brazil, parts of Paraguay, and the Plurinational State of Bolivia.

COLD WAVES AND LOW TEMPERATURES

Intense episodes of cold waves occurred in many places in the southern region of South America. In 2021, **minimum temperature records were reported** in several places: Catamarca, Argentina (-6.2 °C); Rio de Janeiro, Brazil (–9.9 °C); Mariscal Estigarribia, Paraguay (–2.6 °C), among others.

THE 2021 ATLANTIC HURRICANE SEASON

was the third most active on record in the Atlantic, with 21 named storms, including seven hurricanes.

The year 2021 was the seventh consecutive year that a named storm had formed before the season's official start on June 1. Hurricane Elsa became the season's first hurricane, which affected several Caribbean territories, including Barbados, Saint Lucia, Saint Vincent and the Grenadines, Martinique, the Dominican Republic, Haiti, Jamaica, the Cayman Islands, and Cuba.

FIRES

In 2021 forest fires broke out throughout South America. In particular, Brazil reported around 184,000 fires (75,000 of which occurred in the Brazilian Amazon).

THE SEA SURFACE TEMPERATURE[14]

in 2021 in the Caribbean was +0.69 °C above average; it reached 0.5 °C above average in the tropical North Atlantic and adjacent oceanic areas and the +0.43 °C in the Gulf of Mexico.

Source: World Meteorological Organization, 2022. The state of the climate in Latin America and the Caribbean 2021 (WMO-No. 1295).

14. Sea surface temperature (SST) is a fundamental climate system component as it controls the ocean's atmospheric response on weather and climate time scales. In a warmer world, warmer SSTs increase the frequency of marine heat waves, coral bleaching, and damage to reefs, and related fisheries (WMO, 2022).

The region's high vulnerability accentuates the negative consequences of climate change, jeopardizing the achievement of economic and social results.

Germanwatch's Global Climate Risk Index ranks several countries in Latin America and the Caribbean among the most vulnerable to climate change. The Global Climate Risk Index[15] indicates that **in 2019, 6 of the 30 countries most affected by climate change correspond to Latin America and the Caribbean:** Bahamas (#3), Bolivia (#10), Paraguay (#20), Chile (#25), Brazil (#27) and Colombia (#28). Likewise, **between 2000-2019, 7 of the 30 countries most affected by climate change are from the region:** Puerto Rico (#1), Haiti (#3), Bahamas (#6), Dominica (#11), Guatemala (#16), Bolivia (#25), El Salvador (#28). It should be noted that Puerto Rico was the most affected country by climate change in 2000-2019 ***(figure 1.a.).***

The Global Adaptation Index of the University of Notre Dame (ND-GAIN)[16] offers similar conclusions, placing **15 countries in Latin America and the Caribbean in the vulnerability ranking above the midpoint *(figure 1.b.).*** It should be noted that Central America and the Caribbean are two of the most vulnerable geographical areas in the world[17].

The effects of climate change tend to affect the poorest and most vulnerable populations to a greater extent. In Latin America and the Caribbean - one of the world's most unequal regions in terms of income[18] - climate events reduce the income of the poorest 40% of the population by more than double the average of the population, which could **drag between 2.4 and 5.8 million people in the region into extreme poverty by 2030**[19]. For example, when Hurricane Mitch hit Honduras in 1998, it destroyed 18% of the assets in the poorest quintile of the population, while it only impacted 3% of the assets for the highest quintile[20].

In cities, natural disasters and extreme weather events increase inequalities and affect, to a greater extent, the poorest and most vulnerable groups, who tend to reside in areas exposed to natural risks. Generally, these people live in informal settlements, unplanned environments, precarious housing, and lack essential services and infrastructure. Owing to factors such as inequality, informal work, and overcrowded conditions, among others, facing weather-related events becomes an arduous task. **We must rethink how we intervene in cities, especially in hazardous and unplanned areas, and make sure the infrastructures giving shape to cities can endure the effects of climate change**[21].

15. Germanwatch, 2021. Global Climate Risk Index 2021.
16. The ND-GAIN country index summarizes a country's vulnerability to climate change and other global challenges in combination with its readiness to enhance resilience. Its objective is to help governments, companies and communities to better prioritize investments for a more efficient response to the immediate global challenges that lie ahead. Source ND-GAIN, 2023.
17. Mauricio Cárdenas, Juan Pablo Bonilla, Federico Brusa, 2021. Políticas climáticas en América Latina y el Caribe: casos exitosos y desafíos en la lucha contra el cambio climático.
18. Matías Busso; Julián Messina, 2020. The crisis of inequality: Latin America and the Caribbean at the crossroads.
19. Costella, Cecilia; Ten, Anne; Beazley, Rodolfo; Alfonso, Mariana, 2023. Shock-responsive social protection and climate shocks in Latin America and the Caribbean: Lessons from COVID-19.
20. Global Commission on Adaptation, 2021. A Green and Resilient Recovery for Latin America.
21. Felipe Vera, Jeannette Sordi, 2020. Ecological Design: Strategies for the Vulnerable City: Adapting Precarious Areas in Latin America and the Caribbean to Climate Change.

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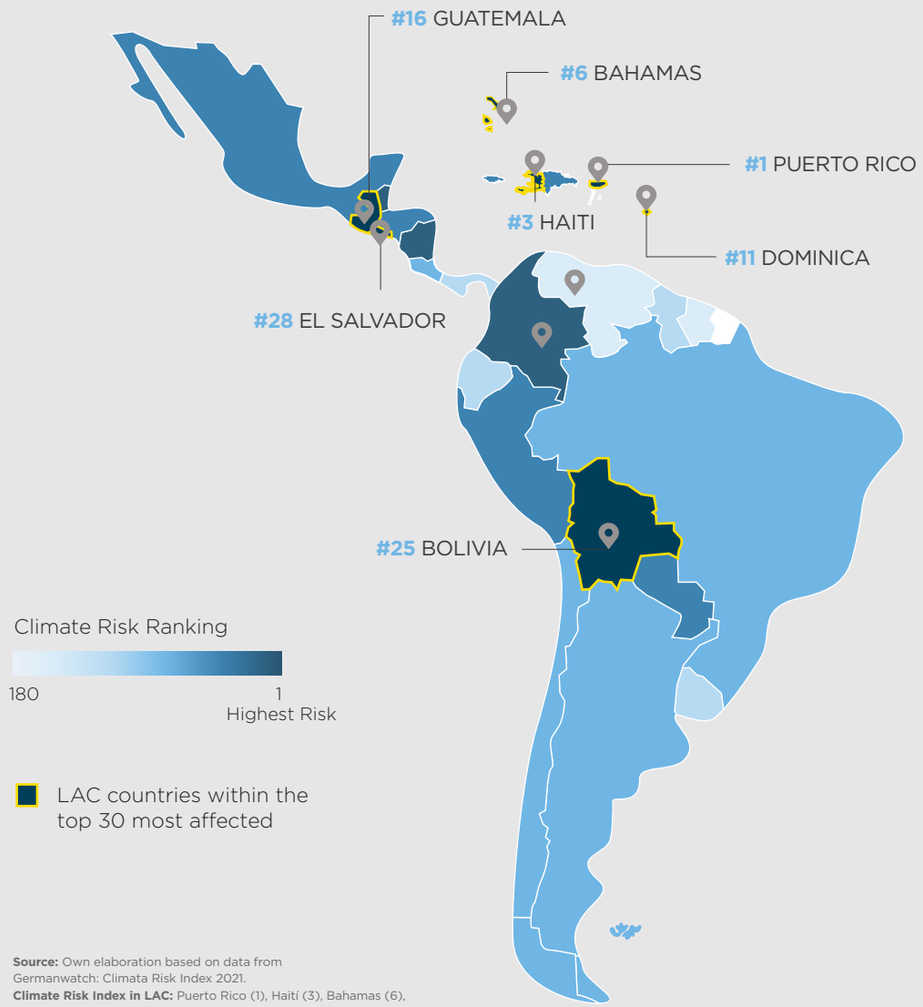
Figure 1. **Climate Risk and Vulnerability of Latin America and the Caribbean**

a. **Climate Risk**

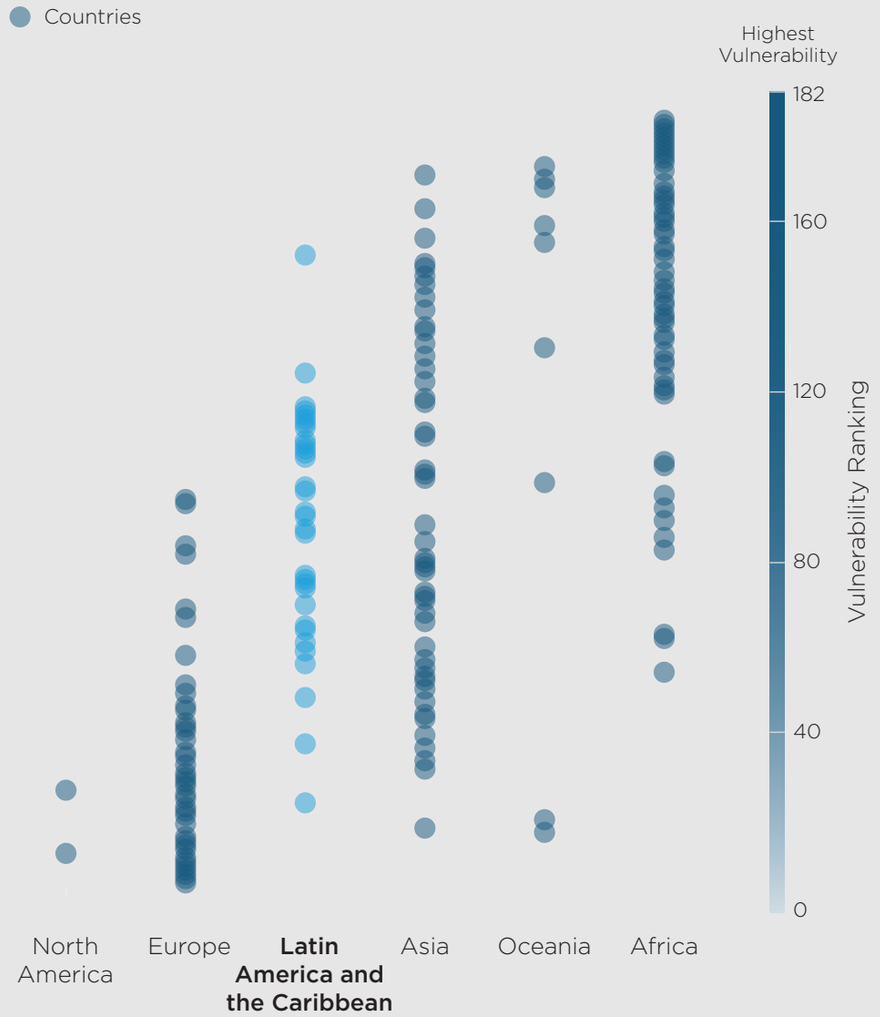
Countries most affected by climate change. 2000-2019.



Source: Own elaboration based on data from Germanwatch: Climata Risk Index 2021.
Climate Risk Index in LAC: Puerto Rico (1), Haití (3), Bahamas (6), Dominica (11), Guatemala (16), Bolivia (25), El Salvador (28), Belize (33), Nicaragua (35), Colombia (38), Honduras (44), Peru (45), Jamaica (54), Dominican Republic (59), Mexico (59), Paraguay (61), Argentina (80), Brazil (81), Chile (83), Costa Rica (89), Uruguay (96), Ecuador (103), Panama (118), Guyana (119), Venezuela (145), Barbados (148), Trinidad and Tobago (159), Suriname (171).

b. **Vulnerabilities**

Distribution of vulnerabilities per country per region.



Note: Puerto Rico is not included in the ranking.
Source: Own elaboration based on data from ND-GAIN. Vulnerability indixes for 2020.
Ranking of vulnerability in LAC: Haiti(150), Antigua and Barbuda (122), Honduras (114), Bolivia (113), Guyana (112), Belize (111), Bahamas (110), Saint Kitts and Nevis (109), Guatemala (106), Ecuador (105), Dominica (104), Nicaragua (103), El Salvador (102), Cuba (95), Peru (94), Domincan Republic (89), Jamaica (88), Colombia (85), Mexico (84), Argentina (74), Uruguay (73), Suriname (72), Paraguay (71), Brazil (67), Panama (62), Granada(61), Venezuela (58), Barbados (56), Costa Rica (53), Trinidad and Tobago (45), Saint Lucia (34), Chile (20).

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Latin America and the Caribbean is the world's second most natural disaster-prone region. Many of these disasters and extreme events are expected to increase in magnitude and frequency due to climate change.

Territories are often exposed to numerous natural hazards, both geophysical (including earthquakes, landslides, volcanic eruptions, and tsunamis) and climate-related ones (including fires, hurricanes, pluvial, river and coastal flooding, heat waves, and droughts). **Climate change contributes to higher disaster risk,** for example, through the increased frequency and intensity of extreme weather events. It also introduces new hazards, such as the sea-level rise and slow-onset events like vegetation changes and ice and snow cover reductions[22]. Some natural disasters like earthquakes, tsunamis, and volcanic eruptions are unrelated to climate change; however, these may be exacerbated by climate change and other factors, such as urbanization and construction in vulnerable areas.

22. Melissa Barandiarán, Maricarmen Esquivel, Sergio Lacambra, Ginés Suárez, Daniela Zuloag. IDB, 2019. Disaster and Climate Change Risk Assessment Methodology for IDB Projects.

© IDB - Paramaribo, Suriname

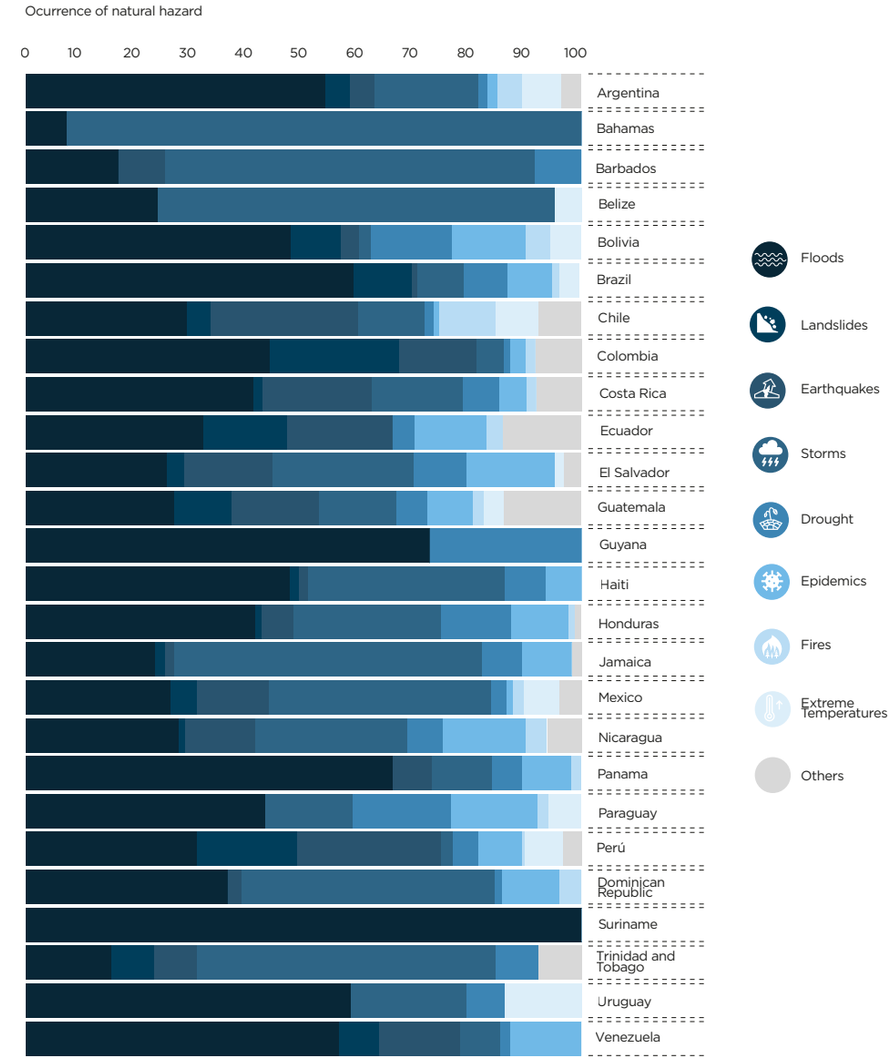
In Latin America and the Caribbean, more than 150 million people have been affected by 1,205 disasters in 2000-2019 (including earthquakes unrelated to climate change), which ranks the region as the second most natural disaster-prone in the world.

During this period, there were 548 floods (the most common recorded disaster), 330 storms, 74 droughts (the disaster that affects the largest number of people in the region), 66 landslides, and 50 extreme temperature events, among others[23]. If the period between 1998 and 2020 is considered, the number of weather-related events and their impacts claimed more than 312,000 lives and affected over 277 million people[24]. The United Nations Office for Disaster Risk Reduction recorded **175 disasters in the Latin American and Caribbean region for 2020-2022** alone, 88% of which were of meteorological, climatological, or hydrological origins and accounted for 40% of disaster-related 71% of registered economic losses[25].

All countries in Latin America and the Caribbean[26] have been affected by at least one type of disaster each year in recent decades, with floods and severe storms being the most frequent extreme events ever reported ***(figure 2).*** Similarly, **most cities are also enduring the strong effects of climate change** and suffer from significantly negative consequences for the region's economy, infrastructure, and societies, to mention some: the unexpected expenses caused by storms or floods, interruption of business operations, impacts on health due to heat waves and drought, or changes in city budgets. Although information on climate change impacts is less available at local levels, **many Latin American cities have reported climate change-related disasters - droughts, storms, and heat waves being the most common *(figure 3)*[27].**

23. United Nations Office for the Coordination of Humanitarian Affairs (OCHA), 2020. Natural disasters in Latin America and the Caribbean 2000-2019.
24. World Meteorological Organization, 2021. The state of the climate in Latin America and the Caribbean 2020 (WMO- Nº 1272).
25. United Nations Office for Disaster Risk Reduction (UNDRR), 2021. Regional Assessment Report of Disaster Risk in Latin America and the Caribbean: Challenges in Disaster Risk Reduction and Progress Towards the Sendai Framework for Disaster Risk Reduction (2015–2030).
26. It refers to the 26 borrowing member countries of the IDB Group, which are those analyzed in this publication: Argentina, Bahamas, Barbados, Belize, Bolivia, Brazil, Chile, Colombia, Costa Rica, Ecuador, El Salvador, Guatemala, Guyana, Haiti, Dominican Republic, Honduras, Jamaica, Mexico, Nicaragua, Panama, Paraguay, Peru, Suriname, Trinidad and Tobago, Uruguay and Venezuela.
27. Felipe Vera, Jeannette Sordi, 2020. Ecological Design: Strategies for the Vulnerable City: Adapting Precarious Areas in Latin America and the Caribbean to Climate Change.

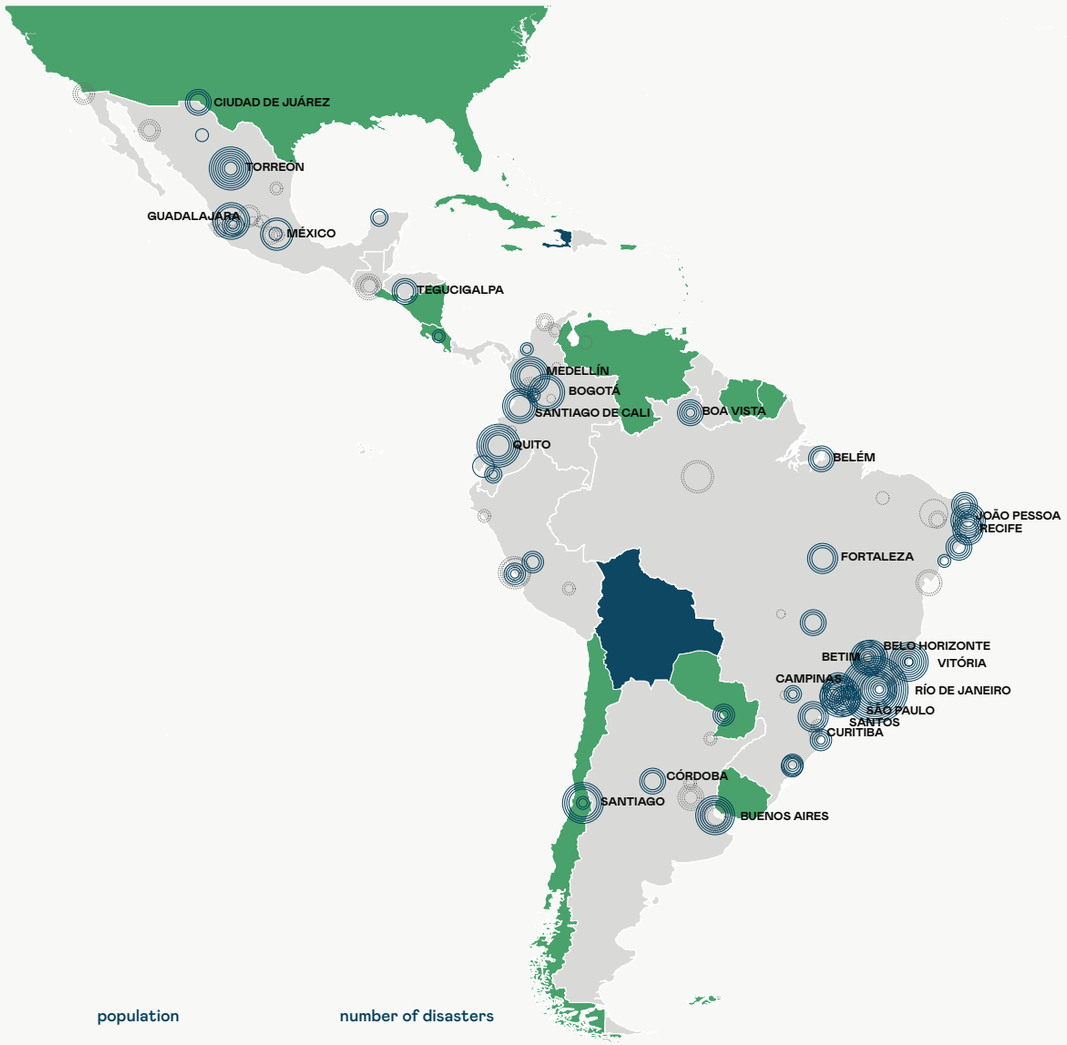
Figure 2: **Ocurrence of natual hazards per country for the period 1990-2018**



Source: Own elaboration based Climate Watch: http://www.climatewatchdata.org/countries (2022)

Figure 3: **Number of Disasters and magnitude of Impact in Latin America and the Caribbean**

Vulnerability to climate change in cities (LAC)
Number of disasters and magnitude of impact in cities with more than 300,000 inhabitants in Latin America and the Caribbean



population

11.200.000

300.000

number of disasters

32

1

Data source:
CDP, https://data.cdp.net/Governance/2018-2019-Full-Cities-Dataset/vzxs-ejjs, 2017 dataset.
Source: Felipe Vera, Jeannette Sordi, 2020. Ecological Design: Strategies for the Vulnerable City: Adapting Precarious Areas in Latin America and the Caribbean to Climate Change.

CITIES AFFECTED BY THE MOST COMMON DISASTERS:
DROUGHTS, STORMS AND HEAT WAVES

MOST FREQUENT DISASTERS

droughts

storms

heat waves

MAGNITUDE

extremely severe

severe

less severe

no data

At the regional level, the frequency of extreme weather events has accelerated[28], and they are expected to continue intensifying in magnitude and frequency due to climate change.

Climate change and extreme weather events will continue to cause serious damage to the health, life, food, water, energy, and socio-economic development of the region. The IPCC foresees that, due to climate change, the existing risks in the region will become severe risks. **Some major threats that will be exacerbated by climate change** include food insecurity due to droughts; hydric insecurity due to the decrease in snow cover; reduction of glaciers and variability of rainfalls; risk to people and infrastructure due to floods and landslides. A rise of 1.5 °C could result in a 100-200% increase in the population affected by floods in Colombia, Brazil, and Argentina, 300% in Ecuador, and 400% in Peru[29]. Warmer weather will increase vector-borne diseases' reproduction, resilience, and distribution. It is estimated that an additional number of South American people infected with malaria will rise from 25 million yearly in 2020 to 50 million by 2080[30]. **Sea-level rise is a major challenge for the region,** where almost half of the population lives within 100 km from the coast[31] and where the sea level is rising faster than at the world scale. **The low-lying Caribbean states are especially vulnerable to this phenomenon[32].**

Therefore, it is important to address climate change as **part of a comprehensive approach** to risk management and climate change. With this objective in mind, **adapting infrastructures, human settlements, and urban areas is one of the top priorities of the fight against climate change in the region[33].**

28. Mauricio Cárdenas, Juan Pablo Bonilla, Federico Brusa, 2021. Climate policies in Latin America and the Caribbean: successful cases and challenges in the fight against climate change.
29. Castellanos, E., MF Lemos, L. Astigarraga, N. Chacón, N. Cuvi. C. Huggel. L. Miranda, M. Moncassim Vale, JP Ometto. PL Peri, JC Postigo, L. Ramajo. L. Roco, and M. Rusticucci. 2022: Central and South America. In: Climate Change 2022: Impacts, Adaptation, and Vulnerability.. Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [H.-O. Pörtner. DC Roberts, M. Tignor. ES Poloczanska. K. Mintenbeck. A. Joy. M. Craig, S. Langsdorf. S. Löschke. V. Möller. A. Okem. B. Rama (eds.)]. Cambridge University Press, Cambridge, UK and New York, NY, USA, p. 1689-1816, doi:10.1017/9781009325844.014.
30. Climate Change and Health. Pan American Health Organization, consulted in February 2023 at: https://www.paho.org/en/themes/climate-change-health
31. Blackman. A., R. Epanchin-Niell. J. Siikamäki. and D. Vélez-López, 2014. Biodiversity Conservation in Latin America and the Caribbean: Prioritizing Policies (Environment for Development). Oxon. UK: Taylor and Francis.
32. World Meteorological Organization, 2022. The state of the climate in Latin America and the Caribbean 2021 (WMO-No. 1295).
33. Costella. Cecilia; Ten, Anne; Beazley, Rodolfo; Alfonso, Mariana, 2023. Shock-responsive social protection and climate shocks in Latin America and the Caribbean: Lessons from COVID-19.

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Displacement and migration related to weather and climate events continue being a concern in the region.

Disasters were the main trigger for internal migration in the Americas in 2021, totaling close to **1.7 million,** more than half resulting from storms and floods. Hurricane Ida was the event that gave place to most of the displacements, causing almost **14,000 preventive evacuations** in Cuba and even more in the United States. Hurricane Elsa also forced significant migrations in the region, causing **180,000 preventive evacuations** in Cuba and, to a lesser extent, in Barbados and the Dominican Republic. Brazil registered **411,000 displacements** due to floods in 2021-170,000 of which occurred during the wettest December in the last 15 years.

In addition, more than any other region, the Americas recorded **282,000 internal displacements associated with forest fires** in 2021. For example, at least 1,100 evacuations were reported in Mexico and 815 in Chile due to forest fires. Smaller-scale disasters tend to go unnoticed though they should be addressed owing to their effects on local communities, particularly in Latin America and the Caribbean[34].

34. Internal Displacement Monitoring Center (IDMC), 2022. Global Report on Internal Displacement (GRID) 2022.

Displacement and migration, internal or international, are the main ways people find to adapt to climate change. In the region, extreme weather events and climate variability drive internal migration, mainly between urban areas[35] or from rural and peri-urban areas to more urbanized ones. This move burdens cities that must provide quality urban and social services, adequate housing, and employment opportunities[36].

According to the IPCC, **droughts, tropical storms, hurricanes, heavy rains, and floods are the main climate-related factors that drive displacement and migration**[37]. The Andes, northeastern Brazil, and the northern countries of Central America are among the regions most sensitive to climate-related migration and displacement- a rising phenomenon in recent years. Although the drivers and consequences are highly context-dependent, climate-related migration is expected to grow on small islands, especially in the Caribbean. Without purposefully determined climate action, estimates are that more than **17 million people in Latin America and the Caribbean will be forced to move by 2050, increasing urban population growth by up to 10%**[38]**.**

35. IDB, 2020. Housing and Urban Development Sector Framework Document.
36. Busso, Matías; Chauvin, Juan Pablo, 2023. Long-term Effects of Weather-induced Migration on Urban Labor and Housing Markets.
37. Castellanos, E., MF Lemos, L. Astigarraga, N. Chacón, N. Cuvi. C. Huggel. L. Miranda, M. Moncassim Vale, JP Ometto. PL Peri, JC Postigo, L. Ramajo. L. Roco, and M. Rusticucci. 2022: Central and South America. In: Climate Change 2022: Impacts, Adaptation, and Vulnerability Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [H.-O. Pörtner. DC Roberts, M. Tignor. ES Poloczanska. K. Mintenbeck. A. Joy. M. Craig, S. Langsdorf. S. Löschke. V. Möller. A. Okem. B. Rama (eds.)]. Cambridge University Press Cambridge, UK and New York, NY, USA, p. 1689-1816, doi:10.1017/9781009325844.014.
38. World Bank, 2022. Roadmap for climate action in Latin America and the Caribbean.

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Climate change represents challenges to urban areas and their growing populations.

The cities in the region continue expanding and absorbing more and more natural resources and rural land. Inequality in cities is persistent, and the **housing deficit affects almost half of the region's population**[39]. The challenges of climate change overlap and exacerbate those inherent in cities, particularly in large towns and metropolises, **where an increase in informal settlements,** pollution, and inadequate access to urban services often accompanies **accelerated and unplanned growth.**

The region´s rapid urbanization and the growing demand for housing and urban services have made room for **informal urban housing growth and rose from 6% to 26% of the total residences from 1990 to 2015**[40]. These precarious buildings and informal settlements are based on the outskirts of the city plans, with deficient public infrastructure and poor primary services such as water and sanitation, which expose the residents to high-risk levels of undesirable climate effects[41]. In addition, because more and more urban center settlements are in coastal areas, research foresees that in South America alone, by 2100, 3 to 4 million inhabitants will endure coastal flooding and erosion due to the sea-level rise in all emissions scenarios.

39. IDB, 2020. Housing and Urban Development Sector Framework Document.

40. Castellanos, E., M.F. Lemos, L. Astigarraga, N. Chacón, N. Cuvi, C. Huggel, L. Miranda, M. Moncassim Vale, J.P. Ometto, P.L. Peri, J.C. Postigo, L. Ramajo, L. Roco, and M. Rusticucci, 2022: Central and South America. In: Climate Change 2022: Impacts, Adaptation, and Vulnerability. Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [H.-O. Pörtner, D.C. Roberts, M. Tignor, E.S. Poloczanska, K. Mintenbeck, A. Alegría, M. Craig, S. Langsdorf, S. Löschke, V. Möller, A. Okem, B. Rama (eds.)]. Cambridge University Press, Cambridge, UK and New York, NY, USA, pp. 1689-1816, doi:10.1017/9781009325844.014.

41. Felipe Vera, Jeannette Sordi, 2020. Ecological Design: Strategies for the Vulnerable City: Adapting Precarious Areas in Latin America and the Caribbean to Climate Change.

Cities with high densities of population and assets are very frequently located in strategic but vulnerable places, putting them at greater risk of storms, floods, droughts, and heat waves.

In fact, in Latin America and the Caribbean, **nearly 80% of the losses caused by disasters occur in urban areas,** where most of the population lives. Notably, 40% and 70% of the total loss happens in cities with fewer than 100,000 inhabitants, where towns´ exposure to disaster risk combines with limited capacities and low investment[42].

In the face of the growing climate change threat, with more than 80% of the population living in urban areas, **the adaptation and resilience of cities are of the utmost importance to achieve more sustainable and equitable development for all.**

42. Castellanos, E., M.F. Lemos, L. Astigarraga, N. Chacón, N. Cuvi, C. Huggel, L. Miranda, M. Moncassim Vale, J.P. Ometto, P.L. Peri, J.C. Postigo, L. Ramajo, L. Roco, and M. Rusticucci, 2022: Central and South America. In: Climate Change 2022: Impacts, Adaptation, and Vulnerability. Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [H.-O. Pörtner, D.C. Roberts, M. Tignor, E.S. Poloczanska, K. Mintenbeck, A. Alegría, M. Craig, S. Langsdorf, S. Löschke, V. Möller, A. Okem, B. Rama (eds.)]. Cambridge University Press, Cambridge, UK and New York, NY, USA, pp. 1689-1816, doi:10.1017/9781009325844.014.

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02

Latin America and the Caribbean: A Key Actor to Move Towards the Net-Zero Emissions Goal

Global greenhouse gas (GHG) emissions continue rising. The higher the warming, the worse the consequences.

Climate-related risks depend on the magnitude and pace of warming[43]. **Globally, GHG emissions have steadily grown in all sectors, reaching their all-time high of 59 ± 6.6 GtCO2eq in 2019**[44]. Even though the COVID-19 pandemic led to a temporary drop in GHG emissions, levels had recovered by the end of December 2020. In 2021, the atmospheric concentrations of the major GHGs (carbon dioxide, methane and nitrous oxide) reached new historic highs. Data from the main monitoring stations indicate that the levels of all three gases continued rising in 2022[45].

All indicators suggest that warming will continue, defying the objectives under the Paris Agreement to limit temperature rise to 1.5 °C above pre-industrial levels, and consequently increasing the risks and potential negative impacts associated with climate change.

43. IPCC, 2018. Global warming of 1.5° (SR1.5).
44. Dhakal. S., JC Minx. FL Toth. A. Abdel- Aziz. MJ Figueroa Meza, K. Hubacek. IGC Jonckheere. Yong-Gun Kim, GF Nemet. S. Pachauri. XC Tan, T. Wiedmann. 2022: Emissions Trends and Drivers. In IPCC, 2022: Climate Change 2022: Mitigation of Climate Change. Contribution of Working Group III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [PR Shukla, J. Skea. R. Slade, A. Al Khourdajie. R. van Diemen, D. McCollum, M. Pathak, S. Some. P. Vyas, R. Fradera. M. Belkacemi. A. Hasija. G. Lisboa. S. Luz, J. Malley, (eds.)]. Cambridge University Press, Cambridge, UK and New York, NY, USA. doi : 10.1017/9781009157926.004
45. World Meteorological Organization, 2022. WMO Provisional State of the Global Climate 2022.

For the achievement of climate goals and commitments, including those of the Paris Agreement, Latin America and the Caribbean must reach net-zero emissions by 2050 at the latest[46].

46. The IDB Group Action Plan on Climate Change 2021-2025 recognizes that all countries must reach a level of net emissions equal to zero, no later than 2050 (as recognized in the 2018 IPCC report Global Warming of 1.5 °C) and emphasizes the need to reduce climate risk and ensure resilience.

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Latin America and the Caribbean has contributed 11% of the global emissions since the industrial revolution[47]. The region has maintained an emission rate per capita (6.28 tCO2eq per capita) similar to the average global value (6.48 tCO2eq per capitaper capita), but much lower than in some regions like North America (17.89 tCO2eq per capita)[48]. The region´s total emissions have increased by 12% since 1990[49]. In 2019, Latin America and the Caribbean was responsible for 8-10% of global GHG emissions ***(figure 4)***[50]. Mitigation **commitments and efforts from all countries and subnational governments are required to move towards low-carbon development,** achieve substantial reductions by 2030, and carbon neutrality by around mid-century.

47. World Meteorological Organization, 2022. WMO Provisional State of the Global Climate 2022.
48. Climate Watch Data, 2023.
49. According to data from Climate Watch. the total GHG emissions of Latin America and the Caribbean in 1990 were 3.61 Gt and in 2019 4.04 Gt. representing an increase of 12% in that period. Source: Climate Watch. 2023.
50. Various sources (including Climate Watch) estimate that Latin America and the Caribbean has a contribution of GHG emissions of 8% with respect to global emissions. The recent IPCC AR6 report (WG III) estimates that in 2019 Latin America and the Caribbean has contributed 10% of global GHG emissions.

The countries' commitments toward carbon neutrality by 2050 can potentially reduce more than 55% of the emissions of Latin America and the Caribbean.

When each country´s contributions to regional emissions are analyzed, only a bulk of six countries emit more than 80% of the GHG emissions of Latin America and the Caribbean: Brazil, Mexico, Argentina, Venezuela, Colombia, and Peru ***(figure 4).*** The good news is that these countries have already committed to reducing GHG emissions. It is worth highlighting that Argentina, Brazil and Colombia have announced their goal of reaching carbon neutrality by 2050 and Mexico aims to reduce 50% of emissions by 2050 compared to those in the year 2000[51]. All in all, **eleven countries in Latin America and the Caribbean have committed to achieving net-zero emissions,** most of them by mid-century[52], which represents more than 55% of the regional emissions. The next chapter discusses country's climate commitments in more detail.

Reaching net-zero emissions is technically feasible and can benefit the region and its citizens economically and socially.

Latin America and the Caribbean has abundant natural resources, renewable energy assets, and the human talent for innovation and entrepreneurship[53], all of which provide multiple opportunities for success in the roadmap toward net-zero emission economies. Therefore, achieving the Paris Agreement goals not only helps cities reduce physical risk and get a cleaner development, it also offers a great deal of possibilities to harness citizens' talent and ensure that cities connect to market leaders with the latest economic development. In addition, **reaching net-zero emissions can bring economic and social benefits for the region,** such as an additional 1% economic growth in GDP and the creation of 15 million net new jobs by 2030. The move to carbon neutrality through investments in renewable energy, electric vehicles, infrastructure for active mobility, and nature-based solutions bring other local benefits: low energy costs; health improvement through electromobility and less harmful air; travel time reduction resulting from less traffic congestion; fewer road accidents; better health conditions through physical exercise; preservation of biodiversity and improvement of ecosystem services that contribute to people's quality of life, to mention some[54].

51. Brazil's 2050 carbon neutrality commitment has been communicated in the country's updated NDC (2022), while Argentina, Colombia, and Mexico's 2050 targets have been communicated in long-term low GHG emission development strategies (LTS) submitted to the UNFCCC in 2022, 2021 and 2016 respectively.
52. This counts countries that have communicated carbon neutrality commitments either via NDC, or through the Long-Term Low GHG Emissions Development Strategy (LTS) or via other climate pledges.
53. Saget, Catherine; Vogt-Schilb, Adrien; Luu, Trang, 2020. El empleo en un futuro de cero emisiones netas en América Latina y el Caribe.
54. Fazekas, Andreas; Bataille, Christopher; Vogt-Schilb, Adrien, 2022. Prosperidad libre de carbono: cómo los gobiernos pueden habilitar 15 transformaciones esenciales.

Understanding where GHG emissions come from is useful for designing and applying effective policies and strategies to reduce emissions.

The city's greenhouse gas emissions profile differs from a country´s because of the geographical scope of the emissions being considered and, among others, the type of activities covered. Intending to facilitate the understanding of the profile of GHG emissions in Latin America and the Caribbean at different scales, the figures below show the distribution of sectoral emissions at a regional level ***(figure 4),*** of the different countries in the region ***(figure 5),*** and a sample of Latin American cities ***(figure 6).*** Finding out about the main sources of emissions will allow us to identify and prioritize the most effective measures to reduce those emissions.

At the regional level *(figure 4):*

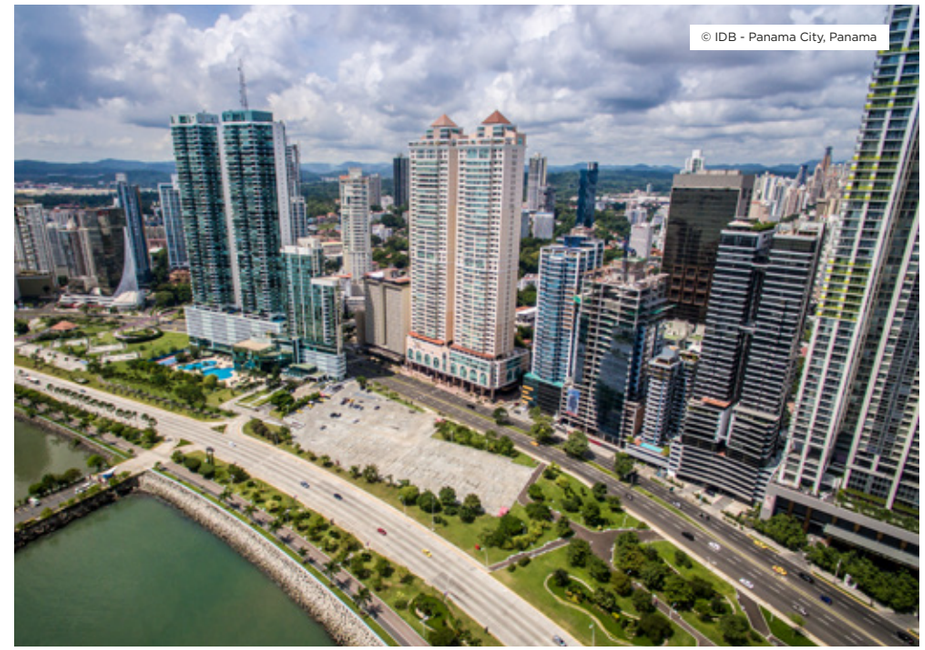
The emissions from Latin America and the Caribbean are dominated by the energy sector (44%), followed by the agriculture and livestock sector (26%), and by activities associated with forestry and land use (20%). Together, **these three sectors represent 90% of the total GHG emissions in Latin America and the Caribbean.** When jointly considering the emissions from agriculture, forestry, and land use in Latin America and the Caribbean, they represent 46% of the total emissions in the region, a level well above the world average of 22%[55]. Emissions from the energy sector include 15% from transportation and 13% from electricity generation and heating. The remaining emissions come from manufacturing and construction activities, fugitive emissions, and buildings.

The analysis of sectoral emissions by country *(figure 5)* shows that:

• The energy sector is the main emitter in 14 of the 26 countries featured, in line with regional emissions. Activities associated with forestry and land use are the main source of emissions in 6 countries; the agriculture and livestock sector is the major emitter in 5 of the countries considered.

• In some cases, forestry and land use can absorb carbon dioxide (CO2) through sustainable forest management and restoration of degraded lands, biomass production for energy generation, and sustainable **agricultural activities designed to increase the carbon storage capacity of soils.** In Latin America and the Caribbean, 14 countries have reported GHG removals from forestry-related activities and land use in their inventories and 4 countries act as net carbon sinks, absorbing more emissions than those generated by the country (Suriname, Panama, Belize, and Guyana).

55. Dhakal, S., JC Minx, FL Toth, A. Abdel-Aziz, MJ Figueroa Meza, K. Hubacek, IGC Jonckheere, Yong-Gun Kim, GF Nemet, S. Pachauri, XC Tan, T. Wiedmann, 2022: Emissions Trends and Drivers. In IPCC, 2022: Climate Change 2022: Mitigation of Climate Change. Contribution of Working Group III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [PR Shukla, J. Skea, R. Slade, A. Al Khourdajie, R. van Diemen, D. McCollum, M. Pathak, S. Some, P. Vyas, R. Fradera, Belkacemi, A. Hasija, G. Lisboa.. Luz, J. Malley, (eds.)]. Cambridge University Press, Cambridge, UK and New York, NY, USA. doi : 10.1017/9781009157926.004.



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At the city level *(figure 6):*

As an exercise, the GHG[56] inventories of 17 cities located in 8 countries in Latin America and the Caribbean were analyzed, 12 of which are members of the C40 network. From these data, it is concluded that:

• **Transport is the sector that generates the most emissions** in 10 of the 17 cities analyzed. The energy sector is the main issuer in the remaining 7.

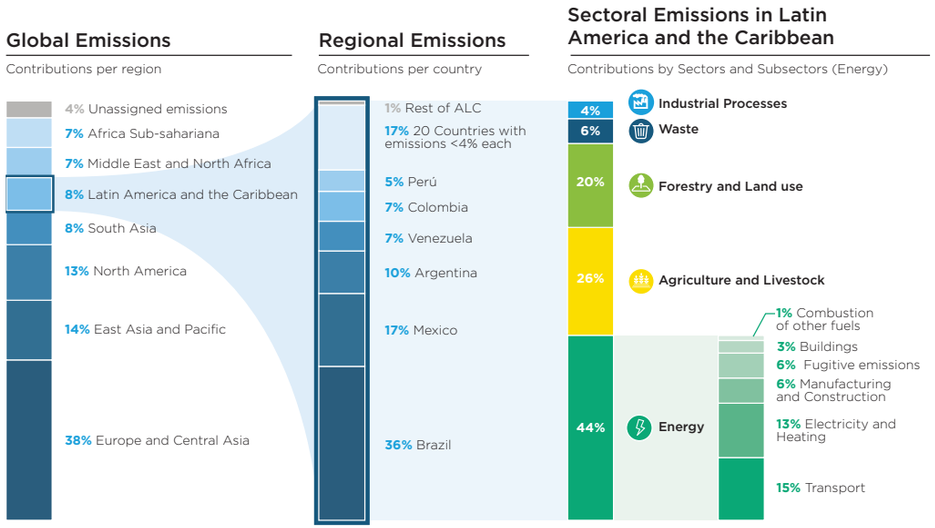
• The common factor of urban inventories reveals that the energy, transport, and waste management sectors are the urban activities that contribute the most to GHG emissions; consequently, it is in these sectors that cities should **prioritize their mitigation efforts.**

• **Urban areas concentrate GHG** fluxes depending on the size of the population, the dimension and nature of the urban economy, incomes, diets, and food consumption, the state of urbanization and urban form, energy and GHG emissions embodied in infrastructure, and imported and exported goods and services to and from cities.

• There are large differences in the emissions from the energy sector among the cities studied. The **energy matrices** of the countries highly condition the emissions of their urban centers generated by electricity consumption. In this way, cities based in countries with a lower share of fossil fuels in their matrices generally present lower emissions per capita from the energy sector than those located in countries with matrices containing higher carbon content.

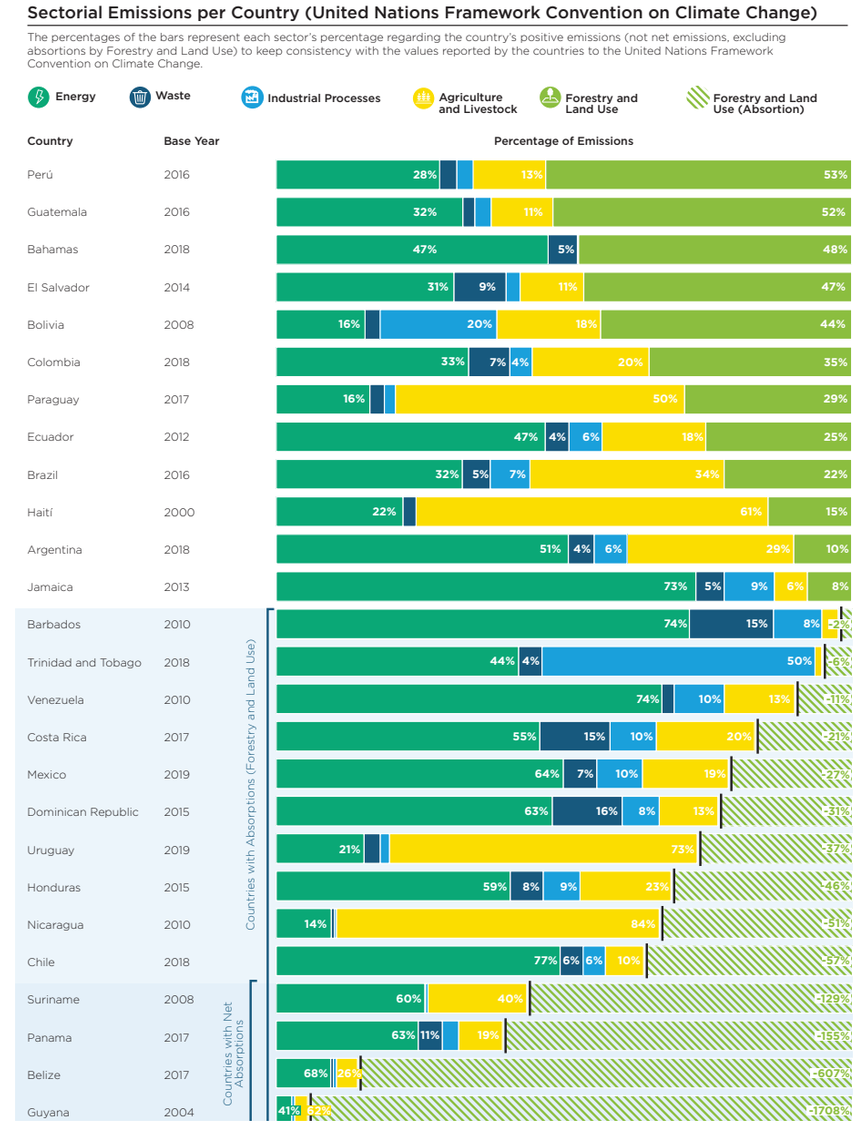
56. GHG emissions from cities according to the Basic level of local inventories, which consider emissions from the Energy, Transport and Waste sectors.

Figure 4: **Distribution of Greenhouse Gas (GHG) emissions in 2019**



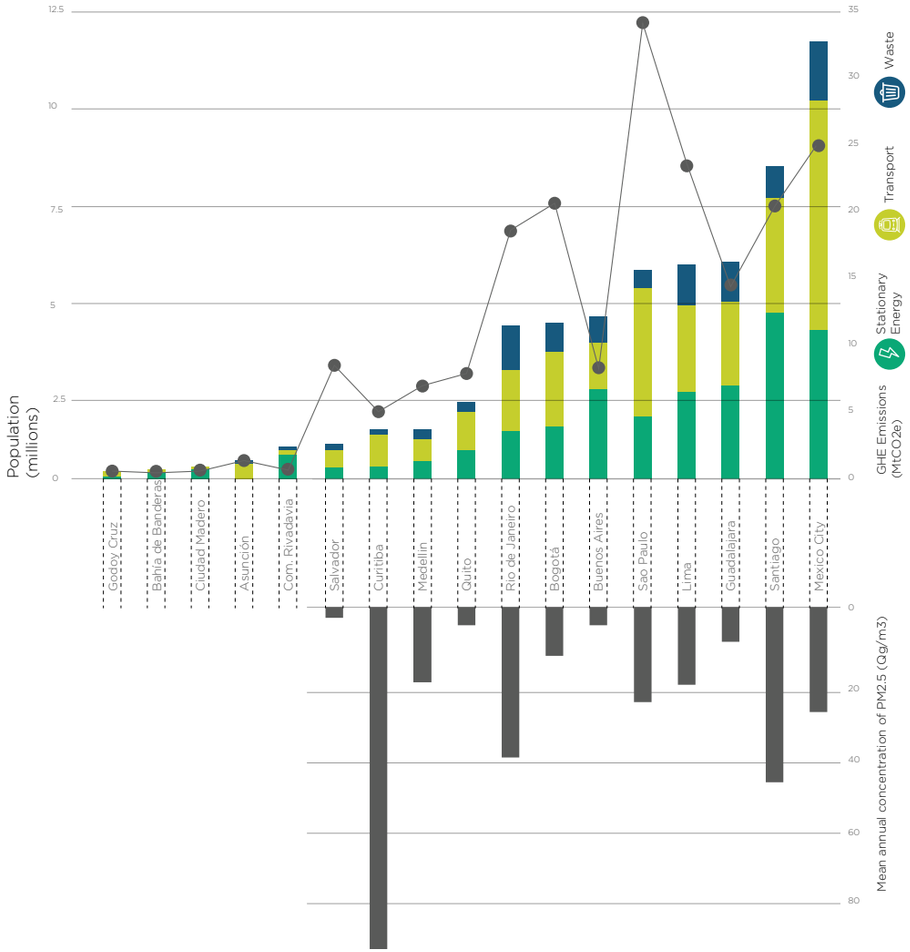
Notes: Unassigned Emissions refers to the international transport emissions (bunker fuels) and excluded territories.
Source: Emissions corresponding to 2019. Climate Watch (2022). Emissions include Forestry and Land Use.
LAC Countries' Percentages of Emissions: Brazil (35.94%), Mexico (16.61%), Argentina (9.88%), Venezuela (7.42%), Colombia (6.70%), Peru (4.72%), Bolivia (3.43%), Ecuador (2.44%), Paraguay (2.39%), Chile (1.37%), Dominican Republic (0.98%), Guatemala (0.95%), Nicaragua (0.95%), Uruguay (0.85%), Trinidad and Tobago (0.70%), Honduras (0.70%), Panama (0.63%), Guyana (0.49%), El Salvador (0.34%), Suriname (0.34%), Haití (0.28%), Jamaica (0.25%), Costa Rica (0.21%), Belize (0.17%), Barbados (0.09%), Bahamas (0.08%), Rest of LAC (1.08%),

Figure 5: **Greenhouse gas (GHG) emissions reported by the countries to the United Nations Framework Convention on Climate Change**



Notes: The bars represent the total of absolute emissions proportionally divided per sector. The percentages of negative emissions (Absortions by Forestry and Land Use) are calculated on the basis of the total positive emissions per country, reason for which they may bear above 100% values, which indicates the country absorbs more GHG that it emits.
Source: Own elaboration based on data from the National Inventories of Greenhouse Gases reported by the countries to the United Nations Framework Convention on Climate Change. For more information, consult section Bibliographical References/National Inventories of Greenhouse Gases consulted.

Figure 6: **Greenhouse Gas Emissions reported by some cities of Latin American and the Caribbean**



Sources: Own elaboration based on the GHG inventories reported by the cities. For more information, see section Bibliographic References/Climate Action Plans of cities consulted.
Population: http://data.un.org/Data.aspx?d=POP&f=tableCode:240
Average Annual concentration of PM2.5: https://www.iqair.com/world-most-polluted-cities/world-air-quality-report-2021-en.pdf https://blogs.worldbank.org/latinamerica/10-key-points-climate-change-impacts-opportunities-and-priorities-latin-america-and https://www.unep.org/news-and-stories/press-release/latin-american-and-caribbean-cities-can-halve-resource-consumption
PNUMA (2021). El Peso de las Ciudades en América Latina y el Caribe: requerimientos futuros de recursos y potenciales rutas de actuación.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Advancing in developing urban GHG inventories is a necessary step for planning cities with low carbon emissions.

Having greenhouse gas inventories at different scales, including the national and local scales, is an important tool for understanding and addressing the environmental impact of human activity and for making appropriate decisions about policies and strategies designed to reduce emissions in every sector and territorial level. As parties of the United Nations Framework Convention on Climate Change, countries regularly submit their national GHG inventories. However, the development of GHG inventories is less frequent at the city level (though more and more cities have GHG inventories that include emissions and removals from the urban territory in a finished period)[57]. Advancement toward developing urban GHG inventories calls for a critical step into low-carbon city planning; a step that will help subnational governments to:

- Know the amount and type of GHG emitted in a city, which will help understand the environmental impact of human activity in that area.
- Identify areas of the city where emissions are highest, which can help focus on reduction efforts in those areas.
- Make informed decisions based on policies and strategies to reduce greenhouse gas emissions and improve air quality.
- Monitor progress in reducing emissions over time and assess the effectiveness of implemented policies and strategies.

It is worth noting that the analysis of urban emissions in this report is not intended to be exhaustive, but rather, 17 cities in the region were selected for which comparable public information on their greenhouse gas inventories was obtained. As a next step, it would be interesting to expand the analysis to more cities that have GHG emission inventories, as well as promote and support the development of urban GHG inventories in cities throughout the region.

57. Dhakal. S., JC Minx. FL Toth. A. Abdel- Aziz. MJ Figueroa Meza, K. Hubacek. IGC Jonckheere. Yong-Gun Kim, GF Nemet. S. Pachauri. XC Tan, T. Wiedmann. 2022: Emissions Trends and Drivers. In IPCC, 2022: Climate Change 2022: Mitigation of Climate Change. Contribution of Working Group III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [PR Shukla, J. Skea. R. Slade, A. Al Khourdajie. R. van Diemen, D. McCollum, M. Pathak, S. Some. P. Vyas, R. Fradera. M. Belkacemi. A. Hasija. G. Lisboa. S. Luz, J. Malley, (eds.)]. Cambridge University Press, Cambridge, UK and New York, NY, USA. doi : 10.1017/9781009157926.004.

The challenge: achieving the reduction of urban greenhouse gas emissions.

The contribution of urban areas to global GHG emissions already represents around 70%. Urban areas concentrate GHG flows due to the size of the urban population, the high concentration of urban services and economic activities, energy and GHG from infrastructure, and imported and exported goods and services to and from the cities. Urban emissions are estimated to have accounted for around 62% of global emissions in 2015, increasing their contribution to 67-72% in 2020. **Global urban emissions per capita are also growing and show an increase of 11.8% between 2000 and 2015**[58]**.**

Despite the difficulties in estimating the urban contribution to GHG emissions, what is certain is that this contribution is highly relevant and will continue to rise: the urban share of regional GHG emissions increased between 2000 and 2015 from 55% to 66%. Likewise, as in other developing regions, in Latin America and the Caribbean, urban GHG emissions per capita increased by 40.4% between 2000 and 2015[58]. In the future, it is expected that the proportion of urban GHG emissions concerning global emissions will continue to increase due to population growth trends, urban land expansion, and demands for food, infrastructure and services, reaching more than 80% of global emissions in some scenarios by 2100.

The scope of the increase in urban GHG emissions depends on each scenario considered and the scale and speed at which urban mitigation actions occur, showing the importance of urban mitigation efforts to reduce GHG emissions significantly[59]. Today, decisions on the design of cities and long-lasting urban infrastructure will determine the scope and impact of climate change and our ability to achieve sustainable, low-GHG emissions and climate-resilient urbanization.

58. Lwasa, S., K.C. Seto, X. Bai, H. Blanco, K.R. Gurney, Ş. Kılkış, O. Lucon, J. Murakami, J. Pan, A. Sharifi, Y. Yamagata, 2022: Urban systems and other settlements. In IPCC, 2022: Climate Change 2022: Mitigation of Climate Change. Contribution of Working Group III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [P.R. Shukla, J. Skea, R. Slade, A. Al Khourdajie, R. van Diemen, D. McCollum, M. Pathak, S. Some, P. Vyas, R. Fradera, M. Belkacemi, A. Hasija, G. Lisboa, S. Luz, J. Malley, (eds.)]. Cambridge University Press, Cambridge, UK and New York, NY, USA. doi: 10.1017/9781009157926.010

59. Lwasa. S., KC Seto. X. Bai, H. Blanco, KR Gurney, Ş. Kılkış, O. Lucon. J. Murakami, J. Pan, A. Sharifi, Y. Yamagata, 2022: Urban systems and other settlements. In IPCC, 2022: Climate Change 2022: Mitigation of Climate Change. Contribution of Working Group III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [PR Shukla, J. Skea. R. Slade, A. Al Khourdajie. R. van Diemen, D. McCollum, M. Pathak, S. Some. P. Vyas, R. Fradera. M. Belkacemi. A. Hasija. G. Lisboa. S. Luz, J. Malley, (eds.)]. Cambridge University Press, Cambridge, UK and New York, NY, USA. doi : 10.1017/9781009157926.010

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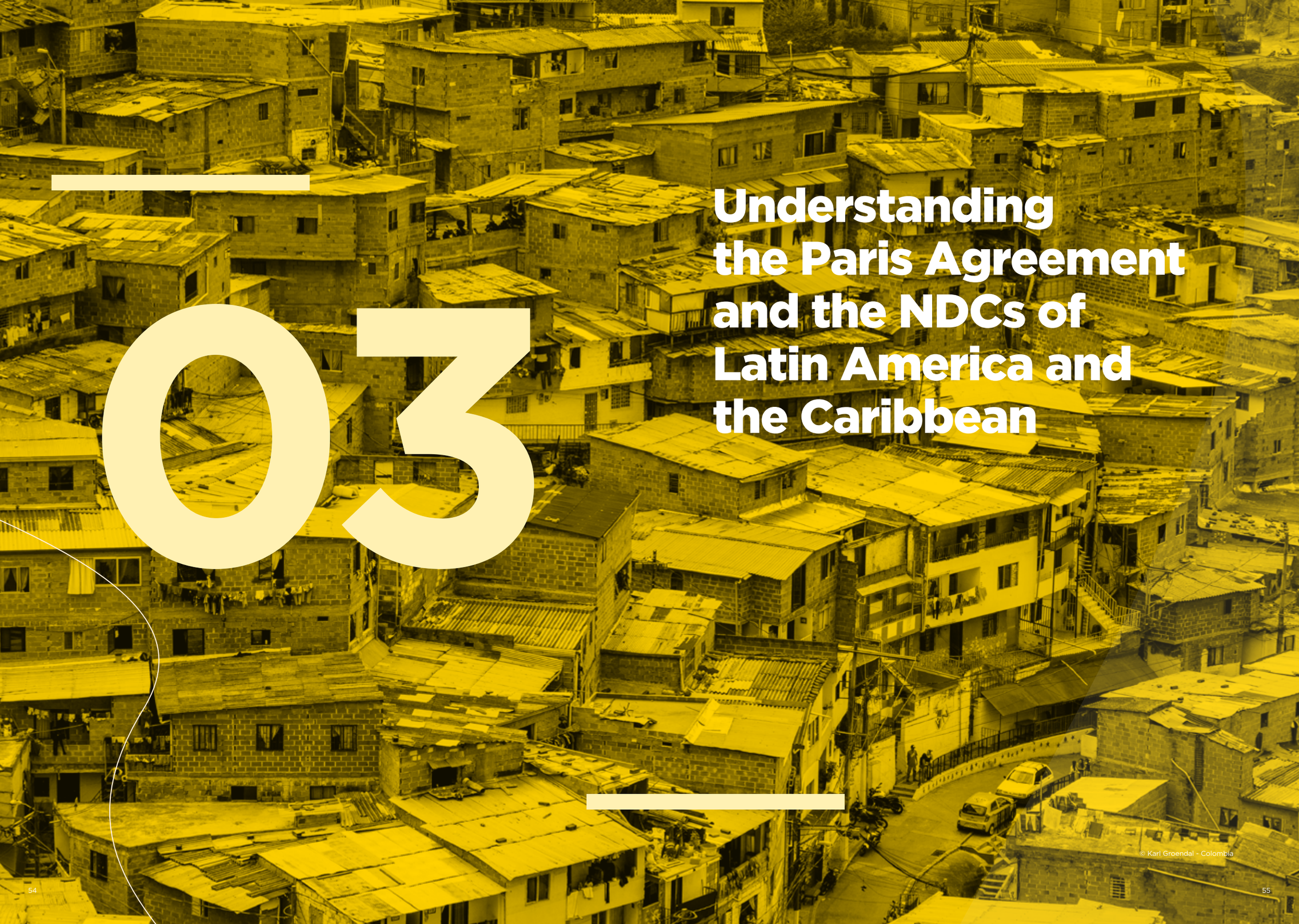
03

Understanding the Paris Agreement and the NDCs of Latin America and the Caribbean



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The Paris Agreement[60] is a legally binding international climate change treaty adopted by 196 countries at COP21 in Paris (2015).

In 2016, practically all the countries in the world ratified the Paris Agreement with the aim of:

- **Holding the increase in the global average temperature to well below 2°C** above pre-industrial levels and pursuing efforts to limit the temperature increase to 1.5°C above pre-industrial levels, recognizing that this would significantly reduce the risks and impacts of climate change;

- **Increasing the ability to adapt to the adverse impacts of climate change** and foster climate resilience and low greenhouse gas emissions development, in a manner that does not threaten food production; and

- **Making finance flows** consistent with a pathway towards low greenhouse gas emissions and climate-resilient development.

Nationally Determined Contributions (NDCs) are at the core of the Paris Agreement: commitments made by countries that are party to the **United Nations Framework Convention on Climate Change (UNFCCC)** within the framework of the Paris Agreement for the reduction of GHG emissions and the adaptation to climate change effects. The contributions of each country are established according to their national circumstances and respective capacities and must be updated every five years. To boost ambition over time, the Paris Agreement states that successive NDCs will represent a progression compared to the previous NDC and reflect its highest possible ambition.

However, the commitments made by countries in the current NDCs are not enough to achieve the goals of the Paris Agreement (it is estimated that the current NDCs will result in a warming of 2.4°C by 2100[61]). Over the next few years, more ambitious goals should be pursued to meet the 2030 Agenda for Sustainable Development Goals and the Paris Agreement.

60. United Nations (UN), Paris Agreement of the United Nations Framework Convention on Climate Change (UNFCCC). December 12, 2015.

61. Climate Action Tracker, 2021. Glasgow's 2030 credibility gap: net zero's lip service to climate action.

The efforts of subnational governments are crucial parts of the solution. With adequate support, local governments can design measures and actions for climate change mitigation and adaptation based on the particular characteristics of their territories and population and join efforts between municipalities and among actors of society, supporting in this way the achievement of global and national climate objectives.

As countries update and implement their NDCs, cities have an opportunity to integrate their climate commitments. With federal governments, cities can be part of the solution to the climate change challenge because:

01

They are a necessary actor to achieve the Paris Agreement's objectives.

Cities play a vital role in the fight against climate change since they are an essential source of GHG; **they concentrate economic activity and are home to large segments of the population vulnerable to climate impacts.** In addition, they have legal and institutional competence over various sectors related to climate action (for example, housing, land use, transport and buildings). Therefore, the efforts of subnational governments and their vast potential for reducing emissions and building resilience are part and parcel of the solution towards meeting global climate goals and the countries' respective climate commitments.

In this context, including subnational governments in formulating and implementing NDCs and improving the coordination of cities' climate action have the potential to accelerate and scale it. Indeed, the Paris Agreement recognizes in its preamble the relevance of all government levels and the various actors in dealing with climate change[62]. This is even more relevant for Latin America and the Caribbean, where implementing the NDCs must improve the quality of people's lives, and 81% reside in urban areas.

62. United Nations (UN), Paris Agreement of the United Nations Framework Convention on Climate Change (UNFCCC). December 12, 2015.

02

Local governments are policymakers and catalysts promoting change at local levels and are better positioned to link global goals with communities.

The pandemic years revealed the **crucial role that subnational governments play** in ensuring the population's well-being and are often the first to respond to a **health and environmental crisis.** Local government authorities stand out as having a more remarkable ability to influence the path the city chooses to develop, which can either drive sustainability or lead to carbon-intensive roads.

Furthermore, **climate change is a global challenge that requires local, context-specific solutions.** In close contact with local citizens and businesses, subnational governments are often better positioned to influence consumer and producer behaviors and implement nationally driven climate policies at the urban level. Also, cities can lead and collaborate in global initiatives to reduce GHG emissions, such as implementing climate action plans and collaborating with other cities to manage common resources at the metropolitan level, share experiences and develop innovative solutions.

With the proper support, local governments could play a crucial role in translating national diagnoses and policies into tangible measures, from sustainable mobility solutions to local renewable energy systems and low-carbon buildings **aligned with the citizens' needs and interests.** In this regard, effective coordination between national and subnational governments can facilitate the translation of the climate goals of the NDCs into concrete actions and facilitate their implementation and monitoring in the territory.

Multiple local governments have joined the fight against climate change,

acknowledging that they are critical players in implementing climate change policies and that cities play a leading role in the solution. Indeed, **a growing number of municipalities, cities, states, and regions are taking climate action at a more ambitious level than their respective national governments,** demonstrating that resilience and GHG emission reductions are possible[63].

63. GIZ, 2021. Policy Brief Localizing NDCs with inspiration from the 2030 Agenda.

The momentum of cities.

With the NDCs in place and countries ready to put their commitments into practice, it is a good time for local and regional governments to engage in climate-related dialogues and **highlight the value of their contributions** and capacities to support implementation and get funds for climate investments.

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Despite the growing number of local and regional climate action initiatives, the current climate-related efforts at a subnational level are not often linked to national governments or surrounding cities and regions.

This prevents them from taking full advantage of their potential to make a significant difference in the transition toward a zero-carbon economy and the strengthening of its resilience[64]. **Climate change is so complex, and urban contexts are so varied that it is difficult for national and local governments** to coordinate the design and implementation of climate commitments effectively. The objectives set out in the NDCs are asymmetrical and the concept of mitigation and adaptation actions at the city level, if any, is quite general regarding what strategy they would like to adopt. Likewise, they do not usually openly reflect subnational governance and, in some cases, the direct participation of cities in these documents turns out to be minor or non-existent.

Below follows an analysis of the NDCs presented by the twenty-six (26) Borrowing Member Countries of the IDB Group[65] as of January 2023. The aim is to identify the common features and trends of the NDCs in the region and detect entry points for the coordination of national climate action with cities. As a result of the analysis, some recommendations are made to strengthen the NDCs of the countries, **highlighting the opportunity to involve subnational governments in the design, updating, and implementation of NDCs** to increase climate ambition.

64. WEF, 2022. Localizing the NDCs in cities and regions.

65. The IDB has 26 borrowing member countries, all of them in Latin America and the Caribbean: Argentina, Bahamas, Barbados, Belize, Bolivia, Brazil, Chile, Colombia, Costa Rica, Ecuador, El Salvador, Guatemala, Guyana, Haiti, Honduras, Jamaica, Mexico, Nicaragua, Panama, Paraguay, Peru, Dominican Republic, Suriname, Trinidad and Tobago, Uruguay and Venezuela.

Understanding NDCs in Latin America and the Caribbean

Carbon Neutral · Reduction from - · Carbon Dioxide (CO_2) · Perfluorocarbono (PFC) · Metane (CH_4) · Waste · Industrial Processes

Fixed Amount (F) · Sulfur Hexafluoride (SF_6) · Hidrofluorocarbonos (HFC) · Nitrous Oxide (N_2O) · Energy · AFOLU

Source: Own elaboration based on data reported by the countries in their NDCs. For more information, consult the section Bibliographic References/Nationally Determined Contributions consulted.

MITIGATION TARGETS

	2025		2030		2040	2050
	Unconditional	Conditional	Unconditional	Conditional		
Argentina			349 $MTCO_2$			⊖
Bahamas				30% GHG↓		
Barbados	20% GHG ↓	35% GHG ↓	35% GHG ↓	70% GHG↓		
Belize				Multiple sectoral targets		
Bolivia			Multiple targets	Multiple targets		
Brazil	37% GHG ↓		50% GHG ↓			⊖
Chile			95 $MTCO_2eq$			⊖
Colombia			169.4 $MTCO_2eq$			⊖
Costa Rica			9.11 $MTCO_2eq$			⊖
Dominican Republic			7% GHG ↓	27% GHG↓		
Ecuador	9% GHG 4% LULUCF ↓	20% GHG 16% LULUCF ↓				
El Salvador			0.819 $MTCO_2e$	0.640 $MTCO_2e$	50.85 $MTCO_2e$ avoided 2035-2040	
Guatemala			11.2% GHG ↓	22.6% GHG↓		59% GHG↓
Guyana	Qualitative - Energy and Forestry	48.7 $MTCO_2e$ ↓				
Haití			6.32% GHG ↓	25.5% GHG↓		
Honduras				16% GHG↓		
Jamaica			25.4% GHG ↓	28.4% GHG↓		
México			22% GHG 51% Black carbon ↓	36% GHG 70% Black carbon ↓		50% GHG↓
Nicaragua			F-GHGs↓	65% Renewable energy 24% Carbon Absorption		
Panamá		11.5% GHG Energy ↓				24% GHG Energy ↓
Paraguay			10% GHG ↓	20% GHG↓		
Perú				179 $MTCO_2e$		
Surinam		25% Energía renovable		Multiple targets		
Trinidad and Tobago			30% GHG Transport ↓	15% GHG↓		
Uruguay			9.267gG CO2 818gG CH4 32gG N2O	10.236gG CO2 879gG CH4 34gG N2O		⊖ CO_2
Venezuela				20% GHG ↓		

	Type of Target	Year last sumbitted to UNFCCC	GHG	IPCC Sectors	Contribution to Global GHG	Financial Requirements (USD Billions)	National Financial Instruments
Argentina	F Level of Emissions	2021	CO_2 CH_4 N_2O PFC HFC	Energy AFOLU Waste Industrial Processes	0.80%		✓
Bahamas	↓ BAU	2022	CO_2 CH_4 N_2O	Energy AFOLU Waste Industrial Processes	0.01%	4	
Barbados	↓ BAU	2021	CO_2 CH_4 N_2O SF_6 HFC	Energy AFOLU Waste Industrial Processes	0.01%		✓
Belize	↓ BAU+ Non-GHG	2021	CO_2 CH_4	Energy AFOLU Waste	0.01%	1.71	✓
Bolivia	Non-GHG Targets	2022	CO_2 CH_4 N_2O HFC	Energy AFOLU Waste Industrial Processes	0.28%		✓
Brazil	↓ 2005	2022	CO_2 CH_4 N_2O SF_6 PFC HFC	Energy AFOLU Waste Industrial Processes	2.92%		
Chile	F Level of Emissions	2020	CO_2 CH_4 N_2O SF_6 PFC HFC	Energy AFOLU Waste Industrial Processes	0.11%		✓
Colombia	F Level of Emissions	2020	CO_2 CH_4 N_2O SF_6 PFC HFC	Energy AFOLU Waste Industrial Processes	0.54%		✓
Costa Rica	F Level of Emissions	2020	CO_2 CH_4 N_2O SF_6 PFC HFC	Energy AFOLU Waste Industrial Processes	0.02%		✓
Dominican Republic	↓ BAU	2020	CO_2 CH_4 N_2O	Energy AFOLU Waste Industrial Processes	0.08%	17.55	✓
Ecuador	↓ BAU	2019	CO_2 CH_4 N_2O	Energy AFOLU Waste Industrial Processes	0.20%		✓
El Salvador	↓ BAU	2022	CO_2 CH_4 N_2O	Energy AFOLU Waste Industrial Processes	0.03%		✓
Guatemala	↓ BAU	2022	CO_2 CH_4 N_2O	Energy AFOLU Waste Industrial Processes	0.08%		
Guyana	↓ BAU+ Non-GHG	2016	CO_2	Energy AFOLU	0.04%	1.6	
Haití	↓ BAU	2022	CO_2 CH_4 N_2O	Energy AFOLU Waste Industrial Processes	0.02%	17.06	✓
Honduras	↓ BAU	2021	CO_2 CH_4 N_2O HFC	Energy AFOLU Waste Industrial Processes	0.06%		✓
Jamaica	↓ BAU	2020	CO_2 CH_4 N_2O HFC	Energy AFOLU	0.02%		
México	↓ BAU	2022	CO_2 CH_4 N_2O SF_6 PFC HFC	Energy AFOLU Waste Industrial Processes	1.35%		✓
Nicaragua	↓ BAU	2020	CO_2 CH_4 N_2O	Energy AFOLU	0.08%	1.65	
Panamá	↓ BAU	2020	CO_2 CH_4 N_2O	Energy AFOLU	0.05%		
Paraguay	↓ BAU	2021	CO_2 CH_4 N_2O SF_6 PFC HFC	Energy AFOLU Waste Industrial Processes	0.19%		✓
Perú	F Level of Emissions	2020	CO_2 CH_4 N_2O SF_6 PFC HFC	Energy AFOLU Industrial Processes	0.38%		✓
Surinam	Non-GHG Targets	2020	CO_2 CH_4 N_2O	Energy AFOLU	0.03%	0.7	
Trinidad and Tobago	↓ BAU	2018	CO_2 CH_4 N_2O	Energy	0.06%	2	
Uruguay	F Level of Emissions	2022	CO_2 CH_4 N_2O	Energy AFOLU Waste Industrial Processes	0.07%		✓
Venezuela	↓ BAU	2021	(Not specified)	Energy AFOLU Waste Industrial Processes	0.60%		✓

Understanding NDCs in Latin America and the Caribbean

Infrastructure · Water Resources · Coastal Areas · Energy · Transport
Agriculture and Food Security · Tourism · Ecosystems and Biodiversity · Health and Social Aspects · Cities, Urban Infrastructure, Human Settlements

	ADAPTATION TARGETS				Other Climate Instruments			
	Components included in NDC							
	Adaptation	Loss and Damage	Climate trends, vulnerability and impacts	Sectors	National Mitigation Plans	Long Term Strategy	National Adaptation Plan	Adaptation Communication
Argentina	✓		✓		✓	✓		✓
Bahamas	✓	✓	✓					
Barbados	✓	✓	✓					
Belize	✓		✓		✓			
Bolivia	✓		✓					
Brazil	✓				✓		✓	✓
Chile	✓	✓	✓		✓	✓	✓	✓
Colombia	✓				✓	✓	✓	✓
Costa Rica	✓		✓		✓	✓	✓	✓
Dominican Republic	✓	✓			✓			
Ecuador	✓		✓		✓			✓
El Salvador	✓		✓		✓			
Guatemala	✓		✓		✓	✓	✓	
Guyana	✓				✓			
Haití	✓	✓						✓
Honduras	✓		✓					
Jamaica					✓			✓
México	✓		✓		✓	✓		✓
Nicaragua	✓							
Panamá	✓				✓			✓
Paraguay	✓	✓	✓		✓		✓	✓
Perú	✓		✓		✓		✓	
Surinam	✓		✓		✓		✓	
Trinidad and Tobago			✓					
Uruguay	✓	✓	✓		✓	✓	✓	✓
Venezuela	✓							

Source: Own elaboration based on data reported by the countries in their NDCs. For more information, consult the section Bibliographic References/Nationally Determined Contributions consulted.

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Key findings of NDCs (mitigation)

In the Paris Agreement, countries aim to reach maximum GHG emissions as soon as possible so that net- zero emissions are achieved.

The 26 borrowing member countries of the IDB Group have submitted their NDCs with emission reduction commitments. Almost all (23 out of 26) have updated their NDCs, reaffirming their climate commitments and/or to increase their ambition[66]. Indeed, climate change plays a significant role in the conversations and policies of all the region's countries and in their commitment to fulfill the Paris Agreement goals.

Most of the NDCs analyzed (24 out of 26) include emission reduction targets for 2030 and only 2 countries set emission reduction targets for 2025. In addition to short-term targets for 2025 or 2030, 9 countries intend to reach a long-term mitigation goal for the year 2050 (year 2040 in the case of El Salvador), helpful in mapping GHG emissions trajectories from the short to medium and long terms.

Most (20) Latin America and the Caribbean countries have established unconditional mitigation goals in their NDCs; that is to say, their fulfillment does not depend on external support in terms of international financing, technology transfer, or capacity building. Of these, 17 have defined conditional targets in addition to unconditional ones, increasing the ambition of their commitments subject to external support. 6 countries (Bahamas, Belize, Honduras, Peru, Panama, and Venezuela) have set only conditional targets, meaning they have committed to climate action susceptible to factors such as the provision of international climate finance.

The majority (19) of the NDCs establish economy-wide mitigation targets, covering all economic sectors (energy, waste, industrial processes and agriculture, forestry and land uses). The energy sector is considered in the NDC of the 26 countries analyzed, 25 countries consider the agriculture and land use sectors, and 19 countries consider the industry and waste sectors. Although the transport sector is usually considered within the energy sector, 9 countries have been identified for setting specific emission reduction goals for this sector.

66. As of December 2022, Ecuador, Guyana and Trinidad and Tobago have submitted to the UNFCCC only a first version of the NDC.

Most (17) countries have defined the mitigation goal as a percentage reduction concerning a business-as-usual (BAU) GHG emissions scenario. 6 countries have set an absolute mitigation goal, limiting the amount of GHG emissions from the country for the target year. Brazil has established an emissions reduction goal regarding the emissions of a reference year (2005). Bolivia and Suriname include mitigation goals that are not measured in GHG emissions (for example, a goal associated with the percentage of renewables in the energy matrix).

All countries include carbon dioxide (CO2) and methane (CH4) in their targets, but only 7 countries cover all relevant GHG in their targets[67].

11 countries committed to achieving net zero emissions, most of them by mid-century[68] (Antigua and Barbuda, Argentina, Barbados, Brazil, Chile, Colombia, Costa Rica, Dominican Republic, Guyana, Jamaica, Panama, and Uruguay), which covers about 55% of the emissions from Latin America and the Caribbean .

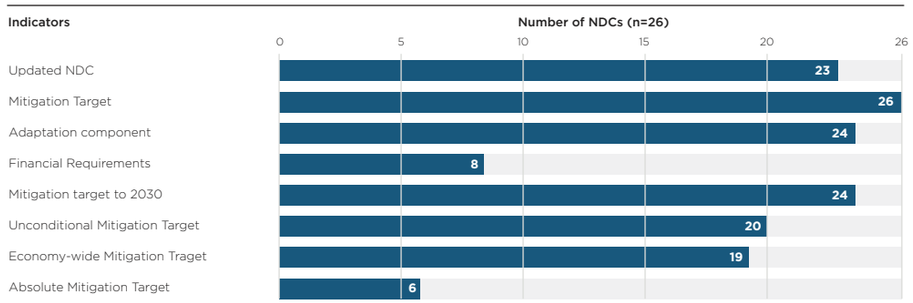
7 countries have submitted long-term low GHG emission development strategies (LTS) to better frame efforts to achieve long-term climate goals (Argentina, Chile, Colombia, Costa Rica, Guatemala, Mexico, and Uruguay), of which 5 establish carbon neutrality goals.

The NDCs, as commitments that countries assume within the framework of their international policy, are usually incorporated into a domestic climate policy, which also integrates national climate plans, sustainable development strategies, new regulatory frameworks or adaptations of existing ones, and financial instruments, among others. **It has been possible to identify national strategies on climate change in 18 of the countries analyzed.**

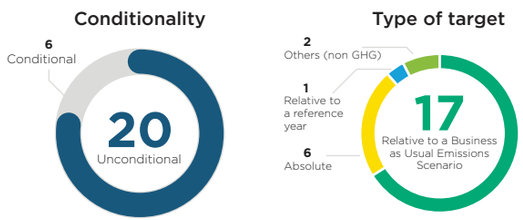
67. Although the Paris Agreement allows countries to define their mitigation commitments, it is encouraged to set unconditional, economy-wide emissions reduction targets (energy, waste, industrial process and product use, agriculture, forestry and land uses) and to include all relevant GHGs: carbon dioxide (CO2), methane (CH4), hydrofluorocarbons (HFCs), nitrogen trifluoride (NF3), nitrous oxide (N2O), perfluorochemicals (PFCs), and sulfur hexafluoride (SF6) to robustly identify emissions reduction opportunities. Source: T. Fransen. C. Henderson, R. O'Connor, N. Alayza. M. Caldwell, S. Chakrabarty, A. Dixit, M. Finch, A. Kustar. P. Langer, F. Stolle, G. Walls, and B. Welle. 2022. "The State of Nationally Determined Contributions: 2022." Report. Washington, DC: World Resources Institute. Available online at doi.org/10.46830/wrirpt.22.00043.
68. This counts countries that have communicated carbon neutrality commitments either via NDC, or through the Long-Term Low GHG Emissions Development Strategy (LTS) or via other climate commitments (climate pledges) ".
69. The Paris Agreement invites countries to formulate and submit long-term strategies. Unlike NDCs, these are not mandatory.

Figure 7. **Overview of NDCs in Latin America and the Caribbean**

a. **Status of NDCs in the Region**



b. **Mitigation targets**



Source: Own elaboration based on data reported by the countries in their NDCs. For more information, consult the section Bibliographic References/Nationally Determined Contributions consulted.

Key findings of NDCs (finance)

Finance supports the mitigation and adaptation goals articulated in countries' NDCs. The Paris Agreement reaffirms that developed countries should provide financial resources to the least endowed and most vulnerable countries to assist them in mitigation and adaptation, and at the same time, all countries are encouraged to make voluntary contributions[70].

Virtually all countries analyzed specify in their NDC that to meet their adaptation and mitigation goals, they will seek access to external financial support, emphasizing the role of concessional climate financing through donations, grants, and loans under favorable conditions, among other mechanisms.

Only 8 countries have included financial requirement amounts in their NDCs, providing a better understanding of the challenges, gaps, and funding needs to achieve NDCs. Some of these countries have included a global number of financial requirements (Bahamas, Haiti, Guyana, and Trinidad and Tobago), while others have disaggregated financial requirements for adaptation and mitigation (Belize and the Dominican Republic) or for specific sectors and projects (Nicaragua and Suriname).

17 of the 26 countries analyzed explicitly mention in their NDC the existence or commitment to create domestic financial instruments for climate action (i.e. national climate funds, public budgets, tax reform, carbon tax, and others).

70. United Nations (UN), Paris Agreement of the United Nations Framework Convention on Climate Change (UNFCCC). December 12, 2015.

Key findings of NDCs (adaptation)

With the Paris Agreement, for the first time, a binding agreement commits all countries to undertake efforts to combat climate change and adapt to its effects.

24 of the 26 countries include adaptation commitments in their NDC. Although mitigation is the centerpiece of the NDCs, presenting clear objectives and priority areas for adaptation is particularly important in a region as vulnerable to climate change as Latin America and the Caribbean.

17 countries have included in their NDC information on climate trends, projections, and impacts associated with climate change. These trends are increasingly supported by the latest assessments and national communications, which serve as a valuable context for adaptation. While the information on trends and impacts is generally robust, information on the vulnerability of specific population groups still lags behind[71]. It is likely that countries that have not included this information are doing so through other vehicles, such as adaptation communications or national adaptation plans.

Of these 24 governments, 23 have defined that the management of water resources, and agriculture and food security are priority sectors for adaptation policies. 20 countries have identified ecosystems and biodiversity as a priority sector for adaptation and 17 countries have prioritized the health sector ***(figure 8).***

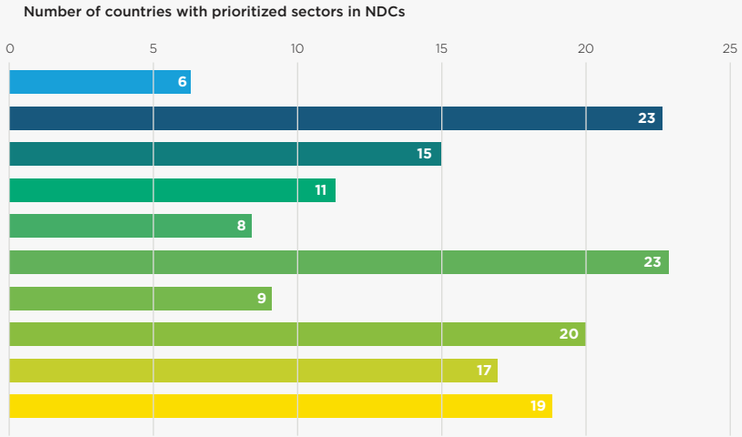
7 countries have included issues related to loss and damage in their NDC (Bahamas, Barbados, Chile, Dominican Republic, Haiti, Paraguay, Uruguay). There is a global trend that climate-vulnerable countries increasingly describe economic losses and damages in their NDC[72].

9 of the countries analyzed have submitted their National Climate Change Adaptation Plans (NAPs) (Brazil, Chile, Colombia, Costa Rica, Guatemala, Paraguay, Peru, Suriname, Uruguay), and **12 countries have submitted Adaptation Communications** to the UNFCCC. In general, NDCs link commitments to adaptation-relevant national and sectoral policies. NAPs are crucial complementary tools to NDCs for adaptation, and alignment of NDCs and country NAP processes is key to operationalizing NDC adaptation priorities.

71. Fransen T., C. Henderson, R. O'Connor, N. Alayza. M. Caldwell, S. Chakrabarty, A. Dixit, M. Finch, A. Kustar. P. Langer, F. Stolle, G. Walls, and B. Welle. 2022. "The State of Nationally Determined Contributions: 2022." Report. Washington, DC: World Resources Institute. Available online at doi.org/10.46830/wrirpt.22.00043.
72. Fransen T., C. Henderson, R. O'Connor, N. Alayza. M. Caldwell, S. Chakrabarty, A. Dixit, M. Finch, A. Kustar. P. Langer, F. Stolle, G. Walls, and B. Welle. 2022. "The State of Nationally Determined Contributions: 2022." Report. Washington, DC: World Resources Institute. Available online at doi.org/10.46830/wrirpt.22.00043.

Figure 8: **Prioritized adaptation sectors in the NDCs of Latin America and the Caribbean**

Adaptation sectors prioritized in NDCs



Sectors

- Industry
- Water Resources
- Coastal areas
- Energy
- Transport
- Agriculture and Food Security
- Tourism
- Ecosystems and Biodiversity
- Health and Social Aspects
- Cities, Urban Infrastructure and Human Settlements

Source: Own elaboration based on data reported by the countries in their NDCs. For more information, consult the section Bibliographic References/Nationally Determined Contributions consulted.

Key findings of NDCs (urban focus)

• **19 countries have prioritized the cities, infrastructure, and/or human settlements sectors in the adaptation section of the NDCs.** However, few have adopted a solid urban or territorial approach including transversal aspects, financing needs, or capacity, as is usually done for other sectors.

• Few countries have indicated a **mechanism for coordination** with subnational governments.

• Very few countries have included climate commitments, targets, responsibilities, or actions of subnational governments.

• Energy, transport, mobility, and waste are the sectors most mentioned in urban mitigation challenges and responses.

• **Infrastructure and water** are the two most mentioned sectors in urban adaptation challenges and responses[73].

73. UN Habitat. 2022. Urban Climate Action. The urban content of the NDCs: Global review 2022.

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04

Towards Increasing Climate Ambition: the Opportunity for Cities

Based on the analysis of the NDCs in the region, it can be inferred that these are robust instruments that address aspects of both adaptation and mitigation and that NDCs have been improved in subsequent updates by the countries. In addition, NDCs **are demonstrating increasingly strong links to national planning processes and domestic climate policy**. However, as mentioned above, the current NDCs are not enough to achieve the goals of the Paris Agreement. So we need to continue strengthening the NDCs to increase ambition and speed up their implementation.

As part of the normal NDC update process, most countries will communicate a new round of NDCs in 2025. We cannot miss this opportunity to communicate to the world clear goals and implementation plans in line with global climate goals for the short, medium and long term. Then, **what can we learn from the process so far to progress in the subsequent NDCs and reflect the most outstanding possible ambition?**

The climate commitments assumed in the NDCs and the approaches and methodologies used show significant heterogeneity between the different countries. On the one hand, this is aligned with the principle of **common but differentiated responsibilities of the United Nations Framework Convention on Climate Change (UNFCCC) and the spirit of NDCs to be established based on national circumstances** and the respective capacities of the parties. However, this also poses a challenge when it comes to understanding the climate ambition of Latin America and the Caribbean, the climate commitments and actions that are driving countries towards compliance with the Paris Agreement, and makes it difficult to address the needs and define the steps to continue in the region. The complexity of comparing and aggregating the region countries' efforts lies in the diversity of mitigation targets (at least six ways of mitigation targets are identified), the different years defined as the NDC horizon (most consider 2030 as the year for compliance, although not all) and the existence of


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conditional and unconditional targets. Recognizing that the NDCs are a country-driven process, **advancing on common frameworks to establish climate objectives and targets** could facilitate the identification of gaps and needs, promote synergies, and channel financing and technical support for the implementation of commitments.

On the other hand, although more than 85% of the Latin American and Caribbean countries considered have updated their NDCs in pursuit of higher climate ambition, **the relationship between NDCs and implementation is still not well understood**[74]. The challenge remains in turning the goals and objectives into concrete actions and investments with measurable and traceable results. Looking ahead to the following updates of the NDCs, countries can improve through translating the mitigation and adaptation goals into financial strategies and investment plans[75] to reach the proposed targets while identifying finance, technology and/or capacity needs, if required. This process should consider the design of implementation mechanisms for the fulfillment of the objectives (for example, budget allocation, laws, and intersectoral coordination cabinets) and the establishment of mechanisms for reporting and verifying results. Achieving high-level political support and early involvement of relevant ministries and actors are necessary for greater integration and mainstreaming of the climate policy[76]. As for cities and urban development, **it is crucial to involve the Ministries of Housing and Habitat of the countries in the design of climate policies and NDCs**. However, until now, they have generally not been involved or have been only at a shallow level[77]. Colombia, Ecuador, Paraguay, and Venezuela are examples of countries that have included specific goals in their NDC with a clear involvement of the respective Housing Ministries.

74. Fransen T., C. Henderson, R. O'Connor, N. Alayza. M. Caldwell, S. Chakrabarty, A. Dixit, M. Finch, A. Kustar. P. Langer, F. Stolle, G. Walls, and B. Welle. 2022. "The State of Nationally Determined Contributions: 2022." Report. Washington, DC: World Resources Institute. Available online at doi.org/10.46830/wrirpt.22.00043.
75. NDC Invest. 2020. Support for the development of NDCs in Latin America and the Caribbean.
76. Mauricio Cárdenas, Juan Pablo Bonilla, Federico Brusa. 2021. Climate policies in Latin America and the Caribbean: Successful cases and challenges in the fight against climate change.
77. Carter, Rebecca; Tye. Stefanie; Aguilar, Soledad, 2022. Long-term adaptation planning in Latin America and the Caribbean.

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Regarding adaptation, although it is already included in most of the NDCs, it is usually kept as a diagnosis and identification of sectors and strategic lines, still far from being transformed into concrete actions or investments. **The current NDCs identify a wide range of adaptation actions**, of diverse scopes, with greater or lesser detail, though they tend to lack a clear prioritization of goals or actions. In some cases, the adaptation components are maintained at the diagnosis level, communicating vulnerabilities and adaptation needs without defining goals, strategic areas, actions, or indicators. Undoubtedly, **strengthening the aspects of adaptation to climate change in the NDCs is one of the biggest challenges** towards the new round of NDCs if we want to advance in the fulfillment of the adaptation objective of the Paris Agreement. It is worth noting that some countries use National Adaptation Plans or Adaptation Communications as the main instrument for planning and communicating adaptation commitments. It is possible, then, that the approach to the adaptation aspects of some countries be more robust in these instruments than in the NDCs, though this was not analyzed in this publication.

There is also a need to **improve the understanding of the climate finance requirements** for implementing the NDCs. Most Latin America and the Caribbean countries make explicit in their NDC the need for external financing for climate action. However, only nine countries in the region have included a figure associated with financing requirements. While countries are not required to report financing needs or means of implementation, there is an opportunity for countries to improve communication about their climate finance requirements to achieve their goals and the degree of NDC conditionality on external finance[78].

Lastly, the NDC's urban-content approach and the involvement of subnational governments should also be strengthened. Countries have **the opportunity to increase climate ambition by connecting their NDC with concrete actions on the local ground**. This shows that there is ample room to improve the inclusion of specific urban requests for finance, technology, and capacity building in NDCs in an urban context. Countries have made progress in establishing links between the international climate regime (NDCs) with domestic climate policies, mainly with other sectoral plans and development strategies at the national level. However, **there is still room for improvement in integrating the climate goals of the Paris Agreement with subnational development plans and strategies**. Although most countries mention local governments and cities as key actors in the struggle against climate change, few have adopted a strong subnational approach or established mechanisms to facilitate their articulation in the design and implementation of the NDCs. Local government-led strategies can increase resilience, reduce carbon emissions, and facilitate citizen engagement towards a sustainable future. Including and communicating regional and local climate efforts in NDCs offer an opportunity to **increase the ambition of the NDCs, facilitate their implementation, and scale climate action at all levels**. At the same time, by formalizing their climate commitments in NDCs, cities could benefit from **increased visibility, recognition of their climate efforts and opportunities for climate finance**. This topic is discussed further below.

78. Fransen T., C. Henderson, R. O'Connor, N. Alayza. M. Caldwell, S. Chakrabarty, A. Dixit, M. Finch, A. Kustar. P. Langer, F. Stolle, G. Walls, and B. Welle. 2022. "The State of Nationally Determined Contributions: 2022." Report. Washington, DC: World Resources Institute. Available online at doi.org/10.46830/wrirpt.22.00043.


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Localization of NDCs in cities: An approach to joining local and national efforts towards the fulfillment of common objectives.

While national governments work on their climate commitments through NDCs, local governments are working on the elaboration of climate action plans, resilience and goals for emissions adaptation and reduction. These simultaneous efforts offer the opportunity for the different government levels to align their actions and jointly address information gaps, technical and financial needs, and market failures in order to be able to speed up processes and achieve the proposed climate goals.

The development, update and implementation of NDCs provide an opportunity to coordinate and align climate action at different levels to increase ambition and accelerate climate action[79].

To achieve this, the global and national goals and plans of these agendas need to be translated and adapted to local contexts and needs collaboratively. This can be understood as ***"localizing NDCs: the process of defining, implementing and monitoring strategies at the local level for achieving global, national and subnational goals and targets"***[80].

Through this process, it is possible to:

- **Involve subnational governments** in the design, update and implementation of NDCs, through strengthened dialogue between the national and subnational levels, for example, through stakeholder consultations.

- **Incorporate climate efforts** of subnational governments both in the development and updating of the NDCs and during their implementation.

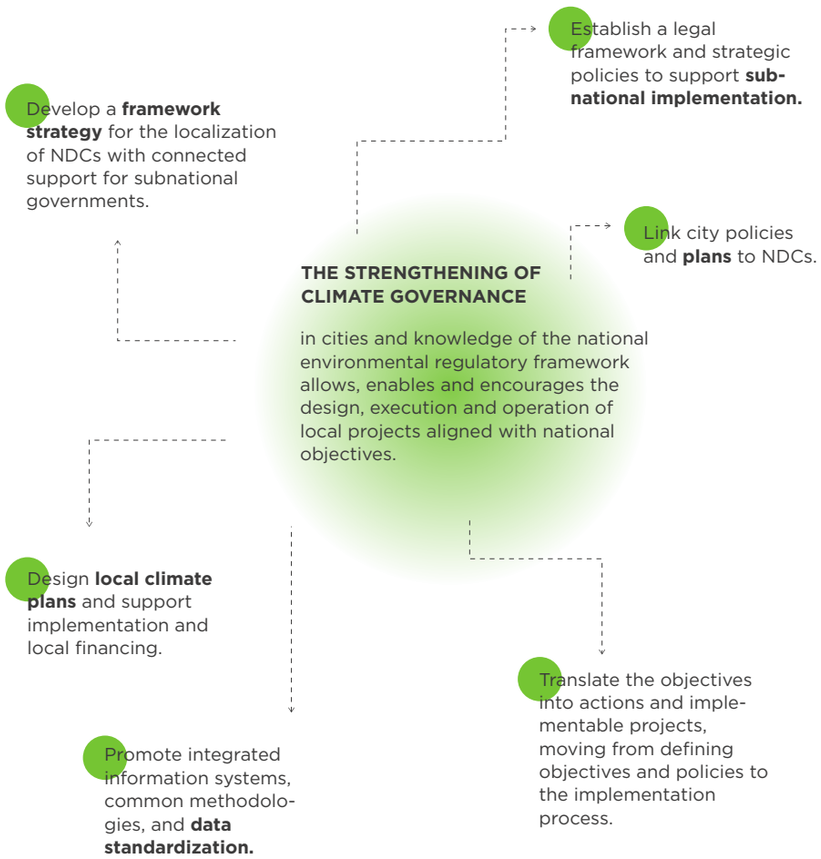
- **Improve vertical integration** and coordination between levels of government to ensure articulation with development plans, improve policy coherence and increase climate ambition.

- **Make visible the multiplying effect that urban initiatives have** when prioritizing projects to implement NDCs and LTS commitments, thus influencing national budgets and initiatives.

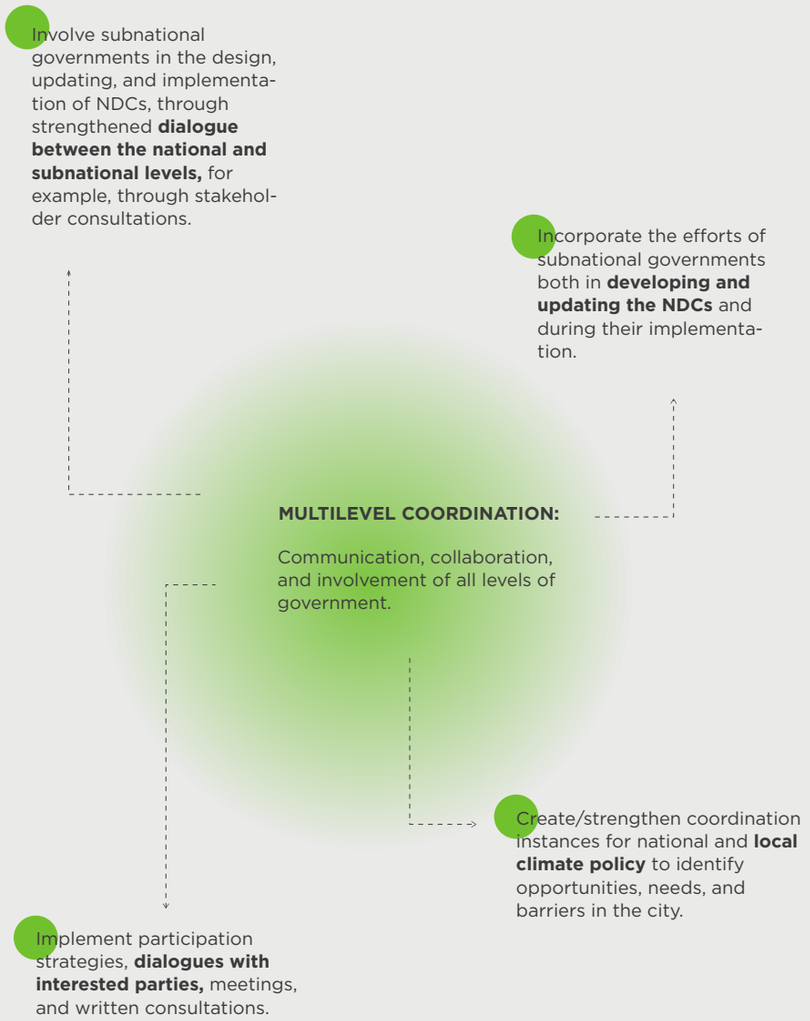
79. Global Covenant of Mayors for Climate & Energy, 2021. The Multilevel Climate Action Playbook for Local & Regional Governments (second edition).
80. GIZ, 2021. Policy Brief Localizing NDCs with inspiration from the 2030 Agenda.

Facilitators of the localization of the NDCs in the cities.

For “NDC localization” we need to empower local actors while strengthening the enabling institutional environment at the national level[81]. Some enabling **mechanisms for NDC localization and vertical integration include:**



81. GIZ, 2021. Policy Brief Localising NDCs with inspiration from the 2030 Agenda.



Strengthen **technical capacity** and knowledge at the city level, followed by adequate access to financing.

Support **joint efforts** for the collection, processing, and use of data.

Promote **collaborations between cities** through alliances and networks for ambitious local climate action.

STRENGTHENING OF CAPACITIES AND COLLABORATIVE LOCAL ACTION:

Show what other cities are doing, **demonstrate how to implement best practices** in other metropolitan areas, and lobby national governments.

Create **opportunities** to bring together mayors and city leaders.

Develop **project portfolios** for subnational implementation.

Co-develop **investment plans** that address regional and local needs.

Localization of climate **finance.**

FINANCIAL (CLIMATE) RESOURCES FOR CITIES:

Develop instruments and invest in capacity at the city level so that climate finance can flow directly to them and create conditions for more effective climate action.

Facilitate **debate** between ministries.

Establish **financing mechanisms** (international, national, regional, municipal) for subnational governments.

Align existing investments and resources.

Support **capacity development** and provide technical expertise and data.

Mobilize **additional funds:** attract the private sector.

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A necessary step: connecting national and subnational climate action.

In order to better understand what and how cities in the region are doing to carry out local climate action, the climate action plans of 17 cities located in 8 countries in Latin America and the Caribbean were analyzed. The objective is to extract some reflections on the commitments and mitigation and adaptation actions postulated in the plans in the context of the commitments assumed by the respective countries.

• 13 of the 17 cities **refer to the national NDC**, while 5 have considered national mitigation commitments to define local goals or actions.

• 8 cities **mention the existence or creation of local financial instruments** to accelerate the implementation of the actions defined in each climate strategy.

The policies cities usually incorporate into climate planning present some characteristics according to the sector addressed. For example, the measures that impact both the energy and transport sectors tend to be aimed at managing demand more efficiently. Thus, for example, energy efficiency measures in buildings (housing, shops, industries) through new regulations, training, awareness, or improvements in public transport, the promotion of active mobility and the ordering of the territory with a transport-oriented development are likely to be implemented by local governments. However, for a greater impact, they should be accompanied by policies at the national level, such as incorporating renewable energies in the energy matrix and using alternative fuels for transport. The waste sector can be addressed almost entirely locally, promoting minimization strategies, separation at source, composting, recovery, recycling, and safe final disposal. At the national level, investments in recycling centers, sanitary landfills, and regulatory adaptation to improve and innovate production processes that generate less disposable material are elements that can complement local initiatives.

Mention should be made regarding the scope and impact of local policies compared to national ones. In the first case, the **proximity to the community and knowledge of the problems in the territory** by local authorities are elements that contribute to a better use of the scarce resources they usually have. In this context, the role of cities in adaptation policies becomes essential to know first-hand the impacts that affect them. For their part, the policies of the National States become more relevant when it comes to modifying production patterns through regulations or laws, or with investments in strategic sectors such as the energy matrix, the promotion of certain productive industries and the definition of alternatives for agricultural practices.

In this framework, although the capacity for action of cities is broad, it also finds limits due to being **immersed in a national state system that defines rules and macro structures** that can condition compliance with its ambitious objectives such as carbon neutrality. In fact, many cities incorporate the concept of “residual emissions” referring to those emissions that cannot be reduced within their territory since they depend on actions of a national scope.

The state of cities in Latin America and The Caribbean

(1) The information for Guadalajara corresponds to the Guadalajara Metropolitan Area.
(2) Projected emissions under the BAU scenario for Mexico City correspond to those of Scope 1 and 2 according to the Global Protocol for Community-Scale Greenhouse Gas Inventories (GPC).
(3) The emissions projected under the BAU scenario of Quito have been estimated based on the Basic+ inventory of the city, which includes more emission sources than the Basic.
(4) For Salvador, projected emissions under the BAU scenario listed in 2030 correspond to 2032 according to the Plano de Mitigação e Adaptação às Mudanças do Clima de Salvador
(5) The information for Santiago corresponds to the Santiago Metropolitan Region
(6) The reported emissions correspond to the Basic level inventories according to the GPC. This level considers the emissions generated by stationary energy, transport within of the municipal limits and the generation of waste within the city. The values are indicated in Mega tons of carbon dioxide equivalent (1,000,000 tons of CO2e) which also includes methane and nitrous oxide emissions.

	GENERAL			EMISSIONS						CLIMATE ACTION PLANS				
							TOTAL	BAU		TARGETS				
	Population	Area (km2)	Mean density (pop/km2)	Stationary energy (MtCO2e)	Transport (MtCO2e)	Waste (MtCO2e)	2022 (MtCO2e)	2030 (MtCO2e)	2050 (MtCO2e)	Mitigation	Adaptation	Reference to NDC	Financial instruments	Year published
Bogotá	7.4M	1,636	4,523	3.91	5.41	2.09	11.42	15.44	23.74	2024 ↓15% GHG; 2030 ↓50% GHG; 2050 −	✓	✓	✓	2022
Buenos Aires	3M	202	14,851	6.54	3.57	1.78	11.90	16.5	21.6	2030 ↓50% GHG; 2050 −	✓			2020
Curitiba	1.9M	435	4,368	0.79	2.33	0.37	3.50	4.8	6.8	Targets for Energy, Waste and Transport; 2050 −	✓			2020
Guadalajara	5.2M	3,265	1,593	6.90	6.20	2.90	16.10	24	46.9	Targets for Energy, Waste and Transport; 2050 −	✓	✓	✓	2020
Lima	8.5M	2,638	3,222	6.34	6.36	3.90	15.79	28.3	54.35	2050 ↓ 81% GHG; 2050 −	✓	✓	✓	2021
Medellín	2.5M	376	6,642	1.33	1.48	0.74	3.56	4.5	6.5	2023 ↓ 5% GHG; 2030 ↓20% GHG; 2050 −	✓	✓	✓	2020
Mexico City	9M	1,485	6,061	10.91	17.14	4.48	32.52	-	65	2024 ↓32% GHG cond.; 2030 ↓56% GHG cond.; 2040 ↓83% GHG cond.; 2050 −	✓	✓	✓	2021
Quito	2.8M	4,231	662	1.98	2.90	0.73	5.61	6.96	2.7	2023 ↓560 ktCO2e; 2030 ↓30% GHG; 2050 −	✓	✓		2020
Río de Janeiro	6.7M	1,255	5,339	3.40	4.69	3.24	11.34	13.9	17.9	2030 ↓20% GHG; 2050 −	✓	✓		2021
Salvador	3M	693	3,859	0.66	1.39	0.38	2.43	2.7	3	2024 ↓15% GHG; 2032 ↓25% GHG; 2049 −	✓	✓		2020
Santiago	7.3M	984	7,419	12.21	8.50	2.46	23.17	-	-	-	✓			2017
São Paulo	12.3M	1,521	8,087	4.58	9.57	1.25	15.41	20	30.88	2030 ↓20% GHG incond.; 2030 ↓50% GHG cond.; 2050 −	✓	✓	✓	2021
Asunción	0.5M	117	4,274	0.0487	0.82	0.394	1.25	1.4	-	Not emit more than 1,123 ktCO2e by 2030	✓			2021
Godoy Cruz	0.2M	107.3	1,864	0.21	0.12	0.13	0.46	0.59	-	Not emit more than 247 ktCO2e by 2030	✓	✓	✓	2020
Ciudad Madero	0.2M	47.9	4,175	0.57	0.32	0.05	0.94	0.99	-	-		✓		2020
Comodoro Rivadavia	0.2M	563	355	1.73	0.38	0.08	2.2	2.46	-	Not emit more than 1,645 tCO2e by 2030	✓	✓		2021
Bahia de Banderas	0.165M	773	213	0.33	0.22	0.05	0.61	0.88	-	Not emit more than 718 ktCO2e by 2030	✓	✓	✓	2020

Source: Own elaboration based on information included in the climate action plans of the cities. For more information, consult the section Bibliographic references/Climate action plans of cities consulted.

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Going further: capitalizing on the efforts of cities

Collaborations between cities through alliances and networks are powerful motivators to enhance the central role of cities towards a low-carbon, resilient and equitable growth. **In Latin America and the Caribbean, numerous initiatives and networks of cities seek to support climate action in cities and collect lessons learned and success stories at the urban level to identify those actions and policies that work best, and that can be upscaled and replicated**. To mention a few, there is the Capital Cities of the Americas network against Climate Change (CC35), the Argentine Network of Municipalities against Climate Change (RAMCC), the Colombian Network of Municipalities against Climate Change (RCMCC), the Association of Municipalities of Panama (AMUPA), the Chilean Network of Municipalities before Climate Change (RedMuniCC). These networks and other global initiatives, such as the IDB Cities Network, ICLEI, and C40, play a fundamental role in systematizing the knowledge generated from experience, promoting exchange, facilitating synergistic work between cities, and strengthening capacities for urban sustainability.

Many cities in Latin America and the Caribbean are already leading climate action as part of these networks and participating in national, regional, and international climate initiatives. Twelve cities in Latin America and the Caribbean are part of the C40, a network of mayors from almost 100 leading cities worldwide who are urgently addressing the climate crisis. More than 130 cities are part of ICLEI, and more than 330 use the CDP-ICLEI Track platform to report their climate reports as an accountability mechanism for cities. For their part, 22 cities are part of the Resilient Initiative Cities Network, and others have joined the Race Initiative to Zero, a global campaign framed within the UNFCCC for cities, companies, universities, and other actors to mobilize and generate change towards a decarbonized economy[82].

More than 580 cities in Latin America and the Caribbean and more than 12,600 worldwide have joined the Covenant of Mayors for Climate and Energy[83] (GCoM), **the largest global alliance of local governments taking action on climate change**. The GCoM, supported by city networks such as C40, ICLEI, and UCLG, establishes a common framework for member cities and a regional and national governance scheme to better articulate efforts. The local governments adhering to the GCoM assume the commitment to develop their strategies against climate change. To do this, they must first carry out a GHG inventory, according to the Global Protocol for Community-Scale Greenhouse Gas Emission Inventories[84] (GPC), assess climate risks, define climate adaptation and mitigation goals which should be aligned to the NDCs, and a series of actions to achieve them.

Outside of these networks and initiatives, other cities in Latin America and the Caribbean are also working on defining climate action plans or implementing concrete actions.

While these networks have proven to be an essential resource in climate action at the local level, most participating subnational governments are mainly in developed countries or are large cities in less developed countries[85]. There is an excellent **opportunity to involve other cities in the region - small, medium, or large - to generate alliances and synergies** to face the challenges of climate change. The list of networks and initiatives of cities mentioned is not exhaustive. However, they give an idea of the large number of cities committed to climate action, an asset that we must take advantage of to accelerate climate action in the region.

82. Race to Zero Campaign. https://unfccc.int/climate-action/race-to-zero-campaign

83. Global Covenant of Mayors for Climate and Energy. https://www.globalcovenantofmayors.org/
84. Greenhouse Gas Protocol. https://ghgprotocol.org/
85. Lwasa. S., KC Seto. X. Bai. H. Blanco, KR Gurney. S. Kilki. O. Lucon. J. Murakami, J. Pan, A. Sharifi. Y. Yamagata. 2022: Urban systems and others settlements. In IPCC, 2022: Climate Change 2022: Mitigation of Climate Change. Contribution of Working Group III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [PR Shukla, J. Skea. R. Slade, A. Al Khourdajie. R. van Diemen, D. McCollum, M. Pathak, S. Some. P. Vyas, R. Fradera. M. Belkacemi. A. Hasija. G. Lisboa. S. Luz, J. Malley, (eds.)]. Cambridge University Press, Cambridge, UK and New York, NY, USA. doi : 10.1017/9781009157926.010

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05

Climate Solutions in the Cities of Latin America and the Caribbean

Many cities in Latin America and the Caribbean are already planning and implementing strategies, projects, and initiatives for climate action.

Below are examples of more than 20 projects and **initiatives led by cities in Latin America and the Caribbean** to improve resilience and risk management, boost sustainable mobility, clean energy and green buildings, promote the circular economy and nature-based solutions, as well as to design strategies for low-carbon development and initiatives for community participation and education.

It is worth mentioning that many of the cases included in this section are based on the reports of "100 Solutions for climate action in cities" from different years, prepared by Sustainia, C40 and Realdania as the objective of this report was not to identify new initiatives but disseminate and make visible outstanding climate actions in cities.

Although there are still many challenges for cities to implement adaptation and mitigation actions on the required scale, these cases show that significant climate actions are already being carried out at the local level throughout the region.

Illustration on the city's climate solutions included in this publication. Source: Own elaboration.

A

Resilience and risk management

In Latin America and the Caribbean, climate change affects, and will continue to affect, development in various ways. In Central America and the Caribbean, extreme events such as hurricanes and droughts threaten livelihoods and infrastructure. In the Andes, changes in the availability of water resources caused by variations in runoff and the retreat of glaciers **affect rural and urban populations** and the main economic activities, including mining and hydroelectric energy. The Amazon and the Gran Chaco face forest degradation and biodiversity loss, threatening local communities. In the Southern Cone, **exports of basic products are at risk** due to the loss of production derived from intensive agriculture. Likewise, in the dry subtropical regions of Mexico and northeastern Brazil, increased droughts threaten rural health and livelihoods[86].

86. IDB Group Action Plan on Climate Change (IDB Group, 2021)..

For every dollar invested in prevention, up to $15 can be saved in disaster recovery, and for every dollar invested in resilience, between $4 and $7 can be saved.

In cities, the challenges of climate change overlap with the challenges of urban areas, such as the generation of waste, land use change, air pollution, and high demand for resources. **Climate change contributes to increased disaster risk**, for example, by increasing the frequency and intensity of extreme weather events. In a region as vulnerable as ours, promoting urban resilience and solid, comprehensive disaster risk management is essential for the sustainable development of cities. **Designing low-carbon and resilient cities** today is much easier than retrofitting them to reduce risk tomorrow[87]. For this reason, many cities in the region and the world are progressing in strengthening their risk management strategies and including climate change and resilience in their plans and investments that tend to reduce vulnerability and **minimize the consequences of climate change** in the medium and long term. In addition to planning processes, a combination of early warning systems, contingency planning and financing, technology adoption, insurance, and migration from areas with unsustainable conditions can help manage the impact of natural disasters and extreme weather shocks[88].

Although many cities are already implementing actions to address the impacts of climate change, adaptation is a complex challenge, and there are still **numerous obstacles that make it difficult to speed up the response**, such as the lack of up-to-date and adequate information at the local level, the absence of financing and technology, cultural values and traditions, and institutional constraints, among others. The good news is that investing in adaptation and resilience is more cost-effective than responding to disasters[89]: for every dollar invested in prevention, up to $15 can be saved in disaster recovery, and for every dollar invested in resilience, between $4 and $7 can be saved while generating non-monetized benefits[90]. Furthermore, by **promoting the resilience of cities and adaptation to reduce negative climate-related impacts**, we will be better prepared to respond to other city challenges, being an opportunity to achieve economic growth and solve urban problems. In this sense, the region's cities have the opportunity to promote economic development and face the recovery from the crisis caused by the COVID-19 pandemic by applying policies and actions that, in addition to seeking economic reactivation, reduce the causes and risks derived from climate change.

87. Birkmann. J., E. Liwenga. R. Pandey, E. Boyd, R. Djalante. F. Gemenne. W. Leal Filho, PF Pinho. L. Stringer, and D. Wrathall, 2022: Poverty, Livelihoods and Sustainable Development. In: Climate Change 2022: Impacts, Adaptation, and Vulnerability. Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [H.-O. Pörtner. DC Roberts, M. Tignor. ES Poloczanska. K. Mintenbeck. A. Joy. M. Craig, S. Langsdorf. S. Löschke. V. Möller. A. Okem. B. Rama (eds.)]. Cambridge University Press, Cambridge, UK and New York, NY, USA, p. 1171-1274, doi:10.1017/9781009325844.010.
88. Disasters and Loss of Life: New Evidence on the Effect of Disaster Risk Management Governance in Latin America and the Caribbean. Roberto Guerrero Compean, Sergio Lacambra Ayuso. IDB, 2020. http://dx.doi.org/10.18235/0002781
89. United Nations Office for Disaster Risk Reduction (UNDRR). Consulted in February 2023 at: https://www.undrr.org/es/sobre-undrr/financiamiento
90. Mechler. R. Reviewing estimates of the economic efficiency of disaster risk management: opportunities and limitations of using risk-based cost–benefit analysis. Nat Hazards 81, 2121–2147 (2016). https://doi.org/10.1007/s11069-016-2170-y

MEXICO CITY | MEXICO

Reshaping Streets Prevents Flooding and Ensures Safety

In 2016, Mexico City launched a "complete streets" initiative, dubbed Calle Verde, in an effort to improve drainage, add green spaces, and cultivate a safer and more attractive streetscape that caters to the needs of pedestrians, cyclists, and public transit users while better preparing the city for the effects of climate change. Consisting of both grey and green interventions, **the program will repair drainage pipes under key corridors and repave streets and sidewalks with permeable pavement in order to prevent flooding during extreme weather events.** Furthermore, corner extensions at intersections will improve pedestrian safety, and planting trees and green spaces will help the city manage rainwater, mitigate urban heat island effects, and serve as attractive public spaces.

MAIN GOAL

-30% Reduction of CO2 emissions by 2020 compared to 2016

OTHER BENEFITS

What can other cities learn?

Combination of gray and green infrastructure to future proof our cities against shock events such as flooding and storms also presents a unique opportunity to re-envision street life while adding to its social, economic and health benefits.

Source: 100 solutions for climate action in cities. C40, Sustania, Realdania, (2016)

MEDELLÍN | COLOMBIA

Restoring Eco-systems Provides Opportunities for Locals

The Peripheral Garden of Medellín was established in 2012 in response to the risks of urban growth in uphill neighborhoods. Covering more than 65 hectares, **the garden features footpaths, bike lanes, and clean mobility corridors, while facilitating ecological restoration, environmental preservation, and sustainable housing.** Thousands of native trees have been planted to restore ecosystems, and organic orchids have been developed to encourage new eco-businesses and preserve regional farming traditions.

Conscious of the communities that already inhabit these areas, the city included them in the process by providing employment and educational opportunities.

MAIN GOAL

70k Native trees have been plantes

OTHER BENEFITS

What can other cities learn?

Having a socially inclusive approach to the restoration of the natural ecosystems allows for a more comprehensive response to the risks of flooding and landslides.

Source: 100 solutions for climate action in cities. C40, Sustania, Realdania, (2016)

PARAMARIBO | SURINAME

Risk Management Plan for Urban Floods

Suriname is a country vulnerable to floods, since 30% of the territory is located a few meters above sea level. In addition, the Paramaribo metropolitan area is **characterized by densely populated areas with poor drainage capacity, which worsens the impact of flooding from heavy rains.** It was decided to assess the flood risk in the Greater Paramaribo area in order to prioritize specific flood risk reduction investments, by developing a program of strategic and policy interventions to address recurrent flooding and the potential impacts resulting from climate change.

The results of the strategic flood risk assessment and the coastal resilience assessment were presented during two workshops organized in partnership with the Ministry of Public Works, Transport and Communication in Paramaribo. Government officials, universities, NGOs, international organizations and multilaterals and the private sector attended the workshops.

MAIN GOAL

15 Strategic interventions proposed to reduce impact of urban flooding

OTHER BENEFITS

What can other cities learn?

This project has given space to the development of other flood management actions and initiatives in Paramaribo, where hybrid solutions with gray and green infrastructure have been designed.

Source: Castro Lancharro, Borja. 2021. Urban Green Infrastructure I: Challenges, opportunities and good practices manual.

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B

Sustainable mobility

In Latin America and the Caribbean, transportation is responsible for approximately 15% of net GHG emissions, being one of the fastest-growing sources of emissions. Likewise, the motorization rate in the region presents an average annual growth of 4.7%, one of the highest in the world[92].

92. Stylized facts of urban transport in Latin America and the Caribbean, IDB - 2019.

The growing urbanization in Latin America and the Caribbean represents a challenge for cities in their efforts to meet the needs for transport and its services, with high rates of congestion and limited coverage of transport systems. In general, the growth of cities has been accompanied by the occupation of areas that are increasingly remote from urban centers, causing an increase in travel times, a greater use of motorized vehicles, the need for more road infrastructure, **harming the environment and generating an increase in CO2 emissions from the sector**. This highlights the need to adopt new forms of mobility that are more sustainable, cleaner, and more durable. **Well-designed, compact and walkable cities with a good public transport system can contribute to reducing carbon emissions, while increasing access to services and opportunities for work and education, as well as improving the quality of life** and reducing travel times and energy needs of millions of people. In this sense, the concepts of the compact city and Transit-Oriented Development (TOD) have been gaining ground, seeking to design cities and neighborhoods that reduce car use and promote sustainable mobility[93].

The cities of the region **have a high potential to transform transportation systems and mitigate GHG emissions from them**. Transport decarbonization options focus on electrification, and urban development based on mobility and the modal transition towards public transport and, above all, non-motorized mobilization[94]. Many cities in Latin America and the Caribbean have strengthened their infrastructure for non-motorized transport by expanding bicycle paths and pedestrian zones in areas with a high circulation of people. An example is the network of protected bicycle lanes in the City of Buenos Aires, which covers more than 287 km and was specially designed to integrate different strategic points in the city, also allowing interconnection with other means of transport[95]. Another example is the implementation of the “Ciclovía program” in Bogotá, which has a total of 127 km and consists of road adaptation that restricts vehicle flow on some roads in the city, enabling them and ensuring their use for recreational traffic, pedestrians, cyclists, skaters, walkers, and others[96].

93. Latina. Daniel A. Rodríguez, 2021. Transit Oriented Development: An Assessment of Trends and Opportunities for the Americas
94. Fazekas, Andreas; Bataille. Christopher; Vogt- Schilb. Adrien, 2022. Carbon-Free Prosperity: How Governments Can Enable 15 Essential Transformations.
95. Government of the City of Buenos Aires. Pedal the city. Argentina.
96. Ciclovia Program, District Institute of Recreation and Sports - IDRD.

© IDB - San José, Costa Rica

For its part, the adoption of electric vehicles can contribute significantly to the fight against climate change by reducing greenhouse gas emissions, using renewable energy sources, and being more efficient in the use of energy. In addition, electromobility can have a positive impact on active mobility (pedestrian, bicycle) as the reduction in air pollution thanks to electric vehicles can reduce respiratory problems, which means that people can feel more comfortable and safer while cycling in congested urban areas where pollution is a problem[97]. However, it is important to note that for electric vehicles to have a significant impact on the fight against climate change, it is also necessary to address other factors, like the production of electricity from renewable sources and energy efficiency in other sectors of the economy.

Other measures that cities can implement to promote more sustainable mobility include:

• **Transformation of the type of equipment and fuels** (more efficient engines, electric vehicles).

• **Discouraging the use of private cars** (implementation of urban tolls in certain areas and times, regulation of entry to cities according to license categories, permission to circulate with a minimum number of passengers to enter the city, delimitation of low emission areas, the regulation to be able to circulate in the streets and the increase in the cost of parking in downtown areas).

• **Strengthening of the public transport system** (bus rapid transit, prioritizing public transport in the road space, improving the service, accessibility and safety of buses and other means of collective transport, integration of the different modes, the use of applications to improve the service information).

97. Electromobility: Current panorama in Latin America and the Caribbean: Infographic version. Perez, Daniel; Gutierrez, Maria Clara; . IDB 2019. http://dx.doi.org/10.18235/0001654

• **Promotion of non-motorized means of transport** (implementation of cycle paths and pedestrian paths, bicycle sharing infrastructure, safe areas dedicated exclusively to these means).

• **Recovery of public spaces and green areas** to promote active mobility.

• Promotion of **urban densification and connectivity** of strategic points.

• **Design and implementation of strategic sustainable mobility plans, including the Sustainable Transit-Oriented Development (STOD) approach:** an urban model with planning and design around public transportation, building compact, high-density neighborhoods; allows people to enjoy spaces with various uses, services, safe public spaces, favoring social interaction.

The implementation and relevance of these measures will depend on the local characteristics and the institutional and financing capacity of each city. The complexity of urban transport policies lies in materializing the plans into tangible projects with what this entails. In this framework, the introduction of simulation models or pilot projects can be useful to determine their effectiveness, costs, benefits, and improvement, and encourage community involvement. Finally, the aforementioned programs must be accompanied by measures that aspire to make public transport a viable, safe and efficient option for the majority of citizens. Access to high-quality transportation networks generates more inclusive cities through increased mobility and offering opportunities for their inhabitants, particularly for low-income people and vulnerable people, such as the elderly, people with disabilities, and ethnic minorities.

Sustainable Transit-Oriented Development (STOD)

Is an urban model gaining acceptance due to its great potential to guide cities towards more sustainable futures.

STOD is the coordination between a city's investments in public transportation and its land development strategy that allows for better accessibility, greater walkability, and mixed land use around transportation areas.

This model allows people to enjoy spaces with various uses, services, and safe public spaces, favoring social interaction. However, implementing this strategy requires urban policies at all government levels that induce the sustainable and inclusive construction of urban projects. For this, it is necessary to have some essential elements such as the use of tools that optimize the use of urban land, the advantage of opportunities to recover land value, the development of public transport infrastructures with clean and renewable energies, and the stimulation of the urban regeneration process.

With this strategy, multiple benefits are obtained, both for the public and private spheres. Among them are **the reduction of travel times, the optimization of the use of resources and services, the containment of horizontal and dispersed growth in cities, the reduction of GHG emissions and the possibility of recovering real estate valuation.** However, one of the main advantages that best illustrates the benefits of using a TOD approach is that it **prioritizes the concentration of diversified activities around mass transit stations**, which promotes urban regeneration in areas that are commonly low-price and of low accessibility for pedestrians and cyclists.

Source: Transit Oriented Development: an assessment of trends and opportunities for Latin America. Daniel A. Rodríguez, IDB 2021

© IDB - Tegucigalpa, Honduras

MEXICO CITY | MEXICO

Public Transit Integration Catapults Bikeshare

While bike-sharing systems have become commonplace in many large cities, Mexico City's ECOBICI stands out as one of the few systems in the world that is **integrated with the city's overall public transit network**. One card allows users to access the metro, buses, trains, and bicycles – making pedal-powered transport a viable commuting method. **This integration is vital to the system's success**, as data from a 2014 User Perception Survey show that 87% of trips are made in combination with other modes of transportation.

MAIN GOAL

-13k tons of co reduced
Between 2010 and 2020

OTHER BENEFITS

What can other cities learn?

The path to climate action begins with a shift in mindset. Strengthening existing systems as viable forms of mobility and integrating them as part of a connected, quality, efficient and equitable public transport system increases both user choice and convenience.

Source: 100 solutions for climate action in cities. C40, Sustania, Realdania, (2015)

LIMA | PERÚ

Car-Free Day Clears Streets

For 12 hours on the last Sunday of every month, the Peruvian capital city has created a ban for vehicles in the old and central district. This road closure **promotes more sustainable transport alternatives** and is also used as a chance to create artistic, educational, and gastronomic activities for the city's citizens and tourists. It also serves as respite for the air pollution caused by traffic during the remainder of the month.

To further encourage walking and cycling in the city, Lima offers free cycling workshops and has created additional cycle routes.

Particulate levels **more than halved during one of the car-free days** and noise levels fell from 78 to 59 decibels, creating a cleaner, calmer, and healthier environment for all to enjoy.

MAIN GOAL

-33 ug/m3 particulated material emissions reduced each day without cars

OTHER BENEFITS

What can other cities learn?

Car-free days as a temporal, low-cost, and scalable strategy can help catalyze long-term change. It prioritizes the city for its people, encourages citizen participation, and significantly enhances the socio-cultural experience of a city. Other actions with similar results can be: removing vehicles from city centers, "pedestrianizing" roads with a high flow of people by eliminating vehicle traffic, orderly restricting the use of private vehicles, among others.

Source: 100 solutions for climate action in cities. C40, Sustania Realdania, (2017)

LOJA | ECUADOR

Bicycles and Electric Taxis for Clean mobility

A fleet of 30 electric taxis has been introduced to the Andean city of Loja, in Ecuador, as part of a **city-wide strategy to improve sustainable transportation**. The city is also building cycle paths, and has constructed 72 km of ecological trails in and outside the city to promote healthy mobility and maintain Loja's reputation as Ecuador's "ecological city."

The use of electric vehicles contributes to improving air quality by reducing the emission of toxic gases and greenhouse gases. In addition to financing the project, Loja has gone one step further and **required all future taxis to be electric**, which will benefit from the high share of renewable energy in the country's energy mix.

The fleet of 30 fully electric taxis operating throughout the city of Loja receives tax incentives and provides job opportunities for returning Ecuadorian migrants.

MAIN GOAL

5k Tons of co2 have been Reduced since 2016

OTHER BENEFITS

What can other cities learn?

Strengthening existing infrastructure while also planning improved systems for the future is the core of climate adaptation and mitigation, to achieve long-term goals. In addition, the adoption of electric vehicles and the implementation of electric vehicle charging infrastructure can provide additional benefits for cycling mobility, including the reduction of air pollution, the expansion of the availability of charging points and the promotion of use of shared electric bicycles powered by renewable energy.

Source: 100 solutions for climate action in cities. C40, Sustania, Realdania, (2017)

© Pixabay - Santiago González - Loja, Ecuador

© IDB - Quetzaltenango, Guatemala

Clean energy and green buildings

The buildings and **construction sector plays an important role in reducing emissions:** only the residential and commercial sectors consume 24% of the final energy in the region and buildings represent 21% of CO2 emissions related to the energy sector, without including emissions related to the construction process and manufacturing of materials and products such as steel, cement and glass. Despite the high demand for new residential buildings, in many countries, the progress in establishing sustainable building codes is slow, where until 2018 only 6 of 33 countries in Latin America and the Caribbean had mandatory or voluntary building codes in force (although most countries had certification programs)[98].

New electricity generation technologies such as **distributed solar, wind, geothermal energies**, and measures for energy efficiency in buildings present an opportunity for cities to be more **sustainable, resilient**, and at the same time, support a truly green economy recovery. Energy efficiency and decarbonization of electricity in buildings in Latin America and the Caribbean could reduce building emissions by 51% from 2018 levels while accommodating a 6% increase in energy demand[99]. The electrification of other sectors, such as transportation, industrial processes, and domestic cooking and heating appliances also brings a significant opportunity for decarbonization and local health benefits[100].

Achieving buildings with net-zero emissions is possible, but it requires **clear and ambitious policy signals** to boost the transformation of buildings and the productive and technological process of the construction sector. There is a need for measures such as the design of passive buildings, efficiency in construction materials, the utilization of low-carbon materials (such as wood), efficient building thermal envelope, high-efficiency lighting and appliances, and sustainable building codes, among others[101]. The adoption and massification of bioclimatic solutions can also help fight climate change by reducing logistics chains while strengthening local economies. Achieving these results at the necessary pace and scale calls for **greater collaboration** among policymakers at all jurisdictional levels, as well as with academics, urban planners, architects, developers, investors, construction companies, and utilities. The variety and extent of energy sustainability measures that exist show the active role that local governments can play in this endeavor and the way in which this task aligns with other priority development goals for the region.

98. GlobalABC /IEA/UNEP, 2020: GlobalABC Regional Roadmap for Buildings and Construction in Latin America: Towards a zero-emission, efficient and resilient buildings and construction sector, IEA, Paris.

99. GlobalABC/IEA/UNEP, 2020: GlobalABC Regional Roadmap for Buildings and Construction in Latin America: Towards a zero-emission, efficient and resilient buildings and construction sector, IEA, Paris.
100. Audoly, Richard; Vogt-Schilb, Adrien; Guivarch, Céline; Pfeiffer, Alexander, 2017. Pathways toward Zero-Carbon Electricity Required for Climate Stabilization.
101. Fazekas, Andreas; Bataille. Christopher; Vogt- Schilb. Adrien, 2022. Carbon-Free Prosperity: How Governments Can Enable 15 Essential Transformations.

SANTIAGO | CHILE

Slashing Smog with Public Buildings Enhancements

Santiago is aggressively investing in renewable energy projects and efficiency upgrades for their schools, hospitals, and other public buildings. For this project, the city planned to invest almost $5 million in **rooftop solar projects and efficiency retrofits** expected to deliver significant reductions in utility bills and emissions for the municipally owned buildings. By aggregating demand across all of the projects, the municipality was able to drive down the cost of solar from $5.40 to $0.96 per installed watt.

As the city is surrounded by mountains, heat and toxic gases can get trapped in the city's valley, leading to dangerous levels of air pollution. This project is a part of the Regional Resilience Strategy that aims to reduce energy consumption levels and obtain more energy from local renewable sources.

MAIN GOAL

3.419 Tons of co2 saved annualy from upgrades

OTHER BENEFITS

What can other cities learn?

The shift to renewable energy production is key to achieve climate action goals. To make it economically viable for residents and to encourage adaptation to a new system, city government can drive prices down by using it extensively across public projects, increasing demand.

Source: 100 solutions for climate action in cities. C40, Sustania, Realdania, (2017)

MENDOZA | ARGENTINA

Small Municipality with Big Renewable Energy Plans

The municipality of Godoy Cruz, situated in Mendoza, may have a population of just 200,000, but it has big ambitions for renewable energy. Their Local Climate Action Plan **unlocks access to finance for renewable energy systems for citizens and businesses who were previously priced out of the market.** The municipal bank will provide citizens low-interest loans, and the municipality will facilitate approvals and installations, making it as affordable and hassle-free as possible for citizens to invest in solar. The program is the first of its kind in Argentina.

MAIN GOAL

15k kg of co2 saved with renewable energy systems

OTHER BENEFITS

What can other cities learn?

Innovation needs to be affordable and inclusive for larger and long-term impact.

Source: 100 solutions for climate action in cities. C40, Sustania, Realdania, (2017)

BUENOS AIRES | ARGENTINA

Smart LED Retrofits Optimizes Resources

In 2013, the Argentine capital began a public light retrofit project with the goal of replacing 91,000, or 72%, of conventional street lights with energy-efficient LEDs by the end of 2016. **The city is well on its way to achieving its goal,** as 60,000 street lights have already been retrofitted. So far, these new lights have avoided 9,866 tons of CO2 emissions and generated 14.77 GWh of energy savings. On top of the street light plan, the city has also replaced all 138,000 traffic lights with high-efficiency LED bulbs, leading to a 90% electricity savings.

But the new street lights are not just efficient, they are smart. Buenos Aires' new street lights include a built-in tele-management system under which every city street light can be controlled remotely from a centralized control panel.

MAIN GOAL

24k kg of co2 saved with renewable energy systems

OTHER BENEFITS

What can other cities learn?

A small change for a smart thought can produce big results. Both energy and cost savings can be achieved without drastic changes to infrastructure.

Source: 100 solutions for climate action in cities. C40, Sustania, Realdania, (2019)

© Deensel - 9 de Julio Avenue and 25 de Mayo Highway intersection, Buenos Aires, Argentina

© Deensel - Puerto Madero, Buenos Aires, Argentina

D

Waste manangement and circular economy

In Latin America and the Caribbean waste represents 6% of GHG emissions. At the municipal level, waste management is important given the increasing levels of household resource consumption and waste generation. **In Latin America and the Caribbean, around 540,000 tons of waste are generated per day**, which is equivalent to 354 kg per inhabitant per year, but less than 1% of the waste is composted and only 4.5% is recycled[102]. This affects sustainability in several ways. Waste is made up of materials that were extracted and processed, and energy was invested in its production, generating GHG emissions. Since these resources are often generated through processes that are energy intensive and highly polluting (such as mining and the extraction of new raw materials), when a product becomes waste, the entire resource used in its manufacture is lost. In addition, the decomposition of waste is the third source of methane emissions caused by human activity (20%), after agriculture (40%) and fossil fuels (35%), which has a global warming potential 25-80 times higher than CO_2[103]. Another consequence of cities' poor waste management is flooding associated with the blockage of urban drainage systems. **The excessive increase in plastics[104] and the lack of their management is the cause of 80% of the pollution of the oceans**. Improperly operated final disposal sites increase the risks of landslides and fires[105], the perpetuation of poverty in surrounding areas, and the loss of economic value of the land[106].

102. Fazekas. Andreas; Bataille. Christopher; Vogt- Schilb. Adrien, 2022. Carbon-Free Prosperity: How Governments Can Enable 15 Essential Transformations.
103. Climate and Clean Air Coalition CCAC & United Nations Environment Programme, 2021. Global Methane Assessment,
104. The presence of this waste in cities has increased in the last decade from 4% to 12%, becoming the third most representative fraction, after organic (52%) and paper and cardboard (13%).
105. The magnitude of landslides and fires at final disposal sites may be exacerbated by hurricanes and rising temperatures, respectively, as a result of climate change.
106. Inter-American Development Bank (2022, in preparation) Sectoral guidelines for solid waste management and progress towards the circular economy, Accelerating the transformation of the sector.

When approached holistically, sustainable waste and materials management can help cities reduce 15-20% of their emissions through reduction, avoidance, recycling, treatment and offsetting (C40 Cities, 2023).

The costs of the negative externalities of inadequate waste management in terms of contamination to the environment and the society represent between 3 and 5 times (US$ 45-125 per capita per year) the cost of proper waste management (US$ 15 - 25 per capita per year). These costs are associated, among others, with **diseases related to direct and indirect contact with waste** (US$ 16-36 per capita per year), contamination of groundwater and surface water and its associated effects on the population and the environment (US$ 4- 20 per capita per year), and losses in tourism due to beach pollution (US$ 26-50 per capita per year)[107]. Therefore, it is much cheaper for governments and society to manage waste in an environmentally sound way. For local governments, the promotion of the circular economy, reduction, reuse, separation at source, as well as proper waste management, can result in lower costs associated with their collection, management and final disposal.

The improvement of water treatment and waste management systems can lower emissions by reducing energy consumption, using renewable energy sources, and methane recovery. In the solid waste sector, there is a clear potential to mitigate climate change through: the closure of open-air dumps; the use of low-GHG generation technologies for waste collection and transport; the promotion of waste management practices, including recycling, recovery of organic waste and its diversion from final disposal sites, as well as the boosting of biological treatment and composting of food and organic waste, in addition to green consumption practices; and even in final disposal with the capture and energy use of the methane generated in landfills. What's more, treated wastewater sludge and composted solid organic waste offer opportunities for their productive or landscape purposes, and the potential to displace traditional fertilizers which helps to mitigate GHG emissions derived from their use.

The circular economy offers an alternative to address the causes of climate change, biodiversity loss, the increase in waste and pollution and, at the same time, provides a great scope for growth as an alternative to the traditional economic model (produce-use-throw). This model depicts a framework of systemic **solutions for economic development and revolutionizes the way we design, produce and consume**. It is based on three principles: modify production and consumption models aimed at reducing the generation of waste and pollution, keep products and materials in use, and regenerate natural systems. In this way, it is possible to decrease the use of resources in its production, extend its useful life, maximize its use and ensure adequate final disposal, where the recovery and use of materials are prioritized and the emissions generated in said facilities are captured.

107. United Nations Environment Program -UNEP, 2015.

Closing open-air dumps and ensuring the **capture and potential use of methane emissions** at final disposal sites.

Incorporating **digital transformation strategies** that allow knowing the status of waste management, making informed decisions and measuring the impact of actions and solutions. What is not measured cannot be improved.

Creating disincentives to produce waste, while updating or modifying relevant regulatory frameworks (for example, construction codes that allow the use of recyclable, local, or naturally-derived materials).

Promoting public-private innovation centers that **identify key circular economy opportunities** in the region. Also, by working with architects, companies and other relevant stakeholders on the way products are designed, manufactured and packaged, so that they use fewer resources, last longer, are reusable for other end uses, can be easily disassembled at the end of its useful life and ultimately recycled[108].

CITIES, AS CENTERS OF CONSUMPTION, EMPLOYMENT, INNOVATION, GENERATION AND WASTE MANAGEMENT, ARE AT THE HEART OF THE CIRCULAR ECONOMY. LOCAL GOVERNMENTS HAVE THE OPPORTUNITY TO LAY THE FOUNDATIONS FOR A CIRCULAR STRATEGY, FOR EXAMPLE:

Allocating recycling centers and waste collection systems with **separation of materials, making them efficient and comfortable** for users (both on a commercial and home scale).

Creating community composting bins, facilities for the **exchange of goods, and incentives for the proper maintenance** and repair of goods, thus extending their useful life.

Strengthening the governance and capacities of the public sector to **ensure adequate planning, management, financing and inspection of waste management,** and the transition of the sector towards the circular economy.

Encouraging businesses that support circular economy schemes through policies with **differentiated taxes** for product repair and life extension initiatives (for example, working with industry and local construction and helping them reuse or recycle materials instead of using virgin materials).

Many cities in the region still have ways to go in terms of implementing circular economy policies and practices. In some cases, the circular economy occurs at a pilot level, the challenge being for cities to adopt it as an integral city vision with the possibility of unifying sectoral strategies in the territory. The transition towards this model is not uniform and varies depending on a series of factors, such as the degree of industrialization, the level of technological development, informal work, the availability of human resources and access to financing, among others. In a post-pandemic and economic recovery context, the circular economy can serve as a catalyst for green jobs creation and solve critical problems of waste management and urban development gaps.

108. Fazekas, Andreas; Bataille. Christopher; Vogt- Schilb. Adrien, 2022. Carbon-Free Prosperity: How Governments Can Enable 15 Essential Transformations.

QUITO | ECUADOR

Creating Electricity and Compost from Organic waste

Under its Development and Land Use Plan, in 2015 Quito launched an integrated waste management project based on the concept of a circular economy, while encouraging social and environmental co-responsibility. **The Organic Waste and Climate Change project has three elements:** generate 5 MW of electricity by 2017 with landfill biogas, process 12 million tons of organic waste into compost through the construction of a municipal organic waste processing plant, and improve paper and cardboard recycling by means of waste recovery, processing, and commercialization. The project aims to achieve a 33 % reduction in greenhouse gas emissions from waste, which is equivalent to approximately 300,000 tons of CO2 by 2017.

MAIN GOAL

-13.2% reduction of CO2 emissions by 2016

OTHER BENEFITS

What can other cities learn?

Waste is wealth. Adopting a circular economy model allows cities to rethink ways in which waste can be re-used as a resource.

Source: 100 solutions for climate action in cities. C40, Sustania, Realdania, (2016)

FORTALEZA | BRAZIL

Utilizing Digital Tools to Transform Waste

Fortaleza has set about reshaping residents' connection to waste. As part of **the Recycling Attitudes Program,** the city is engaging civil society with awareness campaigns, institutional partnerships, and active campaigns to change the way people produce and think about their waste. Teachers are trained in **best recycling practices** in order to educate students and arrange community litter-clearing activities. The program has already benefited more than 50% of municipal schools.

MAIN GOAL

-125k tons of CO2 equivalent will be saved by 2030

OTHER BENEFITS

What can other cities learn?

Education and awareness are powerful tools to change mindsets and re-think interaction with waste, while leveraging digital technology and policy transformations.

Source: 100 solutions for climate action in cities. C40, Sustania, Realdania, (2017)

SANTIAGO | CHILE

Local Recycling Centers to Boost the Recycling Rate

The City of Santiago is making it easier for citizens to recycle by implementing so-called "**clean points**" where waste can be sorted in order to be reused. A network of points will be built to increase the recycling rate. New equipment and training of personnel will also be used to **classify, transport, and eliminate illegal waste disposal in public spaces**. An important aspect of the project is the inclusion of "Base Recyclers" (oneman recycling companies) in the waste network, as their income will increase with more efficient waste collection.

MAIN GOAL

-36k Tons of waste diverted From landfills

OTHER BENEFITS

What can other cities learn?

Direct engagement of the community in climate action and incorporating local businesses into urban systems by offering incentives can catalyze rates of adoption and recycling. One way that recyclers and small trade businesses can be incorporated into the waste management system is through the distribution of the cleaning fee that is paid by users.

Source: 100 solutions for climate action in cities. C40, Sustania, Realdania, (2017)

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Sustainable urban growth

Rapid and unplanned urbanization and urban sprawl present a risk of increasing GHG and increasing vulnerability to climate change and other impacts. In recent decades, Latin America and the Caribbean has been experiencing an unprecedented process of population growth and urbanization. **Cities have densified** while extending their urban and peri-urban sprawl, and new urbanizations have been developed. However, this growth does not always bring a homogeneous benefit for all its inhabitants, since these areas often experience problems of poverty, social exclusion, limited access to primary services, such as drinking water and electricity, and deficient infrastructure. The **increase in informal neighborhoods**, with poor access to basic services and often located in degraded or technically unsuitable places (flood-prone areas, close to garbage dumps, industries, etc.) are part of this continuously expanding urban mosaic.

Compact and efficient urban growth could reduce GHG emissions by 23-26% by 2050 compared to business-as-usual.

This context drives us to rethink the organization of cities in a more ecological and sustainable way. **Building resilience and reducing emissions today is much easier than retrofitting tomorrow**. Rapid urban growth means new investment, new buildings and infrastructure, new demands for energy and transportation, and new questions about what a healthy and fulfilling urban life can look like. Therefore, this is an opportunity to mitigate and adapt to climate change by filling what is already a large investment gap in basic infrastructure in urban areas.

Well-planned and managed, cities can offer solutions to face climate change and lead the necessary transformations to move towards a more sustainable world. An integrated spatial **planning designed to achieve compact and resource-efficient** urban growth through cooperative location with high housing and employment densities, mixed land use, and transit-oriented development could reduce greenhouse gas emissions GHG between 23% and 26% by 2050 compared to the business-as-usual scenario[109].

Many cities are using **land use planning strategies** such as zoning, master plans, urban densification, and urban development and design standards to limit urban sprawl, reduce the need for commuting, and **increase the energy efficiency of the built-up urban area** Also, there are cities that are implementing **“15-minute city”** policies that stipulate that basic needs must be met within a 15-minute walk or bike-ride from our homes. This not only benefits city dwellers in terms of their quality of life, but also presents the possibility for cities to reduce their GHG emissions and contribute to addressing climate change. These are some examples of actions and policies that are already taking place in cities and need to be replicated and scaled up to reduce the impact of urban areas on the environment.

For proper planning of sustainable urban growth, it is necessary to better connect peri-urban areas with urban centers. This may involve improving public transport, infrastructure and urban planning in these areas to ensure coordinated and balanced development. It is also important to consider the quality of life and resilience of these communities, which may require measures such as the protection of natural resources and the promotion of sustainable agricultural practices.

Community consultations are essential in urban planning processes because they allow citizens to express their needs, interests and concerns in relation to their urban environment and to actively participate in decision-making about the city where they live now and in the future.

Multi-stakeholder consultations can improve the quality of decisions by providing information and citizen perspectives on urban problems, which can lead to more effective and sustainable solutions. More equitable solutions are also promoted by taking into account the needs of the most vulnerable and marginalized communities. In addition, citizen participation in urban planning increases transparency and accountability by making the process more accessible and understandable to citizens and by allowing already-made decisions to be questioned and evaluated.

In an increasingly urbanized world, the implementation of public policies and concrete actions is required to achieve adequate land management and sustainable development of cities. For this, it is key to have local governments willing to assume the responsibility of advancing sustainably and on the appropriate scale in territorial planning and development.

109. Lwasa. S., KC Seto. X. Bai, H. Blanco, KR Gurney, S. Kilkiş. O. Lucon. J. Murakami, J. Pan, A. Sharifi, Y. Yamagata, 2022: Urban systems and other settlements. In IPCC, 2022: Climate Change 2022: Mitigation of Climate Change. Contribution of Working Group III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [PR Shukla, J. Skea. R. Slade, A. Al Khourdajie. R. van Diemen, D. McCollum, M. Pathak, S. Some. P. Vyas, R. Fradera. M. Belkacemi. A. Hasija. G. Lisboa. S. Luz, J. Malley, (eds.)]. Cambridge University Press, Cambridge, UK and New York, NY, USA. doi : 10.1017/9781009157926.010

MONTEVIDEO | URUGUAY

Abandoned Vacant Lots Project

The Abandoned Vacant Lots Project is a programmatic instrument that recovers **abandoned, dilapidated and indebted properties located in central and intermediate areas of the city** of Montevideo, restoring their social function. Based on current legal tools, it is implemented through a transversal procedure that enables action on vacant private urban land for public use, whether for community, cultural or social housing purposes, with the right to the city. and the needs of people as the center.

The recovery of these properties contributes to **solving problems associated with abandonment, such as building risk, environmental deterioration, social conflict and citizen security**, and turns these spaces into assets for the city and its inhabitants.

A survey carried out in municipalities of Montevideo identified 339 units in a situation of possible abandonment. From the feasibility analysis, 25 were selected for a potential intervention, involving an area of 6,700 square meters and a debt of $340 million. The area has the potential to build 24,700 square meters, which can mean 280 housing units. These 25 farms are the ones that are being recovered by the Abandoned Vacant Lot Project in its pilot stage.

MAIN GOAL

6.700 M2
of abandoned properties recovered

OTHER BENEFITS

What can other cities learn?

The Abandoned Vacant Lot Project is framed within the criteria of redistribution, equality and intersectionality in the construction of the right to the city and to housing. With its first results in sight, it has shown that from the departmental government it is possible to generate public policies that contribute to the recovery of the urbanized central fabric of Montevideo, restoring abandoned private land for housing and civic purposes.

Source: https://resilientcitiesnetwork.org/urban_resiliences/lessons-from-montevideo/

BOGOTÁ | COLOMBIA

15-minute city: Vital Neighborhoods in Bogotá

The Vital Neighborhoods Project seeks to mainly benefit pedestrians, redistributing public space that was previously dedicated to the circulation of vehicles, through tactical urban planning and infrastructure interventions. Through the strategy, **new areas of public space are generated** to facilitate the meeting and permanence between residents and visitors to the sector, improving road safety and environmental conditions in the area. Sustainable means of transport and the revitalization of the commercial, cultural, and service sectors in the neighborhoods are also promoted. This project reorganizes public space allowing for areas dedicated to pedestrians, vehicular circulation, parking areas, and loading and unloading areas, among others.

San Felipe is the first neighborhood in which the definitive tactical urban planning interventions of Vital Neighborhoods were implemented. However, the District Mobility Secretariat is currently leading the process in other 4 neighborhoods:
·El Porvenir (Bosa)
·La Victoria (San Cristobal)
·Las Cruces - San Bernardo (Santa fe)
·San Carlos - San Benito (Tunjuelito)

This project is one of the initiatives that Bogotá considers for the promotion of a 15-minute city, which means striving to achieve an urban model that allows everyone, in all neighborhoods, to satisfy most of their daily needs within a short walk or bike from home.

MAIN GOAL

Increase **public space** dedicated to pedestrians.

OTHER BENEFITS

What can other cities learn?

A 15-minute city means more foot traffic on local streets, more opportunities for local and diverse employment, and more productive use of buildings and street space. In addition, a 15-minute strategy will reduce unnecessary and unwanted travel and encourage a modal shift away from private vehicles, offering all the benefits of green, healthy transport and cleaner air.

Source: Bogotá Government website:https://www.movilidadbogota.gov.co/web/barrios_vitales15%20mi

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F

Green finance for climate action

As many cities and local governments take steps to build climate resilience and reduce their carbon emissions, they need to access finance for climate-smart urban infrastructure projects[110]. Achieving the **Sustainable Development Goals (SDGs)** and climate commitments requires mobilizing more investment of all kinds: public, private, local, national and international, both in capacity and capital, since the resources necessary to overcome poverty, protect the environment and improve lives far outweigh current financial flows for development[111]. Despite the total climate finance's steady increase over the past decade, cities encounter **significant obstacles** in mobilizing finance for transformative climate action[112]. In this context, national governments, cities, and public and private financial institutions are increasingly acknowledging the importance of cities for climate action and launching initiatives to address barriers that hinder finance access.

110. City Gap Fund website, last consulted: October 2022. Available: https://www.citygapfund.org/
111. IDB Group, 2019. Second update of the IDB Institutional Strategy.
112. Cities Climate Finance Leadership Alliance (2021). The State of Cities Climate Finance.

Many of the identified barriers to climate finance are lack of technical and financial capacity, lack of control over resources, lack of viable financing models, or lack of investor-ready, bankable projects of sufficient size and quality. The ability of cities to meet their climate action ambitions is at a critical point and requires partnership with subnational and national governments, international organizations, civil society, and the private sector. Therefore, **encouraging the strengthening of technical capacities and local planning instruments should be a priority to scale up climate financing in cities**.

Cities' climate action plans, with their respective implementation roadmaps and financing strategies, are a useful tool for directing existing investment flows towards climate goals, as well as for mobilizing additional resources needed to achieve resilient and low-carbon growth. Assessing and communicating how city climate action plans align with international goals such as the Paris Agreement, the NDCs, and the SDGs could attract public and private investment, especially when there are concrete strategies and investment plans for smart and climate-sensitive urban infrastructure[113].

The mobilization of resources from the private sector is essential to provide a sufficient scale of financing. This sector is already investing and leading climate change actions for multiple reasons such as benefits in access to financing, cost savings derived from the impacts of climate change, opportunities for innovation, and the creation of new products and services, among others. **Subnational governments can play an important role in creating an enabling environment to facilitate and scale climate finance** from the private sector while advancing their low-carbon and resilient development strategies.

113. Cities Climate Finance Leadership Alliance (2021). The State of Cities Climate Finance.

TO ACHIEVE WELL-PLANNED, FINANCED, AND TRANSFORMATIVE CLIMATE ACTION IN CITIES AND URBAN SYSTEMS:

Define and incorporate climate considerations in city planning and investment plans based on diagnostic studies and robust GHG emissions inventories that allow the identification of priority sectors and activities responsible for both emissions and carbon sinks related to the city.

Adopt and implement regulations, standards and incentives to encourage private and household investment in buildings, vehicles, equipment, and appliances.

Lay a stronger foundation for climate finance through better use of fiscal transfers, own revenue, and blended financing instruments.

Improve capital investment planning by integrating carbon pricing and other climate-smart metrics into decision-making. This is an important signal to private actors operating in the urban space and helps position the city to address the regulatory risk of national carbon pricing requirements.

Wherever possible, cities should leverage municipal revenue as a tool to create fiscal space for city climate investments and as an instrument to encourage residents, businesses, and other stakeholders to invest in more efficient resources and climate-smart outcomes.

Prepare climate-smart urban infrastructure projects paying attention to potential income generation opportunities and with private sector engagement from an early stage.

Strengthen the municipal financial capacities of cities, including budgeting, contract management, and procurement, to improve the overall quality and sustainability of service delivery and investments.

Promote the awareness and competencies of government teams on climate change, necessary to understand the individual contribution of government areas in achieving the objectives of an interdisciplinary agenda.

Measure what is done, and establish robust monitoring and reporting processes, with clear and simple indicators allowing both the population and potential investors to demonstrate the performance of the objectives proposed to deal with climate change and thus become an increasingly sustainable city.

Evaluate and communicate how the city's climate action plans align with international goals such as the Paris Agreement, NDC, LTSs and/or SDGs.

MEXICO CITY | MEXICO

Green Bonds for Climate Action

Mexico City's Climate Action Program is designed to maximize emissions reductions and increase resilience against future climatic shocks. The city issued $50 million worth of green bonds to finance much of the project, including investments in a new bus rapid transit lines and an LED street lighting project. This was the first example of such a **financing scheme for a Latin American city, and proved popular** – the bonds were oversubscribed by a factor of 2.5. The city also has an online monitoring system designed to track compliance of the program and the progress of each of its 102 climate actions. Finally, the program includes a gender perspective, which seeks to reduce inequality gaps between men and women caused by climate change effects.

MAIN GOAL

-10M tons of CO2 equivalent to be saved

OTHER BENEFITS

What can other cities learn?

Climate action programs need to extensively cover all sectors and promote gender equality and social inclusion. While having successful innovations in financing the projects is essential, the mechanism to monitor the progress of projects is key for effective implementation.

Source: 100 solutions for climate action in cities. C40, Sustania, Realdania, (2017)

SALVADOR | BRAZIL

Tax Rebate Incentivizes Building Green

Salvador's IPTU Verde is a property tax tied to a public certification scheme by which building construction and renovation projects are rated according to their investments in sustainable technologies and ability to reduce CO2 emissions.

Projects gather **points toward a bronze, silver, or gold certification,** which awards the developer a 5%, 7%, or 10% discount on the property tax, respectively. The construction and renovation projects that pursue certification under the IPTU Verde are also prioritized under local government permitting of new developments.

The sustainable technologies recognized under the IPTU Verde certification fall within the areas of water and waste management, energy efficiency, and alternative energy sources and range from natural lighting and ventilation to use of rainwater, and wind and solar energy generation.

MAIN GOAL

-80% CO2 as compared to conventional buildings

MAIN GOAL

What can other cities learn?

Tax incentives are an effective tool that city governments can deploy to guide future development toward sustainable models and green buildings.

Source: 100 solutions for climate action in cities. C40, Sustania, Realdania, (2015)

Urban green infrastructure

Urban green infrastructure (UGI) as well as other nature-based solutions (NbS) can help cities against the impacts of climate change and offer a set of ecosystem services to improve the lives of citizens. The UGI refers to a network of green spaces, natural areas, and ecological corridors integrated into the urban landscape. It includes parks, green roofs and walls, and other types of plant infrastructure that can help reduce pollution, regulate water, and provide ecosystem services to urban residents. Nature-based solutions have the potential to make the city more climate resilient and, as a consequence, a better place to live[114].

114. Castro Lancharro, Borja. 2021. Urban Green Infrastructure I: Challenges, opportunities and good practices manual.

Although the traditional infrastructure is necessary, it can be improved and/or complemented with solutions based on nature and innovation. In fact, green options are, on average, 50% more profitable than "grey" alternatives, and provide 28% more added value[115]. Thus, nature-based solutions can be cost-effective alternatives against climate change that provide a wide range of ecosystem services and benefits, such as increased resilience, protection and restoration of natural capital, biodiversity boost, air quality and water improvement, flood management, and urban heat island mitigation.

Some examples of urban green infrastructure complemented by gray infrastructure and whose implementation can be of great relevance for Latin America and the Caribbean are mentioned below[116]:

• **Tree cover:** planting individual trees or in groups along the streets or in other urban spaces with the capacity to house them for the absorption of GHG and improvement of air quality, temperature regulation, shade generation that improves thermal comfort and facilitate active mobility by protecting people from the sun, noise reduction by acting as a natural acoustic barrier, improvement of biodiversity and provision of public space for recreation.

• **Urban riverbank parks:** green spaces strategically located so that in the event of a flood due to the overflow of a nearby body of water, they can capture excess water without affecting the rest of the urban areas. In addition, riverside parks can act as natural filters for water, helping to reduce pollution and improve water quality in rivers, and at the same time, serve as a place for social interaction and connection with nature, improving people's quality of life.

• **Green roofs on buildings:** covering all or part of the roofs of buildings absorbs carbon dioxide and other pollutants from the air, helping to improve air quality in the surrounding area; regulates temperature by absorbing heat and releasing it slowly thus helping reduce the temperature of the roof surface and surrounding air; helps reduce stormwater runoff by absorbing and retaining a large amount of water, which reduces the load on drainage systems and prevents flooding.

To increase the net impact of green infrastructure in response to climate change, local governments must pay attention to the characteristics of the local climate and prioritize native and adapted species. Likewise, listening to local communities offers interesting strategies for the implementation of this type of project.

115. World Economic Forum, 2022. BiodiverCities by 2030: Transforming Cities' Relationship with Nature.
116. Castro Lancharro, Borja. 2021. Urban Green Infrastructure I: Challenges, opportunities and good practices manual.

ASUNCIÓN | PARAGUAY

Green spaces in Asunción

Asunción has a high endowment of natural resources due to its location on the banks of the Paraguay River and at the confluence of four different ecoregions (Bosque Atlántico, el Cerrado, Chaco, and Pastizales del Sur). It also has a **particularly high number of urban green spaces**: 4,865 hectares of parks and green spaces in built-up areas. The green spaces of Asunción are home to a diversity of birds of global importance, with 353 species of native birds. However, the city has to deal with disintegrated and inefficient urban planning, which has produced the dispersion and fragmentation of urban green spaces.

Faced with this situation, municipal officials developed the project "Asunción Green City of the Americas - Pathways to Sustainability", wit the objective to i) to integrate 5,793 hectares of the metropolitan area into a system of green spaces and corridors with an ecosystem approach; ii) to recover native habitats through the rehabilitation of 20 ha of green area invaded by allochthonous tree species, and 20 ha of beaches, with the aim of regaining the nesting spaces of 75 species of migratory birds.

MAIN GOAL

1.227.442 tCO2eq

of emissions mitigated

OTHER BENEFITS

What can other cities learn?

The improvement in biodiversity has led to an increase in the global population of 5 emblematic species of the city: Tryngites subruficollis, Pluvialis dominica, Tringa flavipes. Calidris fuscicollis and the Calidris melanotos. The program also includes a follow-up and monitoring plan and dissemination of lessons learnt through activities and workshops.

Source: Castro Lancharro, Borja, 2021. Urban Green Infrastructure I: Challenges, opportunities and good practices manual.

MOYOBAMBA | PERÚ

Implementation of an environmental investment mechanism through public contributions

Micro-watersheds provide the following ecosystem services: water regulation; biodiversity conservation; climate regulation; maintenance of natural scenic beauty; carbon fixation; among others. The main source of water supply for the city of Moyobamba comes from the Rumiyacu-Mishquiyacu stream, which supplies approximately 80% of all users.

In 2004 and 2005, diagnostic studies were carried out that supported the high concern about the state of degradation of the micro-watersheds and identified the Compensation for Ecosystem Services as an instrument that could help reverse this situation.

Payments have achieved:

- **Reforestation of 55 hectares** in the micro basins of Mishquiyacu, Rumiyacu and Almendra at the end of the second regulatory year.
- **Installation of four gauges** that allow measuring the flow of surface water in the streams of the micro-watersheds.
- **Monthly records of the flows** measured in liters per second through the gauges.
- **Daily records of water turbidity** located at the entrance and exit of the San Mateo drinking water treatment plant operated by the company.

MAIN GOAL

Conservation and restoration of MICRO-BASINS

OTHER BENEFITS

What can other cities learn?

Based on the experience in Moyobamba and Cusco, the implementation of payment for ecosystem services has been established as a public policy. Currently, there are eight cities in Peru committed to caring for their water sources, who will invest more than 120 million soles, in the next five years, in the conservation of their water supply basins.

Source: International Urban Cooperation Program. European Union-Latin America and the Caribbean. Implementation of an Environmental Investment Mechanism Through Public Contributions in Moyobamba.

BOGOTÁ | COLOMBIA

Ecosystem Upgrade Secures Water Supply

Bogotá is strategically increasing vegetation cover and removing invasive species that negatively impact the water cycle through the Chingaza-Sumapaz- Guerrero Conservation Corridor. Launched in 2014, the project is a means to ensure water security in the city, with 184.4 hectares going through a restoration process and 164.5 hectares going through a reconversion process. Sixteen micro watersheds and more than 12 municipalities were identified as critical focal points. **Research is underway on plants that can absorb higher quantities of water, and vegetation cover is increasing**. By buffering high mountain ecosystems (such as páramos, cloud forests, high Andean forests), more water is able to be absorbed naturally and flow to the reservoir for storage.

MAIN GOAL

+50k Trees planted as part of the project

OTHER BENEFITS

What can other cities learn?

Tax incentives are an effective tool that municipal governments can implement to guide future development towards sustainable models and green buildings. The conservation, restoration and sustainable management of land and ecosystems are key to ensuring the provision of water and other essential ecosystem services for people.

Source: 100 solutions for climate action in cities. C40, Sustania, Realdania, (2016)

QUITO | ECUADOR

Rain gardens in San Enrique de Velasco and the Quebradas de Quito Master Plan: From flood problems to a river of positive change

Despite Quito's rich biodiversity, which includes nearly 18,000 registered plants, 112 species of mammals, and 542 different species of birds, the neighborhood of San Enrique de Velasco has been particularly affected by environmental degradation, where there was virtually no vegetation or green areas. As a result of small but impactful interventions, **the city is helping to reduce citizens' exposure to environmental, social, and economic vulnerabilities.** Measures include the adoption of more effective water management strategies, rain gardens, the planning and creation of ecological parks, and capacity building through targeted outreach programs. For this purpose, the city is promoting the planning of nature-based solutions that are co-created with people. This is a way of educating and involving residents so that they take more ownership and support the actions that are being taken. Residents are now reclaiming their streets, replacing paved areas contributing to downstream flooding, with rain gardens, ditches (shallow channels used to capture runoff), and tree plantings (which create shade and attract birds and bees).

On the other hand, the Quebradas de Quito Master Plan is designed to provide nature-based solutions to the problem of the city´s natural ravines that provide drainage for storms. The program's efforts include, on the one hand, raising residents' awareness of the fact that flood-prone ravines are not ideal places to live.

MAIN GOAL

Improve water management to **prevent flooding**

OTHER BENEFITS

What can other cities learn?

Working with local communities is at the heart of nature-based solutions and local perceptions need to be considered and managed. Educate residents about the positive impact of landscaping and carry out awareness campaigns about the benefits of tree shade and its protection against heat and UV radiation. Local volunteers are helping spearhead the drive to not only plant trees, but to maintain them on an ongoing basis. And as a result, ordinary citizens are embracing the long-term benefits of greening up their neighborhoods.

Source: Mark Douglas Wessel, 2022. Climate Change & Resilience, climate change adaptation, Ecuador, nature-based solutions, sustainable urban development.

H

Community participation, education and sustainable habits

The awareness and education of the population, as well as their involvement and active participation, can be a powerful engine in climate action. Communities can work together to encourage the use of renewable energy, reduce energy consumption, promote sustainable mobility, encourage sustainable urban agriculture, and promote climate awareness. In this sense, individually or in groups, people can achieve significant useful changes in the fight against climate change.

Similarly, **awareness and educational actions, often accompanied by other instruments** (such as economic incentives) can serve to encourage residents to adopt more sustainable habits that help reduce the carbon footprint and improve resilience. Through greater awareness, changes in habits can be boosted towards sustainable mobility, reduction of energy consumption in homes (both electricity consumption and energy for heating or cooling), increase in the intake of plant-based foods instead of meat and dairy, waste reduction and recycling (composting programs, reusable packaging, separation of waste at source), responsible purchasing (favoring local and seasonal products, organic products, fair trade products and brands that are committed to sustainable practices). All these actions are aimed at a decreasing people's carbon footprint, increasing awareness of environmental problems, and encouraging more sustainable behavior.

CURITIBA | BRAZIL

Urban Voids Become Community Gardens

When the entire food supply chain is considered, it is estimated that transportation accounts for around 20% of the total system emissions. The Urban Agriculture program in Curitiba is a community project that rehabilitates degraded land, and makes use of vacant space in private and public locations, including schools, back-yards, and balconies, to produce food. **Through local organic food production, the city hopes to mitigate the greenhouse gas emissions caused by the transport** of food as well as enable more carbon sequestration from increased vegetation. In addition, the urban agriculture project increases food security and can serve as an in co-egenerating activity for participants.

Since its launch in 2011, the initiative has generated more than 750 tons of food and has benefitted more than 83,000 people.

MAIN GOAL

+67M

M2 of land has been repurposed for cultivation

OTHER BENEFITS

What can other cities learn?

Making productive uses of otherwise wasted space in the city is one of the best ways to make direct positive environmental and socio economic impact to neighborhoods. Environmental awareness and education is also a key element of the project, which offers training activities, including home composting, alternative farming methods, pest control and soil conservation.

Source: 100 solutions for climate action in cities. C40, Sustania, Realdania, (2016)

BUENOS AIRES | ARGENTINA

Environmental Education Targets Low-Income Youth

Buenos Aires' Green Schools Program seeks to provide the city's youth, particularly in low-income neighborhoods, with education about four key sustainability themes: integrated waste management, environmental health, energy efficiency and renewable energy, and climate change. **The program offers both direct learning opportunities for students, as well as strategies to improve the teaching methods around these themes.** The program is already achieving impressive results. In 2016, more than 2,500 schools and 588,000 students had already participated in the Green Schools Program's integrated waste management initiative, and more than 16,000 supervisors, managers, teachers, and assistants were trained under Green Schools Program principles.

MAIN GOAL

+440

Schools have vegetable gardens

OTHER BENEFITS

What can other cities learn?

Young generations will be the future decisions makers of the city. Its extremely important for the right narratives to be shared with climate education to make a lasting difference in habits such as waste production.

Source: 100 for climate action in cities. C40, Sustania, Realdania, (2016)

Community participation, education and sustainable habits

RÍO DE JANEIRO | BRAZIL

Pioneereing Sustainability in Schools

Initiated in 2016, six schools in the Brazilian coastal city joined the pilot of the Sustainable Schools Project. Now at eight schools, the project is a pioneering initiative in Brazil, developed to empower students, teachers, and their surrounding communities with knowledge on sustainability and climate change. By teaching new concepts and practices, students learn how to use **natural resources in a sustainable fashion,** the importance of recycling, and how to shrink their carbon footprint.

Participating schools have developed vegetable gardens, composting facilities, vegetable oil collection to avoid disposal in the sewers, and electronics and batteries waste collection. **The city plans to have 40 sustainable schools.**

MAIN GOAL

+40 sustainable schools by 2020

OTHER BENEFITS

What can other cities learn?

Education is an important tool to empower young city residents and enabling them to use resources efficiently.

Source: 100 solutions for climate action in cities. C40, Sustania, Realdania, (2017)

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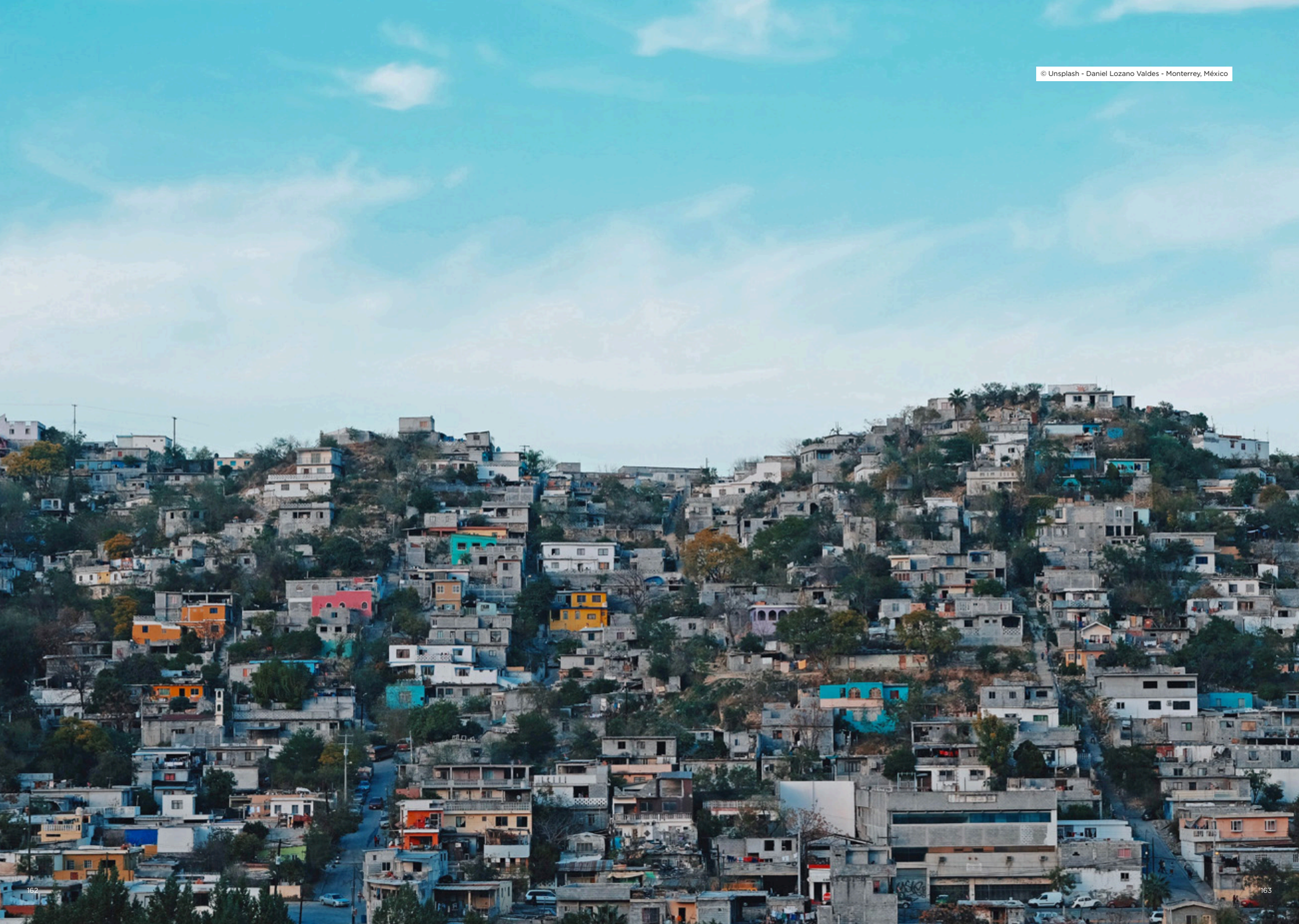

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