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Krystal Crumpler, Giulia Gagliardi, Alexandre Meybeck, Sandro Federici, Lorenzo Campos Aguirre, Mario Bloise, Valentyna Slivinska, Olga Buto, Mirella Salvatore, Ignacia Holmes, Julia Wolf and Martial Bernoux

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CONTENTS

TABLES, FIGURES AND BOXES

TABLES

FIGURES

BOXES

FOREWORD

The Paris Agreement seeks to limit global warming to below a 2°C rise above pre-industrial levels and pursue efforts to stay within 1.5°C. It also sets a global goal on adaptation within the context of sustainable development. Nonetheless, recent estimates indicate that mean temperature has already increased to 1.1 °C, and if only current goals of NDCs are pursued, mean temperature could increase to nearly 3°C by 2100.

According to a FAO analysis, around 90 percent of the countries' NDCs refer to the agriculture sector. The study shows a strong commitment from FAO member nations for climate actions. FAO is providing support to countries with their NDC formulation and implementation, a line of work aligned to the FAO Climate Change Strategy.

FAO's Climate Change Strategy and Plan of Action has three outcomes:

1 Enhanced capacities of Member Nations on climate change through FAO leadership as a provider of technical knowledge and expertise.
2 Improved integration of food security, agriculture, forestry and fisheries within the international agenda on climate change through reinforced FAO engagement.
3 Strengthened coordination and delivery of FAO work on climate change.

The following are key findings of this publication related to the agricultural sector[1] and NDC in Latin America:

- All countries in Latin America, with the exception of one, communicated an adaptation component in their NDC, all of which include the agriculture and land use sectors.
- Ninety percent of all countries with an adaptation component identify at least one policy or measure in agro-ecosystems. Of these countries, seventy-five percent include at least one policy or measure in the crops sub-sector; seventy percent in fisheries and aquaculture; forty-five percent in forestry; thirty-five percent in integrated systems; and twenty-five percent in the livestock sub-sector.
- Ninety-two percent of countries with adaptation in ecosystems include at least one policy or measure targeting water resource use and management; eighty-five percent targeting ecosystems and biodiversity conservation; and seventy percent targeting land and soil resource use and management.
- In social systems, all countries with an adaptation component in Latin America identify at least one adaptation policy or measure. All of them include at least one adaptation policy or measure in social systems related to socio-economics and well-being; ninety-five to institutions and governance; and eighty-five percent to knowledge and capacity.
- Regarding mitigation, all countries in Latin America communicated a general mitigation contribution in their NDC, and sixty-five percent set a GHG target.
- Eighty percent of countries in the region include mitigation in the agriculture sector and up to eighty-five percent include the LULUCF sector.
- All countries in the region with mitigation in the agriculture and/or land use sector include at least one mitigation policy or measure on forest land; thirty-one percent include at least one policy or measure on cropland; thirty-one percent include at least one policy or measure in integrated systems; and twenty-five percent include at least one policy or measure on grasslands.

Latin America will continue to play a large role in global food security and nutrition, having almost a third of the freshwater resources and more than a quarter of world's croplands with medium to high growth potential . However, climate change could have considerable impacts on the capacity to produce

[1] For the purpose of this document, the "agricultural sector" comprise crops, livestock, fisheries and aquaculture, and forestry.

food, potentially affecting the livelihoods and food security of millions for the growing world population. It is urgent to have the necessary knowledge on existing gaps on agriculture, forestry and other land use sector in current NDCs, to adequately considering mitigation and adaptation measures.

FAO is committed to work closely with Latin America members countries providing technical assistance and support to identify opportunities to raise ambitions and promote resilient and sustainable food systems, to secure adequate food and nutrition for population. This report is part of this commitment, with the conviction that together we can achieve the increasingly ambitious goals needed to overcome one of the main challenges of our time.

Julio Berdegué
Assistant Director-General
Office forLatin America and the Caribbean

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ACRONYMS AND ABBREVIATIONS

AFOLU	Agriculture, Forestry and Other Land Use
BAU	Business-as-usual
BUR	Biennial update report
COP	Conference of the Parties
DRR	Disaster risk reduction
ENSO	El Niño Southern Oscillation
EWS	Early warning systems
FAO	Food and Agriculture Organization of the United Nations
FLW	Food loss and waste
GDP	Gross domestic product
GHG	Greenhouse gas
INDC	Intended Nationally Determined Contributions
IPCC	Intergovernmental Panel on Climate Change
IPPU	Industrial processes and products use
LLDC	Land-locked developing country
LULUCF	Land Use, Land Use Change and Forestry
NAP	National Adaptation Plan
NC	National Communication
NDC	Nationally Determined Contributions
NGHGI	National greenhouse gas inventory
OECD	Organisation for Economic Co-operation and Development
R&D	Research and development
SFDRR	Sendai Framework on Disaster Risk Reduction
SDG	Sustainable Development Goal
UN	United Nations
UNFCCC	United Nations Framework Convention on Climate Change
USD	United States Dollar
2030 Agenda	2030 Agenda for Sustainable Development

CHEMICAL FORMULAE

CO_2	Carbon dioxide
Mt CO_2 eq	Million tons of carbon dioxide equivalent
N_2O	Nitrous oxide

EXECUTIVE SUMMARY

TABLE 1.

NDC SUMMARY TABLE

FAOSTAT COUNTRY NAME	MITIGATION IN AGRICULTURE SECTOR INCLUDED	MITIGATION IN LULUCF SECTOR INCLUDED	ADAPTATION IN AGRICULTURE INCLUDED	DRR/M[2] IN AGRICULTURE INCLUDED	GENDER MENTIONED	CO-BENEFITS MENTIONED	SDGs[3] MENTIONED	NAP[4] MENTIONED	LOSS AND DAMAGE MENTIONED
BELIZE									
COSTA RICA									
EL SALVADOR									
GUATEMALA									
HONDURAS									
MEXICO									
NICARAGUA									
PANAMA									
CENTRAL AMERICA									
ARGENTINA									
BOLIVIA (PLURINATIONAL STATE OF)									
BRAZIL									
CHILE									
COLOMBIA									

[2] Disaster risk reduction and management (DRR/M).

[3] Sustainble Development Goals (SDG).

[4] National Adaptation Plan (NAP).

ECUADOR									
GUYANA									
PARAGUAY									
PERU									
SURINAME									
URUGUAY									
VENEZUELA (BOLIVARIAN REPUBLIC OF)									

SOUTH AMERICA

1.1 MITIGATION IN AGRICULTURE AND LAND USE SECTORS: GAPS AND OPPORTUNITIES

Without implementation of the NDCs, total economy-wide net emissions in the region are expected to increase by around 45 percent in 2030 compared to those reported in 2015, rising from 3.7 Gt CO_2 eq. in 2015 to 5.4 Gt CO_2 eq. in 2030. Thirteen out of the 20 countries in the region,[5] representing 97 percent of economy-wide net emissions in the region, set a general greenhouse gas (GHG) target.

Under the mitigation scenario, total net emissions in the region are expected to fall by 36 percent compared to the 2030 counterfactual scenario, or from 5.4 Gt CO_2 eq. to 3.5 Gt CO_2 eq. in 2030, which equates to a cumulated net reduction of -15.4 Gt CO_2 eq., 15 percent of which is explicitly referenced as conditional to international support.[6]

The Agriculture, Forestry and Other Land Use sector (AFOLU) represents the largest source of emissions in Latin America, at around 45 percent of total emissions. Achieving the 36 percent reduction in net emissions by 2030 as set forth in country NDCs will largely depend on greater investment in and uptake of mitigation options in the agriculture and land use sectors.

Overall, 80 to 85 percent of countries in the region are committed to mitigation in the agriculture and Land Use, Land Use Change and Forestry (LULUCF) sectors, respectively, expressed as either policies or measures, GHG targets (Chile and Ecuador) or non-GHG targets (Panama and Honduras). All of those countries promote mitigation on forest land, primarily via sustainable forest management and afforestation/reforestation policies measures, while around one-third include mitigation on cropland and in integrated systems, but very few promote mitigation in the livestock sector.

The most significant GHG hotspots identified at the regional level are emissions from enteric fermentation (31 percent of AFOLU emissions), forest degradation (21 percent), deforestation and managed

[5] Belize, El Salvador, Nicaragua, Panama, Bolivia, Guyana and Suriname do not communicate a GHG target.

[6] Cumulated net emission reduction calculated linearly.

soils (16 percent per each). On the other hand, emission removals from forest management represent the greatest carbon sink (83 percent of removals), as from afforestation to a lesser extent (13 percent).

In Central America, a very high mitigation policy coverage gap is found in relation to emissions from enteric fermentation, while a high gap is found in relation to emissions from managed soils. Moderate policy coverage gaps are found around emissions from deforestation, cropland, grassland and biomass burning on forest land.

In South America, a very high mitigation policy coverage gap is found in relation to emissions from enteric fermentation, while a high gap is found in relation to emissions from managed soils and deforestation. A moderate policy coverage gap is found around emissions from cropland.

1.2 CLIMATE-RELATED IMPACTS IN ECOSYSTEMS AND SOCIAL SYSTEMS

In Latin America, all countries report climate-related hazards, impacts and vulnerabilities in ecosystems and all but two (Panama and Paraguay) report climate-related risks in social systems.

Droughts and floods are amongst the most frequently observed and/or projected climate-related hazards in the region, and water stress and sea surface temperature rise constitute the most frequently reported climate-related slow onset events in terrestrial ecosystems and in marine and coastal ecosystems, respectively.

Out of all ecosystem types, agro-ecosystems are considered most vulnerable to climate-related impacts (80 percent of countries), primarily in the crops and fisheries sector (55 and 50 percent of countries, respectively), followed by oceans and coastal zones ecosystems (45 percent). Genetic resources are frequently referenced amongst natural resource-related impacts (80 percent of countries), followed by water (70 percent), and land and soil resources (50 percent), while the most frequently reported losses in ecosystem services include primary production and productivity loss (80 percent), changes in water availability and quality (60 percent), changes in species range, abundance and extinction (45 percent) and coastal erosion (40 percent).

Loss of productive infrastructure and assets, loss of rural livelihoods and incomes and poverty and inequality constitute the most frequently reported climate-related risks in social systems (72 percent, 56 percent and 44 percent each), exacerbated by the underlying economic dependence on agriculture and natural resources reported as a non-climatic driver of vulnerability (61 percent).

1.3 ADAPTATION IN ECOSYSTEMS: GAPS AND OPPORTUNITIES

All but one country (Panama) in the region communicated an adaptation component in their NDCs, all of which include the agriculture and land use sectors. Ninety percent of countries with adaptation include policies or measures in agro-ecosystems, and half include measures in ocean and coastal zones, primarily mangrove conservation and replanting.

In agro-ecosystems, the crops sub-sector is most frequently promoted amongst adaptation policies or measures (75 percent of countries with adaptation in agro-ecosystems), primarily plant management, followed by fisheries and aquaculture (70 percent), forestry (45 percent), integrated systems (35 percent) and livestock (25 percent).

The majority of countries with adaptation in ecosystems target water resource use and management (90 percent of countries with adaptation in ecosystems), primarily irrigation and drainage, as well as ecosystems and biodiversity conservation (85 percent) and land and soil resource use and management (70 percent).

In Central America, very high adaptation policy coverage gaps are found in relation to climate-related impacts observed or projected in ice and snow, mountain, inland water, wetland and desert ecosystems, and moderate to high policy coverage gaps are found in relation to climate-related impacts on grasslands, livestock and integrated systems. Moderate policy coverage gaps are found in relation to climate-related impacts on land and soil and water resources, as well as in relation to climate-related impacts on ecosystem services, including erosion and biological control, as well as in relation to wildfires.

In South America, a very high adaptation policy coverage gap is found in relation to climate-related impacts observed or projected in inland water ecosystems, and moderate policy coverage gaps are found in relation to climate-related impacts in the crops and livestock sub-sectors. High to very adaptation high policy coverage gaps are found in relation to climate-related wildfires, sea level rise and snow and ice melting. Moderate to high policy coverage gaps are found in relation to climate-related impacts on land and soil and genetic resources, and in relation to climate-related impacts on ecosystem services, including the maintenance of genetic diversity and abundance and nutrient cycling and soil formation.

1.4 ADAPTATION IN SOCIAL SYSTEMS: GAPS AND OPPORTUNITIES

All countries with an adaptation component in the region include measures related to socio-economics and well-being. The majority of those countries promote resilience and adaptive capacity building (75 percent of countries with adaptation in social systems), followed by credit and insurance services and resilient infrastructure (50 percent each), disease management and prevention and health information and services (45 percent each), amongst others.

Ninety-five percent of countries with an adaptation component include measures related to institutions and governance. The majority of those countries target disaster risk reduction (DRR) and management (60 percent), followed by policy mainstreaming and coherence (50 percent), amongst others.

Eighty-five percent of countries with an adaptation component include measures related to knowledge and capacity. The majority of those countries promote awareness raising and education, climate information services, and research and development (R&D) (60 percent each), followed by early warning systems, and hazard and vulnerability mapping (45 percent each), amongst others.

In Central America, high to very high adaptation policy coverage gaps are found in relation to climate-related migration and displacement, gender and youth inequality and rural livelihoods and income loss, while a moderate policy coverage gap is found in relation to conflict.

In South America, a very high policy coverage gap is found in relation to climate-related migration and displacement.

1.5 SYNERGIES AND CO-BENEFITS

Overall, 90 percent of countries in the region explicitly recognize the co-benefits of either mitigation or adaptation in the agriculture and land use sectors within their NDCs. Adaptation in ocean and coastal zones and forestry represent the main areas in which mitigation co-benefits are most frequently reported, while mitigation in forestry and integrated systems represent the main areas in which adaptation and/or sustainable development co-benefits are most frequently reported.

Forty-five percent of countries in the region promote at least one type of food loss and waste (FLW) reduction-related measure as an adaptation or mitigation strategy in the agriculture and land use sectors, primarily through FLW prevention, followed by recovery (for example, bioenergy) and reuse (for example, feed).

Aligning the climate and sustainable development agenda presents a unique opportunity for countries to co-deliver. The greatest area of convergence between agricultural climate actions in the

region and the 2030 Agenda for Sustainable Development (2030 Agenda), after Sustainable Development Goal (SDG) 13 "Climate Action," are found around SDG targets 2.3" Assure agricultural productivity for marginalized", 12.2 "Efficient use of natural resources", 15.3 "Restore degraded land and combat desertification", 8.1 "Sustainable economic growth" and 1.4 "Equal access of vulnerable to all type of resources".

Almost all countries in the region promote climate change adaptation measures that contribute to the Sendai Framework, with the greatest areas of convergence found around priority for action III "Investing in disaster risk reduction" and I "Understanding disaster risk" (95 percent and 89 percent of countries with adaptation, respectively). However, more can be done to understand disaster risk, strengthen disaster risk governance and enhance disaster preparedness and "build back better" in the agriculture and land use sectors.

1.6 BARRIERS TO CLIMATE ACTION AND SUPPORT NEEDS

Climate action in the agriculture and land use sectors will require rapid mobilization of financial resources, enhanced capacities and the transfer of technology in the region. All countries in Central America reference capacity-building, finance and technology transfer support needs, while three-fourth of South American countries identify capacity-building and technology transfer support needs and over 90 percent require additional financial support.

Economic and financial barriers are cited most frequently amongst factors impeding the implementation of climate action in the region (100 percent of countries with barriers reported), followed by legal and regulatory and informational and awareness-related barriers (91 percent each), amongst others.

Over half of all countries in the region report at least one priority need for implementing climate action in the agriculture and land use sectors, primarily in the crops sub-sector and in ocean and coastal zones. Priority technology needs are stressed in relation to sustainable agriculture and land use management, bioenergy production, genetic resources diversification, irrigation and drainage and mapping and monitoring.

1.7 CONCLUSION

By highlighting the gaps in the coverage of mitigation and adaptation in the agriculture and land use sectors, as well as illustrating opportunities for enhancing climate action ambitions in the next round of NDCs, this analysis can serve as an important roadmap for informing programming and directing future investments in support of low-emission and climate-resilient agriculture and food systems in Latin America.

INTRODUCTION

BACKGROUND

The Paris Agreement constitutes a landmark achievement in the international response to climate change, as developed and developing countries alike committed to do their part in the transition to a low-emission and climate-resilient future. The Agreement seeks to limit global warming to below a 2°C rise above pre-industrial levels and pursue efforts to stay within 1.5°C, as well as sets a global goal on adaptation within the context of sustainable development. Underpinning the Agreement are the (Intended) Nationally Determined Contributions, (I)NDCs,[7] representing the main national policy framework, under the United Nations Framework Convention on Climate Change (UNFCCC), by which Parties communicate a commitment to act at the national level to mitigate greenhouse gas (GHG) emissions and adapt to changes in climate, report on progress made, and identify support where it is needed.

The success of the Paris Agreement rests upon the enhanced ambition of Parties to progressively revise and strengthen their respective mitigation and adaptation plans over time (UNFCCC, 2015).[8] At the twenty-second Conference of Parties (COP) of UNFCCC, a facilitative dialogue[9] was convened to assess collective efforts made towards achieving the long-term goal of the Agreement, with the view of enhancing pre-2020 ambitions and the provision of means of implementation (UNFCCC, 2016). In 2023, and every five years thereafter, Parties shall periodically take stock of the implementation of the Agreement to assess the collective progress towards achieving its purpose and long-term goals (UNFCCC, 2015).[10] The outcome of the global stocktake shall inform Parties in updating and enhancing, in a nationally determined manner, their actions and support in accordance with the relevant provisions of this Agreement, as well as in enhancing international cooperation for climate action.

The tracking of NDC implementation will take place under the Enhanced Transparency Framework,[11] which provides a foundation for building mutual trust and confidence (UNFCCC, 2015). The "Paris Rulebook" requires Parties to report reliable, transparent and comprehensive information on GHG emissions, climate actions and support, with built-in flexibility for developing countries under the principle of common but differentiated responsibilities and respective capabilities (UNFCCC, 2018).[12]

Linked to the Paris Agreement and NDCs are the 17 Sustainable Development Goals (SDGs) of the 2030 Agenda, which sets out a vision for a hunger-free, more equitable, sustainable, peaceful and resilient world in 2030. Closing the emissions gap while safeguarding food security and pulling millions out of extreme poverty can only be achieved in a context of sustainable development, and sustainable development can only be achieved if coupled with a low-emission and climate-resilient future.

The agriculture and land use sectors[13] feature prominently in the NDCs, with up to 86 and 97 percent of developing countries highlighting mitigation and adaptation in agriculture and land use, respectively (FAO, forthcoming). As such, FAO has a critical role to play in supporting Member Countries to leverage the mitigation and adaptation potential in the agriculture and land use sectors and harness their synergies, while "leaving no one behind."

[7] For the purpose of this document, the (I)NDCs and NDCs are collectively referred to as NDCs.

[8] Article 4.2 of the Paris Agreement.

[9] Talanoa dialogue decision 1/CP.22, paragraph 16 (COP22, Fiji).

[10] Article 14 of the Paris Agreement.

[11] Article 13 of the Paris Agreement.

[12] Modalities, procedures and guidelines for the transparency framework for action and support referred to in Article 13 of the Paris Agreement (FCCC/CP/2018/L.23).

[13] For the purpose of this document, the 'agriculture sectors' comprise crops, livestock, fisheries and aquaculture, and forestry.

OBJECTIVE

FAO recognizes that its goals to eliminate hunger, food insecurity and malnutrition; reduce rural poverty; and make agriculture, forestry and fisheries more productive and sustainable, cannot be fulfilled without decisive action on climate change (FAO, 2013). Building on its longstanding leadership as a provider of technical knowledge and expertise on sustainable food and agriculture, FAO is committed to supporting member countries prepare for and respond to the adverse impacts of climate change. FAO's Climate Change Strategy outlines its commitment to enhancing countries' institutional and technical capacity to plan and implement NDCs; to improving the integration of food security, agriculture, forestry and fisheries within the international climate agenda; and to strengthening the coordination and delivery of FAO's work (FAO, 2017b).

It is with this in mind that FAO is developing a series of regional-level analyses of the NDCs to assess the current commitments and identify gaps and opportunities in the agriculture and land use sectors for enhancing mitigation and adaptation ambitions ahead of the next round of revisions of the NDCs in 2020. At COP 22, FAO launched an extensive global analysis of the NDCs, evidencing the significant role of the agriculture and Land Use, Land Use Change and Forestry (LULUCF) sectors[14] in the NDCs (FAO, 2016a). In 2016, FAO assessed the main challenges countries face when moving from NDC planning to implementation and identified five priority areas for international support in the agriculture and land use sectors (FAO, 2016b). To date, FAO has published regional analyses of the NDCs in Eastern Africa (FAO, 2017c), Central Asia and Eastern and Southern Europe (FAO, 2019b), Asia (FAO, 2020a), the Pacific (FAO, 2020b) and the Caribbean (FAO, 2020c).

This report provides a unique, sector-specific synthesis of the NDCs from Latin America. It summarizes the substantial contributions already put forward by countries, opportunities for further action and the gaps, barriers and needs that will need to be addressed if the agriculture and land use sectors in Latin America are to raise mitigation and adaptation ambitions. The findings of this report will help member countries to reflect on their progress in advancing toward NDC priorities for agriculture and associated national climate goals including related targets under the SDGs. The analysis also helps to clarify the links between the NDCs from the region and the Sendai Framework for Disaster Risk Reduction (SFDRR). Finally, the report serves as a guide to FAO, as well as other international actors, for the support that will be required to help countries in the region to move forward to implement agriculture and land use sector priorities in their NDCs and ensure that future commitments from the agriculture sector are quantifiable, verifiable and sufficiently ambitious.

The report is divided into six chapters:

Chapter 1 describes the geographical scope, data sources and methodological approach underlying the analysis.

Chapter 2 provides an overview of the regional and sub-regional trends driving emission trajectories, climate vulnerabilities, adaptive capacities and food security and nutrition outcomes in the region.

Chapter 3 presents a common framework for the synthesis and analysis of the NDCs in the agriculture and land use sectors. It reflects the heterogeneous nature of country commitments and illustrates regional trends. It analyses the scope, specificity, measurability and timeline of the mitigation and adaptation contributions in the agriculture and land use sectors. The data informs the gap and opportunity analysis in Chapter 4.

Chapter 4 describes the results of the gap and opportunity analysis of the mitigation and adaptation contributions in the agriculture and land use sectors to support the NDC revision process and ambition-building mechanism of the Paris Agreement.

Chapter 5 assesses the opportunities for capturing adaptation and mitigation co-benefits, as well as leveraging synergies between climate actions in the agriculture and land use sectors and the 2030 Agenda for Sustainable Development and Sendai Framework for Disaster Risk Reduction.

Chapter 6 presents key messages and policy recommendations.

[14] For the purposes of this document, the Agriculture and LULUCF sectors, as defined by Intergovernmental Panel on Climate Change (IPCC), are also collectively referred to as the "agriculture sectors."

CHAPTER 1

CHAPTER

1

METHODOLOGY

1.1 GEOGRAPHIC SCOPE

For this analysis, Latin America comprises 20 countries spanning two geographic areas: Central America (Belize, Costa Rica, El Salvador, Guatemala, Honduras, Mexico, Nicaragua and Panama) and South America (Argentina, Bolivia (Plurinational State of), Brazil, Chile, Colombia, Ecuador, Guyana, Paraguay, Peru, Suriname, Uruguay, Venezuela (Bolivarian Republic of)) (UNSD, n.d.). In order to account for similarities and differences across landscapes, climates and political economies, the analysis is disaggregated by sub-region. Belize, Guyana and Suriname are Small Island Developing States (SIDS) and Bolivia and Paraguay are land-locked developing countries (LLDC). The assignment of countries or areas to specific groupings is for statistical convenience and does not imply any assumption regarding political or other affiliation of countries or territories by the UN.

1.2 DATA

This analysis is based on the information reported in the latest NDCs, national communications (NCs), biennial update reports (BURs) and technical needs assessments (TNAs) of 20 non-Annex I Parties to the UNFCCC as of 1 December 2019. **Annex 1** contains a list of all the documents analysed.

1.3 COMMON FRAMEWORK

A common framework was developed to facilitate the synthesis and analysis of the NDCs in the agriculture and land use sectors. The NDCs are the product of diverse national capacities and processes, meaning they vary greatly in terms of format, scale and detail. The framework provides a structure for assessing the clarity, measurability, transparency and ambition of NDCs over time. Each NDC is analysed within the bounds of this common framework. The common framework was based on a stocktaking of the NDCs to quantify and qualify the types of climate change mitigation and adaptation contributions in the agriculture and land use sectors by means of a common set of categories and sub-categories. The full methodological notes are contained in (FAO, 2019c).

CHAPTER 2

CHAPTER

2

REGIONAL CIRCUMSTANCES

Latin America is home to a multitude of different cultures and economic activities strongly intertwined with the territory. The region comprises Central America with 2.4 million km^2, and South America with 17.3 million km^2, representing almost 15 percent of the surface of the planet, with a diverse climate and topography (WB-Open Data, undated).[15] The objective of this chapter is to provide a brief summary of some of the characteristics that could explain the dynamics that drive greenhouse gas (GHG) emissions and vulnerabilities to climate change impacts in the region.

2.1 CLIMATE AND NATURAL RESOURCES

Due to its enormous latitudinal extension, many of the climates of the world can be found in Latin America. Overall, equatorial climates can be found along the equator, with abundant rainfall (from 2 500 mm to 3 000 mm) throughout the year and with a mean temperature over 25 °C and dense rainforests representing the predominant vegetation. The remaining area between the equator and the tropics is characterized by a tropical climate with a dry season, with average annual temperatures between 20 °C and 25 °C and rainfall concentrated in some months, especially during summer, although with marked differences due to varying altitudes. This zone covers the centre and south of Mexico, Central America and Andean states, and forests and savannahs are the predominant vegetation. Around the tropics and mixed high pressure centres, arid and semi-arid climates appear, such as the desert from the north of Mexico, with temperatures reaching as high as 45°C in the Gulf

[15] Based on Land area (sq. km) by the World Bank Database.

of California, or the desert of Peru and Chile, the driest of the world. A semi-arid climate zone can be found on the northeast of Brazil and Peru highlands (altiplano), el Chaco (Bolivia, Argentina, Paraguay and Brazil), pampa (Argentina, Uruguay, Brazil) and Patagonia (Argentina and Chile). The vegetation associated with this zone comprises steppes, xerophytes, and species native to South America such as coirón (Festuca gracillima) and llareta (Azorella compacta). Temperate climates can be found along the line of the tropics (Cancer and Capricorn) and higher latitudes, with a Mediterranean climate in the central zone of Chile and the interior of Argentina, and temperate under oceanic influence in South America, over 38 °C, with dense rainforests and conifers. Near the poles, cold climate becomes prevalent, with low temperatures all year (FAO, 2016c). Some important geographic features in Latin America are the Andes mountain range in South America, with its own climatic zones varying by altitude, from 3 000 to 7 000 meters, and the narrow corridor represented by Central America, under the influence of two oceans, where the Dry Corridor is located, an ecological region that runs from southern Mexico through Guatemala, El Salvador, Honduras, Nicaragua, Costa Rica and Panama. The corridor is very susceptible to extreme weather events, due to changing patterns of ocean circulation such as El Niño Southern Oscillation (ENSO),[16] resulting in droughts or flooding due to irregular rainfall (FAO, 2017a).

Latin America has been considered as one of the regions with more biodiversity in the world. Some estimates indicate that 12 of the 14 existent biomes of the planet are present in the region, with approximately 190 terrestrial, 96 freshwater and 44 marine ecoregions (FAO, 2019d) Brazil, Mexico and Colombia are the countries with the most diversity in terrestrial ecoregions and freshwater. Due to the extension of Latin America and variety of climate zones, vegetation ranges from dense rainforests to savannahs, shrubs, grasslands, desert scrubs and mosses of the tundra, as well as species adapted to high altitude habitats along the Andes. The region is also rich in freshwater resources, accounting for 31 percent of the availability of the world, especially South America (IDB and CEPAL, 2018). Available water resources per capita are near 28 000 m^3y-1, above the world average of 6 000 m^3y-1, although this number varies greatly among and inside sub-regions, and on average only 65 percent of population has access to drinking water and 22 percent to sanitation(FAO, 2016c; Peña, 2016). The region also has abundance in coastal and marine resources, having for instance the marine system that produces the most fish per surface unit in the world (Humboldt Current System), and fisheries and aquaculture are important economic activities for countries like Mexico, Brazil, Peru, Chile and Ecuador, although the fish consumption of the region is among the lowest globally, as the region focuses primarily on exportation (FAO, 2018b). It should be noted that some countries are also rich on minerals (such as iron, bauxite, zinc, nickel, copper, silver and lithium), petroleum and gas, and extraction of those resources contributes an important share of the economy of those countries (Saravia-Matus and Aguirre Hörmann, 2019).

With vast natural resources, Latin America has an important potential, among others, to produce food for a world with an increasing population, to produce energy from varied renewable sources and to sequester carbon in the vegetation, soils and marine ecosystems. Nonetheless, a development model based for decades on the extraction of natural resources has greatly degraded and modified the ecosystems (UNEP, 2016). In the decade between 2001 and 2011, 48 percent of the forest cover was converted to pastures, while 53 percent of the savannahs were converted to croplands (Pendrill and Persson, 2017). The soil resource is also threatened, due to erosion, acidification, pollution, loss of organic carbon and biodiversity. It is estimated that in South America between 27 percent and 80 percent of agricultural soils are degraded, and in Central America nearly 45 percent of croplands are affected by degradation (Gardi *et al.*, 2015; Morales and Parada, 2005). Aquatic ecosystems are also highly degraded. In the period between 1970 and 2015, there was a reduction of 59 percent of wetlands and pollution has increased in most rivers of the region (Ramsar Convention on Wetlands, 2018). Likewise, glaciers are progressively receding. Coastal development due to demographic expansion, tourism, urbanization and maritime transport, has degraded habitats and natural resources (UNEP, 2016).

[16] ENSO is one of the most important climatic phenomena on Earth, influencing the fluctuations in temperature between ocean and atmosphere in east-central Equatorial Pacific Ocean, hence affecting Central and South America. The variations can have large-scale impacts on weather and climate. There is no evidence that climate change has increased the frequency of the oscillation, but it may be increasing its effects.

Several marine ecosystem are overexploited (especially the southeast Pacific and southwest Atlantic) (Barange *et al.*, 2018), polluted or have suffered the introduction of invasive species. Likewise, mangroves and seagrass beds are threatened by coastal activities, with nearly 40 percent of the mangroves from Central America at risk (Ramsar Convention on Wetlands, 2018). Furthermore, climate change represents an additional threat for several ecosystems of Latin America.

2.2 FARMING SYSTEMS

Due to the enormous latitudinal range, variations in altitude and diverse agro-ecological zones, the Latin America region has one of the more diverse and complex range of farming systems in the world. Sixteen major farming systems have been identified, but the four most important in terms of population are the Extensive Mixed Farming Systems, Dryland Mixed Farming Systems, Maize-Beans Farming Systems and High Altitude Mixed Farming Systems. Extensive Mixed Farming System in central western Brazil (Cerrados) and eastern Colombia, Venezuela and Guyana (Llanos), dedicated traditionally to extensive livestock ranching and cropping of rice, soybeans, maize and coffee. Dryland Mixed Farming System, located in northeast Brazil and Yucatan peninsula in Mexico, mainly destined to semi-subsistence based livestock, maize, beans and vegetables. Maize-Beans Farming System, from Central Mexico to Panama, historically and culturally based upon maize and beans production for subsistence, and coffee and vegetables as sources of cash income. High Altitude Mixed Farming System, in the altiplano (southern Peru, western Bolivia, northern Chile and Argentina) at altitudes of more than 3 200 meters, depends on indigenous grains, potatoes, sheep and llamas (Dixon, Gulliver and Gibbon, 2001).

The high diversity of farming systems also operates at different levels of technology and sophistication, making agriculture varied in terms of economic importance, ranging from capital and technology intensive corporate sectors successfully integrated into global markets, to a broad productive sector based on subsistence farming and several landless rural populations. There is also an intermediate sector that has connected to markets, but continues to be extremely vulnerable to economic, political and climatic risks. It is estimated that there are 15 million smallholder and family farmers in Latin America (OECD and FAO, 2019).

It is important to note that the region has abundant forest resources, but also a high deforestation rate due to agriculture, livestock, urban expansion or unsustainable practices. Between 2010 and 2015, Central and South America lost 5.5 percent of forest cover. In the case of South America, it is estimated that the net loss of forest reached 2 million hectares/year (FAO, 2019d). To reduce this trend and promote sustainable uses of forest, some countries have started to develop strategies to implement the REDD+ mechanism, with a focus on forest conservation and sustainable management, which help to sequester carbon from the atmosphere.

Fisheries and aquaculture are activities that are increasing moderately in the region, especially aquaculture, whose main target are competitive markets outside the region, as Latin America is a net exporter, with a per capita consumption of fish, which is among the lowest of the world (almost 10 kilos per capita). The main exports are shrimps, tuna, salmon and fishmeal (FAO, 2018b). On the other hand, fish capture in continental waters (not coastal or oceanic) is one of the principal sources of protein for many communities, especially for those living in poverty and/or belonging to indigenous communities located along watersheds.

2.3 POPULATION AND RURAL ECONOMY

More than 580 million people inhabit Latin America, and it is expected that by 2030 this number will increase until 710 million approximately. Central America has nearly 175 million habitants (72 percent of them from Mexico), with an average density of 106 habitants/km^2. South America has nearly 408 million habitants, 49 percent of them live in Brazil, with an average density of 24 habitants/km^2 (CEPALSTAT, undated; WB-Open Data, undated). **Figures 1-2** provide a summary of the population share in Central and Southern American countries.

FIGURE 1.

POPULATION IN CENTRAL AMERICA IN 2018, BY COUNTRY (THOUSANDS)

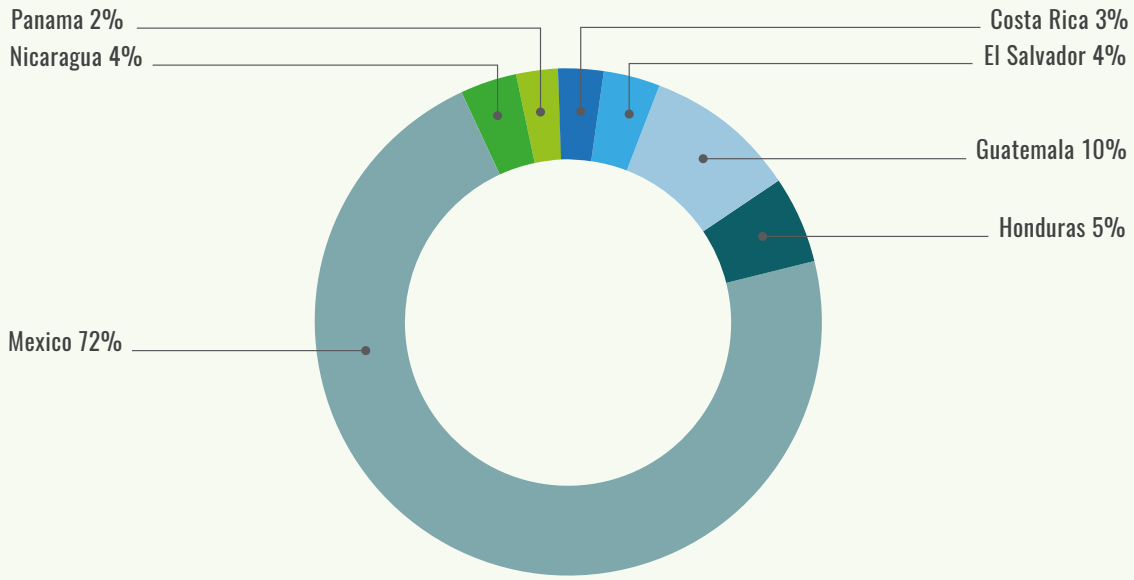
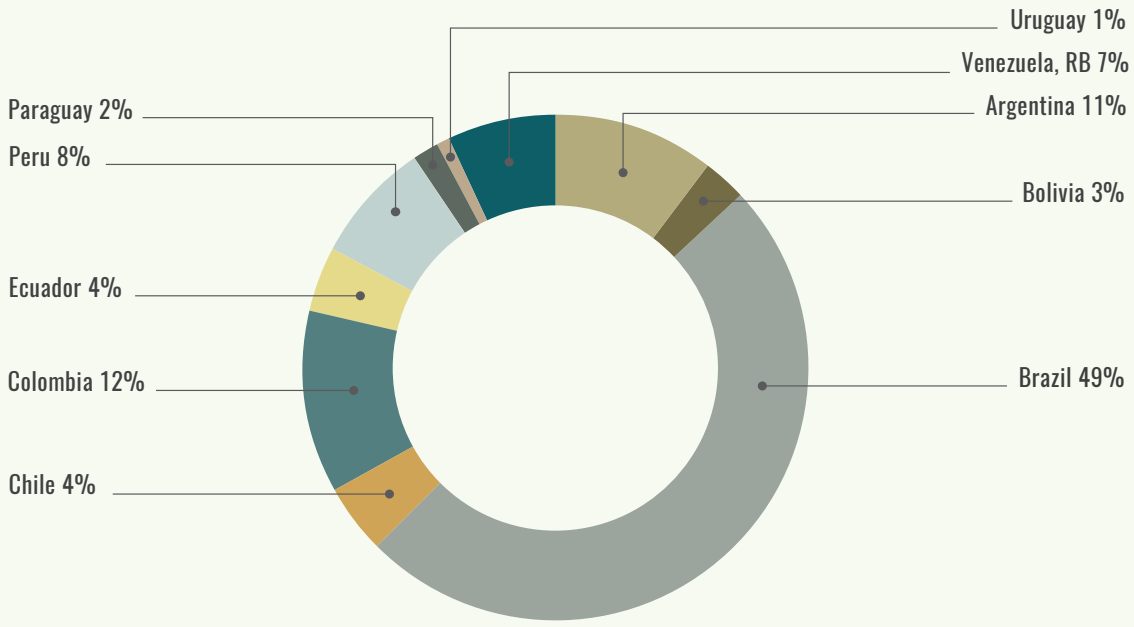


FIGURE 2.

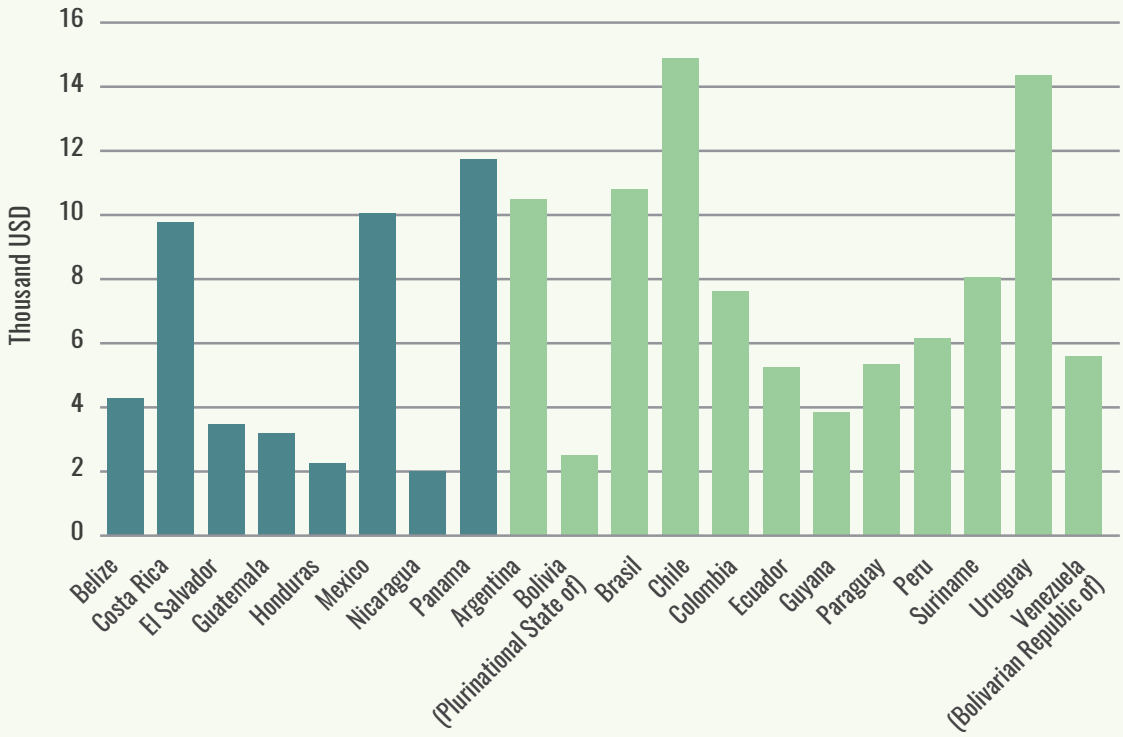
POPULATION IN SOUTH AMERICA IN 2018, BY COUNTRY (THOUSANDS)



On average, the region is moving from a middle income to a middle-high income status, with an average gross domestic product (GDP) of USD 6 000 per capita for Central America and USD 8 000 per capita for South America. It must be noted that these numbers mask important differences between the countries. **Figure 3** presents the GDP of each country of the two sub-regions.

FIGURE 3.

GROSS DOMESTIC PRODUCT OF LATIN AMERICAN COUNTRIES IN 2017 (THOUSAND USD PER CAPITA IN CONSTANT 2010 USD)



Source: elaborated using data from CEPALSTAT, n.d.

Since the 1970s, the population in urban zones has surpassed that of rural areas in Latin America, and it is expected that by 2030, more than 83 percent of the people will inhabit urban areas (CEPALSTAT, undated).[17] The region has become the largest exporter of agricultural commodities in the world, with agriculture accounting for an average of 5.3 percent and 4.2 percent of GDP for South and Central America in 2016, respectively, although there are considerable differences across countries. For instance, while agriculture accounts for less than 4 percent of GDP in Mexico and Chile, it exceeds 10 percent of GDP in Honduras and Nicaragua and 20 percent of GDP in Paraguay (Trivelli and Berdegué, 2019). Nonetheless, during the last 25 years, agriculture and livestock production has steadily increased in Latin America, expanding 132 percent in South America and 85 percent in Central America (Saravia-Matus and Aguirre Hörmann, 2019). Latin America is responsible for 12 percent of the global fish production, and those activities are the main source of income of almost 2.4 million people in the region (Flores Nava, 2019). On average, there will be a constant growth of the agriculture and fisheries sectors in the next decade, as the region gradually becomes the next dispenser of food for a growing world, having high potential for croplands. FAO estimates that by 2027, nearly 11 million new hectares will be destined to agriculture and almost half of that will be used for croplands (Saravia-Matus and Aguirre Hörmann, 2019). Despite this

[17] Data extracted from CEPALSTAT. Estadísticas e indicadores – Distribución porcentual de la población en áreas urbana y rural, por sexo.

potential, some barriers to overcome are the unsustainable use of soils, deforestation, over exploitation of fisheries and to reduce the inequities of the region such as wealth distribution. In this context, rural poverty and extreme rural poverty have increased in recent years in Latin America, from 45.1 percent to 46.4 percent, and 18.6 percent to 20.4 percent, respectively, in the period from 2014 to2017. This implies that in 2017, there were 2 million more poor rural people than in 2016 (FAO, 2018c).

2.4 FOOD SECURITY AND NUTRITION

After a decade-long decline, the prevalence of undernourishment and severe food insecurity appears to be increasing in the world during the last years, and Latin America shares this trend, as can be seen in **Figures 4-5**. This is more notorious in South America, where over the last year there was an increase in the amount of people suffering from undernourishment, reaching nearly 21.4 million. In the case of Central America, the amount of undernourished people has stabilized at nearly 11 million, as seen on **Figure 5**. Wasting in children has a low prevalence (approximately 1.3 percent) in Latin America when compared with other regions, but on the other hand, has a high prevalence of childhood overweight (approximately 7.3 percent) (FAO *et al.*, 2018). When severe food insecurity is considered (implying that a person has no access to food for a day or more), there has been an overall increase in the region in the last years, affecting almost 22 million in Central America and 36 million in South America (**Figure 6**).

FIGURE 4.

PREVALENCE OF UNDERNOURISHMENT IN LATIN AMERICA, 2005-2017

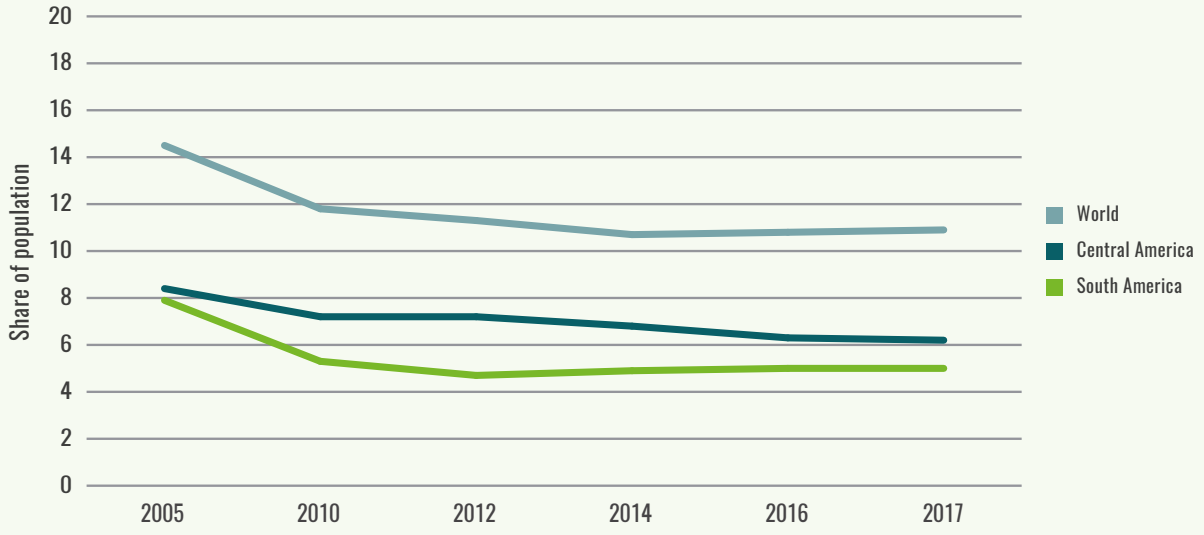


FIGURE 5.

NUMBER OF UNDERNOURISHED PEOPLE IN LATIN AMERICA

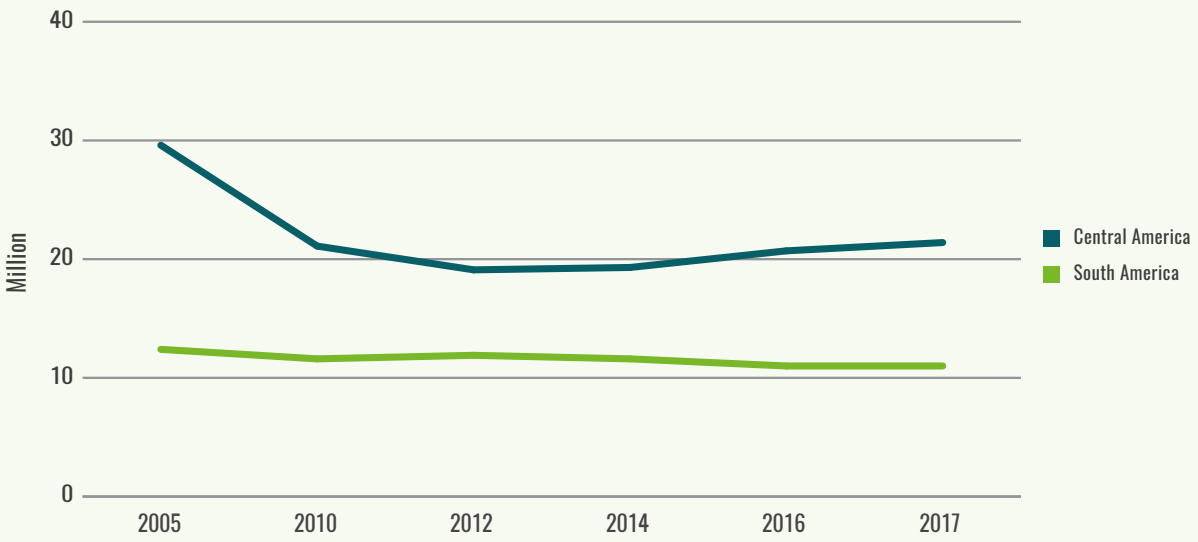
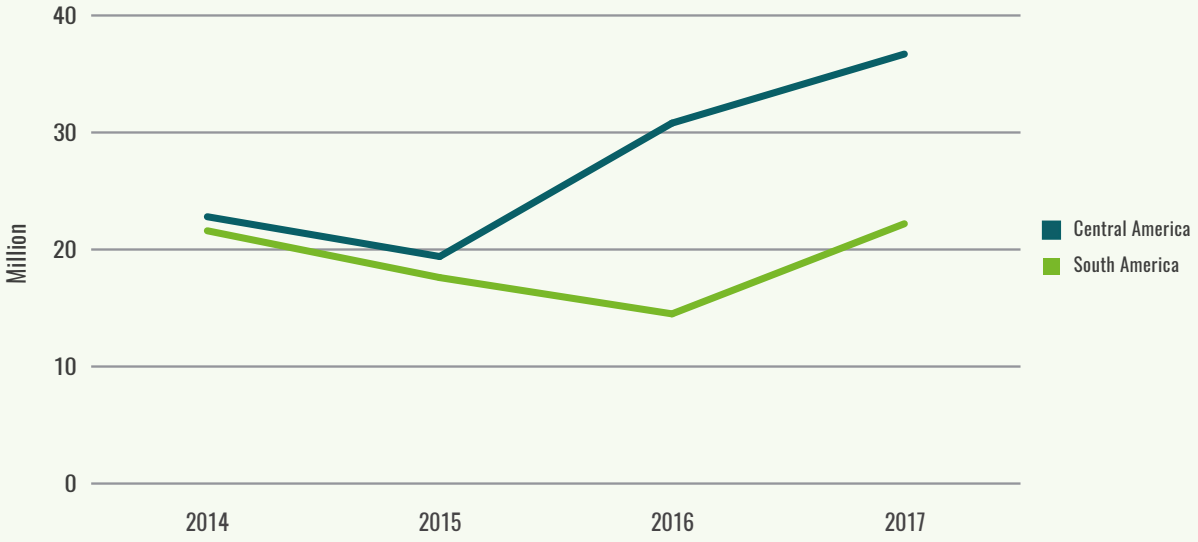


FIGURE 6.

NUMBER OF PEOPLE EXPERIENCING SEVERE FOOD INSECURITY IN LATIN AMERICA (ONE OR MORE DAYS WITHOUT FOOD), MEASURED WITH THE FOOD INSECURITY EXPERIENCE SCALE



Source: elaborated with data from FAO, State of Food Security, 2018.

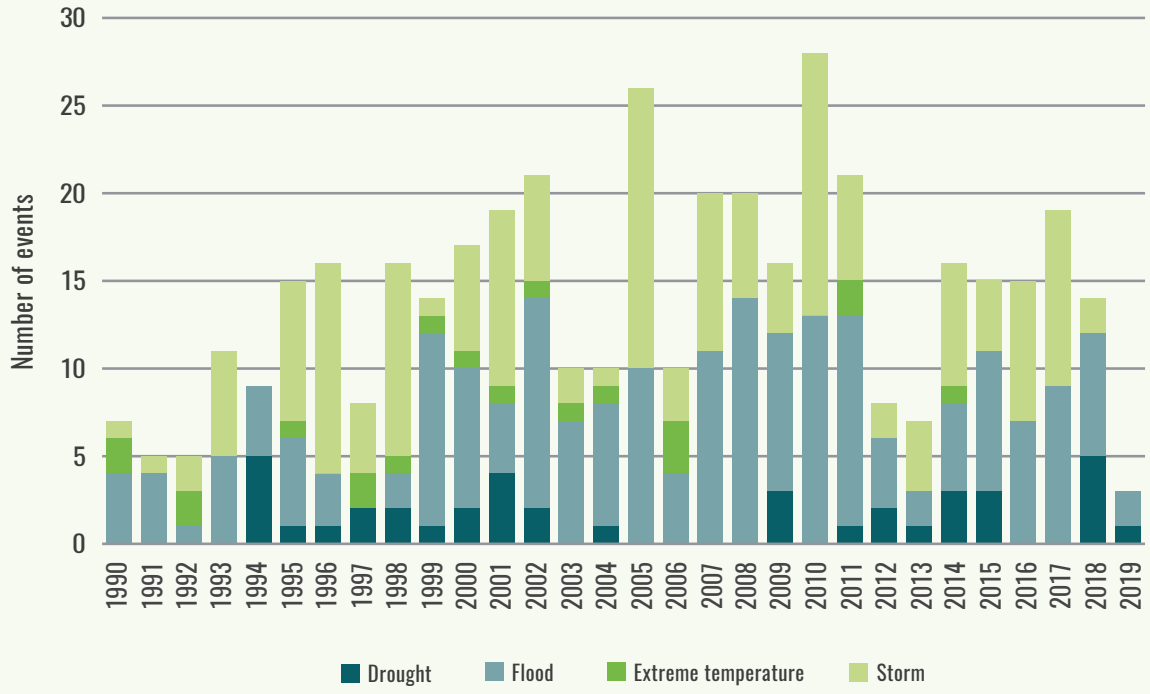
The fluctuations in food security and nutrition could be attributed to instability and conflicts in some countries, adverse climate events that have impacted food production and stability, and increased inequality in the access to and utilization of food. Climate has a crucial role in the harvest of rural families in Latin America, and events such as droughts and heavy rains can be devastating to food production. For instance, prolonged droughts and heavy rains in 2018 destroyed more than half of the maize and bean crops of subsistence farmers in the Dry Corridor of Central America, seriously affecting their food security.

Approximately 2.2 million people suffered crop losses because of the drought, that ruined 70 percent of the first crop, and heavy rains thereafter ruined 50 percent of the second crop. These events could be more frequent in the future due to possible incremental effects of climate change on El Niño Southern Oscillation (ENSO). It is estimated that up to 82 percent of the families of the Dry Corridor had to sell their agricultural tools and animals for subsistence, and 8 percent of the families may migrate in response to this situation (FAO, 2018a). Migration due to food insecurity is a phenomenon that has increased in South America ¬ which hosts the major increase of undernourished people of the region , due to deterioration of food security in the Bolivarian Republic of Venezuela, where prevalence of undernourished increased almost fourfold between 2012 and 2018 (FAO, 2019a).

Climate change is expected to increase food insecurity in the region if adaptive measures are not implemented in time. Under a 2 °C global temperature increase, it is expected that the mean temperature in Central America will raise by 2.2 °C, while in South America this increase might be between 2.1 °C and 2.6 °C, depending on the country. Likewise, rainfall might increase in the south of South America (up to 15 percent), but droughts might be more frequent in Central America and the north of South America (precipitations might reduce by up to 10 percent) (Jarvis *et al.*, 2019). There might be an increase in the frequency of extreme climate events that might result in natural disasters such as floods, a trend that has been slowly increasing in the last decades in the region, as can be seen **Figures 7-8.**

FIGURE 7.

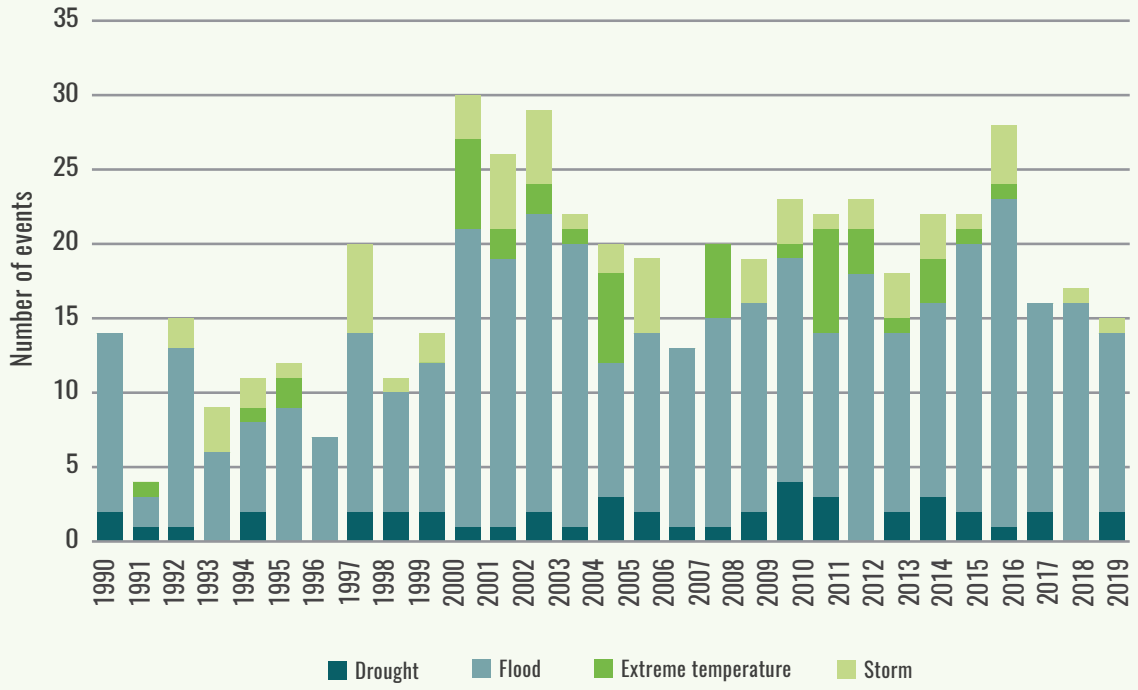
CLIMATE-RELATED NATURAL DISASTERS IN CENTRAL AMERICA BETWEEN 1990 AND 2018



Source: elaboration of data from The International Disaster Database EM-DAT, n.d.

FIGURE 8.

CLIMATE-RELATED NATURAL DISASTERS IN SOUTH AMERICA BETWEEN 1990 AND 2018



Source: elaboration of data from The International Disaster Database EM-DAT, n.d.

2.5 GREENHOUSE GAS EMISSIONS PROFILE

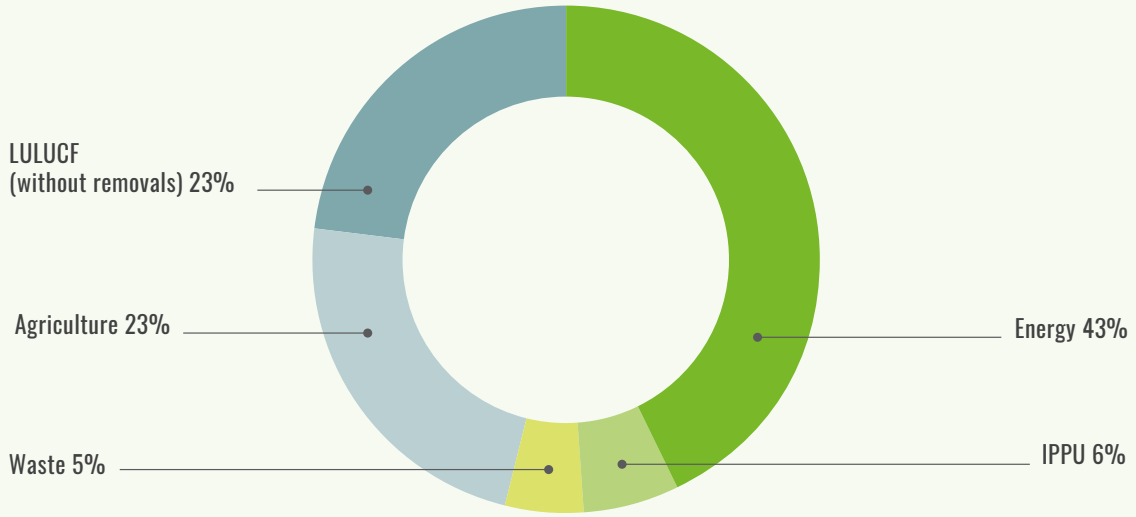
The national greenhouse gas inventory (NGHGI) data from the last available year was collected from national reports submitted to the UNFCCC between 2009 and 2015. **Annex 1** contains source and year per country.

The Agriculture, Forestry and Other Land Use (AFOLU) sector[18] represents the largest share of emissions in the region (46 percent), followed by the Energy sector (43 percent), Industrial Processes and Product Use (IPPU) (6 percent) and Waste (5 percent) sectors. Emissions from the agriculture sector (0.92 Gt CO_2 eq.) are almost equal to those from the Land Use, Land Use Change and Forestry (LULUCF) sector excluding removals (0.89 Gt CO_2 eq.), equal to 23 percent shares of national emissions each. **Figure 9** illustrates the share of economy-wide emissions in the region, by sector.

[18] The AFOLU sector refers to the Agriculture and LULUCF sector as defined by IPCC (2006).

FIGURE 9.

ECONOMY-WIDE EMISSIONS IN LATIN AMERICA, BY SECTOR (SHARE OF TOTAL EMISSIONS)



At the sub-regional level, agriculture is a significant source of emissions in Central America (15 percent of total emissions) and even more in South America (26 percent). The LULUCF sector (without removals) represents almost the same level of emissions as agriculture in Central America (13 percent) and South America (26 percent), when removals are excluded. **Figures 10-11** illustrates the share of economy-wide emissions by sector for each sub-region.

FIGURE 10.

ECONOMY-WIDE EMISSIONS IN CENTRAL AMERICA, BY SECTOR (SHARE OF TOTAL EMISSIONS)

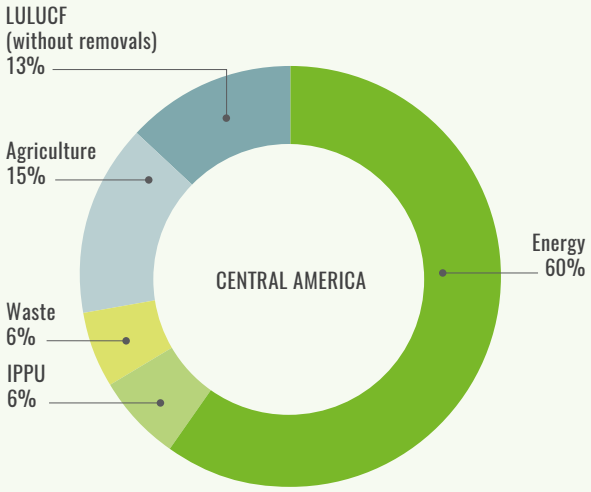
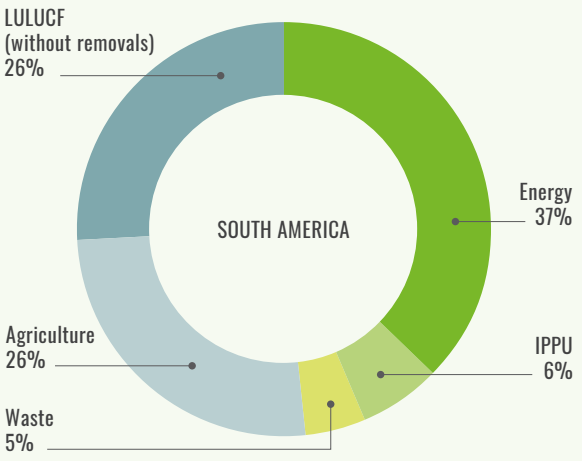


FIGURE 11.

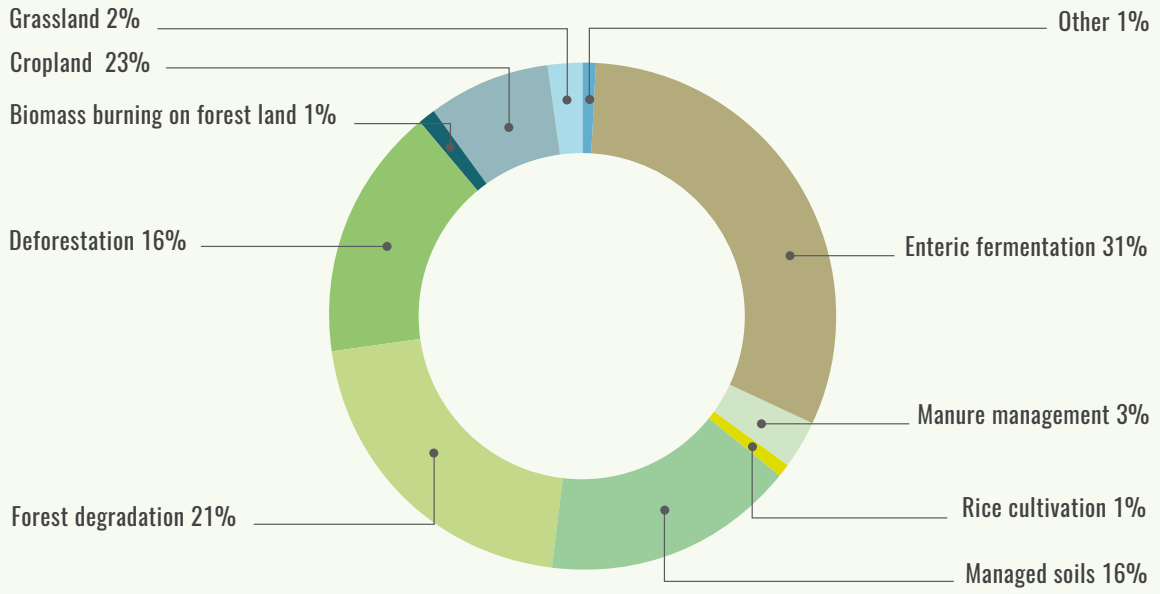
ECONOMY-WIDE EMISSIONS IN SOUTH AMERICA, BY SECTOR (SHARE OF TOTAL EMISSIONS)



Within the AFOLU sector,[19] the most significant GHG sources are enteric fermentation (31 percent), forest degradation (21 percent), deforestation and managed soils (16 percent each).[20] **Figure 12** illustrates the emissions in the AFOLU sector in Latin America, by major category.

FIGURE 12.

EMISSIONS IN THE AFOLU SECTOR IN LATIN AMERICA, BY MAJOR CATEGORY (SHARE OF TOTAL EMISSIONS)



** The emission categories and sub-categories with a share of less than 1 percent of the total sum are considered "other" in the figure.*

At the sub-regional level, the share of major sources of emissions, such as enteric fermentation, deforestation and managed soils, are comparable. In Central America, the greatest source of AFOLU emissions are from enteric fermentation (28 percent), deforestation (23 percent) and managed soils (16 percent). Similarly, in South America, the greatest source of AFOLU emissions are from: enteric fermentation (31 percent), followed by deforestation and managed soils (15 percent each). **Figures 13-14** illustrate the share of emissions in the AFOLU sector per major category for each sub-region

[19] The GHG source/sink categories used in this analysis adhere to IPCC (2006) by integrating country data reported using IPCC (1996) into a common GHG profile framework. FAO (2020a) illustrates the methodology that links the IPCC (1996) source/sink categories to IPCC (2006) land use categories, carbon pools and non-CO_2 gases

[20] Corresponds to the IPCC (2006) categories "Direct and indirect N20 emissions from agricultural", "Liming", "Urea application" and the IPCC (1996) category "Agricultural soils".

FIGURE 13.

EMISSIONS IN THE AFOLU SECTOR IN CENTRAL AMERICA, BY MAJOR CATEGORY (SHARE OF TOTAL EMISSIONS)

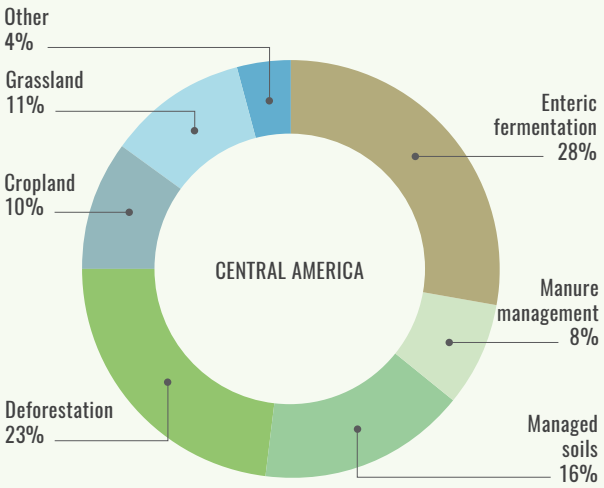
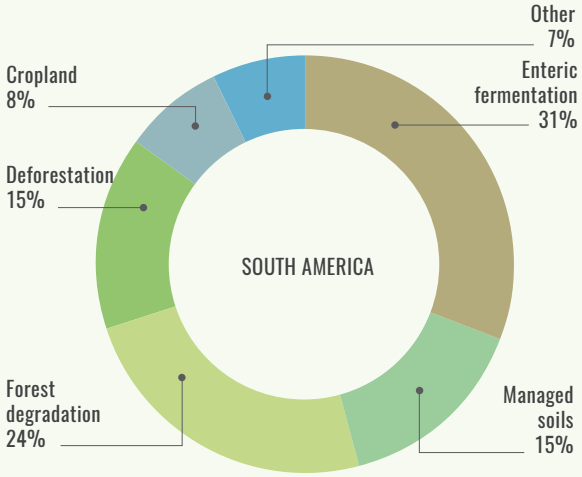


FIGURE 14.

EMISSIONS IN THE AFOLU SECTOR IN SOUTH AMERICA, BY MAJOR CATEGORY (SHARE OF TOTAL EMISSIONS)

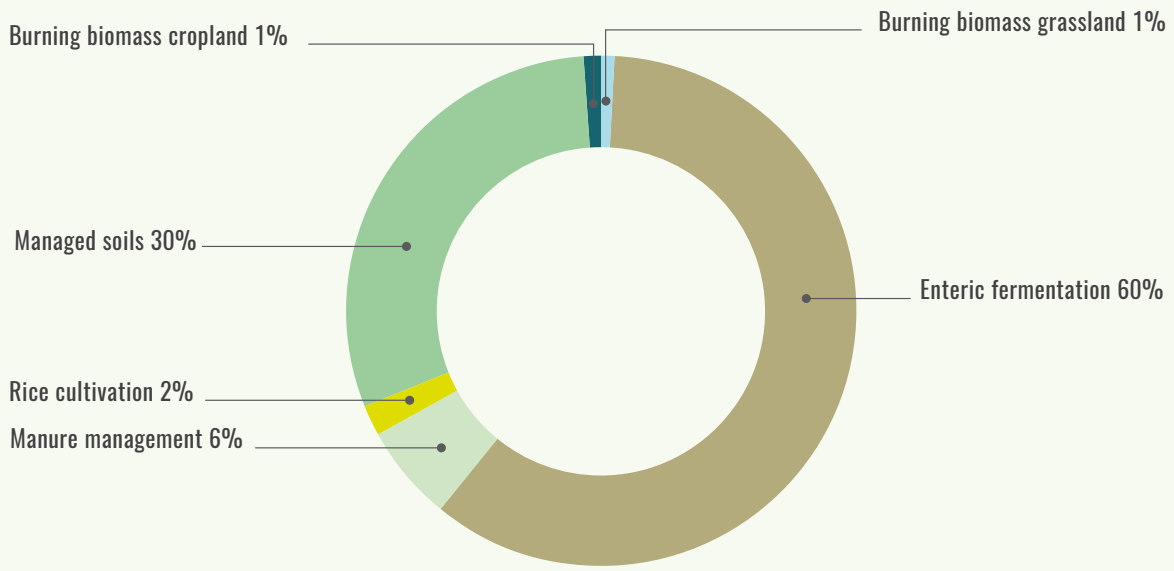


** The emission categories and sub-categories with a share less than 1 percent of the total sum are considered "other" in figure.*

Within the agriculture sector, the largest sources of emissions are from enteric fermentation (60 percent), managed soils (30 percent) and manure management (6 percent). **Figure 15** illustrates the share of emissions in the agriculture sector by major category.

FIGURE 15.

EMISSIONS IN THE AGRICULTURE SECTOR IN LATIN AMERICA, BY MAJOR CATEGORY (SHARE OF TOTAL EMISSIONS)



At the sub-regional level, the major source of emissions remains the same with the largest share from enteric fermentation in Central America (53 percent) and in South America (62 percent). **Figures 16-17** illustrate the share of emissions in the agriculture sector per major category.

FIGURE 16.

EMISSIONS IN THE AGRICULTURE SECTOR IN CENTRAL AMERICA, BY MAJOR CATEGORY (SHARE OF TOTAL EMISSIONS)

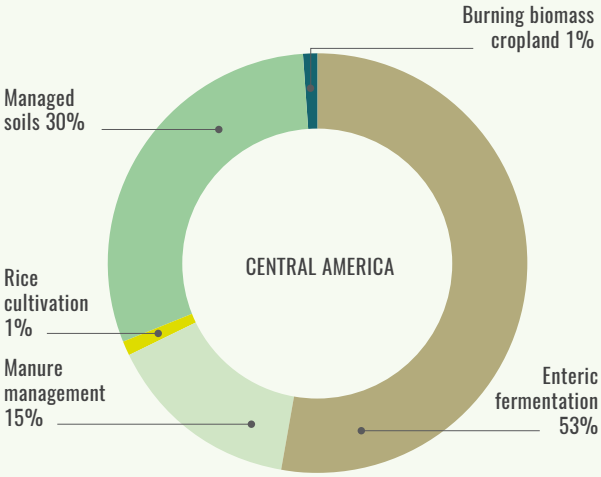
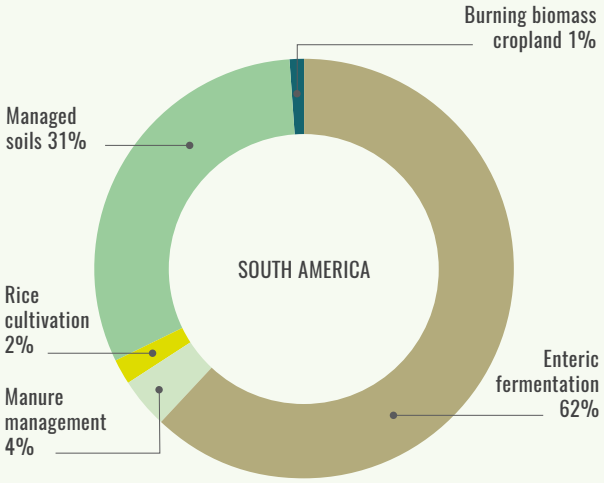


FIGURE 17.

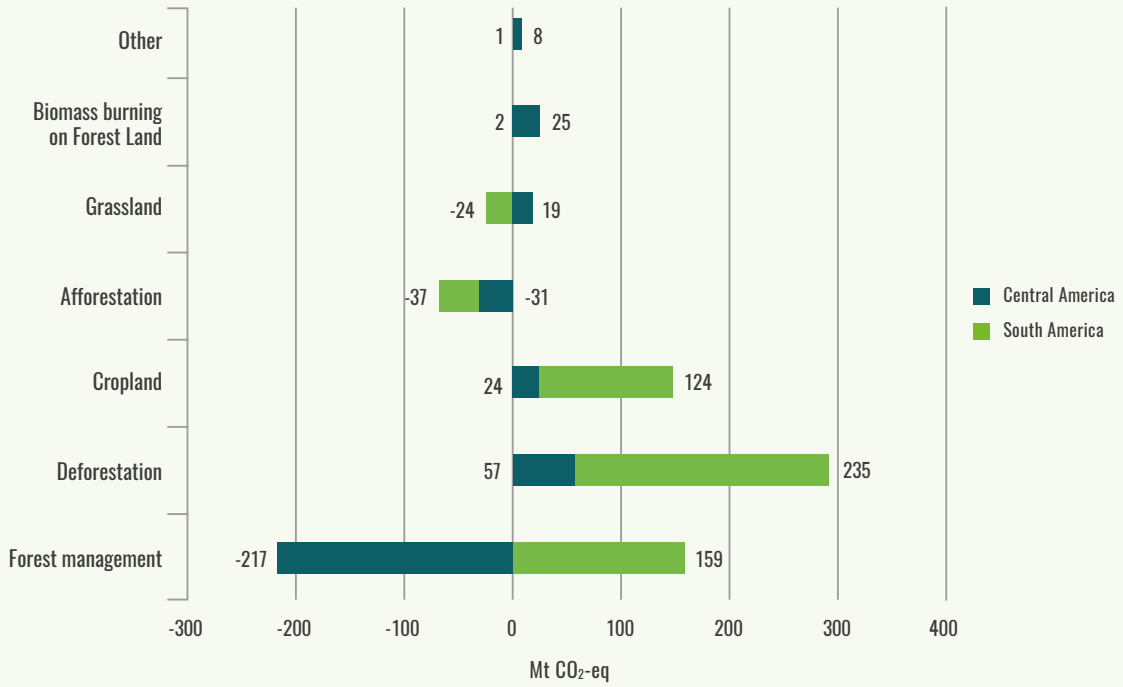
EMISSIONS IN THE AGRICULTURE SECTOR IN SOUTH AMERICA, BY MAJOR CATEGORY (SHARE OF TOTAL EMISSIONS)



The LULUCF sector constitutes a net source of emissions at the regional level, mainly from forest management (44 percent of LULUCF emissions) and deforestation (33 percent). However, removals from forest management represent the greatest sink for removals (83 percent of removals), followed by afforestation (13 percent). At the sub-regional level, the LULUCF sector represents a net sink in Central America, mainly through removals from forest management (85 percent of removals). In South America, the LULUCF sector is a net source, mainly due to emissions from forest degradation (48 percent of emissions) and deforestation (30 percent). **Figure 18** illustrates the emissions and removals in the LULUCF sector by major (sub-) category and sub-region.

FIGURE 18.

EMISSIONS AND REMOVALS IN THE LULUCF SECTOR, BY MAJOR (SUB) CATEGORY AND SUB-REGION



CHAPTER 3

CHAPTER

3

SYNTHESIS OF MITIGATION AND ADAPTATION CONTRIBUTIONS IN THE AGRICULTURE AND LAND USE SECTORS

This chapter provides a systematic review and synthesis of the role of the agriculture and land use sectors in the NDCs of 20 countries in Latin America, at the regional and sub-regional levels. It reflects the heterogeneous nature of country commitments and illustrates regional trends. It aims to identify the structural characteristics of the NDCs and to assess the scope, specificity, measurability and timeline of the mitigation contribution in the agriculture and land use sectors and adaptation component related to agriculture, food security and nutrition. The data informs the gap and opportunity analysis in Chapter 4, which seeks to support countries to enhance their NDCs in 2020 and future revision cycles, as well as guide the prioritization of country support and investment options.

3.1 MITIGATION CONTRIBUTION

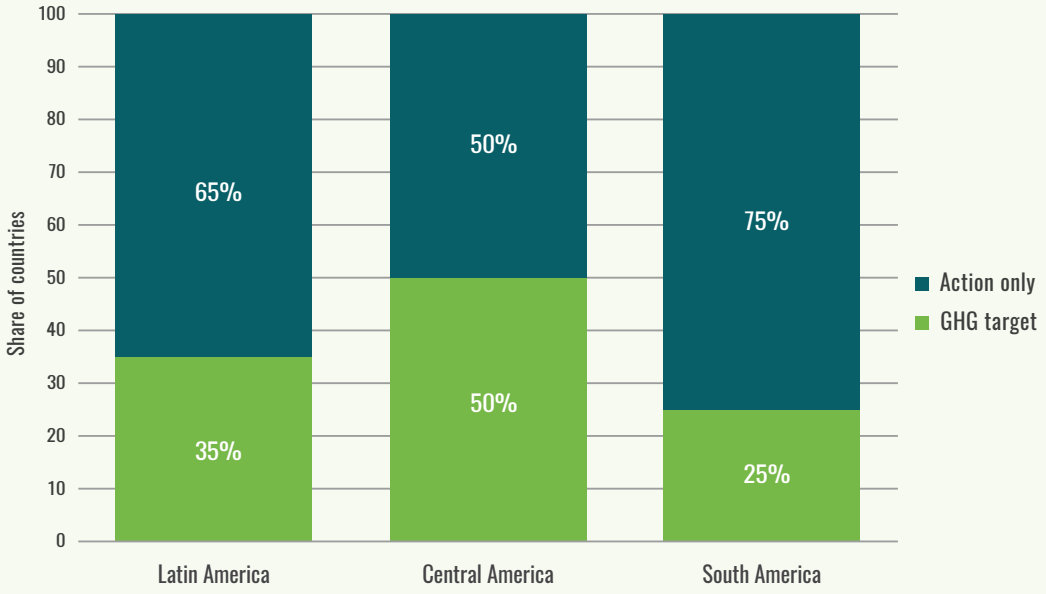
This section synthesizes the mitigation contributions in the agriculture and land use sectors communicated in the NDCs of 20 countries in Latin America at the regional and sub-regional levels. The data from the NDCs were supplemented with information reported in NCs to the UNFCCC.

3.1.1 General mitigation contribution

All 20 countries in Latin America communicated a general mitigation contribution in their NDC, 13 of which (65 percent) set a GHG target and seven[21] (35 percent) qualify their contribution in terms of "Action-only." At the sub-regional level, a greater share of countries in South America communicated GHG targets. **Figure 19** illustrates the share of countries, at the regional and sub-regional level, with a general mitigation contribution by type.

FIGURE 19.

TYPE OF GENERAL MITIGATION CONTRIBUTIONS EXPRESSED IN THE NDCs OF LATIN AMERICAN COUNTRIES



Out of those countries with a general GHG target, the majority (85 percent) are expressed as an absolute reduction of net emissions, while a small share[22] are expressed as a reduction in terms of emission intensity per unit of GDP or per capita. Almost three-fourths (70 percent) set their target in comparison to the level of emissions under a business as usual (BAU) scenario, and the remaining countries[23] (30 percent) set their GHG target against emissions from a specific base year.

The period of NDC implementation varies between 2016 and 2030, with the majority of countries specifying an end-year of 2030. Only four countries[24] set an end-date of 2025. **Annex 2** contains detailed information on each country's general mitigation contribution.

Around half of all general mitigation contributions are economy-wide in scope, mostly in South America, covering emissions from all IPCC sectors – energy, industrial processes and products use (IPPU), AFOLU and waste. The other half cover emissions from multiple sectors. All countries in the region include the energy sector in their general mitigation contribution, and LULUCF is second to that.

Eighty percent of countries in the region include the agriculture sector and up to 85 percent include the LULUCF sector in their general mitigation contributions. Taken together, 65 percent of countries in the region include both agriculture and the LULUCF sectors (e.g. AFOLU). **Figure 20** illustrates the IPCC sectors included in general mitigation contributions by share of countries at the regional and sub-regional level.

[21] Belize, El Salvador, Nicaragua, Panama, Bolivia, Guyana and Suriname.

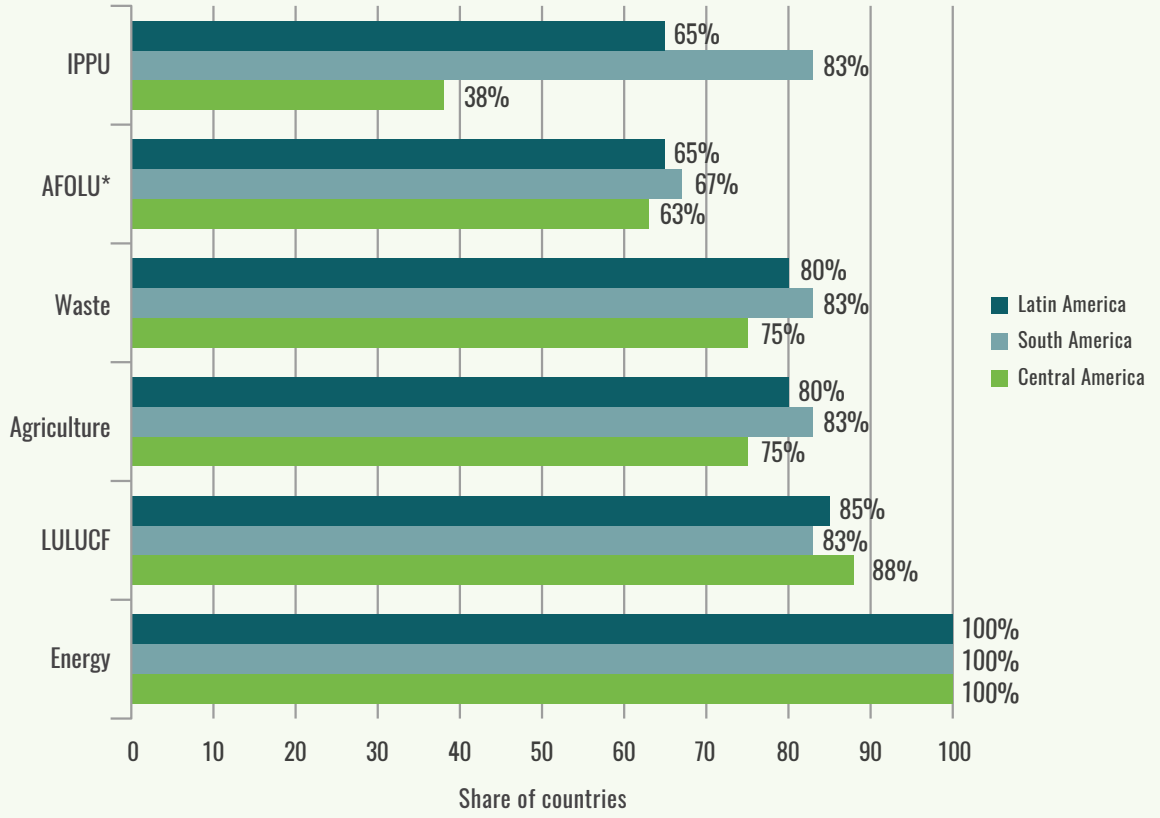
[22] Chile, Dominican Republic and Uruguay.

[23] Costa Rica, Brazil, Chile and Uruguay.

[24] Ecuador, Guyana, Suriname and Uruguay.

FIGURE 20.

SECTORS INCLUDED IN THE GENERAL MITIGATION CONTRIBUTIONS IN THE NDCs OF LATIN AMERICAN COUNTRIES



** AFOLU refers to when both agriculture and LULUCF sectors are included in mitigation contribution.*

3.1.2 Mitigation in the agriculture and land use sectors

Overall, 80 percent of countries in the region include agriculture in their mitigation contribution, 40 percent of which include a set of sector-specific mitigation policies or measures. Only four countries[25] do not include mitigation in the sector. **Figure 21** illustrates the share of countries, at the regional and sub-regional level, with a mitigation contribution in the agriculture sector by type. **Annex 3** contains detailed information on each country's agricultural mitigation contribution.

Eighty five percent of countries in the region include LULUCF in their mitigation contribution, expressed as either a set of mitigation policies or measures (80 percent), an absolute reduction target in GHG emissions compared to a base year level[26] (10 percent), or a non-GHG target[27] (10 percent). **Figure 22** illustrates the share of countries, at the regional and sub-regional level, with a mitigation contribution in the LULUCF sector by type. **Annex 4** contains detailed information on each country's LULUCF mitigation contribution.

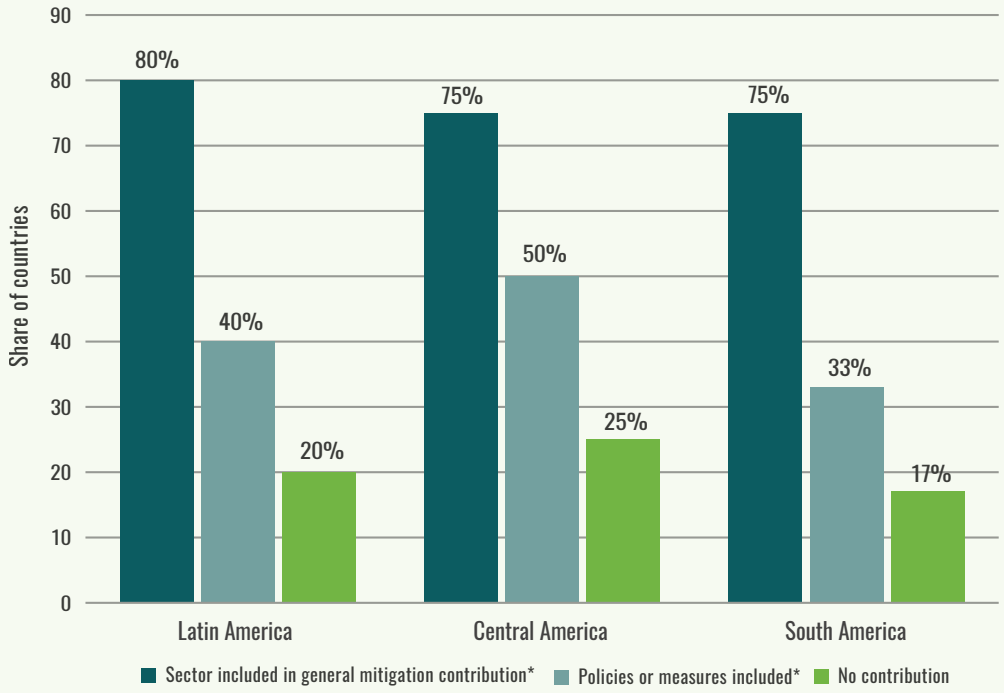
[25] Belize, Panama, Guyana and Suriname.

[26] Chile and Ecuador.

[27] Honduras and Panama.

FIGURE 21.

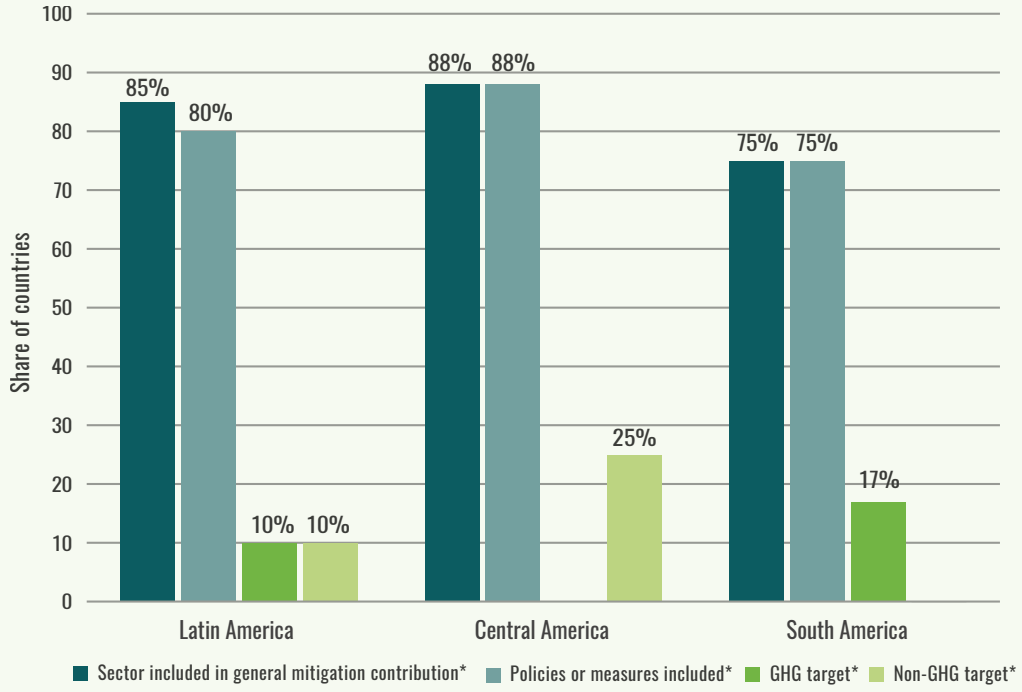
TYPE OF MITIGATION CONTRIBUTIONS IN THE AGRICULTURE SECTOR EXPRESSED IN THE NDCs OF LATIN AMERICAN COUNTRIES



** Categories are not mutually exclusive.*

FIGURE 22.

TYPE OF MITIGATION CONTRIBUTIONS IN THE LULUCF SECTOR EXPRESSED IN THE NDCs OF LATIN AMERICAN COUNTRIES



** Categories are not mutually exclusive.*
Note: Honduras, Chile and Ecuador communicate a sectoral contribution that is additional to the general mitigation contribution in the form of GHG (Chile and Ecuador) or non-GHG targets (Honduras).

Policies and measures in the agriculture and land use sectors

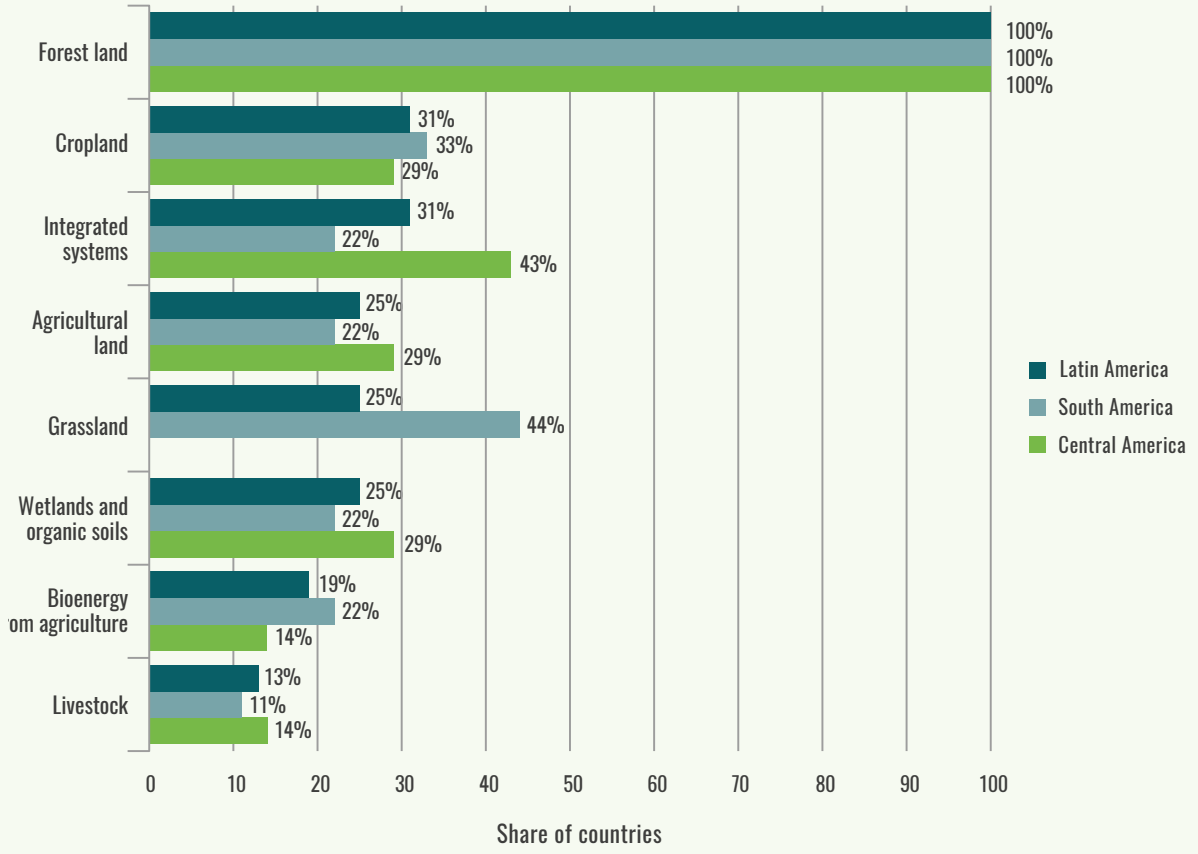
Countries often include mitigation in their contribution as policies or measures that aim to reduce net emissions or emission intensity, or enhance carbon sinks, from a particular agriculture activity and/or land use. The methodological notes (FAO, 2020a) contains the methodological matrix for how policies and measures in the agriculture and land use sectors are categorized in relation to corresponding GHG source and sink categories in line with IPCC Guidelines (IPCC, 2006).

The policies and measures in the agriculture and land use sectors were categorized by management activity, agriculture sub-sector and IPCC land use category, and aggregated into ten main sub-sector/land use categories: 1) all land;[28] 2) agricultural land;[29] 3) cropland; 4) integrated systems; 5) livestock; 6) grassland; 7) forest land; 8) wetlands and organic soils; 9) bioenergy from agriculture; and 10) bioenergy from forests.

Overall, all countries in the region with mitigation in the agriculture and/or land use sector include at least one mitigation policy or measure on forest land, followed by cropland and integrated systems (31 percent of countries with mitigation in agriculture and/or land use), agricultural land, grassland and wetlands and organic soils (25 percent each), bioenergy from agriculture (19 percent) and in the livestock sub-sector (13 percent). **Figure 23** illustrates the share of countries, at the regional and sub-regional level, with one or more (to avoid bias of representation) policies or measures in the agriculture and/or land use sectors, by land use category/sub-sector.

FIGURE 23.

MITIGATION POLICIES OR MEASURES IN THE AGRICULTURE AND LAND USE SECTORS INCLUDED IN THE NDCs OF LATIN AMERICAN COUNTRIES, BY SECTOR/LAND USE



[28] For the purpose of this document, "all land" refers to agriculture, forestry and other land uses.

[29] For the purpose of this document, "agricultural land" refers to a combination of cropland and grassland.

The coverage of policies and measures in the agriculture and land use sectors are presented by prevalence amongst countries in Latin America, in descending order:

FOREST LAND

All countries in the region with mitigation in the agriculture and land use sectors include at least one policy or measure on forest land. The majority of those countries aim to reduce land use emissions and/or enhance removals on forest land by reducing degradation and promoting sustainable forest management (SFM) (81 percent of countries with mitigation in the agriculture and/or land use sectors), followed by afforestation/reforestation (75 percent), reducing deforestation and forest conservation (36 percent), general forest land management (38 percent) and fire management (31 percent). **Figure 24** illustrates the share of countries, at the regional and sub-regional level, with one or more (to avoid bias of representation) policy or measure on forest land, out of countries with mitigation in the agriculture and/or land use sectors, by management activity.

FIGURE 24.

MITIGATION POLICIES OR MEASURES ON FOREST LAND IN THE NDCs OF LATIN AMERICAN COUNTRIES

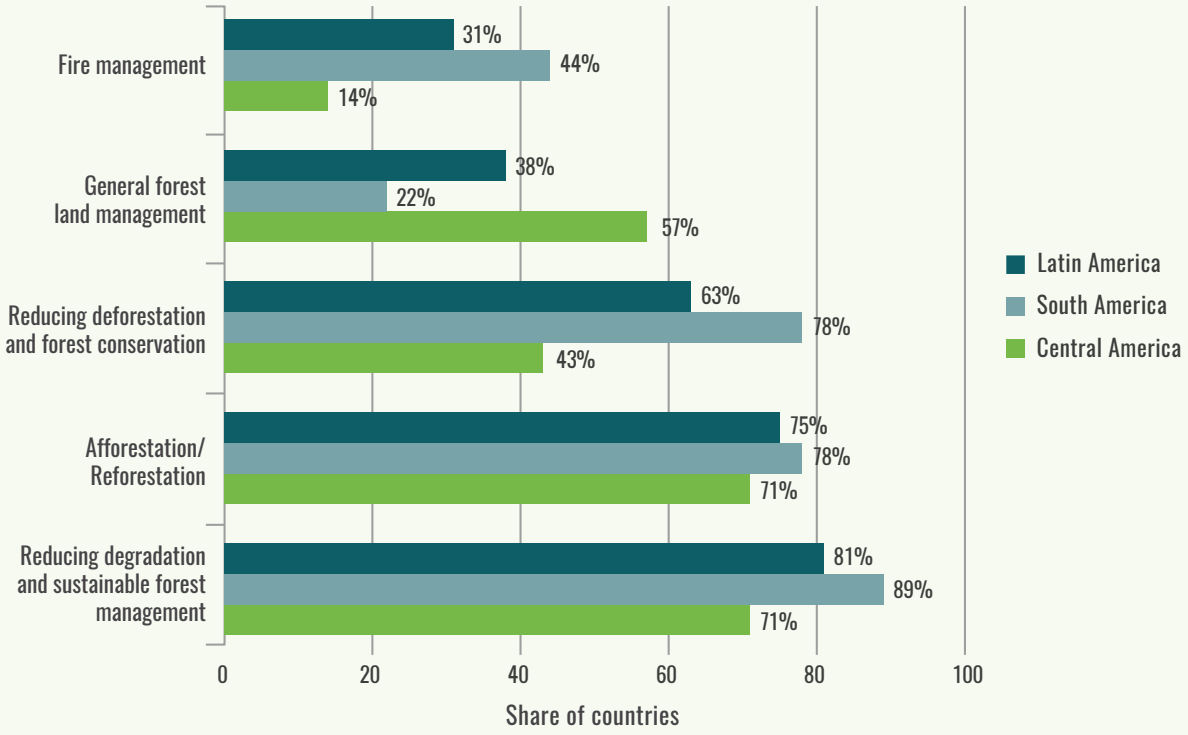


TABLE 2.

EXAMPLES OF MITIGATION POLICIES AND MEASURES ON FOREST

COUNTRY	MANAGEMENT ACTIVITY	METRIC	2030 TARGET
CHILE	SUSTAINABLE DEVELOPMENT AND RECOVERY OF 100,000 HECTARES OF FOREST LAND, MAINLY NATIVE	GHG QUANTIFIED	-1200 KT CO_2 EQ
HONDURAS	REDUCE WOOD CONSUMPTION BY 39 PERCENT THROUGH THE UTILIZATION OF EFFICIENT COOKSTOVES, HELPING THE FIGHT AGAINST DEFORESTATION	NON-GHG QUANTIFIED	-39%
BOLIVIA	STRENGTHENING COMMUNITY BASED STEWARDSHIP IN FOREST MANAGEMENT AND FARMING SYSTEMS	NON-QUANTIFIED	

CROPLAND

Thirty-one percent of countries in the region with mitigation in the agriculture and/or land use sectors include at least one policy or measure on cropland. The majority of those countries promote plant management (25 percent of countries with mitigation in the agriculture and/or land use sectors), followed by general cropland management and tillage/residue management (13 percent each) and nutrient and rice management (6 percent each). **Figure 25** illustrates the share of countries, at the regional and sub-regional level, with one or more (to avoid bias of representation) policy or measure on cropland out of countries with mitigation in the agriculture and/or land use sectors, by management activity.

FIGURE 25.

MITIGATION POLICIES OR MEASURES ON CROPLAND IN THE NDCs OF LATIN AMERICAN COUNTRIES

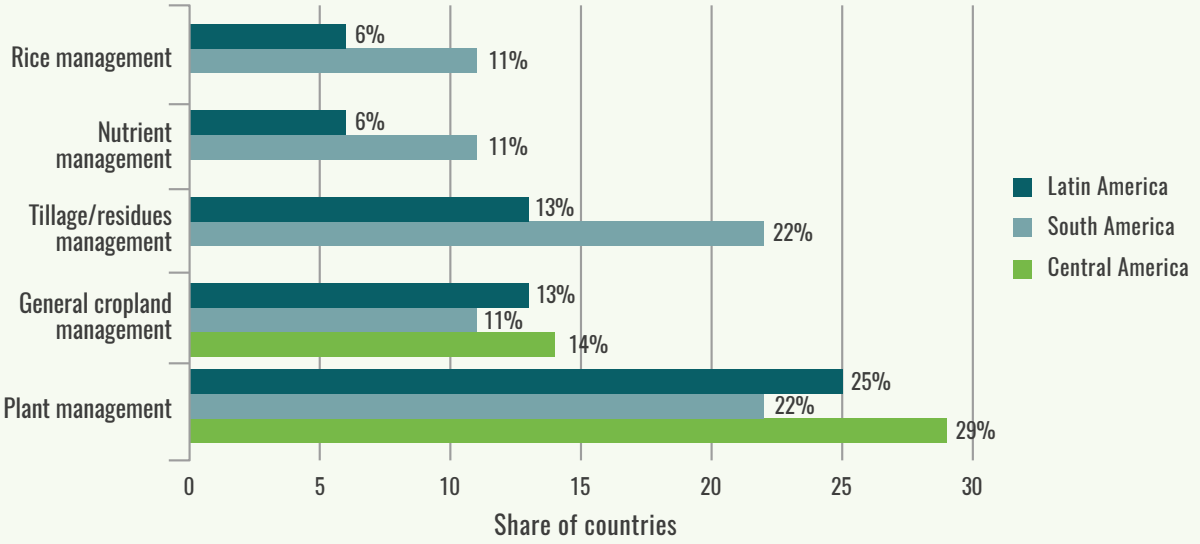


TABLE 3.

EXAMPLES OF MITIGATION POLICIES AND MEASURES ON CROPLAND

COUNTRY	MANAGEMENT ACTIVITY	METRIC	2030 TARGET
URUGUAY	IMPLEMENTATION OF SERVICE CROPS (COVERS) INSTALLED IN SOYBEAN PRE-HARVEST IN 600 000 HA BY 2025	NON-GHG QUANTIFIED	600 000 HA
BOLIVIA	USAGE OF BETTER LOCAL ADAPTED VARIETIES OF SPECIES SUITED FOR THE CLIMATE, AND RESISTANT TO PESTS AND DISEASES	NON- QUANTIFIED	

INTEGRATED SYSTEMS

Thirty-one percent of countries in the region with mitigation in the agriculture and/or land use sectors include at least one policy or measure in integrated systems. The majority of those countries promote agroforestry (31 percent of countries with mitigation in the agriculture and/or land use sectors), followed by other mixed production systems (13 percent). **Figure 26** illustrates the share of countries, at the regional and sub-regional level, with one or more (to avoid bias of representation) policy or measure on integrated systems out of countries with mitigation in the agriculture and/or land use sectors, by management activity.

FIGURE 26.

MITIGATION POLICIES OR MEASURES IN INTEGRATED SYSTEMS IN THE NDCs OF LATIN AMERICAN COUNTRIES

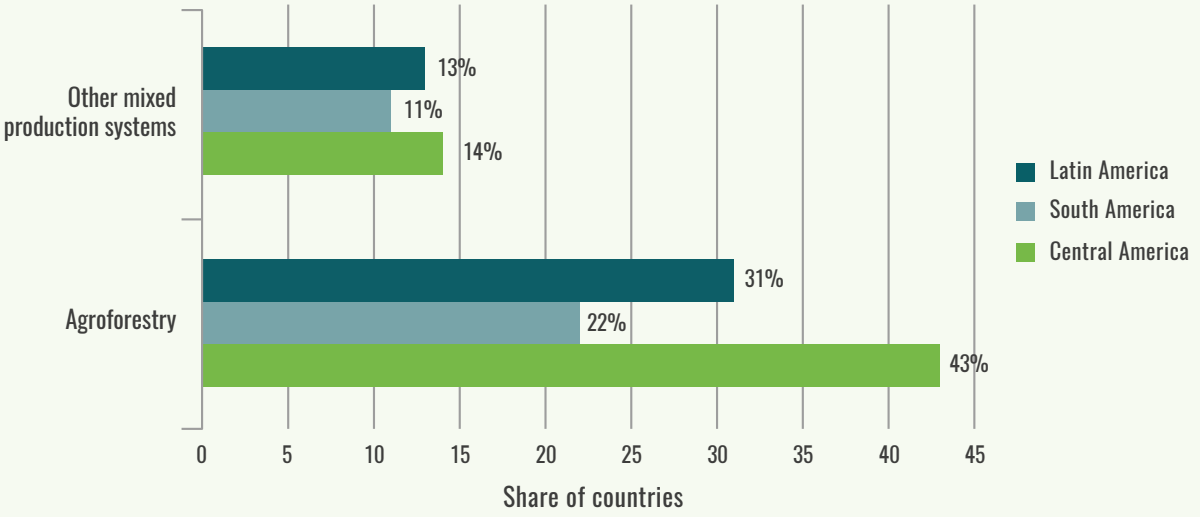


TABLE 4.

EXAMPLES OF MITIGATION POLICIES AND MEASURES IN INTEGRATED SYSTEMS

COUNTRY	MANAGEMENT ACTIVITY	METRIC	2030 TARGET
BRAZIL	ENHANCE CROPLAND-LIVESTOCK-FORESTRY SYSTEMS	NON-GHG QUANTIFIED	5 MILLION HA
EL SALVADOR	ESTABLISH BIOLOGICAL CORRIDORS THROUGH THE ADOPTION OF RESILIENT AGROFORESTRY SYSTEMS	NON- QUANTIFIED	
PANAMA	MAINTAIN AND/OR INCREASE FOREST COVERAGE OF THEIR PROPERTIES THROUGH THE ESTABLISHMENT OF AGROFORESTRY SYSTEMS AND THE ESTABLISHMENT OF SMALL FAST-GROWING FOREST AREAS	NON-QUANTIFIED	

GRASSLAND

Twenty-five percent of countries in the region with mitigation in the agriculture and/or land use sectors include at least one policy or measure on grasslands, all of which promote improved grassland management.

TABLE 5.

EXAMPLES OF MITIGATION POLICIES AND MEASURES ON GRASSLANDS

COUNTRY	MANAGEMENT ACTIVITY	METRIC	2030 TARGET
URUGUAY	ZERO CO_2 EMISSIONS FROM 3 000 000 KILO HECTARES OF GRASSLAND	GHG QUANTIFIED	0 CO_2 EQ
BRAZIL	RESTORE DEGRADED PASTURE LANDS	NON-GHG QUANTIFIED	15 MILLION HA
BOLIVIA	TRANSITION TO SEMI - INTENSIVE SYSTEMS OF LIVESTOCK MANAGEMENT	NON-QUANTIFIED	

WETLANDS AND ORGANIC SOILS

Twenty-five percent of countries in the region with mitigation in the agriculture and/or land use sectors include at least one policy or measure on wetlands and organic soils. The majority of those countries promote general wetlands management (13 percent of countries with mitigation in the agriculture and/or land use sectors), followed by mangrove restoration or conservation, reducing deforestation and forest conservation, and rewetting organic soils drained for agriculture (6 percent each). **Figure 27** illustrates the share of countries, at the regional and sub-regional level, with one or more (to avoid bias of representation) policy or measure on wetlands and organic soils out of countries with mitigation in the agriculture and/or land use sectors, by management activity.

FIGURE 27.

MITIGATION POLICIES OR MEASURES ON WETLANDS AND ORGANIC SOILS IN THE NDCs OF LATIN AMERICAN COUNTRIES

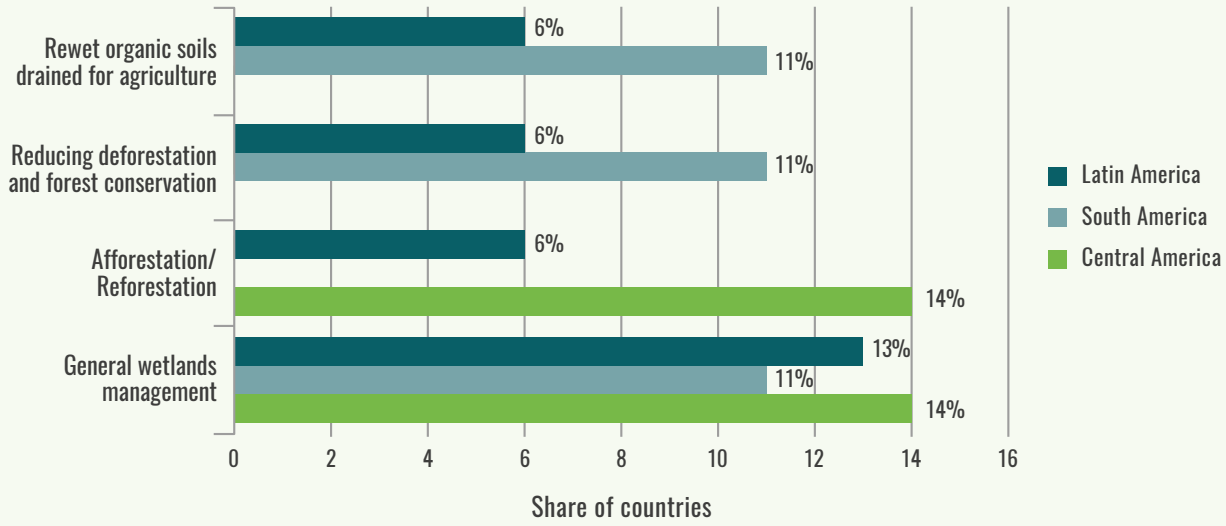


TABLE 6.

EXAMPLES OF MITIGATION POLICIES AND MEASURES ON WETLANDS AND ORGANIC SOILS

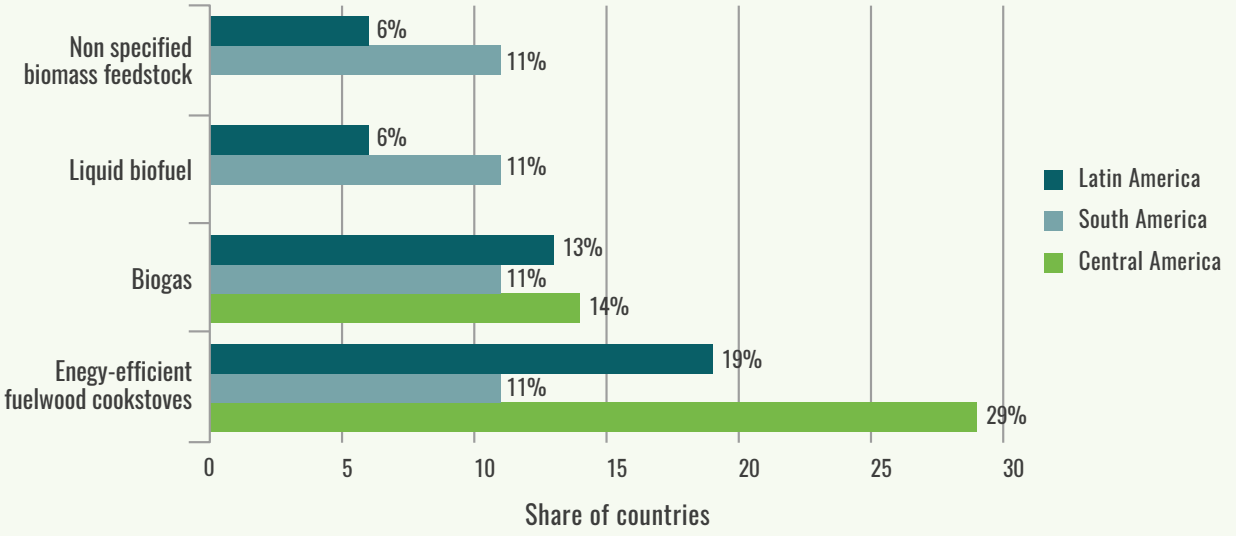
COUNTRY	MANAGEMENT ACTIVITY	METRIC	2030 TARGET
SURINAME	INCREASING THE PERCENTAGE OF WETLANDS UNDER PRESERVATION	NON-QUANTIFIED	
URUGUAY	ZERO CO_2 EQ. EMISSIONS FROM 4 183 KILO HECTARES OF ORGANIC SOILS	GHG QUANTIFIED	0 CO_2 EQ
BELIZE	RESTORATION AND PROTECTION HAVE THE POTENTIAL TO TURN MANGROVE SYSTEMS INTO A NET CARBON SINK	GHG QUANTIFIED	-379 KT CO_2 EQ

BIOENERGY FROM AGRICULTURE

Nineteen percent of countries in the region with mitigation in the agriculture and/or land use sectors include at least one policy or measure promoting bioenergy production from agricultural biomass. The majority of those countries aim to reduce net emissions across all sectors by the use of more energy-efficient wood fuelled cookstoves (19 percent of countries with mitigation in the agriculture and/or land use sectors), followed by substituting fossil fuel as a source of energy through the production of biogas (13 percent) and the substitution of fossil fuels with liquid biofuels or non-specified biomass stock (6 percent each). **Figure 28** illustrates the share of countries, at the regional and sub-regional level, with one or more (to avoid bias of representation) bioenergy-related policy or measure out of countries with mitigation in the agriculture and/or land use sectors, by management activity.

FIGURE 28.

BIOENERGY-RELATED MITIGATION POLICIES OR MEASURES IN THE NDCs OF LATIN AMERICAN COUNTRIES



LIVESTOCK

Only four countries[30] (13 percent of countries in the region with mitigation in the agriculture and/or land use sectors) **include at least one policy or measure in the livestock sub-sector**, with equal distribution of improved manure management and breeding and husbandry practices.

[30] Bolivia, Ecuador, Costa Rica and Uruguay.

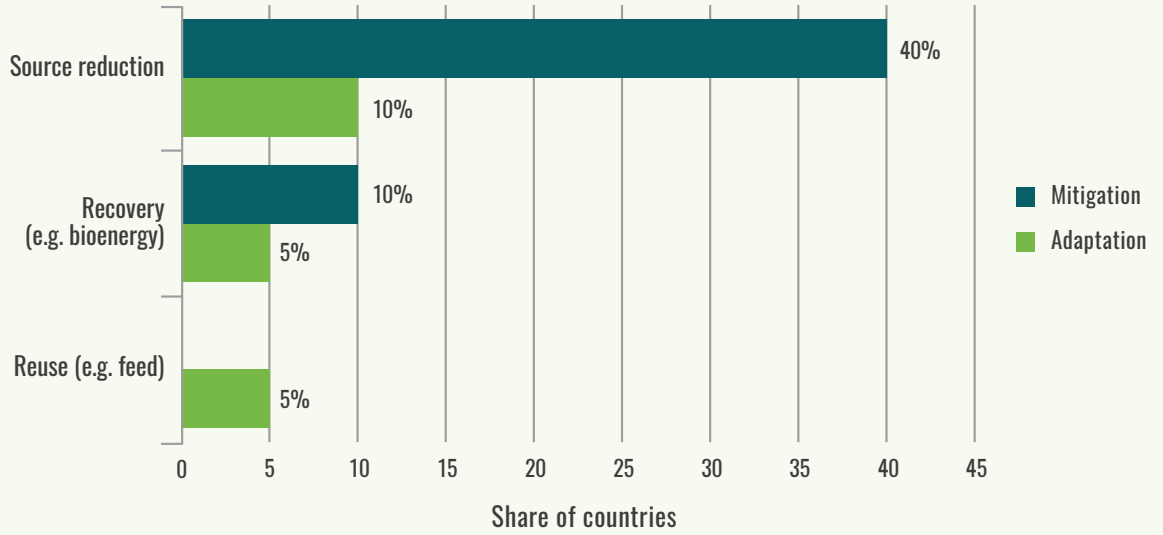
BOX 1: FOOD SYSTEMS IN THE NATIONALLY DETERMINED CONTRIBUTIONS OF LATIN AMERICAN COUNTRIES

Climate actions in agricultural and food systems present opportunities for leveraging mitigation and adaptation synergies, as efficiency- and substitution-based interventions along the food value chain may generate emissions, and cost reductions, per unit of production.

Forty-five percent of countries in the region promote at least one type of food loss and waste (FLW) reduction-related measure as adaptation or mitigation in the agriculture and land use sectors, primarily through FLW prevention, followed by recovery (e.g. bioenergy) and reuse (e.g. feed). **Figure 29** illustrates the share of countries with a FLW reduction measure out of countries with mitigation and/or adaptation in the agriculture and land use sectors. The majority of FLW measures are promoted as mitigation (70 percent) and a smaller share as adaptation (30 percent).

FIGURE 29.

FOOD LOSS AND WASTE REDUCTION-RELATED MEASURES IN THE NDCs OF LATIN AMERICAN COUNTRIES



It should be noted that the measures are not presented as explicit FLW reduction measures but as adaptation and/or mitigation, which contribute to FLW reduction.

3.2 ADAPTATION CONTRIBUTION

Climate change directly affects the natural resources and ecosystems upon which agricultural production, food systems and rural livelihoods rely. Climate change impacts are transmitted to food security and nutrition through different pathways, and the severity of the impact is determined by climate drivers and risks, and by the underlying vulnerability of ecosystems, agro-ecosystems, rural economies and households (FAO, 2016d).

A key way to moderate, reduce and/or avoid climate-related impacts is to reduce a system's underlying vulnerabilities, strengthen its adaptive capacity and increase its resilience (FAO, 2016e). Adaptation to climate change refers to changes in processes, practices and structures to moderate

potential damages from climate change, or to benefit from opportunities associated with such changes. Adaptation in the agriculture and land use sectors signifies modifying agricultural production and socio-economic institutional systems in response to and in preparation for actual or expected climate variability and change and their impacts, to moderate harmful effects and exploit beneficial opportunities. Resilience is generally understood as the capacity of individuals, groups, communities and institutions to anticipate, absorb (cope), adapt and transform in the face of climate variability and extremes that undermine food security and nutrition (FAO *et al.*, 2018). Adaptive capacity encompasses two dimensions: the capacity to manage or moderate climate risks (including extreme climatic events), and the capacity to gradually respond to longer-term climate changes (FAO, 2017d).

This section synthesizes, at the regional and sub-regional levels, the adaptation component in the agriculture and land use sectors communicated in the NDCs of 20 countries in Latin America. It also contains a summary of the major climate-related hazards, impacts and vulnerabilities reported in ecosystems and social systems. The data from the NDCs were supplemented with information reported in NCs.

3.2.1 Climate-related hazards, impacts, and vulnerabilities

In order to contextualize the fairness and ambition of the NDCs, as well as to inform adaptation planning, all countries in the region include a description of observed and/or expected climate variability and extremes, as well as cite the climate-related hazards, impacts and vulnerabilities in ecosystems and/or social systems that are already being observed or are expected in the future.

Climate-related hazards

All countries in the region report observed and/or projected climate-related hazards, including hydro-meteorological, climatological and biological processes or phenomenon that may cause loss of life, injury, or other health impacts, as well as damage and loss to property, infrastructure, livelihoods, service provision, ecosystems, and environmental resources.[31]

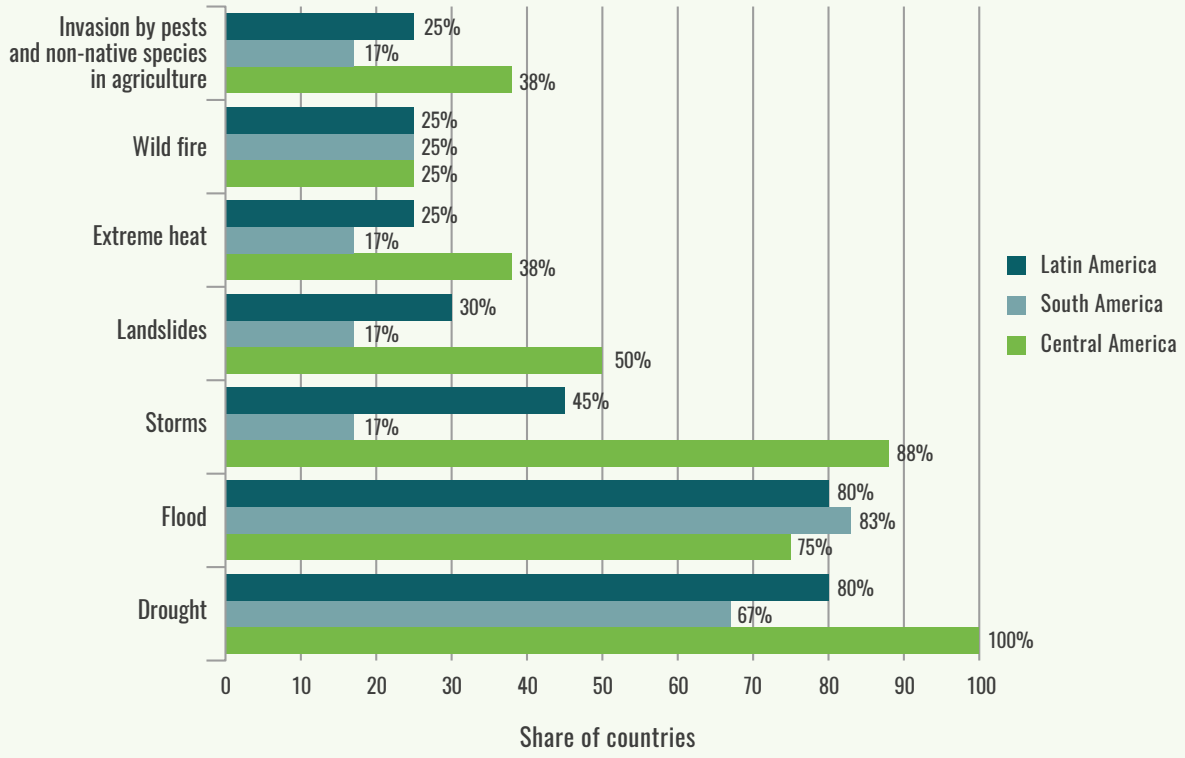
At the regional level, the majority report the occurrence of droughts and floods (80 percent of countries each), **amongst observed and/or projected climate-related hazards,**[32] followed by storms (45 percent) and landslides (30 percent), as well as extreme heat, wild fire and invasion by pests and non-native species in agriculture (25 percent each). **Figure 30** illustrates the share of countries, at the regional and sub-regional level, with observed and/or projected climate-related hazards reported, by type of hazard.

[31] Definition of climate-related hazard adapted from IPCC (2014) and EM-DAT (undated).

[32] Definition of climate-related slow onset events adopted from IPCC (2014).

FIGURE 30.

OBSERVED AND/OR PROJECTED CLIMATE-RELATED HAZARDS REPORTED IN THE NDCs OF LATIN AMERICAN COUNTRIES



Climate-related slow onset events

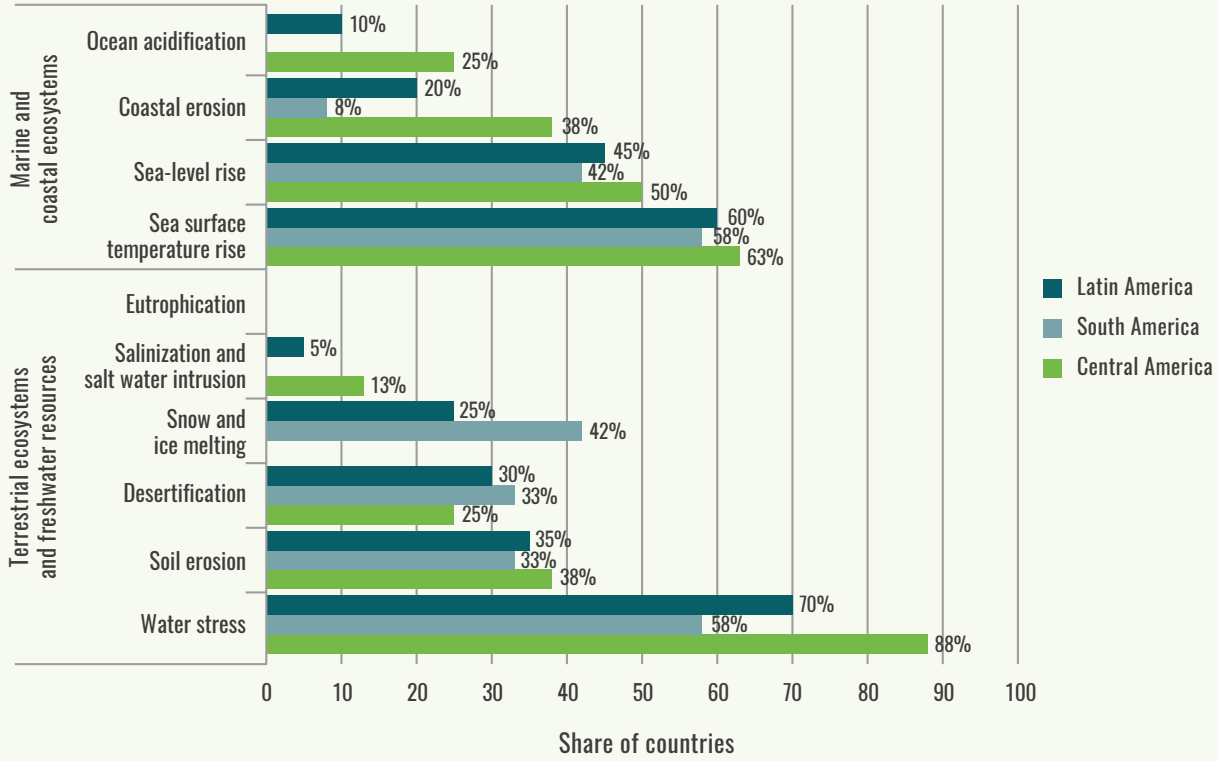
All countries in the region report observed and/or projected climate-related chemical, biological, and physical changes, leading to slow onset events.[33]

At the regional level, water stress is reported most frequently (70 percent of countries) **amongst observed and/or projected climate-related slow onset events** in terrestrial and freshwater ecosystems, followed by soil erosion (35 percent) and desertification (30 percent), amongst others. In marine and coastal ecosystems, sea surface temperature and sea level rise are reported most frequently (60 and 45 percent, respectively) amongst observed and/or projected climate-related slow onset events, followed by coastal erosion (20 percent) and acidification (10 percent). **Figure 31** illustrates the share of countries, at the regional and sub-regional level, with observed and/or projected climate-related slow onset events reported, by type of event.

[33] Definition of climate-related hazard adapted from IPCC (2014) and EM-DAT (undated).

FIGURE 31.

OBSERVED AND/OR PROJECTED CLIMATE-RELATED SLOW ONSET EVENTS IN MARINE AND COASTAL ECOSYSTEMS AND TERRESTRIAL AND FRESHWATER ECOSYSTEMS REPORTED IN THE NDCs OF LATIN AMERICAN COUNTRIES



Climate-related vulnerabilities

NON-CLIMATIC DRIVERS OF VULNERABILITY

All countries in the region, with the exception of two,[34] report on the intersecting environmental, social, economic, cultural, political and institutional variables, or stressors, that can affect individual adaptive capacity to respond, as well as the level of exposure to climate change, creating new or exacerbating existing vulnerabilities to climate change.[35]

At the regional level, economic dependence on agriculture and natural resources is most frequently reported amongst the non-climatic stressors of vulnerability (61 percent of countries with stressors reported), followed by geography and topography (56 percent), poverty and low levels of development (50 percent), population growth and demographics (33 percent), natural hazards (22 percent), natural resource use and competition (17 percent) and conflict (11 percent), amongst others. **Figure 32** illustrates the share of countries, at the regional and sub-regional level, with a non-climatic driver of vulnerability reported, by type of stressor, out of countries with vulnerabilities in social systems reported.

[34] Panama and Paraguay.

[35] Definition of non-climatic stressors adapted from IPCC (2014).

FIGURE 32.

NON-CLIMATIC DRIVERS OF CLIMATE CHANGE VULNERABILITY REPORTED IN THE NDCs OF LATIN AMERICAN COUNTRIES

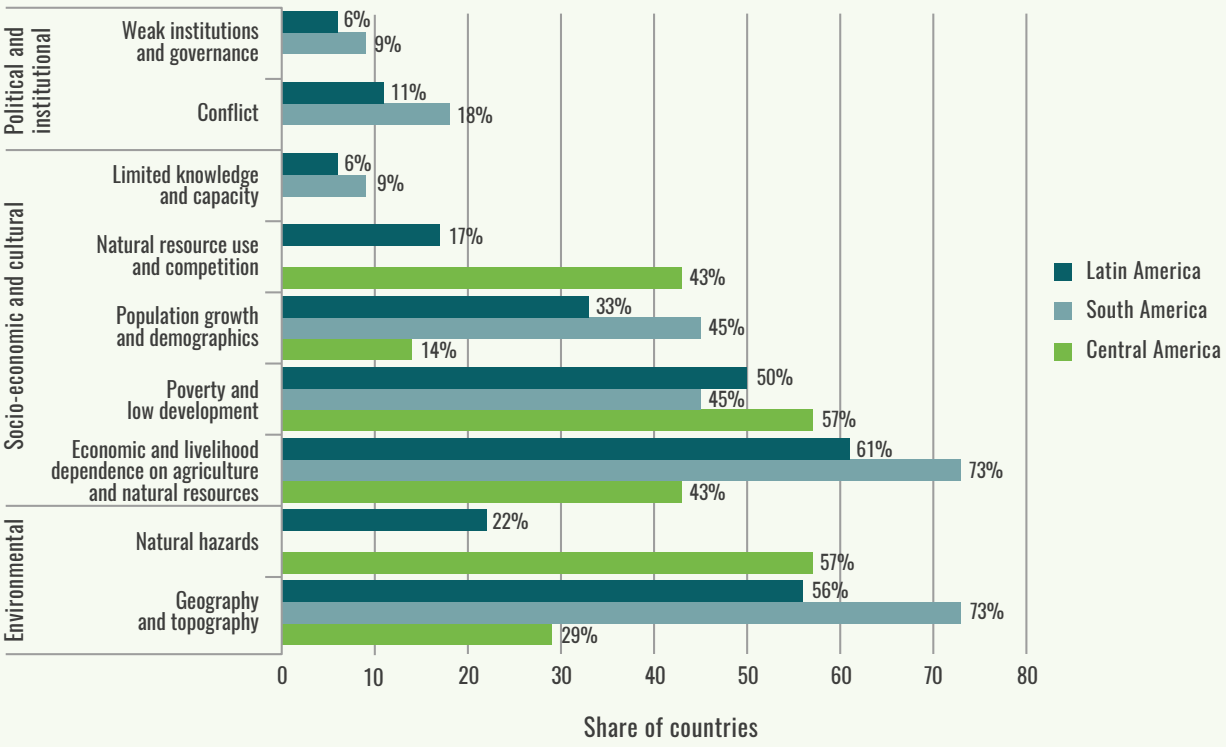


TABLE 7.

EXAMPLES OF NON-CLIMATIC DRIVERS OF VULNERABILITY REPORTED

COUNTRY	NON-CLIMATIC DRIVER		DESCRIPTION
MEXICO	ENVIRONMENTAL	GEOGRAPHY AND TOPOGRAPHY	ITS LOCATION BETWEEN TWO OCEANS, AS WELL AS ITS LATITUDE AND TOPOGRAPHY SIGNIFICANTLY INCREASE MEXICO'S EXPOSURE TO EXTREME HYDRO METEOROLOGICAL EVENTS
NICARAGUA		NATURAL HAZARDS	NICARAGUA IS EXPOSED TO DIFFERENT EVENTS CONNECTED TO THE NATURAL VARIABILITY OF CLIMATE, SUCH AS EL NINO AND LA NINA AND HURRICANES
ARGENTINA	SOCIO-ECONOMIC AND CULTURAL	ECONOMIC AND LIVELIHOOD DEPENDENCE ON AGRICULTURE AND NATURAL RESOURCES	THE VULNERABILITY REGARDING CLIMATE CHANGE BECOMES HIGHLY RELEVANT REGARDING THE AGRICULTURAL ACTIVITY BECAUSE OF ITS PROMINENT PLACE ON THE ECONOMIC DEVELOPMENT OF THE COUNTRY AND ITS FUNDAMENTAL ROLE IN THE PRODUCTION AND SUPPLY OF FOOD ON A GLOBAL SCALE
GUATEMALA		POVERTY AND LOW ECONOMIC DEVELOPMENT	THE SOCIO-ENVIRONMENTAL VULNERABILITY OF THE COUNTRY MANIFESTS ITSELF IN THE HIGH LEVELS OF POVERTY
CHILE		NATURAL RESOURCES USE AND COMPETITION	CHILE SUFFERS FROM OTHER NON-ENVIRONMENTAL VULNERABILITIES. IN THE LAST DECADE, MINING HAS AVERAGED 57 PERCENT OF TOTAL NATIONAL EXPORTS, WITH COPPER ACCOUNTING FOR ALMOST ALL OF THEM

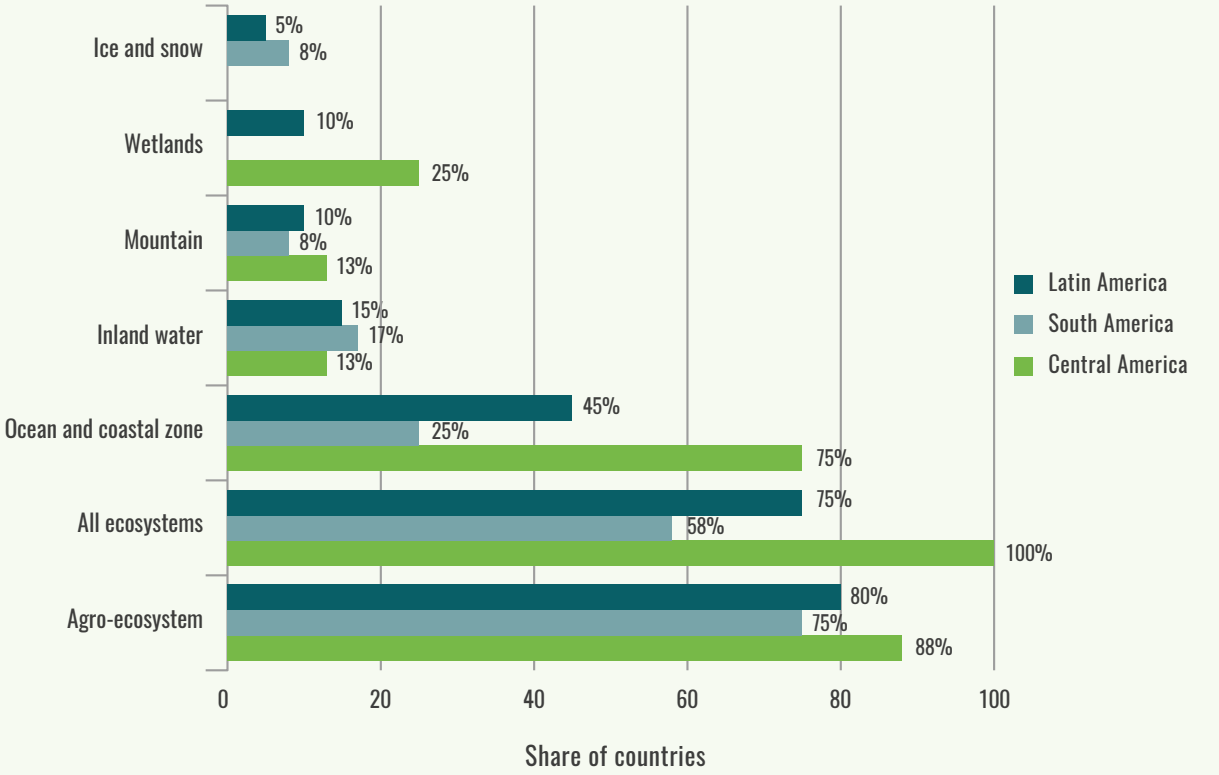
Climate-driven impacts, vulnerabilities and risks in ecosystems

All countries in the region report observed and/or projected climate-driven impacts, vulnerabilities and risks in ecosystems.[36] The impacts of climate change refer generally to the effects of extreme weather and climate events and of climate change on the lives, livelihoods, health, ecosystems, economies, societies, cultures, services, and infrastructure, due to the interaction of climate changes or hazardous climate events occurring within a specific time period and the vulnerability of an exposed society or system. The vulnerability of an exposed system depends on sensitivity and lack of capacity to cope and adapt. The probability of occurrence compounded by the impact, or risk, results from the interaction of vulnerability, exposure, and hazard.[37]

At the regional level, agro-ecosystems are most frequently referenced as vulnerable to climate-related impacts (80 percent of countries), followed by ecosystems in general (75 percent), oceans and coastal zones (45 percent), inland water (15 percent), mountain (10 percent), wetlands (10 percent) and ice and snow ecosystems (5 percent). **Figure 33** illustrates the share of countries, at the regional and sub-regional level, that report one or more observed and/or expected climate-related impact, vulnerability and risk in ecosystems, by type of ecosystem.

FIGURE 33.

OBSERVED AND/OR PROJECTED CLIMATE-RELATED IMPACTS REPORTED IN ECOSYSTEMS IN THE NDCs OF LATIN AMERICAN COUNTRIES



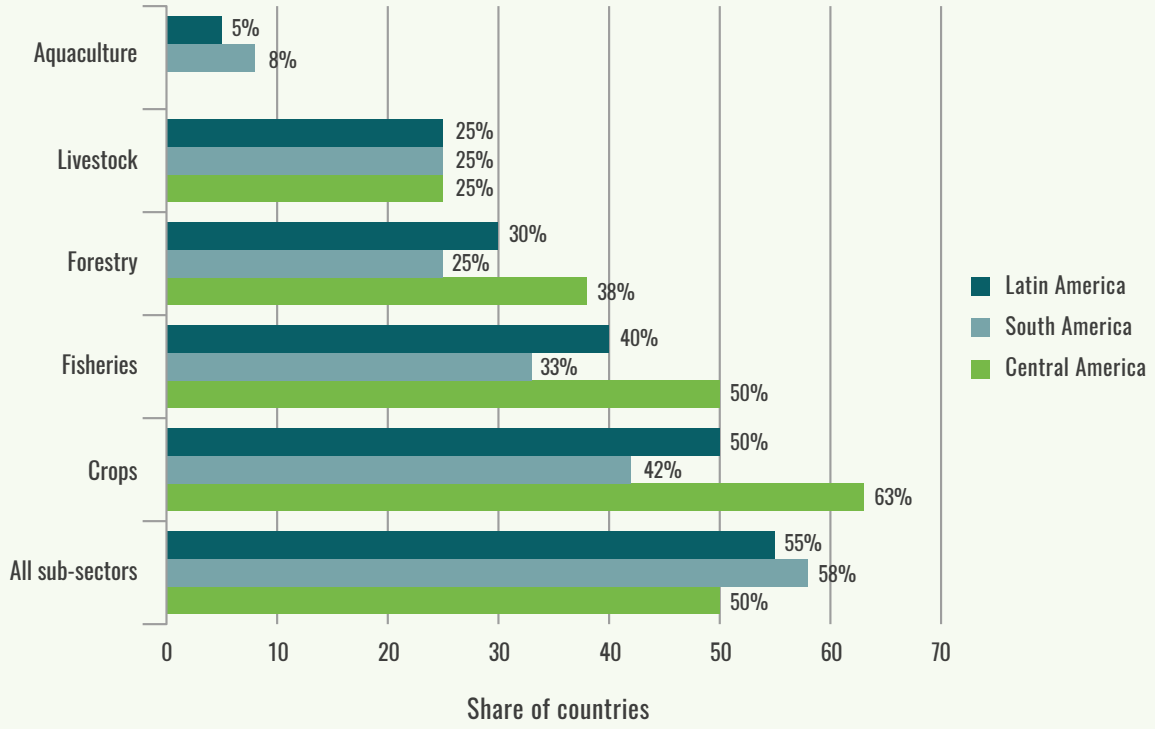
[36] Definition of ecosystems elaborated from MEA (2005).

[37] Definition of impact, vulnerability and risk in ecosystems adapted from IPCC (2014).

In agro-ecosystems, the majority of countries indicate the agriculture sector in general and crops sub-sector as the most vulnerable to climate change (55 and 50 percent of countries, respectively), followed by the fisheries (40 percent), forestry (30 percent), livestock (25 percent) and aquaculture (5 percent) sub-sectors. **Figure 34** illustrates the share of countries, at the regional and sub-regional level, that report one or more observed and/or expected climate-related impact, vulnerability and risk in agro-ecosystems, by sub-sector.

FIGURE 34.

OBSERVED AND/OR PROJECTED CLIMATE-RELATED IMPACTS REPORTED IN AGRO-ECOSYSTEMS IN THE NDCs OF LATIN AMERICAN COUNTRIES

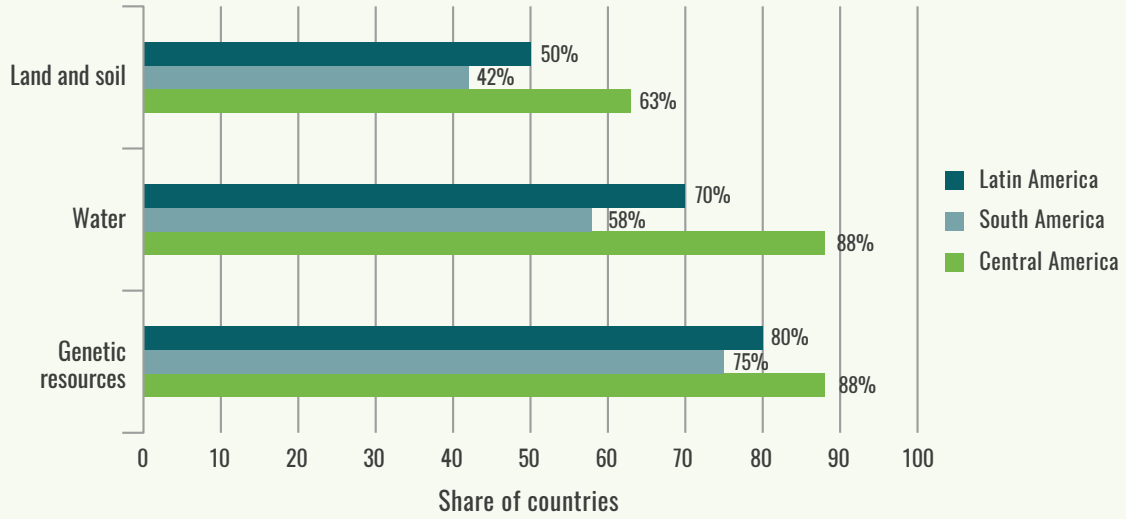


Climate-driven impacts, vulnerabilities and risks in ecosystems vary by natural resource and ecosystem service affected. Observed and/or projected climate-related impacts reported by countries were qualified by the type of natural resource and ecosystem service primarily affected.

At the regional level, genetic resources are reported most frequently amongst natural resource impacts across all ecosystems (80 percent of countries), followed by water (70 percent) and land and soil resources (50 percent). **Figure 35** illustrates the share of countries, at the regional and sub-regional level, with observed and/or projected climate-related impacts, vulnerabilities and risks in ecosystems reported, by natural resource impacted.

FIGURE 35.

TYPES OF NATURAL RESOURCES IMPACTED BY OBSERVED AND/OR PROJECTED CLIMATE-RELATED IMPACTS, VULNERABILITIES AND RISKS REPORTED IN THE NDCs OF LATIN AMERICAN COUNTRIES



Amongst ecosystem service-related impacts, primary production and productivity loss is reported most frequently (80 percent of countries) across all ecosystems, followed by changes in water availability and quality (60 percent), changes in species range, abundance and extinction (45 percent), coastal erosion (40 percent), ecosystem, biodiversity and ecosystem services loss in general (35 percent), biodiversity loss (30 percent), changes in hydrological flow and water cycling (30 percent), mangrove mortality and/or coastal reef degradation (20 percent), amongst others. **Figure 36** illustrates the share of countries, at the regional and sub-regional level, with observed and/or projected climate-related impacts in ecosystems by ecosystem service impact category.

FIGURE 36.

TYPES OF ECOSYSTEM SERVICES IMPACTED BY OBSERVED AND/OR PROJECTED CLIMATE-RELATED IMPACTS, VULNERABILITIES AND RISKS REPORTED IN THE NDCs OF LATIN AMERICAN COUNTRIES

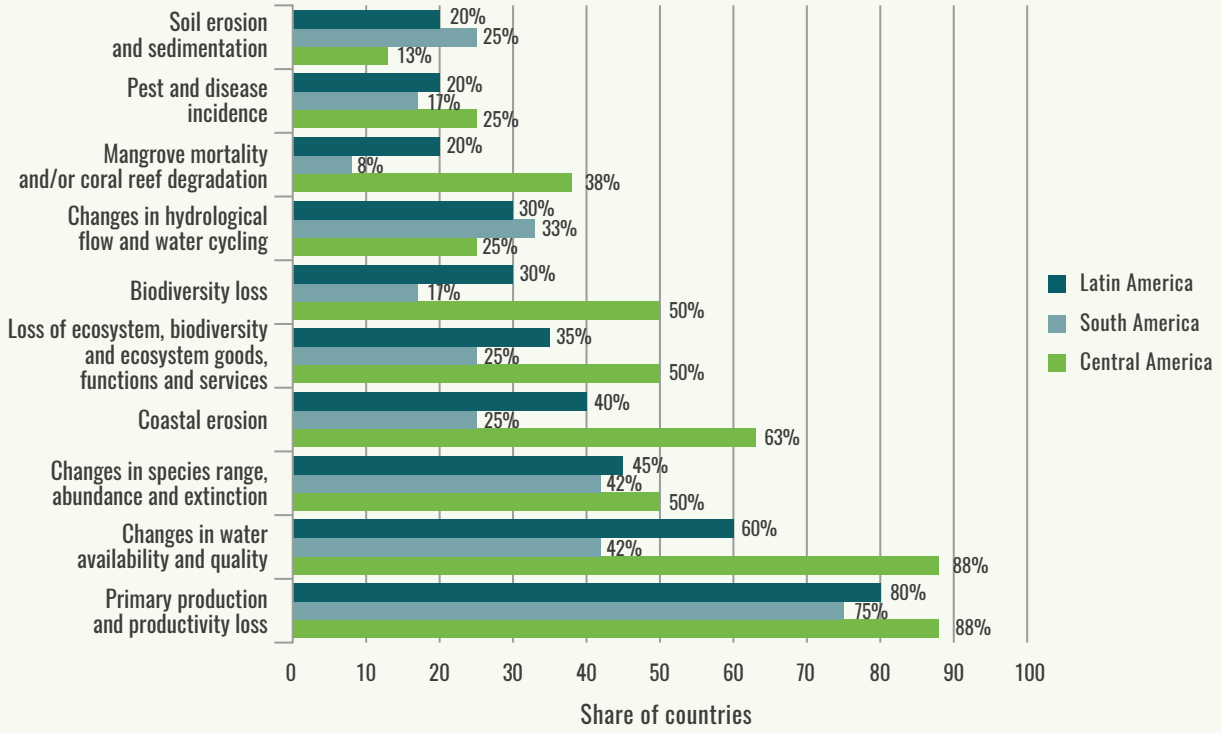


TABLE 8.

EXAMPLES OF OBSERVED AND/OR PROJECTED CLIMATE-RELATED IMPACTS, VULNERABILITIES AND RISKS REPORTED IN ECOSYSTEMS

COUNTRY	ECOSYSTEM	SECTOR	CLIMATE-RELATED RISK
CHILE	AGRO-ECOSYSTEM	FISHERIES AND AQUACULTURE	CHANGES IN TEMPERATURE AND SALINITY, OCEAN ACIDIFICATION AND CHANGES IN OXYGEN CONCENTRATION WILL NEGATIVELY IMPACT FISHERIES AND AQUACULTURE
HONDURAS		FORESTRY	DROUGHT AND TEMPERATURES INCREASE WILL CAUSE MORE FOREST FIRES
SURINAME		CROPS	RICE PRODUCTION MAY BE HAMPERED BY FREQUENT OCCURRENCE OF CROP DISEASES AND PEST INFESTATIONS IN THE COMING YEARS
EL SALVADOR		LIVESTOCK	DRY GRASS NEGATIVELY IMPACTS CATTLE
ARGENTINA	MOUNTAIN		REDUCTION IN THE RAINFALLS IN THE MOUNTAIN AREAS AND A REDUCTION IN THE FLOW OF THE RIVERS IN THE CUYO REGION
MEXICO	OCEAN AND COASTAL ZONE		A RISE IN THE SEA LEVEL OF 1 METER COULD CAUSE THE LOSS OF 2965.47 HA OF MANGROVES
HONDURAS	WETLANDS		DECREASE IN PRECIPITATION WILL ALTER THE STRUCTURE AND FUNCTIONS OF WETLANDS

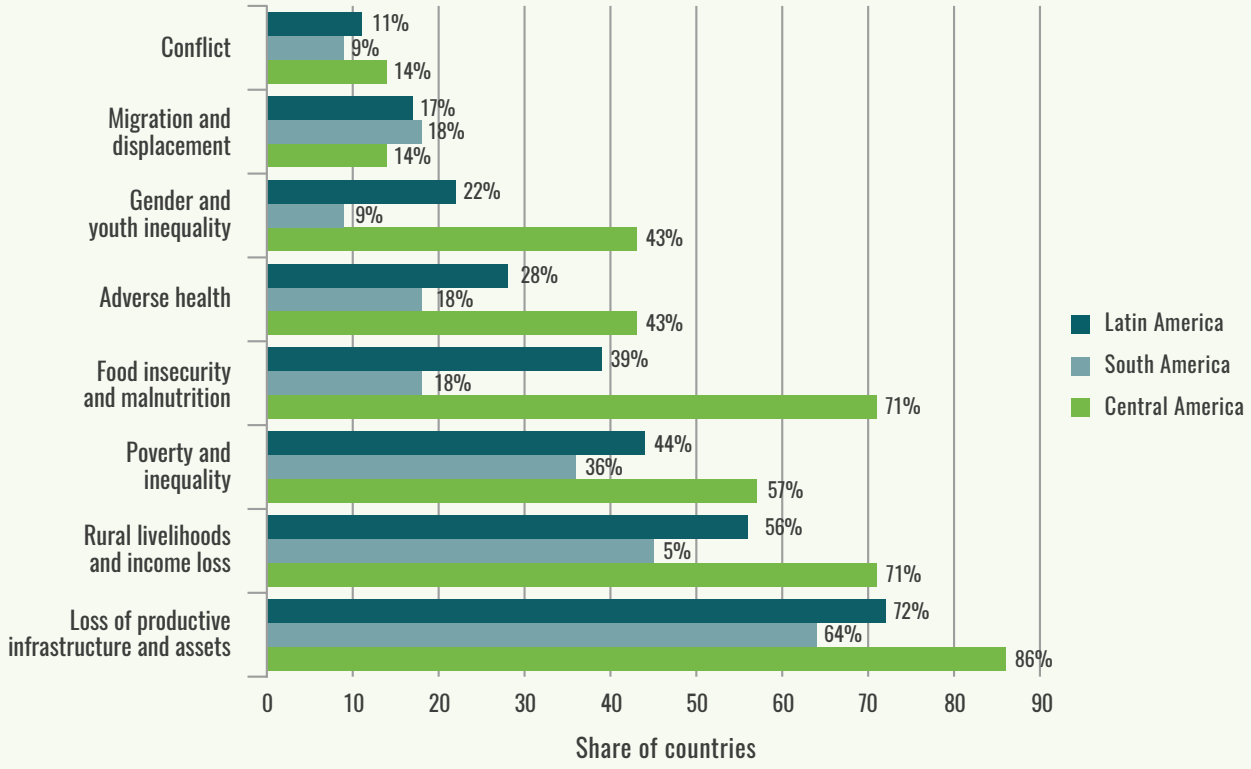
CLIMATE-DRIVEN IMPACTS, VULNERABILITIES AND RISKS IN SOCIAL SYSTEMS

All countries in the region, with the exception of two,[38] identify at least one observed and/or expected impact, vulnerability and risk induced by climate change in social systems.[39] For the sake of this analysis, the climate-related impacts are differentiated across three main pillars: socio-economics and well-being; knowledge and capacity; and institutions and governance.

At the regional level, the majority of countries report the loss of productive infrastructure and assets as a climate-related risk in social systems (72 percent of countries with risks reported), followed by loss of rural livelihoods and income (56 percent), poverty and inequality (44 percent), food insecurity and malnutrition (39 percent), adverse health (28 percent), gender and youth inequality (22 percent), migration and displacement (17 percent) and conflict (11 percent). **Figure 37** illustrates the share of countries, at the regional and sub-regional level, that report one or more observed and/or expected climate-related impact, vulnerability and risk, by type, out of countries with risks in social systems reported.

FIGURE 37.

OBSERVED AND/OR PROJECTED CLIMATE-RELATED RISKS IN SOCIAL SYSTEMS REPORTED IN THE NDCs OF LATIN AMERICAN COUNTRIES



[38] Panama and Paraguay.

[39] Definition of impact, vulnerability and risk in social systems adapted from IPCC (2014).

TABLE 9.

EXAMPLES OF OBSERVED AND/OR PROJECTED CLIMATE-RELATED IMPACTS VULNERABILITIES AND RISKS REPORTED IN SOCIAL SYSTEMS

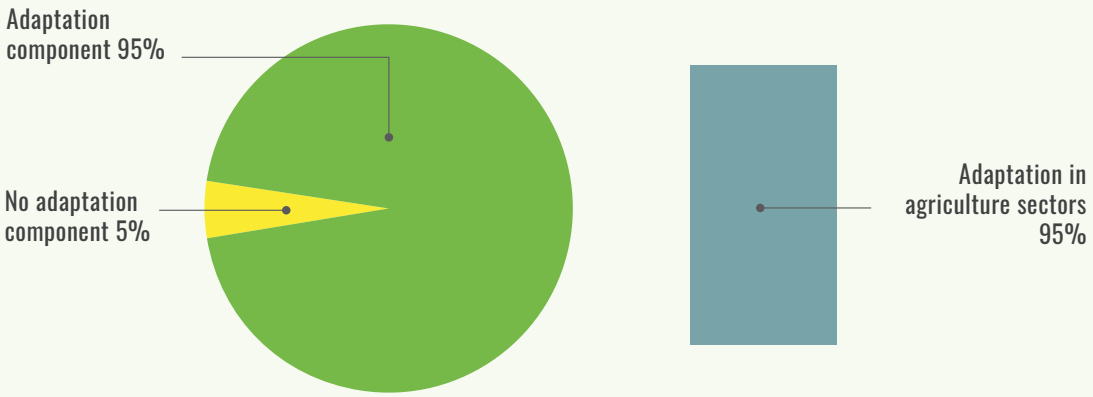
COUNTRY	CLIMATE-RELATED RISK	DESCRIPTION
COSTA RICA	LOSS OF PRODUCTIVE INFRASTRUCTURE AND ASSETS	REGARDING IMPACT TO SECTORS, ROAD INFRASTRUCTURE HAS EXPERIENCED THE BIGGEST IMPACT, FOLLOWED BY POWER DISTRIBUTION NETWORKS, AGRICULTURE AND HOUSING; FOUR VITAL ACTIVITIES FOR COUNTRY DEVELOPMENT
ARGENTINA	ADVERSE HEALTH	INTENSIFICATION OF THE TRANSMISSION OF DENGUE FEVER AND OTHER DISEASES IS EXPECTED
BELIZE	FOOD INSECURITY AND MALNUTRITION	A DECLINE IN THIS INDUSTRY (FISHERIES) CAN SIGNIFICANTLY AFFECT BELIZE'S FOOD SECURITY AS WELL AS OUR GDP
BELIZE	RURAL LIVELIHOODS AND INCOME LOSS	IT WOULD ALSO AFFECT OVER 3 500 LICENSED FISHERS, WHICH COULD LEAD TO AN ANNUAL LOSS OF APPROXIMATELY USD 12.5 MILLION PER YEAR
BANGLADESH	GENDER AND YOUTH INEQUALITY	WOMEN MAY FACE CERTAIN BIO-PHYSICAL STRESSES DUE TO CLIMATE CHANGE AND ITS IMPACTS. THESE ARE SOME TIME ACCENTUATED BY THEIR SOCIAL, REPRODUCTIVE AND CARE-GIVER ROLE IN THE FAMILY AS WELL AS THE SOCIAL DIFFERENTIATION THAT THEY MAY FACE
SURINAME	MIGRATION AND DISPLACEMENT	SURINAME'S DILEMMA IS WHETHER TO CONTINUE TO INVEST HEAVILY IN ADAPTATION OR RELOCATE AND REBUILD ITS ENTIRE ECONOMY AWAY FROM THE THREAT OF THE RISING SEA
GUATEMALA	POVERTY AND INEQUALITY	THE MOST AFFECTED ARE INDIGENOUS PEOPLE, SUBSISTENCE FARMERS, ARTISANAL FISHERMEN AND WOMEN AND CHILDREN. DESPITE BEING THE BIGGEST ECONOMY IN CENTRAL AMERICA, IT IS AMONG THE COUNTRIES WITH THE HIGHEST LEVEL OF INEQUALITY IN LATIN AMERICA, WITH HIGH INDEXES OF POVERTY (ESPECIALLY IN RURAL AREAS AND INDIGENOUS PEOPLES) AND HIGH RATES OF CHRONIC MALNUTRITION

3.2.2 Adaptation in the agriculture and land use sectors

All countries in Latin America, with the exception of one,[40] communicated an adaptation component in their NDCs, all of which include the agriculture and land use sectors (95 percent of countries). The level of detail included in each country's adaptation component varies, as some countries detailed their adaptation visions, goals and measures, while other countries made reference to national adaptation and climate change plans. **Figure 38** illustrates the share of countries with an adaptation component and adaptation in the agriculture and land use sectors.

FIGURE 38.

SHARE OF COUNTRIES WITH AN ADAPTATION COMPONENT AND ADAPTATION IN THE AGRICULTURE AND LAND USE SECTORS



[40] Panama includes adaptation measures in NC.

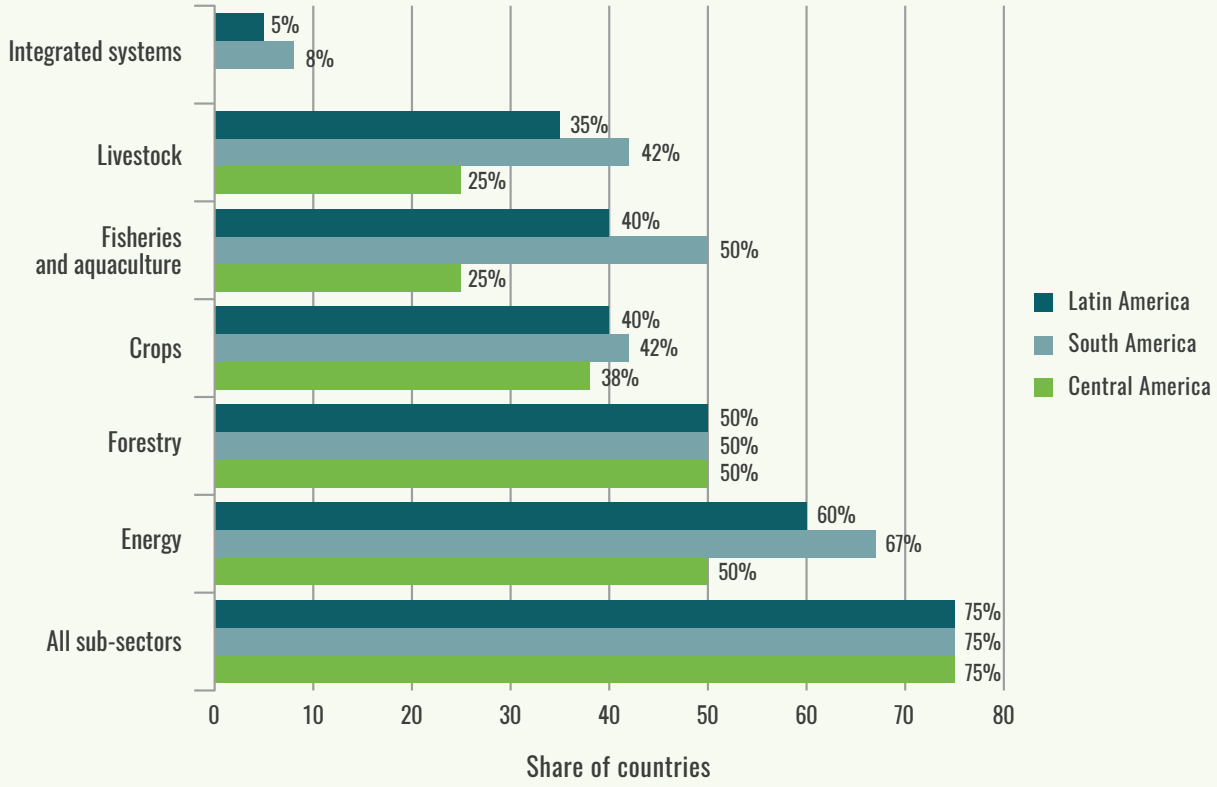
Priority sectors and cross-sectoral priorities

Countries often identify a number of priority (sub-)sectors and cross-sectoral priorities in ecosystems and social systems as part of their adaptation strategy in the agriculture and land use sectors.

Amongst priority sectors for adaptation in the region, agriculture is mentioned most frequently (75 percent of countries with an adaptation component), followed by energy (60 percent), forestry (50 percent), crops (40 percent), fisheries and aquaculture (40 percent), livestock (35 percent) and integrated systems (5 percent). **Figure 39** illustrates the share of countries with an adaptation component, at the regional and sub-regional level, with priority sectors in agriculture by sub-sector.

FIGURE 39.

PRIORITY SECTORS FOR ADAPTATION IN THE NDCs OF LATIN AMERICAN COUNTRIES



Amongst cross-sectoral priorities for adaptation, water resources are promoted most frequently in the region (55 percent of countries with an adaptation component), followed by ecosystems and natural resources (40 percent), biodiversity (35 percent), oceans and coastal zones (30 percent) and land and soil resources (25 percent). **Figure 40** illustrates the share of countries with an adaptation component, at the regional and sub-regional level, with cross-sectoral priorities in ecosystems, by type.

Countries often identify a number of cross-cutting priorities in social systems as part of their adaptation strategy.

Amongst cross-cutting adaptation priorities in social systems, health and resilient infrastructure are most frequently promoted in the region (60 percent of countries with an adaptation component, respectively), followed by Disaster Risk Reduction (DRR) (50 percent), food security and nutrition (30 percent), gender equality (25 percent), poverty and inequality reduction (25 percent) and human rights (20 percent). **Figure 41** illustrates the share of countries with an adaptation component, at the regional and sub-regional level, with cross-cutting priorities in social systems by type.

FIGURE 40.

CROSS-SECTORAL PRIORITIES FOR ECOSYSTEM-BASED ADAPTATION IN THE NDCs OF LATIN AMERICAN COUNTRIES

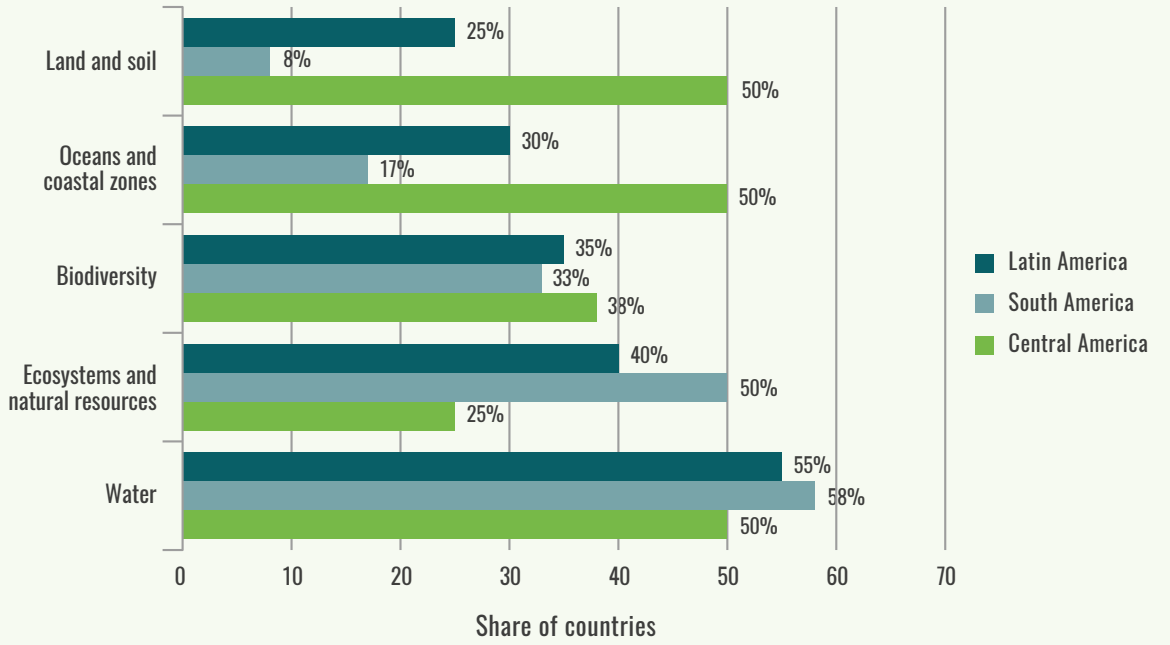
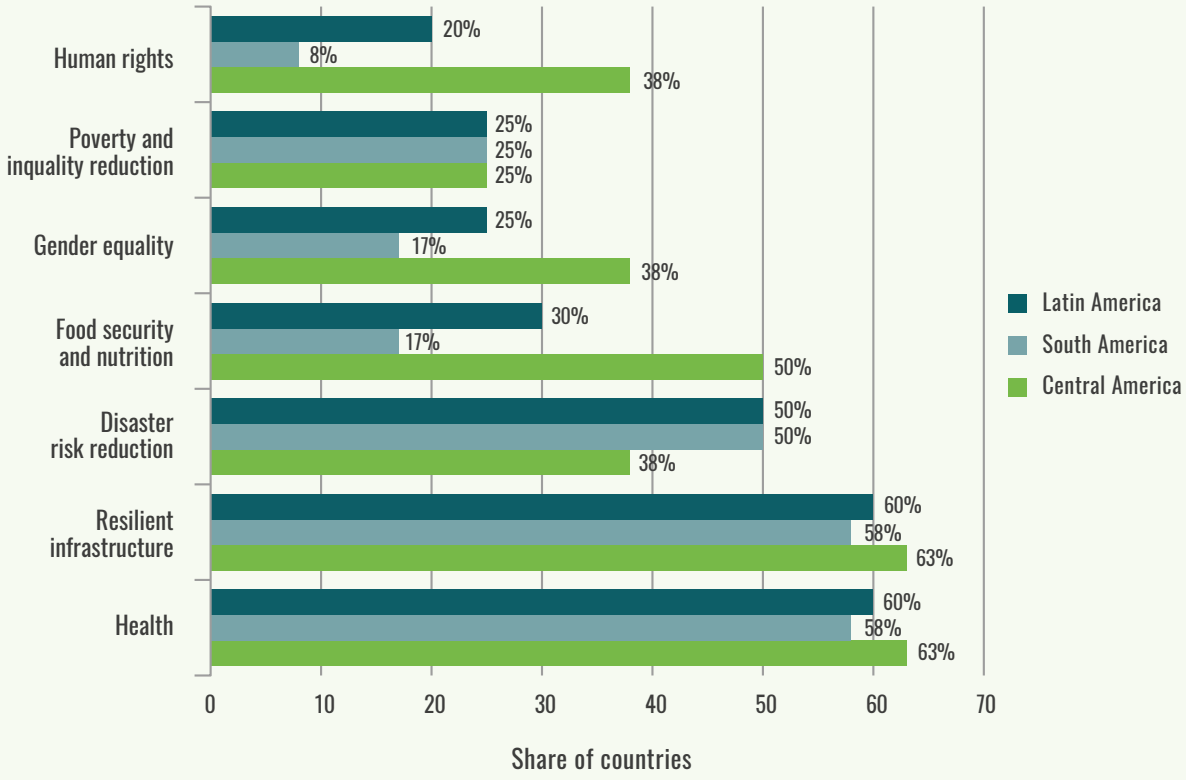


FIGURE 41.

CROSS-SECTORAL PRIORITIES FOR SOCIAL SYSTEM-BASED ADAPTATION IN THE NDCs OF LATIN AMERICAN COUNTRIES



Adaptation measures in ecosystems and social systems

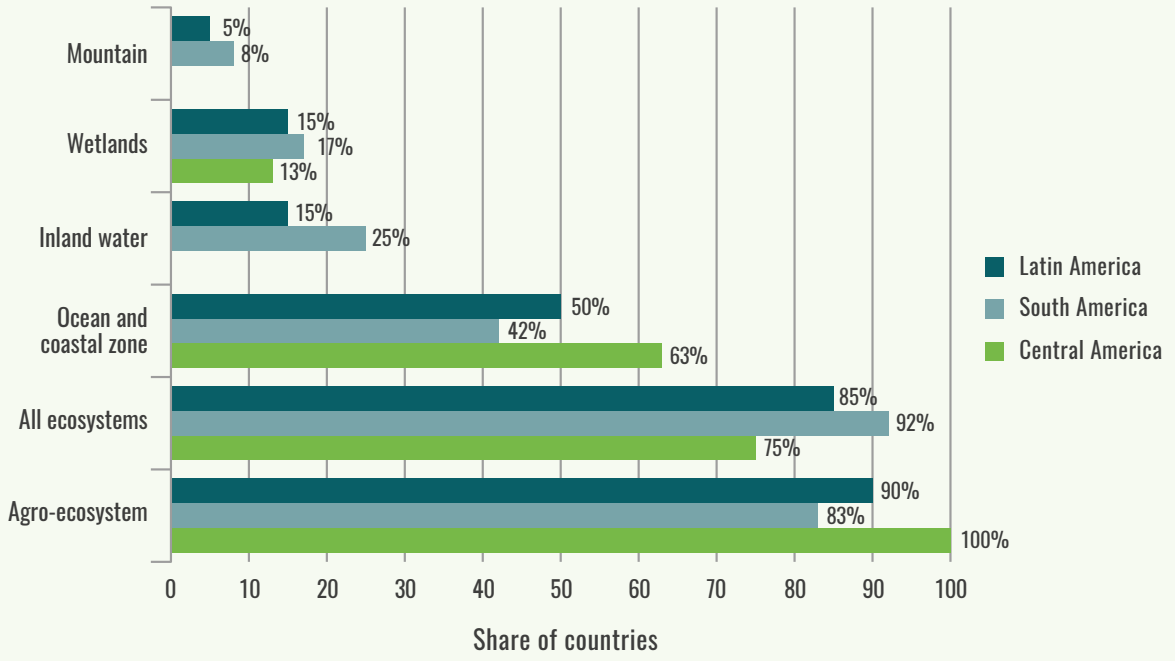
Adaptation measures in ecosystems are differentiated by type of ecosystem, natural resource and ecosystem service supported and management activity and measures in social systems are differentiated by dimension and intervention option. It should be noted that the objective of adaptation measures and their entry-points are often multiple, as their impacts are often cross-cutting. For this reason, adaptation measures are categorized thematically, depending on the level of detail provided, and categories are not considered mutually exclusive.

ADAPTATION MEASURES IN ECOSYSTEMS

All countries in Latin America identify at least one adaptation policy or measure in ecosystems. The majority of those countries promote adaptation in agro-ecosystems (90 percent of countries with adaptation), followed by ecosystems in general (85 percent), ocean and coastal zones (50 percent), inland water (15 percent), wetlands (15 percent) and mountain ecosystems (5 percent). **Figure 42** illustrates the share of countries, at the regional and sub-regional level, that include one or more (to avoid bias of representation) adaptation measure in ecosystems, by type of ecosystem, out of countries with an adaptation component.

FIGURE 42.

ADAPTATION POLICIES AND MEASURES IN ECOSYSTEMS IN THE NDCs OF LATIN AMERICAN COUNTRIES



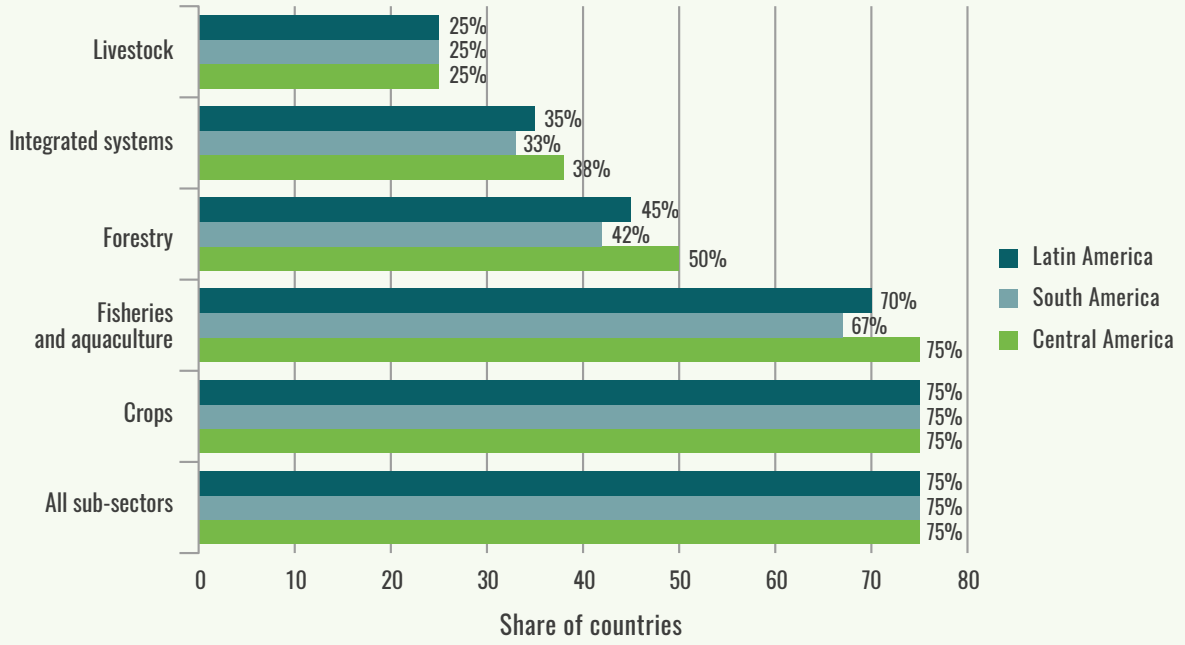
The adaptation measures in ecosystems are described by ecosystem type and management activity in order of regional priority:

Agro-ecosystems

Ninety percent of all countries with an adaptation component identify at least one policy or measure in agro-ecosystems. The majority of those countries promote adaptation in the crops sub-sector (75 percent of countries with adaptation in agro-ecosystems), followed by fisheries and aquaculture (70 percent), forestry (45 percent), integrated systems (35 percent) and livestock (25 percent). **Figure 43** illustrates the share of countries, at the regional and sub-regional level, with one or more (to avoid bias of representation) adaptation measure, by sub-sector, out of countries with adaptation in agro-ecosystems.

FIGURE 43.

ADAPTATION POLICIES AND MEASURES IN AGROECOSYSTEMS IN THE NDCs OF LATIN AMERICAN COUNTRIES



Crops

Seventy-five percent of countries with adaptation in agro-ecosystems include at least one policy or measure in the crops sub-sector. The majority of those countries promote plant management (60 percent of countries with adaptation in agro-ecosystems), followed by pest and disease management (20 percent) and nutrient and on-farm soil management (15 percent), amongst others. **Figure 44** illustrates the share of countries, at the regional and sub-regional level, with one or more (to avoid bias of representation) adaptation measure in the crops sub-sector, by management activity, out of countries with adaptation in agro-ecosystems.

FIGURE 44.

ADAPTATION POLICIES AND MEASURES IN THE CROPS SUB-SECTOR IN THE NDCs OF LATIN AMERICAN COUNTRIES

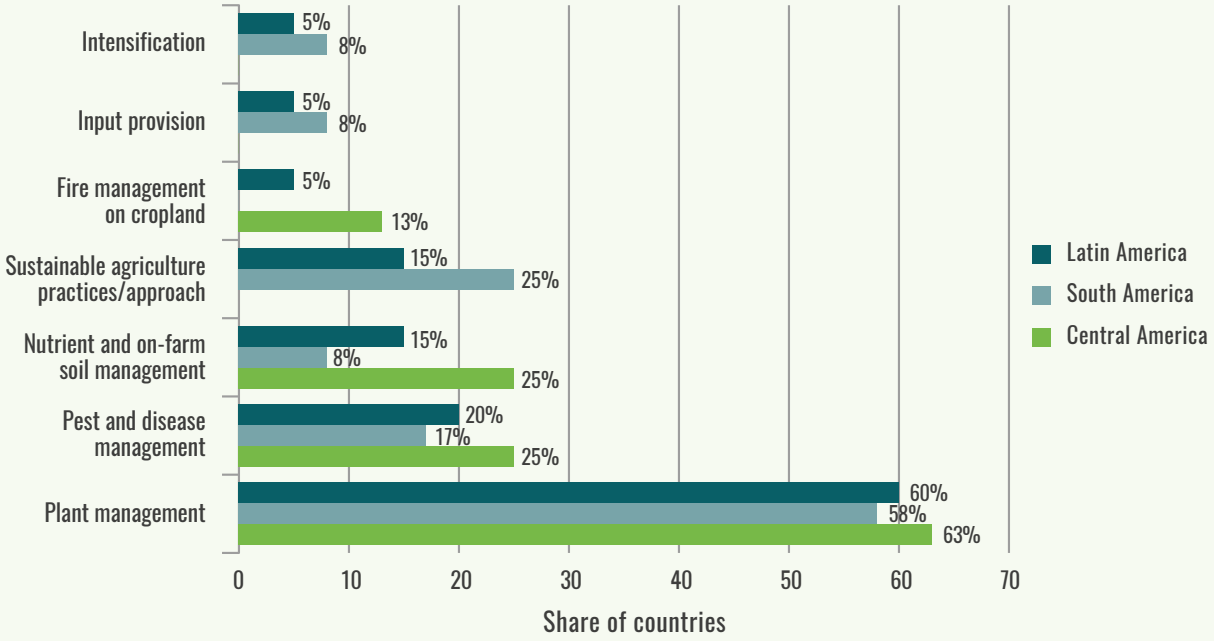


TABLE 10.

EXAMPLES OF ADAPTATION MEASURES IN THE CROPS SUB-SECTOR

COUNTRY	MANAGEMENT ACTIVITY	METRIC	2030 TARGET
URUGUAY	BY 2025, 95 PERCENT OF THE AGRICULTURAL AREA IS UNDER LAND USE AND MANAGEMENT PLANS, INCLUDING PLANS TO REDUCE EROSION AND PRESERVE ORGANIC MATTER IN CROPLANDS, THE PRODUCTIVITY AND WATER STORAGE CAPACITY HAVE IMPROVED, AND THE RISK OF EROSION DURING EXTREME RAINFALL EVENTS HAS BEEN REDUCED	QUANTIFIED	95 PERCENT OF THE AGRICULTURAL AREA
BELIZE	IMPROVE CROP PRACTICES, INCREASE ACCESS TO DROUGHT TOLERANT CROPS	NON-QUANTIFIED	
HONDURAS	USE OF SLOW-ABSORBING ORGANIC FERTILISER	NON-QUANTIFIED	

Fisheries and aquaculture

Seventy percent of countries with adaptation in agro-ecosystems include at least one measure in fisheries and aquaculture. The majority of those countries promote improved practices in fisheries (30 percent of countries with adaptation in agro-ecosystems), followed by aquaculture (20 percent) and only one country includes diversification (5 percent). **Figure 45** illustrates the share of countries, at the regional and sub-regional level, with one or more (to avoid bias of representation) adaptation measure in fisheries and aquaculture, out of countries with adaptation in agro-ecosystems, by management activity.

FIGURE 45.

ADAPTATION POLICIES AND MEASURES IN THE FISHERIES AND AQUACULTURE SUB-SECTOR IN THE NDCs OF LATIN AMERICAN COUNTRIES

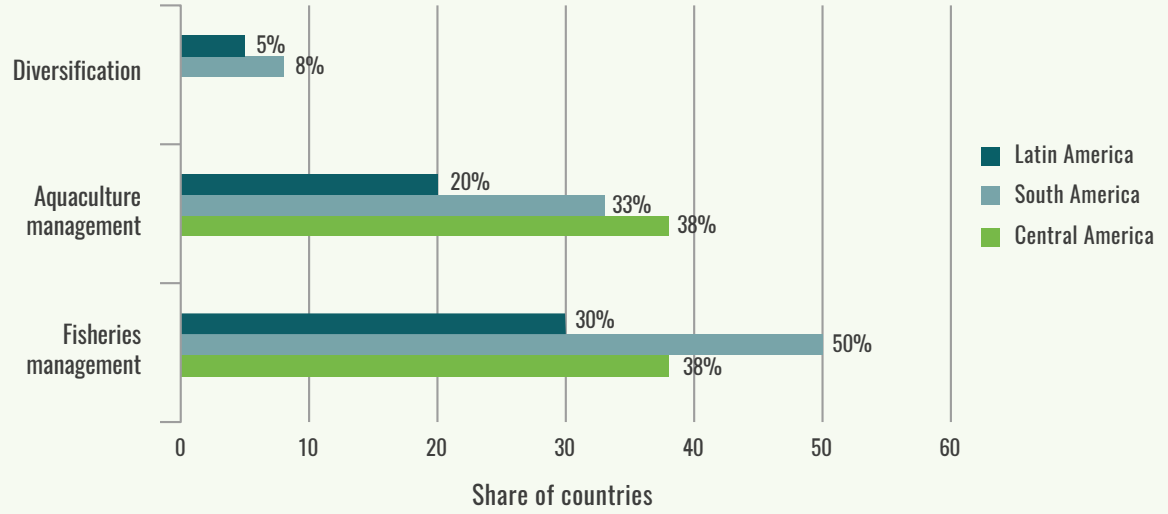


TABLE 11.

EXAMPLES OF ADAPTATION MEASURES IN FISHERIES AND AQUACULTURE

COUNTRY	MANAGEMENT ACTIVITY	METRIC
BELIZE	SUPPORT MANGROVE AND FISHERIES CONSERVATION AND MANAGEMENT PLANS TO PROTECT WETLANDS AND SEA GRASS BEDS	NON-QUANTIFIED
HONDURAS	DEVELOP AQUACULTURE IN COASTAL AREAS	NON-QUANTIFIED

Forestry

Forty-five percent of countries with adaptation in agroecosystems include at least one measure in forestry. The majority of those countries promote afforestation/reforestation (50 percent of countries with adaptation in agro-ecosystems), followed by reducing deforestation and forest conservation (45 percent), reducing degradation and SFM (40 percent) and fire management (20 percent), amongst others. **Figure 46** illustrates the share of countries, at the regional and sub-regional level, with one or more (to avoid bias of representation) adaptation measure in the forestry sub-sector, out of countries with adaptation in agro-ecosystems, by management activity.

FIGURE 46.

ADAPTATION POLICIES AND MEASURES IN THE FORESTRY SUB-SECTOR IN THE NDCs OF LATIN AMERICAN COUNTRIES

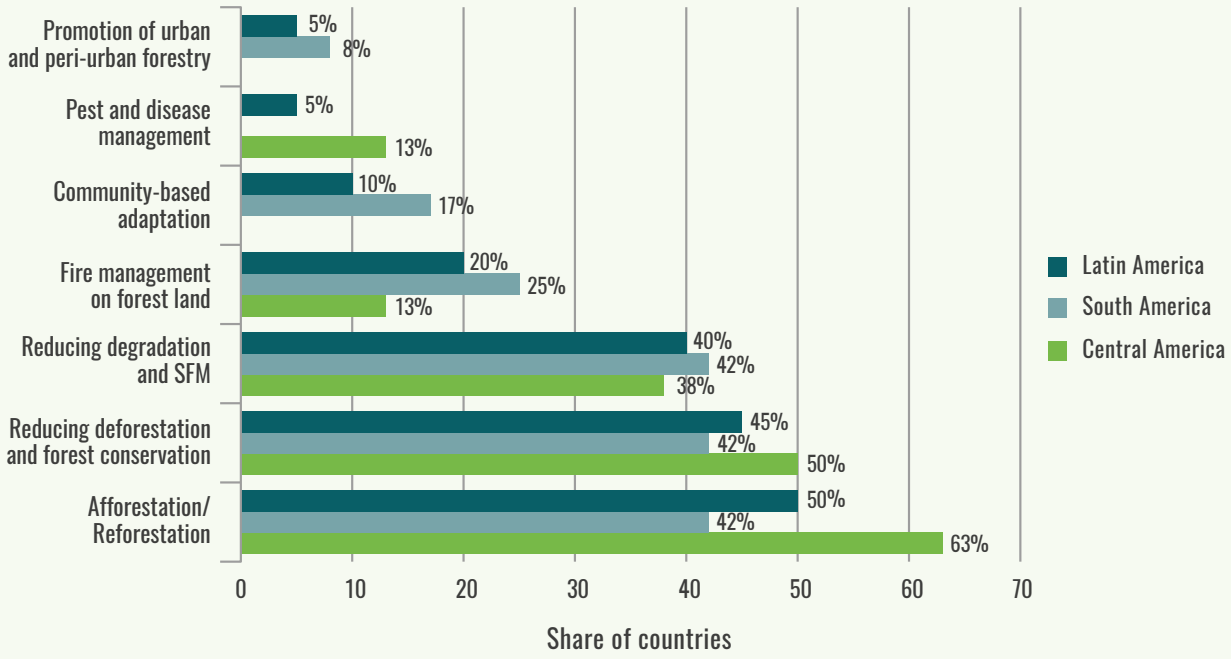


TABLE 12.

EXAMPLES OF ADAPTATION MEASURES IN THE FORESTRY SUB-SECTOR

COUNTRY	MANAGEMENT ACTIVITY	METRIC	2030 TARGET
MEXICO	REACH A RATE OF 0 PERCENT DEFORESTATION BY THE YEAR 2030	QUANTIFIED	0 PERCENT DEFORESTATION RATE
BOLIVIA	INCREASE NET FOREST COVER MORE THAN 54 MILLION HECTARES BY 2030, COMPARED TO THE 52.5 MILLION OF 2010	QUANTIFIED	54 MILLION
VENEZUELA	PREVENTION AND CONTROL OF FOREST FIRES	QUANTIFIED	10 PERCENT OF BARREN LAND UNDER MANAGEMENT

Integrated systems

Thirty-five percent of countries with adaptation in agro-ecosystems include at least one measure in integrated systems. The majority of those countries promote agroforestry (40 percent of countries with adaptation in agro-ecosystems), and a small share include other mixed biomass systems (15 percent). **Figure 47** illustrates the share of countries, at the regional and sub-regional level, with one or more (to avoid bias of representation) adaptation measure in integrated systems out of countries with adaptation in agro-ecosystems, by management activity.

FIGURE 47.

ADAPTATION POLICIES AND MEASURES IN INTEGRATED SYSTEMS IN THE NDCs OF LATIN AMERICAN COUNTRIES

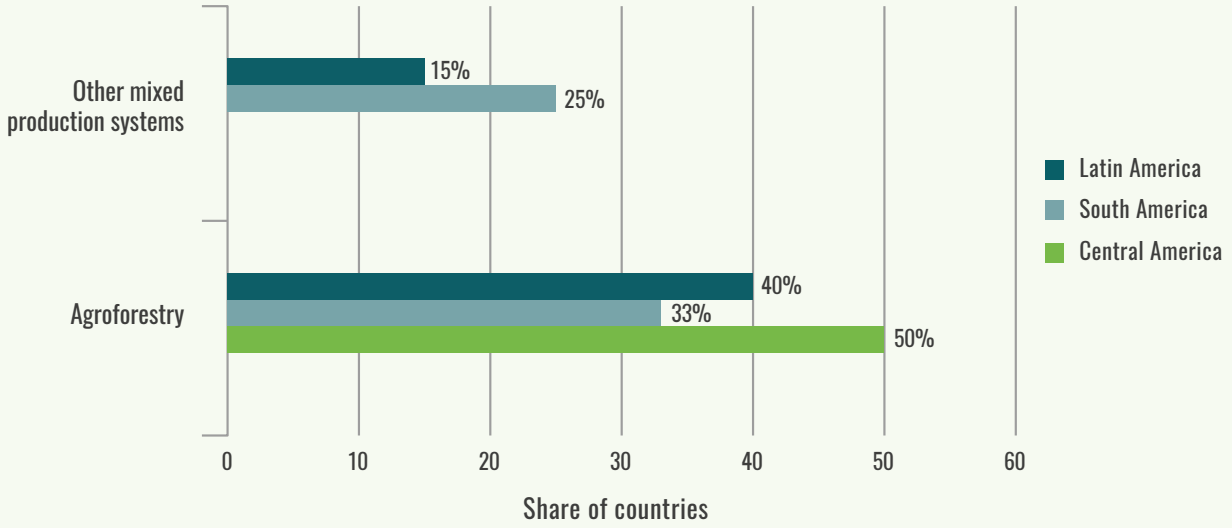


TABLE 13.

EXAMPLES OF ADAPTATION MEASURES IN INTEGRATED SYSTEMS

COUNTRY	MANAGEMENT ACTIVITY	METRIC	2030 TARGET
HONDURAS	IMPLEMENTATION OF AGRO-FORESTRY SYSTEMS "QUESUNGUAL"	NON-QUANTIFIED	
ECUADOR	APPLICATION OF SILVOPASTURE SYSTEMS		

Livestock

Twenty-five percent of countries with adaptation in agroecosystems include at least one measure in the livestock sub-sector. The majority of those countries promote animal breeding and husbandry measures (25 percent of countries with adaptation in agro-ecosystems), followed by improved feeding practices (15 percent), general livestock management, intensification and water management (10 percent each), amongst others. **Figure 48** illustrates the share of countries, at the regional and sub-regional level, with one or more (to avoid bias of representation) adaptation measure in the livestock sub-sector out of countries with adaptation in agro-ecosystems, by management activity.

FIGURE 48.

ADAPTATION POLICIES AND MEASURES IN THE LIVESTOCK SUB-SECTOR IN THE NDCs OF LATIN AMERICAN COUNTRIES

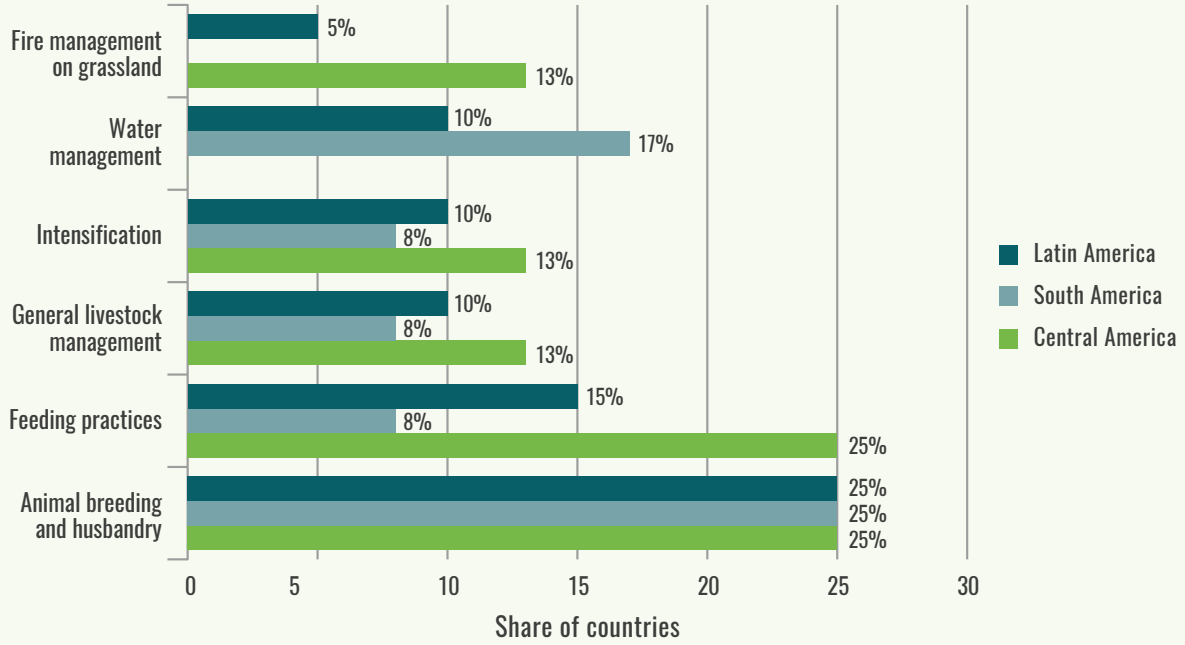


TABLE 14.

EXAMPLES OF ADAPTATION MEASURES IN THE LIVESTOCK SUB-SECTOR

COUNTRY	MANAGEMENT ACTIVITY	METRIC	2030 TARGET
URUGUAY	ADOPTION, BY 2025, OF GOOD PRACTICES OF NATURAL LAND MANAGEMENT AND MANAGEMENT OF BREEDING HERDS IN LIVESTOCK PRODUCTION IN AN AREA RANGING FROM 1 000 000 TO 3 000 000 HA (10-30 PERCENT OF GRASSLANDS), INCLUDING THE SUPPLY OF FORAGE, REGENERATIVE MANAGEMENT AND THE ADDITION OF SUPPLEMENTS IN TIMES OF DROUGHT, ENHANCING EXTENSION AND LIVESTOCK INNOVATION MECHANISMS FOR THAT PURPOSE	QUANTIFIED	10-30 PERCENT OF GRASSLANDS
HONDURAS	LIMIT THE BURNING OF PASTURELAND TO CONTROL MITES IN THE CATTLE	NON-QUANTIFIED	

Ocean and coastal zone ecosystems

Fifty percent of countries with adaptation in ecosystems include at least one measure in ocean and coastal zone ecosystems. The majority of those countries promote coastal zone management (35 percent of countries with adaptation in ecosystems), followed by mangrove conservation and replanting (25 percent), and general ecosystem management, conservation and restoration (15 percent), while a small share include afforestation/reforestation, biodiversity protection, flood management and genetic resources conservation (5 percent each). **Figure 49** illustrates the number of countries, at the regional and sub-regional levels, with one or more (to avoid bias of representation) adaptation measure in ocean and coastal zone ecosystems out of countries with adaptation in ecosystems, by management activity.

FIGURE 49.

ADAPTATION POLICIES AND MEASURES IN OCEAN AND COASTAL ZONE ECOSYSTEMS

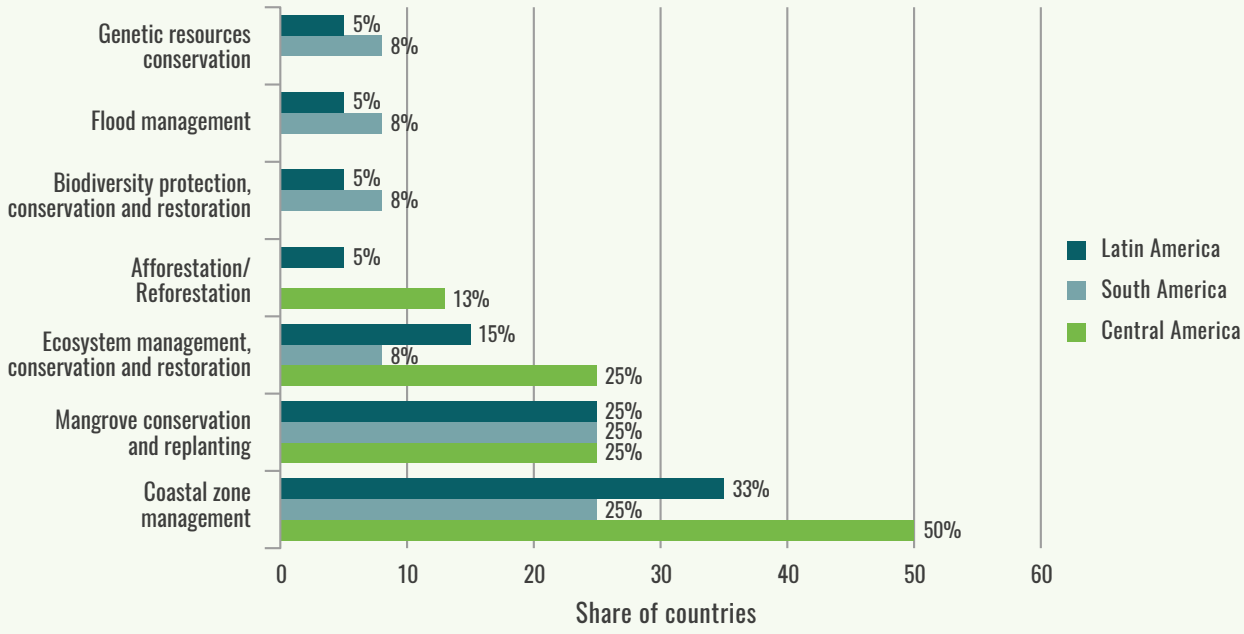


TABLE 15.

EXAMPLES OF ADAPTATION MEASURES IN OCEAN AND COASTAL ZONE ECOSYSTEMS

COUNTRY	MANAGEMENT ACTIVITY	METRIC
SURINAME	MANGROVE PROTECTION, RESTORATION AND EXPANSION	NON-QUANTIFIED
BELIZE	MANAGE AND REGULATE FURTHER DEVELOPMENT OF THE COASTLINE, ESPECIALLY IN VULNERABLE AREAS SUCH AS THE BELIZE AND COROZAL DISTRICTS	NON-QUANTIFIED

INLAND WATER ECOSYSTEMS

Three countries[41] (15 percent of countries with adaptation in ecosystems) include at least one adaptation measure in inland water ecosystems, primarily promoting water-related ecosystem protection and restoration in South America.

WETLAND ECOSYSTEMS

Three countries[42] (15 percent of countries with adaptation in ecosystems) include at least one adaptation measure in wetland ecosystems.

MOUNTAIN ECOSYSTEMS

Only one country[43] (8 percent of countries with adaptation in ecosystems) include at least one adaptation measure in mountain ecosystems, particularly ecosystem management, conservation and restoration.

[41] Ecuador, Peru and Suriname.

[42] Honduras, Argentina and Ecuador.

[43] Colombia

NATURAL RESOURCES

Natural resource use and management options are integrated within each of the ecosystem-based approaches to adaptation identified above due to their cross-cutting nature. The distribution of those management options are presented from a natural resource lens below:

Water resources

Ninety percent of countries with adaptation in ecosystems include at least one measure targeting water resource use and management. The majority of those countries promote sustainable water use and management (55 percent of countries with adaptation in ecosystems), followed by irrigation and drainage (50 percent), integrated watershed management (35 percent), flood management and water storage and harvesting (25 percent each), and water-use efficiency (20 percent), amongst others. **Figure 50** illustrates the share of countries, at the regional and sub-regional levels, with one or more (to avoid bias of representation) water-related adaptation measure out of countries with adaptation in ecosystems, by resource use and management option.

FIGURE 50.

WATER-RELATED ADAPTATION MEASURES IN THE NDCs OF LATIN AMERICAN COUNTRIES

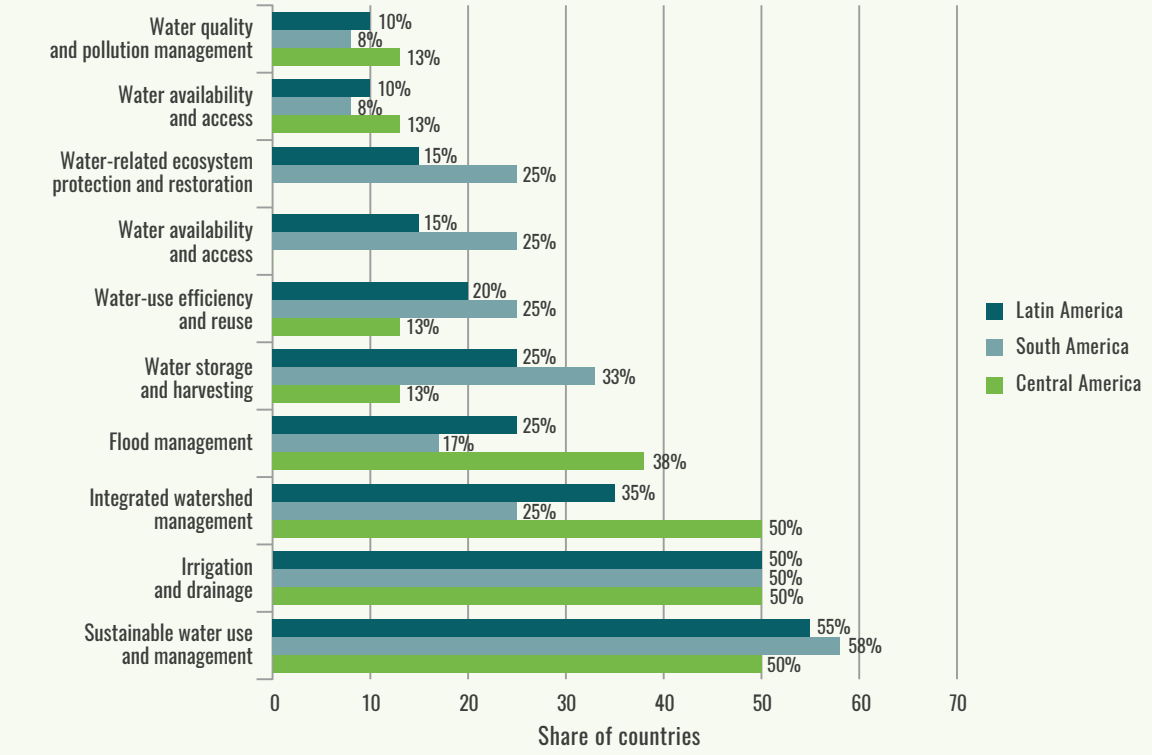


TABLE 16.

EXAMPLES OF WATER RELATED ADAPTATION MEASURES

COUNTRY	MANAGEMENT ACTIVITY	METRIC	2030 TARGET
BELIZE	NEW GRANARY AREAS AND ADEQUATE AND EFFICIENT IRRIGATION AND DRAINAGE INFRASTRUCTURE WILL BE DEVELOPED TO INCREASE THE PRODUCTION OF RICE	NON-QUANTIFIED	
BOLIVIA	SIGNIFICANT IMPROVEMENT OF SOCIAL PARTICIPATION FOR LOCAL WATER MANAGEMENT, INCREASING TO 80 PERCENT THE NUMBER OF SOCIAL ORGANIZATIONS WITH RESILIENT SYSTEMS WITH RESPECT TO 35 PERCENT OF 2010	QUANTIFIED	80 PERCENT OF SOCIAL ORGANIZATIONS

Ecosystems and biodiversity

Eighty-five percent of countries with adaptation in ecosystems include at least one measure targeting ecosystems and biodiversity conservation. The majority of those countries promote ecosystem management conservation and restoration (55 percent of countries with adaptation in ecosystems), followed by crop breeding and diversification (50 percent), biodiversity protection, conservation and restoration (40 percent), animal breeding (25 percent), pest and disease management (20 percent) and agro-ecology (10 percent), amongst others. **Figure 51** illustrates the share of countries, at the regional and sub-regional level, with one or more (to avoid bias of representation) ecosystem and biodiversity-related adaptation measure out of countries with adaptation in ecosystems, by resource use and management option.

FIGURE 51.

ECOSYSTEM AND BIODIVERSITY-RELATED ADAPTATION MEASURES IN THE NDCs OF LATIN AMERICAN COUNTRIES

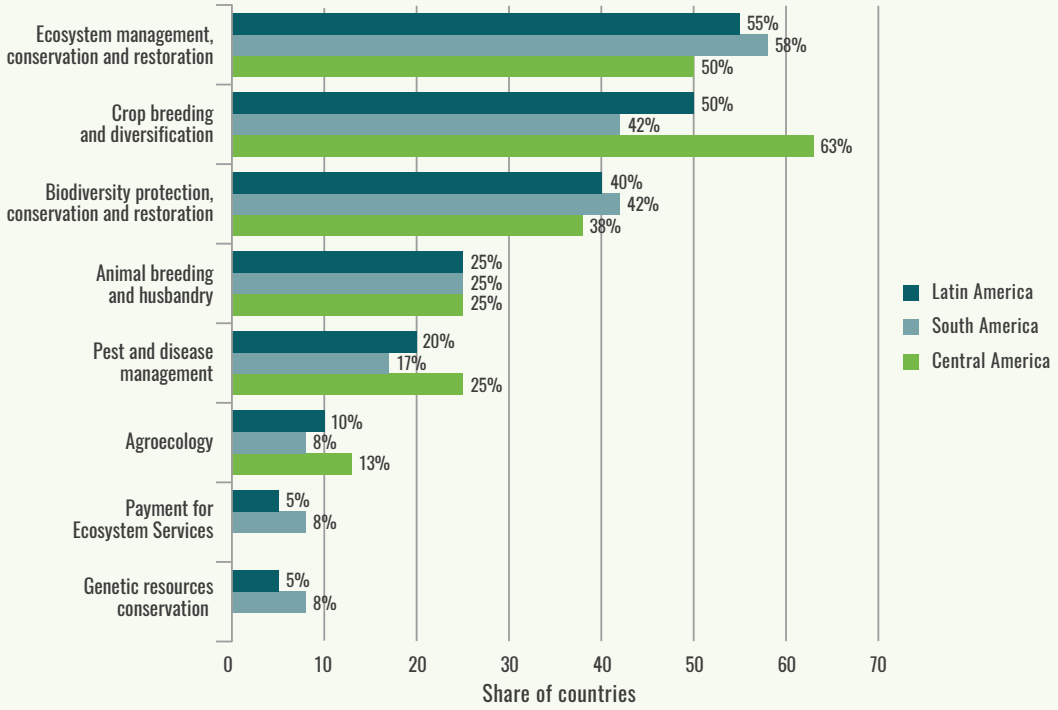


TABLE 17.

EXAMPLES OF ECOSYSTEM AND BIODIVERSITY-RELATED ADAPTATION MEASURES

COUNTRY	MANAGEMENT ACTIVITY	METRIC
BELIZE	IMPROVE LIVESTOCK HUSBANDRY PRACTICES, INCREASE ACCESS TO LIVESTOCK BREEDS	NON-QUANTIFIED
MEXICO	USE OF NATIVE MAIZE SPECIES	NON-QUANTIFIED

Land and soil resources

Seventy percent of countries with adaptation in ecosystems include at least one measure targeting land and soil resource use and management. The majority of those countries promote land/soil conservation, restoration and rehabilitation (50 percent of countries with adaptation in ecosystems), followed by coastal zone management (35 percent), integrated landscape management (25 percent) and nutrient and on-farm management (20 percent). **Figure 52** illustrates the share of countries, at the regional and sub-regional level, with one or more (to avoid bias of representation) land and soil-related adaptation measure out of countries with adaptation in ecosystems, by resource use and management option.

FIGURE 52.

LAND AND SOIL-RELATED ADAPTATION MEASURES IN THE NDCs OF LATIN AMERICAN COUNTRIES

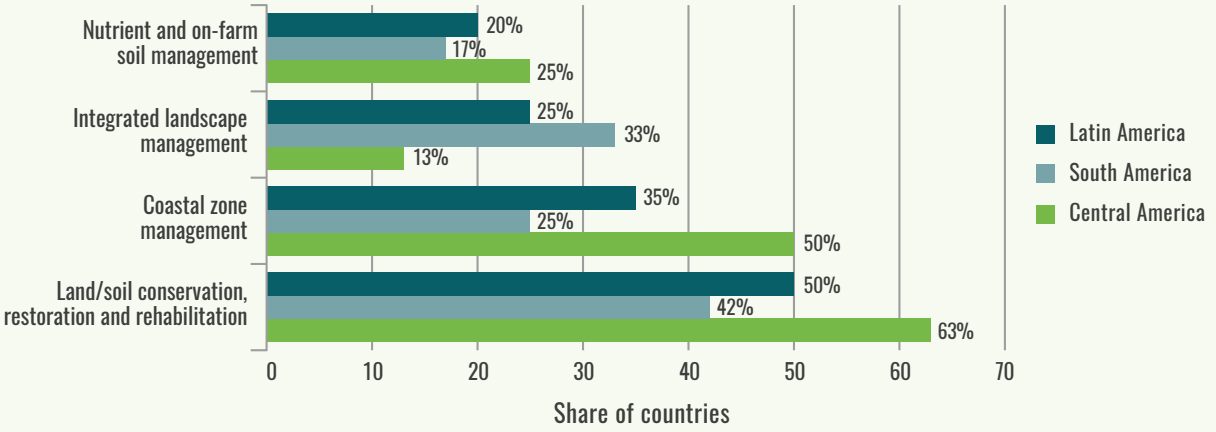


TABLE 18.

EXAMPLES OF LAND-RELATED ADAPTATION MEASURES

COUNTRY	MANAGEMENT ACTIVITY	METRIC	2030 TARGET
URUGUAY	BY 2025, 95 PERCENT OF THE AGRICULTURAL AREA IS UNDER LAND USE AND MANAGEMENT PLANS, INCLUDING PLANS TO REDUCE EROSION AND PRESERVE ORGANIC MATTER IN CROPLANDS, THE PRODUCTIVITY AND WATER STORAGE CAPACITY HAVE IMPROVED, AND THE RISK OF EROSION DURING EXTREME RAINFALL EVENTS HAS BEEN REDUCED	QUANTIFIED	95 PERCENT LAND
BOLIVIA	RESTORATION OF VEGETATION COVER (TREES, GRASSLANDS, WETLANDS AND OTHERS) TO PREVENT EROSION AND REDUCE DAMAGE DUE TO ADVERSE CLIMATIC EVENTS	NON-QUANTIFIED	

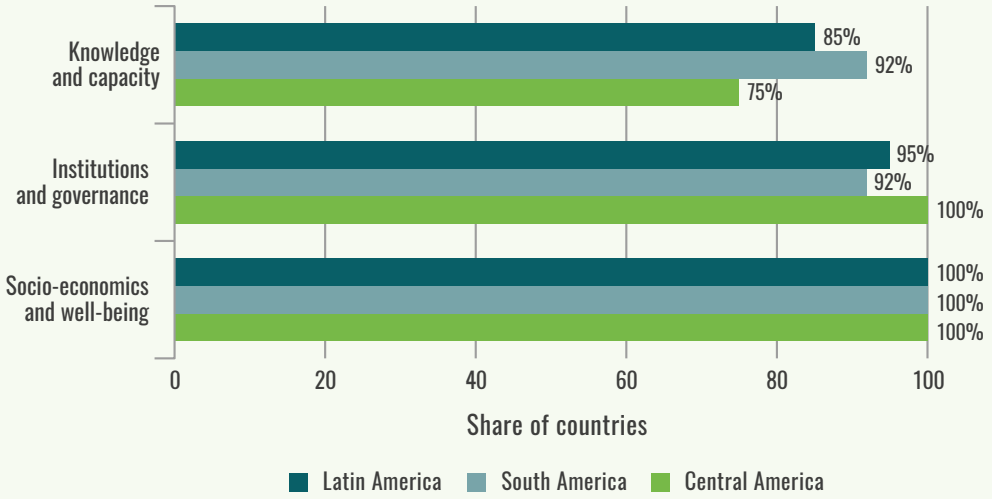
ADAPTATION MEASURES IN SOCIAL SYSTEMS

For the sake of this analysis, adaptation measures in social systems are differentiated along three main pillars: socio-economics and well-being; knowledge and capacity; and institutions and governance. Social systems refer to the interaction between agricultural and food systems and rural livelihoods, and the institutions, governments and economies influencing individual adaptive capacity and exposure to climate change. The measures contained, therefore, in this section are not exclusive to agriculture.

All countries with an adaptation component in Latin America identify at least one adaptation measure in social systems, primarily around the socio-economic and well-being pillars (100 percent of countries with adaptation), followed by institutions and governance (95 percent) and knowledge and capacity pillar (85 percent). **Figure 53** illustrates the share of countries, at the regional and sub-regional levels, that include one or more (to avoid bias of representation) adaptation measure in social systems, by pillar, out of countries with an adaptation component.

FIGURE 53.

ADAPTATION POLICIES AND MEASURES IN SOCIAL SYSTEMS IN THE NDCs OF LATIN AMERICAN COUNTRIES



Socio-economics and well-being

All countries with an adaptation component in the region include measures related to socio-economics and well-being, of which the majority promote resilience and adaptive capacity building (75 percent of countries with adaptation in social systems), followed by credit and insurance services and resilient infrastructure (50 percent each), disease management and prevention and health information and services (45 percent each), amongst others. **Figure 54** illustrates the share of countries, at the sub-regional level, with one or more (to avoid bias of representation) socio-economics and well-being-related adaptation measure, by intervention option, out of countries with adaptation in social systems.

FIGURE 54.

SOCIO-ECONOMICS AND WELL-BEING RELATED ADAPTATION MEASURES IN THE NDCs OF LATIN AMERICAN COUNTRIES

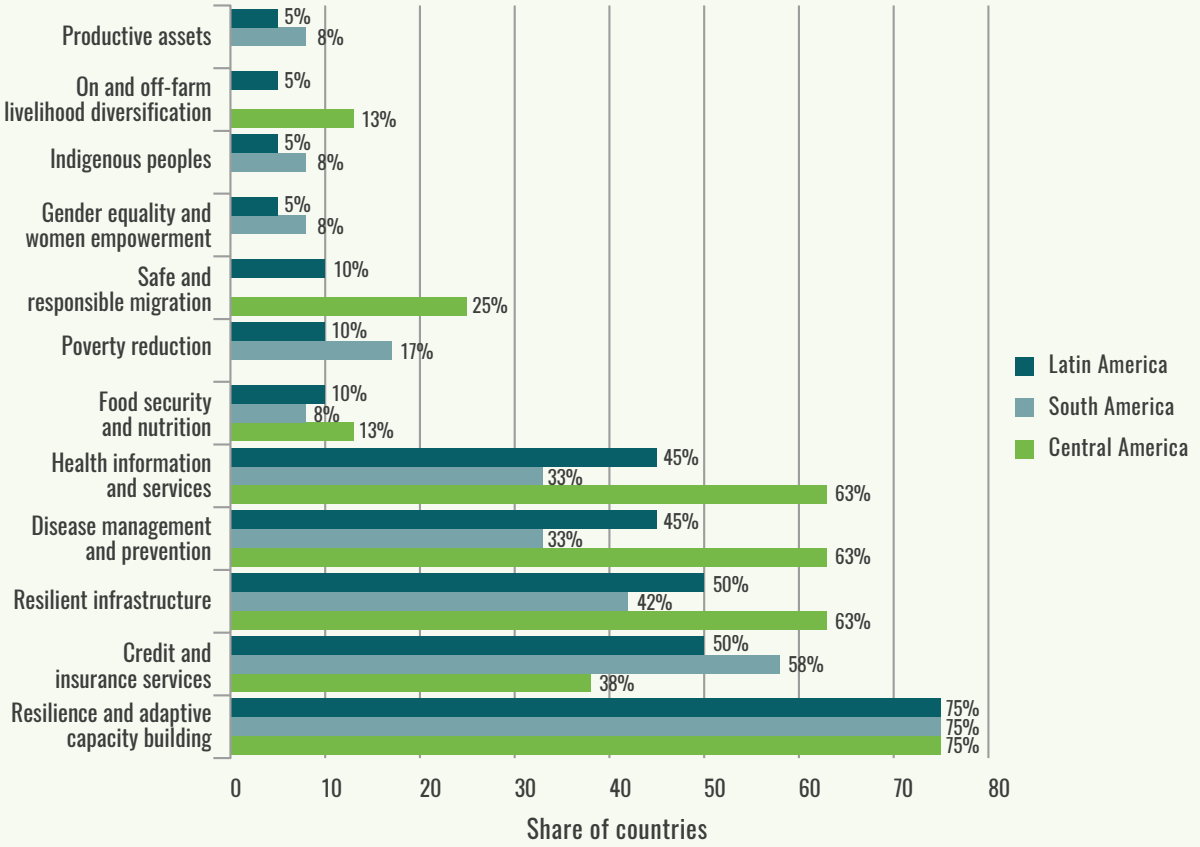


TABLE 19.

EXAMPLES OF SOCIO-ECONOMICS AND WELL-BEING RELATED ADAPTATION MEASURES

COUNTRY	MANAGEMENT ACTIVITY	METRIC	2030 TARGET
BOLIVIA	EXTREME POVERTY HAS BEEN REDUCED TO ZERO WITHIN THE POPULATION THAT DEPENDS ON FORESTS BY 2030 FROM APPROXIMATELY 350 THOUSAND PEOPLE IN 2010	QUANTIFIED	0 EXTREME POOR
MEXICO	RELOCATE IRREGULAR HUMAN SETTLEMENTS OF ZONES PRONE TO DISASTERS THROUGH LAND USE REGULATIONS	NON-QUANTIFIED	
URUGUAY	AN "ASSESSMENT FOR THE ESTABLISHMENT OF MODELS TO PREDICT THE BEHAVIOUR OF VECTOR-BORNE DISEASES AND ZOONOSIS LINKED TO CLIMATE CHANGE" WILL BE UNDER DEVELOPMENT BY 2025	NON-QUANTIFIED	

Institutions and governance

Ninety-five percent of countries with an adaptation component include measures related to institutions and governance. The majority of those countries target DRR and management (60 percent of countries with adaptation in social systems), followed by policy mainstreaming and coherence (50 percent), institutional capacity building (35 percent), land tenure reform and water governance (25 percent), law and regulation in general (20 percent), and participatory governance and inclusion (20 percent), amongst others. **Figure 55** illustrates the share of countries, at the regional and sub-regional levels, with one or more (to avoid bias of representation) institutions and governance-related adaptation measure, by intervention option, out of countries with adaptation in social systems.

FIGURE 55.

INSTITUTIONS AND GOVERNANCE-RELATED ADAPTATION MEASURES IN THE NDCs OF LATIN AMERICAN COUNTRIES)

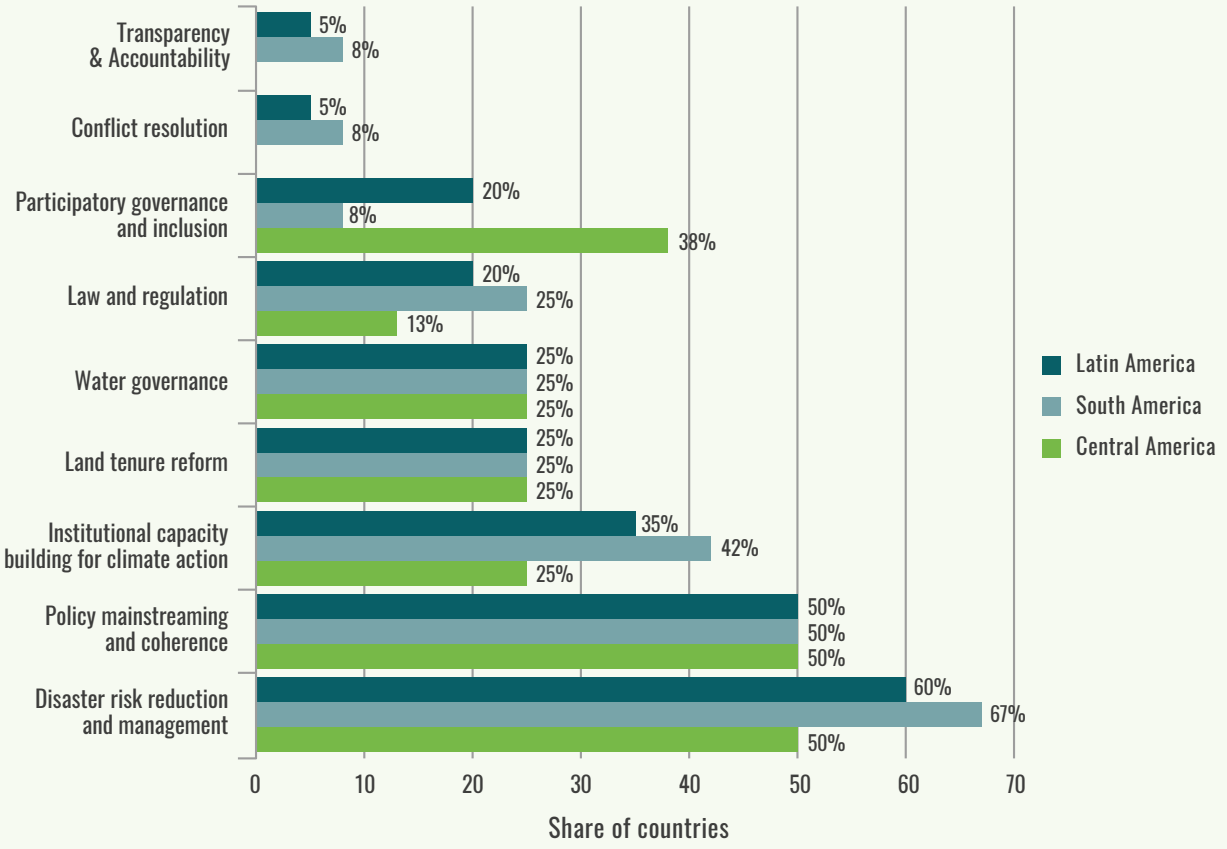


TABLE 20.

EXAMPLES OF INSTITUTIONS AND GOVERNANCE-RELATED ADAPTATION MEASURES

COUNTRY	MANAGEMENT ACTIVITY	METRIC	2030 TARGET
SURINAME	DRAFTED LAW FOR PROTECTING THE UNPROTECTED PARTS OF THE MANGROVE FORESTS ALONG THE COAST	NON-QUANTIFIED	
COLUMBIA	100 PERCENT OF THE NATIONAL TERRITORY COVERED BY CLIMATE CHANGE PLANS FORMULATED AND BEING IMPLEMENTED	QUANTIFIED	100 PERCENT

Knowledge and capacity

Eighty-five percent of countries with an adaptation component include measures related to knowledge and capacity. The majority of those countries promote awareness raising and education, climate information services and research and development (R&D) (60 percent of countries with adaptation in social systems each), followed by early warning systems and hazard and vulnerability mapping (45 percent each), extension services (20 percent) and impact assessment and monitoring and use of traditional knowledge (10 percent each). **Figure 56** illustrates the share of countries, at the regional and sub-regional levels, with one or more (to avoid bias of representation) knowledge and capacity-related adaptation measure, by intervention option, out of countries with adaptation measures in social systems.

FIGURE 56.

KNOWLEDGE AND CAPACITY-RELATED ADAPTATION MEASURES IN THE NDCs OF LATIN AMERICAN COUNTRIES

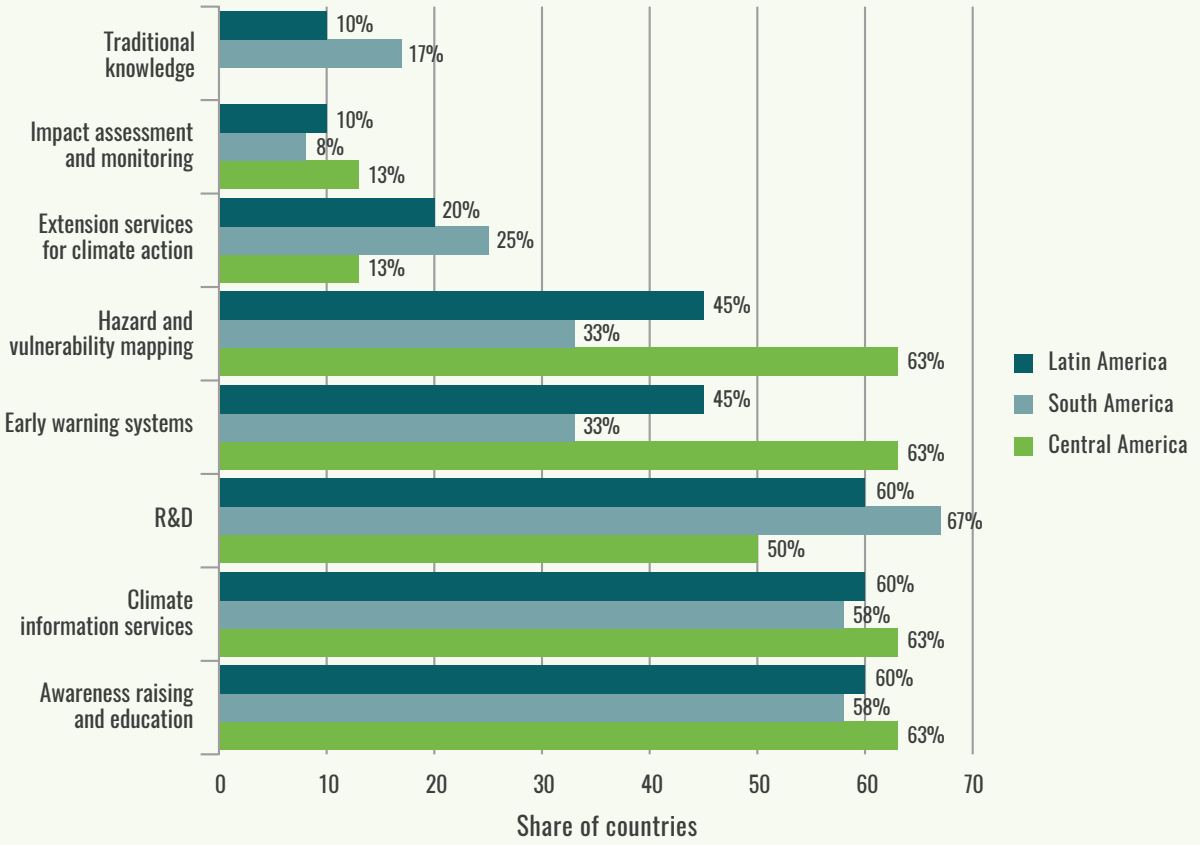


TABLE 21.

EXAMPLES OF KNOWLEDGE AND CAPACITY RELATED ADAPTATION MEASURES

COUNTRY	MANAGEMENT ACTIVITY	METRIC
COSTA RICA	DESIGN OF A NATIONAL VULNERABILITY MONITORING PROGRAM FOR INFRASTRUCTURE DURING FLOODS, DROUGHT, LANDSLIDES AND SEA LEVEL RISING WHICH MAY ALL BE AGGRAVATED BY THE ADVERSE IMPACTS OF CLIMATE CHANGE	NON-QUANTIFIED
MEXICO	REDUCE THE POPULATION'S VULNERABILITY AND INCREASE ITS ADAPTIVE CAPACITY THROUGH EARLY WARNING SYSTEMS, RISK MANAGEMENT, AS WELL AS HYDRO METEOROLOGICAL MONITORING, AT EVERY LEVEL OF GOVERNMENT	NON-QUANTIFIED
PERU	INCREASE THE NUMBER OF PRIORITIZED DISTRICTS, DUE TO HYDRO-METEOROLOGICAL AND CLIMATE EVENTS, THAT ARE MONITORED	NON-QUANTIFIED
BOLIVIA	IMPLEMENTATION OF ANCESTRAL PRACTICES AND KNOWLEDGE, IN THE CONTEXT OF INTEGRATED WATER MANAGEMENT	NON-QUANTIFIED

3.3 BARRIERS AND SUPPORT NEEDS

Article 9, 10 and 11 of the Paris Agreement reiterate the obligations of developed countries to support developing countries' efforts to build clean, climate-resilient futures through the provision of finance, technology and capacity-building support for climate change mitigation and adaptation.

This section presents the different types of support needs communicated by 11 countries in Latin America,[44] as well as the barriers facing these nations to effectively put in place technologies and policies to achieve their climate goals and targets. Information from the NDCs was supplemented by a comprehensive review of country NCs and TNAs submitted after 2010 to understand the types of support needs and potential barriers to implementation of climate actions in the agriculture and land use sectors.

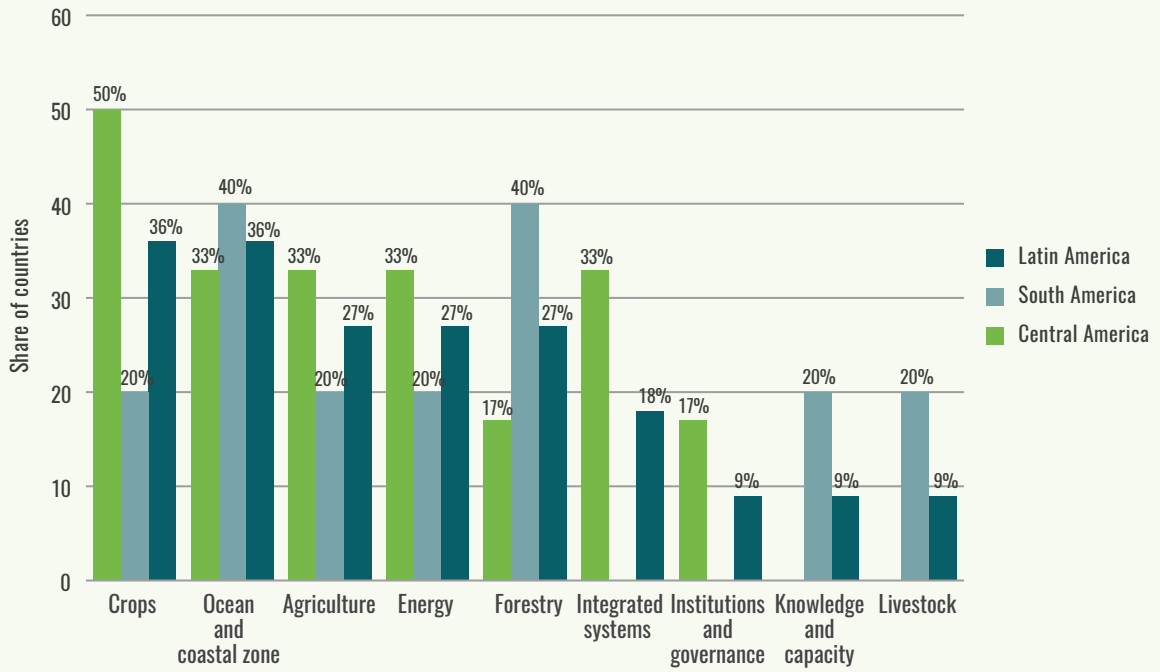
3.3.1 Priority support needs

In Latin America, 55 percent of all countries report at least one priority need for implementing climate action in the agriculture and land use sectors, almost equally distributed between adaptation and mitigation. At the sub-regional level, 75 percent of countries in Central America and 42 percent in Southern America report at least one priority need.

The majority of countries in Latin America report support needs in the crops sub-sector and in ocean and coastal zones (36 percent of countries with needs reported, respectively), followed by in the agriculture sector in general, forestry and energy sub-sector (27 percent each), amongst others. **Figure 57** illustrates the share of countries, at the regional and sub-regional level with priority support needs, by sector, out of countries with needs reported.

FIGURE 57.

PRIORITY SUPPORT NEEDS FOR IMPLEMENTATION OF CLIMATE CHANGE ADAPTATION AND MITIGATION IN LATIN AMERICA, BY SECTOR

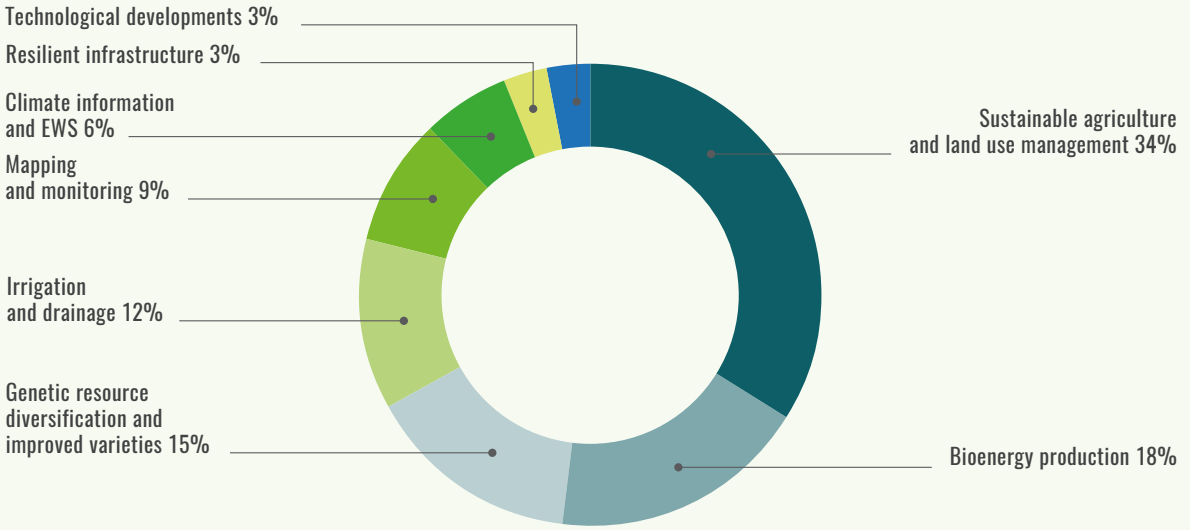


The most frequently reported priority technologies for which support is needed in Latin America are sustainable agriculture and land use management (34 percent of total technologies), bioenergy production (18 percent), genetic resource diversification (15 percent), irrigation and drainage (12 percent) and mapping and monitoring (9 percent), amongst others. **Figure 58** illustrates the priority support needs in Latin America by type of technology.

[44] Belize, Costa Rica, El Salvador, Honduras, Guatemala, Panama, Colombia, Ecuador, Guyana, Uruguay and Suriname reported support needs and/or barriers in the documents analysed.

FIGURE 58.

PRIORITY SUPPORT NEEDS FOR IMPLEMENTATION OF CLIMATE CHANGE ADAPTATION AND MITIGATION IN LATIN AMERICA, BY TYPE OF TECHNOLOGY (SHARE OF TOTAL)



3.3.2 Barriers to implementation

Overall, the most frequently reported barriers to the implementation of adaptation and mitigation priorities in Latin America are economic and financial (100 percent of countries with barriers reported), followed by legal and regulatory and informational and awareness (91 percent each) and institutional and organizational, human skills and technical (73 percent each), amongst others. **Figure 59** illustrates the share of countries with barriers to the implementation of adaptation and mitigation priorities, at the regional and sub-regional level, out of countries with barriers reported.

FIGURE 59.

BARRIERS TO THE IMPLEMENTATION OF CLIMATE ACTION IN THE AGRICULTURE AND USE SECTORS REPORTED IN LATIN AMERICA

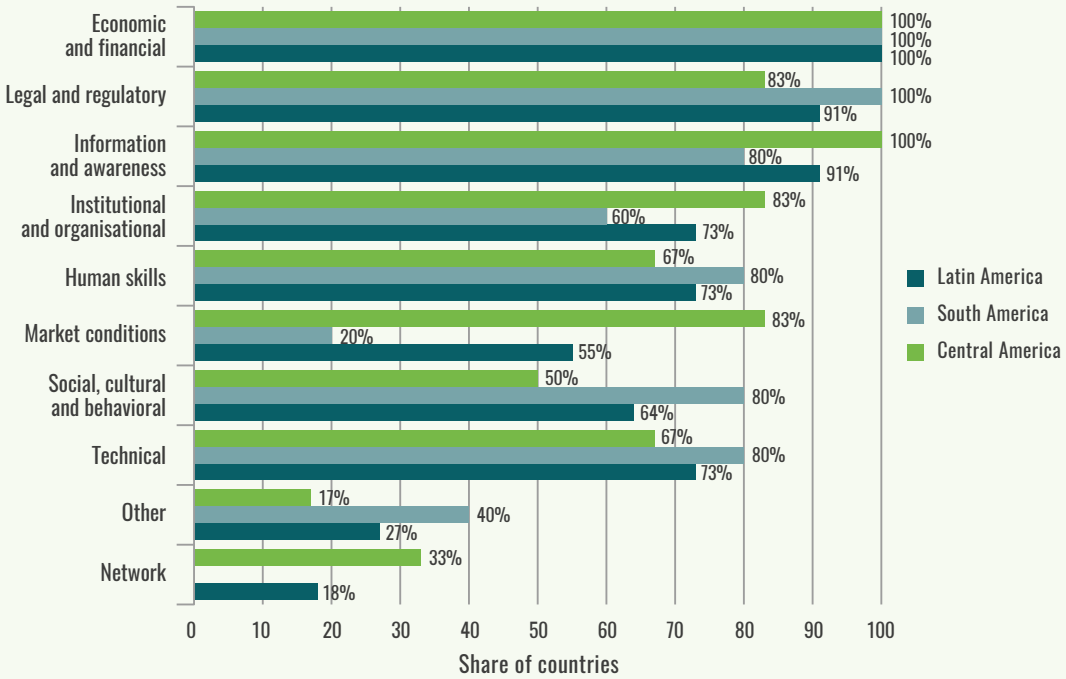


TABLE 22.

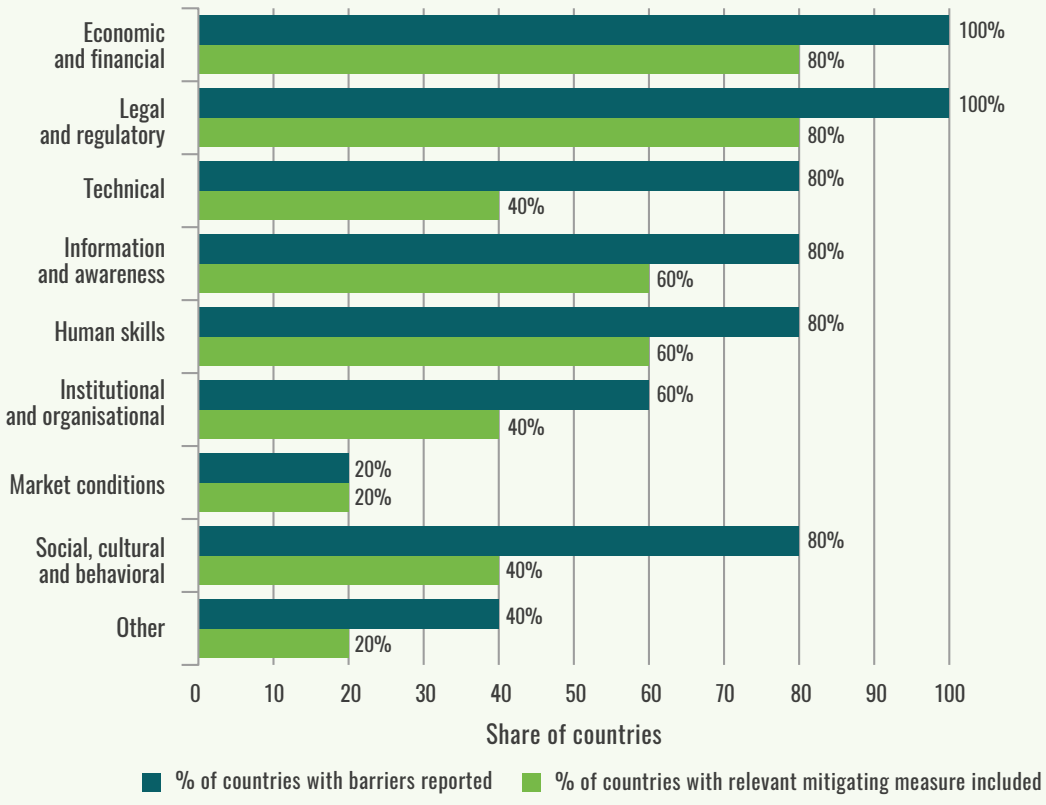
EXAMPLES OF BARRIERS REPORTED IN LATIN AMERICA

COUNTRY	TYPE OF BARRIER	DESCRIPTION OF BARRIER
HONDURAS	FINANCIAL AND ECONOMIC	HIGH COST OF RESEARCH ON CLIMATE CHANGE AND DROUGHT TOLERANT SEED VARIETIES
PANAMA	FINANCIAL AND ECONOMIC	HIGH COST OF PRODUCTION OF BIOETHANOL
BELIZE	LEGAL AND REGULATORY	INADEQUATE REGULATORY AND POLICY FRAMEWORK
HONDURAS	INFORMATION AND AWARENESS	LACK OF INFORMATION ON THE POTENTIAL OF PRODUCTION
BELIZE	HUMAN SKILLS	LOW TECHNICAL CAPACITY
EL SALVADOR	TECHNICAL	PHYSIOGRAPHIC AND HYDROGEOLOGICAL LIMITATIONS TO IRRIGATION
COLOMBIA	INSTITUTIONAL AND ORGANIZATIONAL	LACK OF INSTITUTIONAL INTERACTION

While many of those countries in Central America set forth a number of mitigating measures to address the barriers reported, gaps still emerge around information and awareness-related barriers, as well as technical, legal and regulatory, economic and financial, market conditions and human skills-related barriers. **Figure 60** illustrates the share of countries in Central America with barriers reported compared against the share of countries with mitigating measures proposed. This comparison, however, does not assess the quality (i.e. effectiveness and status of implementation) of the mitigating measures identified.

FIGURE 60.

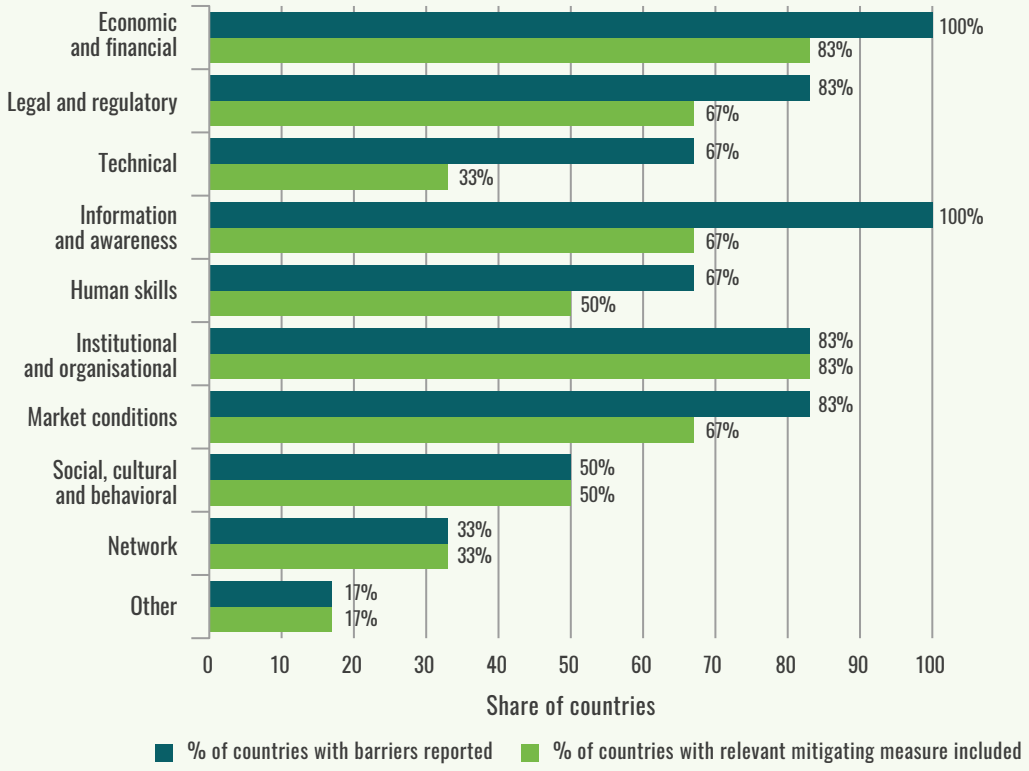
BARRIERS TO THE IMPLEMENTATION OF CLIMATE ACTION IN THE AGRICULTURE AND LAND USE SECTORS REPORTED IN CENTRAL AMERICA COMPARED AGAINST MITIGATING MEASURES SET FORTH TO ADDRESS ASSOCIATED BARRIERS



While many of those countries in Central America set forth a number of mitigating measures to address the barriers reported, gaps still emerge around almost all types reported, including social, cultural and behavioural-related barriers, as well as technical, information and awareness, legal and regulatory, economic and financial, institutional and organizational and human skills-related barriers. **Figure 61** illustrates the share of countries in South America with barriers reported compared against the share of countries with mitigating measures proposed. This comparison, however, does not assess the quality (i.e. effectiveness and status of implementation) of the mitigating measures identified.

FIGURE 61.

BARRIERS TO THE IMPLEMENTATION OF CLIMATE ACTION IN THE AGRICULTURE AND LAND USE SECTORS REPORTED IN SOUTH AMERICA COMPARED AGAINST MITIGATING MEASURES SET FORTH TO ADDRESS ASSOCIATED BARRIERS



3.3.3 Capacity building, finance and technology transfer

In Central America, all countries report capacity-building, finance and technology transfer support needs and, in South America, three-fourths identify capacity-building and technology transfer support needs and over 90 percent require additional financial support.

CHAPTER 4

CHAPTER

4

GAPS AND OPPORTUNITIES FOR ENHANCING AMBITION IN THE AGRICULTURE AND LAND USE SECTORS

This section aims to assess the degree to which the mitigation policies and measures in the agriculture and land use sectors address the major sources of sectoral GHG emissions, and the extent to which adaptation measures in ecosystems and social systems respond to the major observed and/or projected climate-related hazards, slow onset risks, impacts and vulnerabilities reported. The results of the "gap" analysis can inform the review and revision of NDCs in 2020 and future revision cycles by highlighting the "opportunities" to realign mitigation and adaptation priorities in the agriculture and land use sectors. The methodology behind the gap and opportunity analysis is described in FAO (FAO, 2020a, 2020b).

4.1 MITIGATION ANALYSIS

This section first projects the counterfactual scenario – or net emissions in the absence of mitigation – and compares it to the mitigation scenario set out in country NDCs. Information from the NDCs is supplemented by information from the NCs. The "GHG hotspots" in the agriculture and land use sectors are also identified and serve as the reference against which the mitigation policies or measures presented in the NDCs are assessed in order to identify gaps and opportunities for enhancing mitigation ambition.

4.1.1 Counterfactual and mitigation scenarios

Based on national data reported to the UNFCCC by all 20 countries in the region between 2000 and 2019, the counterfactual and mitigation scenarios are estimated at the country and sub-regional levels and then aggregated to the regional level. The counterfactual scenario, at the country-level, is based on the projected level of net emissions in 2030 that is either reported by the country, or projected by using the average change

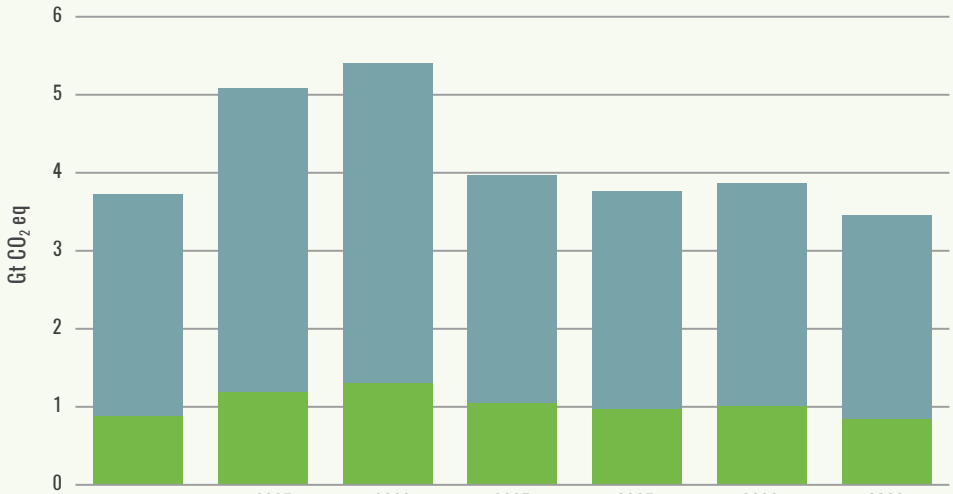
in sub-regional net emissions estimated by other countries in the sub-region as a proxy. The counterfactual scenarios for each country are then aggregated at the sub-regional level. The mitigation scenario, at the country level, is based on the estimated level of net emissions in 2030 that would result from the GHG reduction target reported in their NDC. The mitigation scenarios for each country are then aggregated at the sub-regional level. The counterfactual and mitigation scenarios at the sub-regional level can then be further aggregated at the regional level. Once the counterfactual and mitigation scenarios are established, they are compared to quantify the impact of NDC implementation in terms of the percent reduction in regional net emissions compared to either a scenario without NDC implementation (i.e. the counterfactual level of emissions in 2030) or the historical level of emissions (in 2015).

Without implementation of the NDCs, total economy-wide net emissions in 2030 are expected to increase by around 45 percent compared to those reported in 2015, rising from 3.7 Gt CO_2 eq. in 2015 to 5.4 Gt CO_2 eq. in 2030. Thirteen out of the 20 countries in the region,[45] representing 97 percent of economy-wide net emissions in the region, set a general GHG target, covering the 2016-2030 period.

Under the mitigation scenario, total net emissions in the region are expected to fall by 36 percent compared to the 2030 counterfactual scenario, or from 5.4 Gt CO_2 eq. to 3.5 Gt CO_2 eq. in 2030, which equates to a cumulated net reduction of -15.4 Gt CO_2 eq. over the implementation period, of which 15 percent is explicitly referenced as conditional to international support.

FIGURE 62.

HISTORICAL (2015), COUNTERFACTUAL (2030) AND UNCONDITIONAL AND COMBINED MITIGATION SCENARIOS (2030) IN LATIN AMERICA



	2015*	2025 Counterfactual*	2030 Counterfactual*	2025 Unconditional NDC Target	2025 NDC Target	2030 Unconditional NDC Target	2030 NDC Target
South America	2.84	3.90	4.10	2.92	2.79	2.85	2.61
Central America	0.88	1.18	1.30	1.05	0.97	1.01	0.84

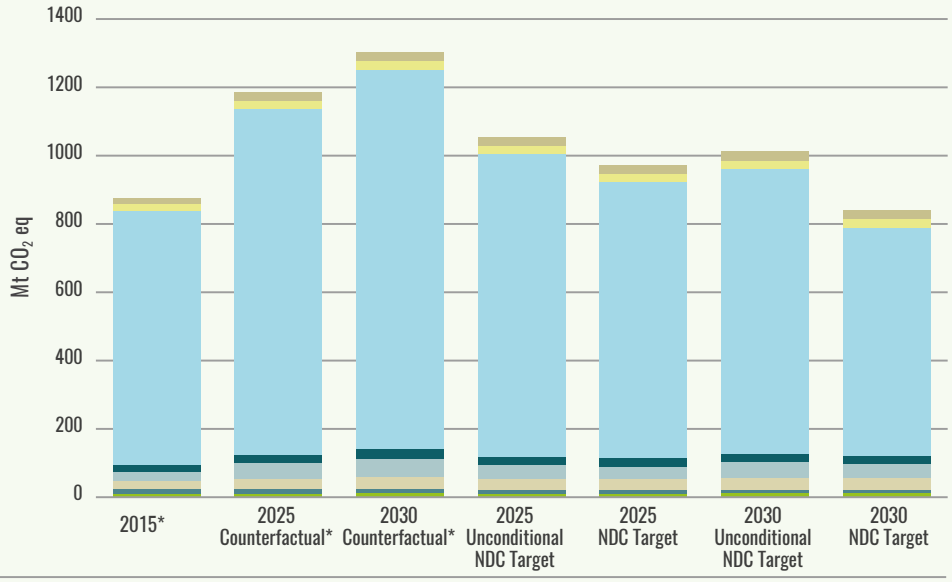
** Estimated based on national data, when available, and linearly interpolated, extrapolated or projected data.*

Figures 63-64 illustrate the various emission scenarios at the sub-regional level.

[45] Belize, El Salvador, Nicaragua, Panama, Bolivia, Guyana and Suriname do not communicate a GHG target.

FIGURE 63.

HISTORICAL (2015), COUNTERFACTUAL (2030) AND UNCONDITIONAL AND COMBINED MITIGATION SCENARIOS (2030) FOR ALL COUNTRIES IN CENTRAL AMERICA

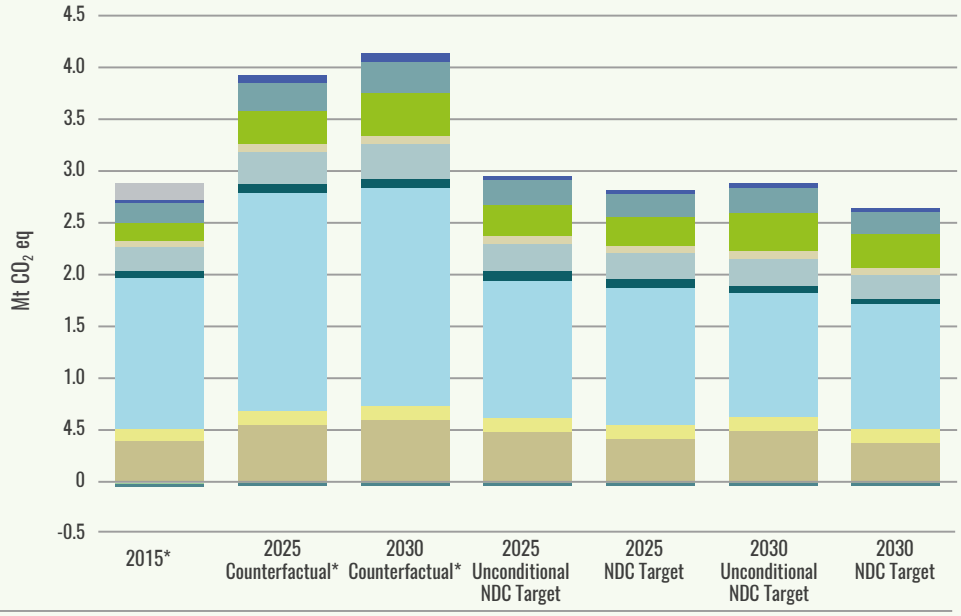


	2015*	2025 Counterfactual*	2030 Counterfactual*	2025 Unconditional NDC Target	2025 NDC Target	2030 Unconditional NDC Target	2030 NDC Target
Panama**	19.34	24.64	27.29	24.64	24.64	27.29	27.29
Nicaragua**	18.27	23.27	25.77	23.27	23.27	25.77	25.77
Mexico	744.72	1,013.00	1,110.00	886.38	810.40	832.50	666.00
Honduras	20.08	25.47	28.92	25.47	23.56	23.56	24.58
Guatemala	25.71	44.47	53.85	41.15	37.76	47.81	41.66
El Salvador**	24.39	31.07	34.41	31.07	31.07	34.41	34.41
Costa Rica	15.01	12.44	12.44	10.91	10.91	9.37	9.37
Belize	7.85	10.00	11.08	10.00	10.00	11.08	11.08

** Estimated based on national data, when available, and linearly interpolated, extrapolated or projected data.*
*** Country without a GHG target where the 2030 counterfactual scenario is projected based on sub-regional emission trends and used under the 2030 mitigation scenarios, assuming the absence of mitigation.*
Note: if a country does not set an unconditional and/or combined target, the counterfactual scenario emission level is used, assuming the absence of mitigation.

FIGURE 64.

HISTORICAL (2015), COUNTERFACTUAL (2030) AN UNCONDITIONAL AND COMBINED MITIGATION SCENARIOS (2030) FOR ALL COUNTRIES IN SOUTH AMERICA



	2015*	2025 Counterfactual*	2030 Counterfactual*	2025 Unconditional NDC Target	2025 NDC Target	2030 Unconditional NDC Target	2030 NDC Target
Venezuela (Bolivarian Republic of)	162.33	0.22	0.33	0.22	0.19	0.33	0.26
Uruguay	29.63	81.00	81.00	42.00	39.00	42.00	39.00
Suriname**	-1.58	-1.14	-1.14	-1.14	-1.14	-1.14	-1.14
Peru	192.47	263.02	298.30	236.72	223.57	238.64	208.81
Paraguay	180.89	324.00	416.00	302.40	280.80	374.40	332.80
Guyana**	-38.36	-26.47	-26.47	-26.47	-26.47	-26.47	-26.47
Ecuador	61.89	76.90	76.90	73.44	68.87	68.87	68.87
Colombia	224.93	306.50	335.00	265.63	245.20	268.00	234.50
Chile	63.27	91.90	91.90	91.90	91.90	63.97	50.46
Brazil	1,465.29	2,100.00	2,100.00	1,323.00	1,323.00	1,197.00	1,197.00
Bolivia (Plurinational State of)**	114.73	132.21	140.95	132.21	132.21	140.95	140.95
Argentina	390.25	550.00	592.00	482.49	411.88	483.00	369.00

** Estimated based on national data, when available, and linearly interpolated, extrapolated or projected data.*
*** Country without a GHG target where the 2030 counterfactual scenario is projected based on sub-regional emission trends and used under the 2030 mitigation scenarios, assuming the absence of mitigation.*
Note: if a country does not set an unconditional and/or combined target, the counterfactual scenario emission level is used, assuming the absence of mitigation.

None of the countries in the region project 2030 counterfactual emission scenarios nor communicate a GHG target in the agriculture sector and only two countries communicate a GHG target in the LULUCF sector. Chile sets a target of a 2.4 percent increase in net removals by 2030 compared to 2010 levels, 50 percent of which is conditional to external support. Ecuador communicates a 20 percent reduction in net emissions by 2025 compared to 2008 levels, of which 80 percent is conditional to external support.

4.1.2 Greenhouse gas hotspots

This section identifies the major emission sources, against which the policies or measures set forth in the NDCs are compared, to inform the gap and opportunity analysis in the section that follows. For each country, the first and second[46] largest sources of sectoral emissions, or "GHG hotspots," were identified based on data reported in the NGHGI. The country-level GHG hotspots are then aggregated at sub-regional and regional levels to identify trends amongst emissions sources, and account for differences, across sub-regional economies and land covers.

[46] Above a 10 percent share.

In the agriculture sector, the largest GHG hotspot in the region is constituted by emissions from enteric fermentation (60 percent of total agriculture emissions), followed by emissions from managed soils (30 percent), both predominantly generated in South America. **Figures 65-66** illustrate the GHG hotspots in the agriculture sector, at the regional and sub-regional level, where the size of the bubble corresponds to the amount of Mt CO_2 eq.

FIGURE 65.

GHG HOTSPOTS IN THE AGRICULTURE SECTOR IN LATIN AMERICA, PER GHG CATEGORY

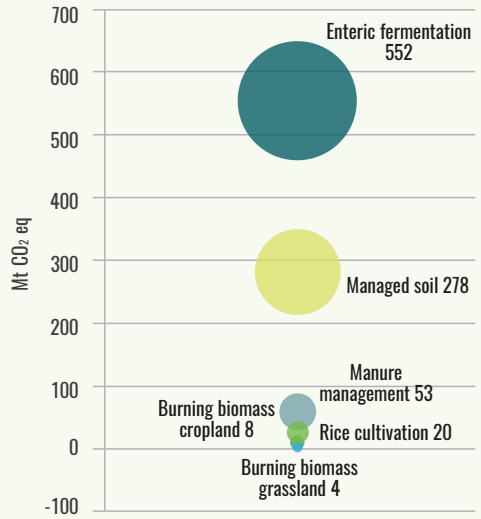
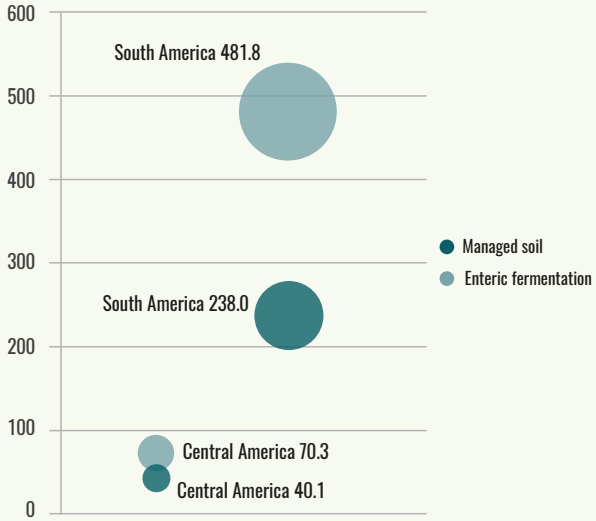


FIGURE 66.

GHG HOTSPOTS IN THE AGRICULTURE SECTOR IN CENTRAL AND SOUTH AMERICA, PER GHG CATEGORY



In the LULUCF sector, the largest GHG hotspots in the region is generated by emissions from forest degradation (43 percent of total LULUCF emissions), mostly in South America, followed by deforestation (32 percent) in both Central and South America, cropland (17 percent) primarily in South America, and grassland (3 percent), predominantly in Central America. **Figures 67-68** illustrate the GHG hotspots in the LULUCF sector, at the regional and sub-regional level, where the size of the bubble corresponds to the amount of Mt CO_2 eq.

FIGURE 67.

GHG HOTSPOTS IN THE LULUCF SECTOR IN LATIN AMERICA, PER GHG CATEGORY

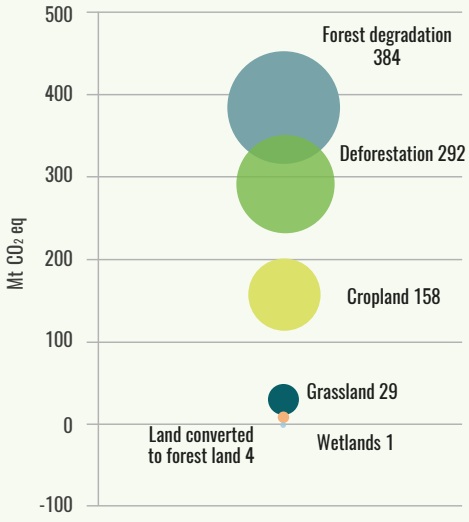
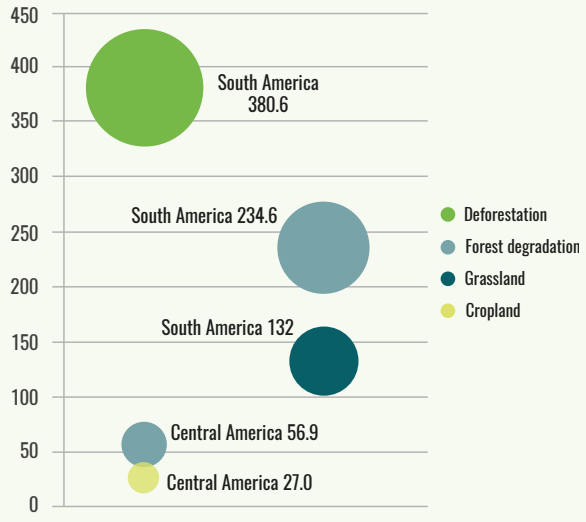


FIGURE 68.

GHG HOTSPOTS IN THE LULUCF SECTOR IN CENTRAL AND SOUTH AMERICA, PER GHG CATEGORY



When emissions from the agriculture and LULUCF sector are combined, the largest GHG hotspots in the region are emissions from enteric fermentation (30 percent of total AFOLU emissions), primarily in South America, **followed by forest degradation** (21 percent), primarily in South America, **as well as deforestation and managed soils** (16 percent each), predominantly in Central America. **Figures 69-70** illustrate the GHG hotspots in the AFOLU sector, at the regional and sub-regional level, where the size of the bubble corresponds to the amount of Mt CO_2 eq.

FIGURE 69.

GHG HOTSPOTS IN THE AFOLU SECTOR IN LATIN AMERICA, PER GHG CATEGORY

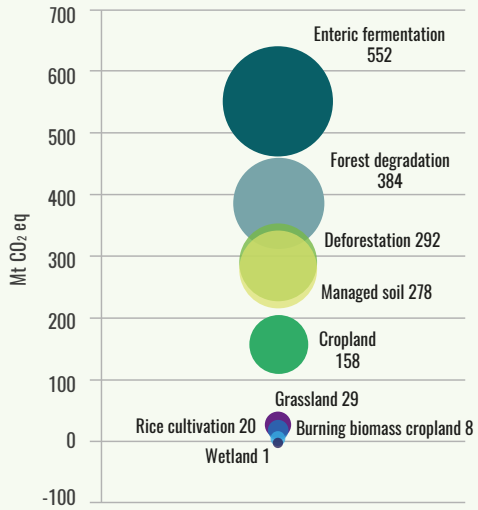
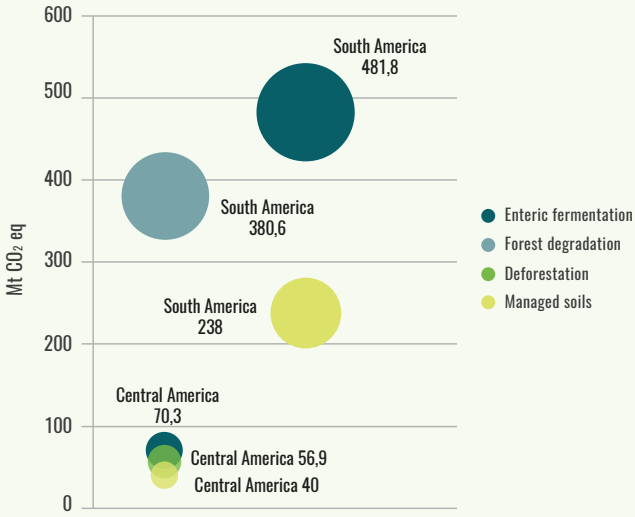


FIGURE 70.

GHG HOTSPOTS IN THE AFOLU SECTOR IN CENTRAL AND SOUTH AMERICA, PER GHG CATEGORY



4.1.3 Gaps and opportunities for enhancing mitigation

A gap analysis was run to assess the degree to which the mitigation policies and measures in the agriculture and land use sectors set forth in the NDCs address the main sources of sectoral GHG emissions, or GHG hotspots, to illustrate not only current "gaps" but potential "opportunities" for enhancing future NDCs. The analysis is based on the mitigation matrices for the agriculture and LULUCF sectors contained in the methodological framework (FAO, 2020a). "Policy coverage" refers to when at least one mitigation policy or measure in a country's NDC aims to reduce emissions or enhance sinks from the GHG hotspot identified in its NGHGI. Policy coverage is quantified at the sub-regional level as the share of countries with at least one mitigation policy or measure that is in line with the GHG hotspot identified. A "policy coverage gap" refers to when there is absence of at least one policy or measure in a country's NDC that targets the GHG hotspot identified. The gap is quantified at the sub-regional level as the share of countries with a policy coverage gap per GHG hotspot identified (**Table 23**). **Annex 5** contain a summary of the country-level gap analysis results per GHG hotspot.

It should be noted that the analysis serves as a broad review of the coverage of mitigation policies or measures mentioned in the NDC and not an assessment of their strength, which should be further assessed in terms of type (e.g. action, policy, project, programme or framework), scale, comprehensiveness and timeframe. The analysis, therefore, serves as an initial stocktaking of policy coverage and does not necessarily indicate policy effectiveness.

TABLE 23.

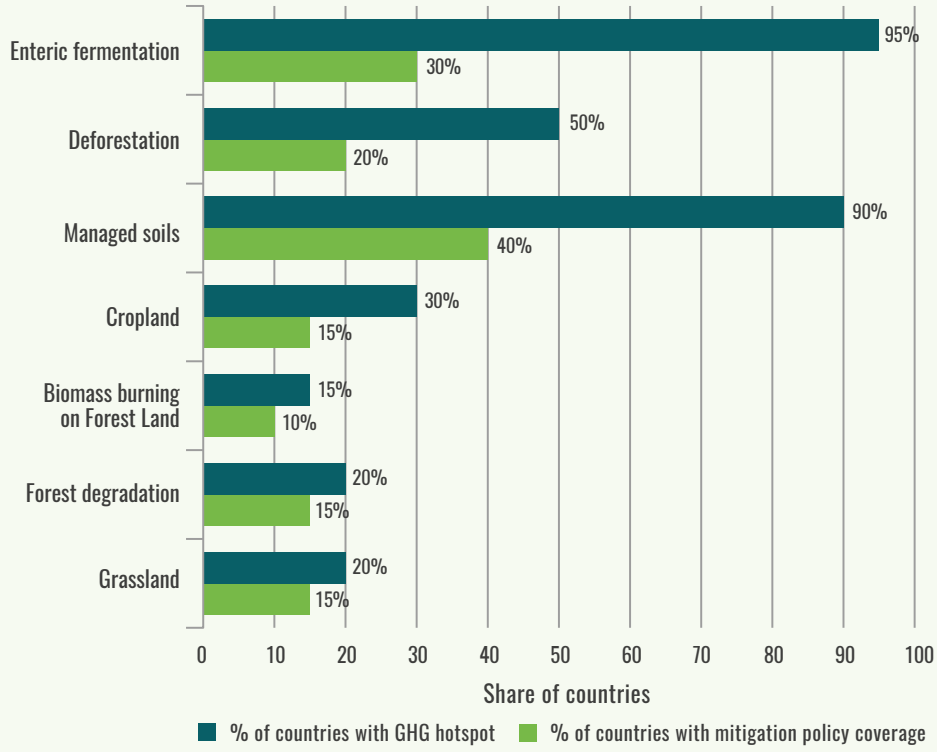
RANGE OF POLICY COVERAGE GAPS IN THE NDC

SCORE	RANGE OF POLICY COVERAGE GAP
VERY HIGH	61 TO 100 PERCENT
HIGH	31 TO 60 PERCENT
MODERATE	10 TO 30 PERCENT
LOW	0 TO 9 PERCENT

In Latin America, very high mitigation policy coverage gaps are observed around emissions from enteric fermentation and deforestation, high gaps are found around emissions from managed soils and cropland, and moderate gaps are found around emissions from biomass burning of forestland, forest degradation and grassland. **Figure 71** presents the results of the mitigation policy gap and opportunity analysis by which the percent of countries with each type of GHG hotspot is compared against the share of countries with mitigation policy coverage in the NDCs, ordered from highest to lowest policy coverage gap.

FIGURE 71.

MITIGATION GAP AND OPPORTUNITY ANALYSIS RESULTS FOR LATIN AMERICA, PER GHG HOTSPOT



* GHG hotspots associated with 5 percent or less of countries are excluded from the analysis.

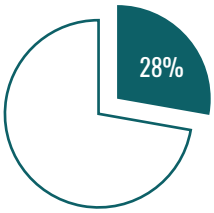
The sub-regional results are presented below:

CENTRAL AMERICA

In Central America, a very high mitigation policy coverage gap[47] is found in relation to emissions from enteric fermentation, while a high gap is found in relation to emissions from managed soils. Moderate policy coverage gaps are found around emissions from deforestation, cropland and grassland.

[47] Only those GHG hotspots representing a 10 percent or greater share of AFOLU emissions per sub-region are listed.

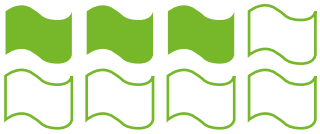
ENTERIC FERMENTATION

NUMBER OF COUNTRIES WITH HOTSPOT	HOTSPOT SHARE OF AFOLU EMISSIONS IN SUB-REGION	POLICY COVERAGE GAP
 100%		VERY HIGH

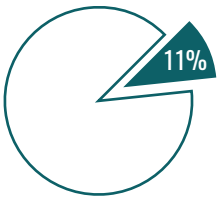
MANAGED SOILS

NUMBER OF COUNTRIES WITH HOTSPOT	HOTSPOT SHARE OF AFOLU EMISSIONS IN SUB-REGION	POLICY COVERAGE GAP
 100%		HIGH

DEFORESTATION

NUMBER OF COUNTRIES WITH HOTSPOT	HOTSPOT SHARE OF AFOLU EMISSIONS IN SUB-REGION	POLICY COVERAGE GAP
 38%		MODERATE

GRASSLAND

NUMBER OF COUNTRIES WITH HOTSPOT	HOTSPOT SHARE OF AFOLU EMISSIONS IN SUB-REGION	POLICY COVERAGE GAP
 50%		MODERATE

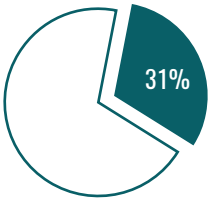
CROPLAND

NUMBER OF COUNTRIES WITH HOTSPOT	HOTSPOT SHARE OF AFOLU EMISSIONS IN SUB-REGION	POLICY COVERAGE GAP
 25%		MODERATE

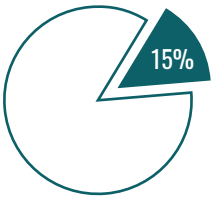
SOUTH AMERICA

In South America, a very high mitigation policy coverage gap[48] is found in relation to emissions from enteric fermentation, while a high gap is found in relation to emissions from managed soils and deforestation. A moderate policy coverage gap is found around emissions from cropland.

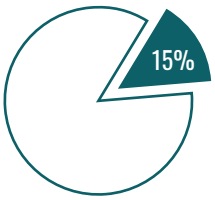
ENTERIC FERMENTATION

NUMBER OF COUNTRIES WITH HOTSPOT	HOTSPOT SHARE OF AFOLU EMISSIONS IN SUB-REGION	POLICY COVERAGE GAP
 92%		**VERY HIGH**

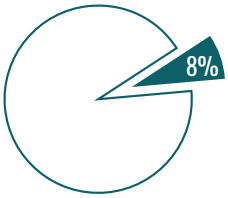
MANAGED SOILS

NUMBER OF COUNTRIES WITH HOTSPOT	HOTSPOT SHARE OF AFOLU EMISSIONS IN SUB-REGION	POLICY COVERAGE GAP
 83%		**HIGH**

DEFORESTATION

NUMBER OF COUNTRIES WITH HOTSPOT	HOTSPOT SHARE OF AFOLU EMISSIONS IN SUB-REGION	POLICY COVERAGE GAP
 58%		**HIGH**

CROPLAND

NUMBER OF COUNTRIES WITH HOTSPOT	HOTSPOT SHARE OF AFOLU EMISSIONS IN SUB-REGION	POLICY COVERAGE GAP
 33%		**MODERATE**

[48] Only those GHG hotspots representing a 10 percent or greater share of AFOLU emissions per sub-region are listed.

4.2 ADAPTATION ANALYSIS

This section presents the results of a gap analysis that compares the observed and/or projected climate-related hazards, impacts, vulnerabilities and risks in ecosystems and social systems reported, or "vulnerability hotspots", against the relevant adaptation measures set forth in the NDCs in order to identify gaps and opportunities for strengthening next round NDCs. Information from the NDCs are supplemented with information from NCs. The analysis is based on the adaptation matrices for ecosystems and social systems contained in the methodological framework (FAO, 2020a).

4.2.1 Gaps and opportunities for enhancing adaptation

For each country, the observed and/or projected climate-related hazards, risks and vulnerabilities reported in ecosystems or social systems, or "vulnerability hotspots," are compared against the set of adaptation priorities or measures set forth in the NDCs at either the ecosystem service level (for ecosystems) or social dimension (for social systems). "Policy coverage" refers to when at least one adaptation measure in a country's NDC aims to reduce vulnerability and/or increase adaptive capacity in relation to a given vulnerability hotspot. Policy coverage is quantified at the sub-regional level as the share of countries with at least one adaptation measure that addresses a given hotspot. A "policy coverage gap" refers to when there is misalignment between the adaptation priorities or measures presented in a country's NDC and a given vulnerability hotspot. A policy coverage gap is the difference between the share of countries with a vulnerability hotspot and the share of countries with policy coverage. The gap is quantified at the sub-regional level as the share of countries with a policy coverage gap out of the share of countries with a vulnerability hotspot (**Table 24**). **Annex 6-7** contains the country-level gap analysis results per vulnerability hotspot for each country.

It should be noted that the analysis serves as a broad review of the coverage of adaptation priority sectors and measures mentioned in the NDCs and not an assessment of their strength, which should be further assessed in terms of type (e.g. action, policy, project, programme or framework), scale, comprehensiveness and timeframe. The analysis, therefore, serves as an initial stocktaking of policy coverage and does not necessarily indicate policy effectiveness.

TABLE 24.

RANGE OF POLICY COVERAGE GAPS IN THE NDC

SCORE	POLICY COVERAGE GAP RANGE
VERY HIGH	61 TO 100 PERCENT
HIGH	31 TO 60 PERCENT
MODERATE	10 TO 30 PERCENT
LOW	0 TO 9 PERCENT

Gaps and opportunities in ecosystems

In Latin America, all countries reported climate-related hazards, impacts and vulnerabilities in ecosystems.

In terms of climate-related hazard hotspots, high to very high adaptation policy coverage gaps are found in relation to wild fires and snow and ice melting, and moderate policy coverage gaps are found around eutrophication, storms, sea-level rise, invasion by pests and non-native species, drought and floods.

In terms of ecosystem vulnerability hotpots, very high adaptation policy coverage gaps are found in relation to climate-related impacts observed or projected in inland water, mountain, ice and snow, desert and wetlands ecosystems.

In terms of vulnerable agricultural sector hotspots, very high adaptation policy coverage gaps are found in relation to climate-related impacts observed or projected in grasslands and integrated systems, moderate coverage gap is found in relation to livestock and low coverage gaps are found in relation to crops.

In terms of natural resource vulnerability hotspots, a moderate adaptation policy coverage gap is found in relation to climate-related impacts observed or projected on land and soil resources. Low policy coverage gaps are found in relation to climate-related impacts on water and genetic resources.

In terms of ecosystem service vulnerability hotspots, moderate adaptation policy coverage gaps are found in relation to climate-related impacts observed or projected on livestock, biofuel production, biological control, nutrient cycling and soil formation. Low policy coverage gaps are found in relation to climate-related impacts on the maintenance of genetic diversity and abundance, erosion control, and the provision of crops and freshwater.

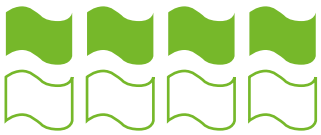
The sub-regional results are presented below by climate-related vulnerability hotspot:

CENTRAL AMERICA

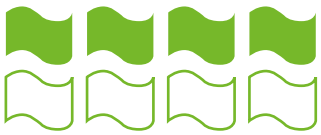
In Central America, very high adaptation policy coverage gap is found in relation to climate-related impacts observed or projected in ice and snow, mountain, inland water, wetland, and desert ecosystems. Moderate to high policy coverage gaps are found in relation to climate-related impacts on grasslands, livestock and integrated systems. Moderate policy coverage gaps are found in relation to climate-related impacts on land and soil and water resources, as well as in relation to climate-related impacts on ecosystem services, including erosion and biological control, as well as in relation to wildfires.

ECOSYSTEM VULNERABILITY HOTSPOT	NUMBER OF COUNTRIES WITH HOTSPOT	POLICY COVERAGE GAP
ICE AND SNOW ECOSYSTEMS	 **50%**	**VERY HIGH**

ECOSYSTEM VULNERABILITY HOTSPOT	NUMBER OF COUNTRIES WITH HOTSPOT	POLICY COVERAGE GAP
MOUNTAIN ECOSYSTEMS	 **50%**	**VERY HIGH**

ECOSYSTEM VULNERABILITY HOTSPOT	NUMBER OF COUNTRIES WITH HOTSPOT	POLICY COVERAGE GAP
INLAND WATER ECOSYSTEMS	 **50%**	**VERY HIGH**

ECOSYSTEM VULNERABILITY HOTSPOT	NUMBER OF COUNTRIES WITH HOTSPOT	POLICY COVERAGE GAP
WETLAND ECOSYSTEMS	 **50%**	**VERY HIGH**

ECOSYSTEM VULNERABILITY HOTSPOT	NUMBER OF COUNTRIES WITH HOTSPOT	POLICY COVERAGE GAP
DESERT ECOSYSTEMS	 **50%**	**VERY HIGH**

SECTOR VULNERABILITY HOTSPOT	NUMBER OF COUNTRIES WITH HOTSPOT	POLICY COVERAGE GAP
GRASSLANDS	 **50%**	**VERY HIGH**

SECTOR VULNERABILITY HOTSPOT	NUMBER OF COUNTRIES WITH HOTSPOT	POLICY COVERAGE GAP
INTEGRATED SYSTEMS	 **50%**	**HIGH**

SECTOR VULNERABILITY HOTSPOT	NUMBER OF COUNTRIES WITH HOTSPOT	POLICY COVERAGE GAP
LIVESTOCK	 **63%**	**MODERATE**

NATURAL RESOURCE VULNERABILITY HOTSPOT	NUMBER OF COUNTRIES WITH HOTSPOT	POLICY COVERAGE GAP
LAND AND SOIL RESOURCES	 **75%**	**MODERATE**

NATURAL RESOURCE VULNERABILITY HOTSPOT	NUMBER OF COUNTRIES WITH HOTSPOT	POLICY COVERAGE GAP
WATER RESOURCES	 **88%**	**MODERATE**

ECOSYSTEM SERVICE VULNERABILITY HOTSPOT	NUMBER OF COUNTRIES WITH HOTSPOT	POLICY COVERAGE GAP
BIOLOGICAL CONTROL	 **50%**	**MODERATE**

ECOSYSTEM SERVICE VULNERABILITY HOTSPOT	NUMBER OF COUNTRIES WITH HOTSPOT	POLICY COVERAGE GAP
EROSION CONTROL	 **75%**	**MODERATE**

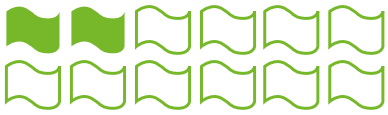
CLIMATE-RELATED HAZARD HOTSPOT	NUMBER OF COUNTRIES WITH HOTSPOT	POLICY COVERAGE GAP
WILD FIRE	 **50%**	**MODERATE**

SOUTH AMERICA

In South America, high to very high adaptation policy coverage gaps are found in relation to climate-related wildfires, sea level rise and snow and ice melting. A very high policy coverage gap is found in relation to climate-related impacts observed or projected in inland water ecosystems, and moderate policy coverage gaps are found in relation to climate-related impacts in the crops and livestock sub-sectors. Moderate to high policy coverage gaps are found in relation to climate-related impacts on land and soil and genetic resources, and in relation to climate-related impacts on ecosystem services, including the maintenance of genetic diversity and abundance and nutrient cycling and soil formation.

CLIMATE-RELATED HAZARD HOTSPOT	NUMBER OF COUNTRIES WITH HOTSPOT	POLICY COVERAGE GAP
WILD FIRE	 **25%**	**VERY HIGH**

CLIMATE-RELATED HAZARD HOTSPOT	NUMBER OF COUNTRIES WITH HOTSPOT	POLICY COVERAGE GAP
SNOW AND ICE MELTING	 **42%**	**VERY HIGH**

ECOSYSTEM VULNERABILITY HOTSPOT	NUMBER OF COUNTRIES WITH HOTSPOT	POLICY COVERAGE GAP
INLAND WATER ECOSYSTEMS	 **17%**	**VERY HIGH**

CLIMATE-RELATED HAZARD HOTSPOT	NUMBER OF COUNTRIES WITH HOTSPOT	POLICY COVERAGE GAP
SEA LEVEL RISE	 **42%**	**HIGH**

ECOSYSTEM SERVICE VULNERABILITY HOTSPOT	NUMBER OF COUNTRIES WITH HOTSPOT	POLICY COVERAGE GAP
NUTRIENT CYCLING AND SOIL FORMATION	 **17%**	**HIGH**

SECTOR VULNERABILITY HOTSPOT	NUMBER OF COUNTRIES WITH HOTSPOT	POLICY COVERAGE GAP
CROPS	 **42%**	**MODERATE**

SECTOR VULNERABILITY HOTSPOT	NUMBER OF COUNTRIES WITH HOTSPOT	POLICY COVERAGE GAP
LIVESTOCK	 **25%**	**MODERATE**

NATURAL RESOURCE VULNERABILITY HOTSPOT	NUMBER OF COUNTRIES WITH HOTSPOT	POLICY COVERAGE GAP
LAND AND SOIL RESOURCES	 **42%**	**MODERATE**

NATURAL RESOURCE VULNERABILITY HOTSPOT	NUMBER OF COUNTRIES WITH HOTSPOT	POLICY COVERAGE GAP
GENETIC RESOURCES	 **83%**	**MODERATE**

ECOSYSTEM SERVICE VULNERABILITY HOTSPOT	NUMBER OF COUNTRIES WITH HOTSPOT	POLICY COVERAGE GAP
MAINTENANCE OF GENETIC DIVERSITY AND ABUNDANCE	 **33%**	**MODERATE**

Gaps and opportunities in social systems

In Latin America, all countries with the exception of two,[49] reported climate-related hazards, impacts and vulnerabilities in social systems. Therefore, the gap and opportunity analysis is only relevant to those reporting countries.

In terms of climate-related risk hotspots, high to very high policy coverage gap is found in relation to migration and displacement and gender and youth inequality, while moderate policy coverage gaps are found in relation to climate-related rural livelihoods and income loss and conflict.

The sub-regional results are presented below:

CENTRAL AMERICA

In Central America, high to very policy coverage gaps are found in relation to climate-related migration and displacement, gender and youth inequality and rural livelihoods and income loss, while a moderate policy coverage gap is found in relation to conflict.

CLIMATE-RELATED RISK HOTSPOT	NUMBER OF COUNTRIES WITH HOTSPOT	POLICY COVERAGE GAP
MIGRATION AND DISPLACEMENT	 **57%**	**VERY HIGH**

CLIMATE-RELATED RISK HOTSPOT	NUMBER OF COUNTRIES WITH HOTSPOT	POLICY COVERAGE GAP
GENDER AND YOUTH INEQUALITY	 **57%**	**HIGH**

[49] Panama and Paraguay.

CLIMATE-RELATED RISK HOTSPOT	NUMBER OF COUNTRIES WITH HOTSPOT	POLICY COVERAGE GAP
RURAL LIVELIHOODS AND INCOME LOSS		**HIGH**
	71%	

CLIMATE-RELATED RISK HOTSPOT	NUMBER OF COUNTRIES WITH HOTSPOT	POLICY COVERAGE GAP
CONFLICT		**MODERATE**
	57%	

SOUTH AMERICA

In South America, a very high policy coverage gap is found in relation to climate-related migration and displacement. On the other hand, very high policy coverage is observed in relation to the most frequently reported climate-related risks including loss of productive infrastructure and assets, rural livelihoods and income loss and poverty and inequality. However, the strength and status of implementation of the measures are not assessed.

CLIMATE-RELATED RISK HOTSPOT	NUMBER OF COUNTRIES WITH HOTSPOT	POLICY COVERAGE GAP
MIGRATION AND DISPLACEMENT		**VERY HIGH**
	18%	

CHAPTER 5

CHAPTER

5

OPPORTUNITIES FOR LEVERAGING SYNERGIES WITH SUSTAINABLE DEVELOPMENT

The world faces a double challenge of eradicating hunger by 2030 and addressing global climate change at the same time. In 2015, with the adoption of the 2030 Agenda for Sustainable Development and the Paris Agreement, developed and developing countries alike pledged to take ambitious action to end all forms of poverty, fight inequalities, and tackle climate change, ensuring that no one is left behind.

The Paris Agreement rests upon 167 (I)NDCs that reflect the national climate targets, policies and measures of 194 countries,[50] **while the SDGs are defined by 17 goals and 169 targets**, which need to be translated into national and subnational plans.

The SDGs and NDCs are interlinked (GIZ and WRI, 2018). Both the 2030 Agenda and the preamble of the Paris Agreement acknowledge the intrinsic relationship between climate change, sustainable development and food security. The 2030 Agenda integrates addressing climate change in its 17 goals and refers to the UNFCCC as the primary international forum for negotiating the global response to climate change. Similarly, the Paris Agreement requires parties to embed climate action "in the context of sustainable development" and acknowledges the "fundamental priority of safeguarding food security and ending hunger, and the particular vulnerabilities of food production systems to the adverse impacts of climate change" (UNFCCC, 2015).[51]

The challenge is to strike a balance between emission reductions, adaptation and development and poverty reduction priorities, and find policies that co-deliver. Climate change response pathways in developing countries should address the dual need for mitigation and adaptation together, leveraging synergies and reconciling tradeoffs amongst varying objectives. Capturing the co-benefits of mitigation and adaptation in the agriculture sector can also support progress in achieving the objectives of other international agreements, including the Sendai Framework for Disaster Risk Reduction, the United Nations Convention to Combat Desertification and the Convention on Biological Diversity.

[50] As of March 1, 2019.

[51] Article 2.1 of Paris Agreement.

Transforming the approach to NDC and SDG implementation from silos to synergies presents an unprecedented opportunity for national governments to leverage progress across both agendas and optimize resources in the path towards low-emissions and climate resilient development.

The Sendai Framework charts the global course over the next 15 years, with seven targets and four priorities for action, to reducing risk. It recognizes the opportunity to enhance coherence and mutual reinforcement across international agreements, to link mechanisms for monitoring and reporting and to promote cooperation in implementation.

This section aims to assess the opportunities for capturing mitigation and adaptation co-benefits within the NDCs, as well as leveraging synergies between climate actions and the sustainable development agenda. It first presents the types of co-benefits explicitly referenced by countries in their NDCs and then looks beyond to the potential co-benefits and synergies that may be generated from climate actions that are not explicitly recognized in the NDCs. It also assesses the links between climate actions in the agriculture and land use sectors and the 2030 Agenda and the Sendai Framework.

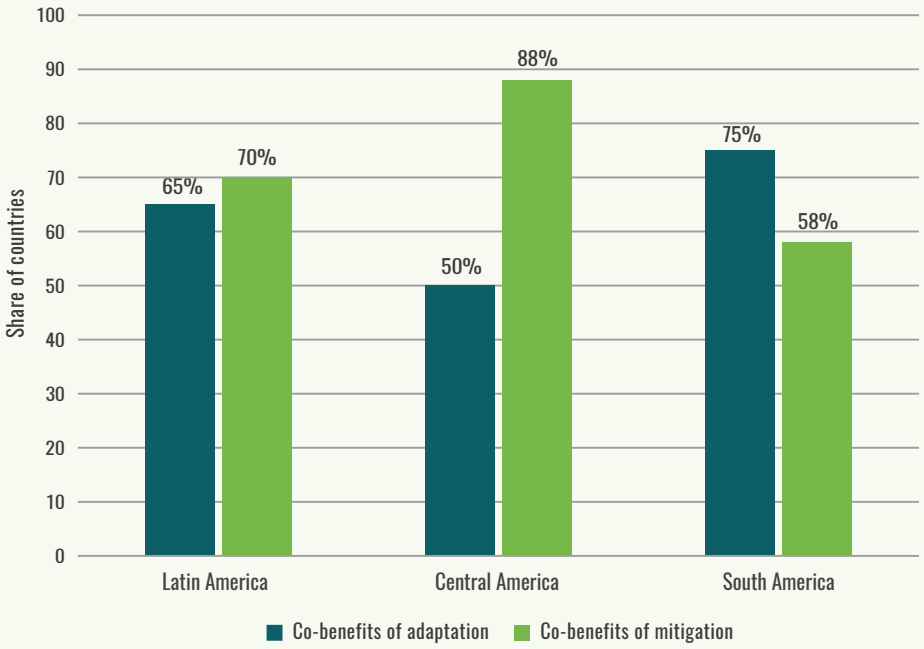
5.1 MITIGATION AND ADAPTION CO-BENEFITS

The identification of co-benefits can be critical for driving progress across mitigation and adaptation agendas and informing investment options in the agriculture and land use sectors. Mitigation and adaptation in agriculture are closely interlinked through a web of feedbacks, synergies, and trade-offs. Sustainable food and agriculture systems carry the greatest potential for generating synergies across climate change mitigation and adaptation efforts, as well as significant socio-economic and environmental co-benefits (FAO, 2016e).

Overall, 90 percent of countries in Latin America explicitly recognize either the mitigation or adaptation co-benefits of climate action in the agriculture and land use sectors within their NDCs. **Figure 72** illustrates the share of countries, at the regional and sub-regional level, with explicit reference to the co-benefits of mitigation and/or adaptation in the agriculture and land use sectors.

FIGURE 72.

EXPLICIT REFERENCE TO THE CO-BENEFITS OF MITIGATION AND ADAPTATION IN THE AGRICULTURE AND LAND USE SECTORS IN THE NDCs OF LATIN AMERICAN COUNTRIES



5.1.1 Mitigation co-benefits of adaptation

At the regional level, adaptation in ocean and coastal zones and forestry represent the main areas in which mitigation co-benefits are most frequently reported (47 and 37 percent of countries with adaptation in agriculture and land use, respectively), followed by adaptation in integrated systems (26 percent) and wetlands (16 percent), amongst others. **Figure 73** illustrates the share of countries, at the regional and sub-regional levels, with at least one adaptation measure with mitigation co-benefits explicitly referenced out of countries with adaptation in agriculture and land use sectors, by land use/sub-sector.

FIGURE 73.

MITIGATION CO-BENEFITS OF ADAPTATION IN AGRICULTURE AND LAND USE SECTORS REFERENCED IN THE NDCs OF LATIN AMERICAN COUNTRIES, BY LAND USE/SUB-SECTOR

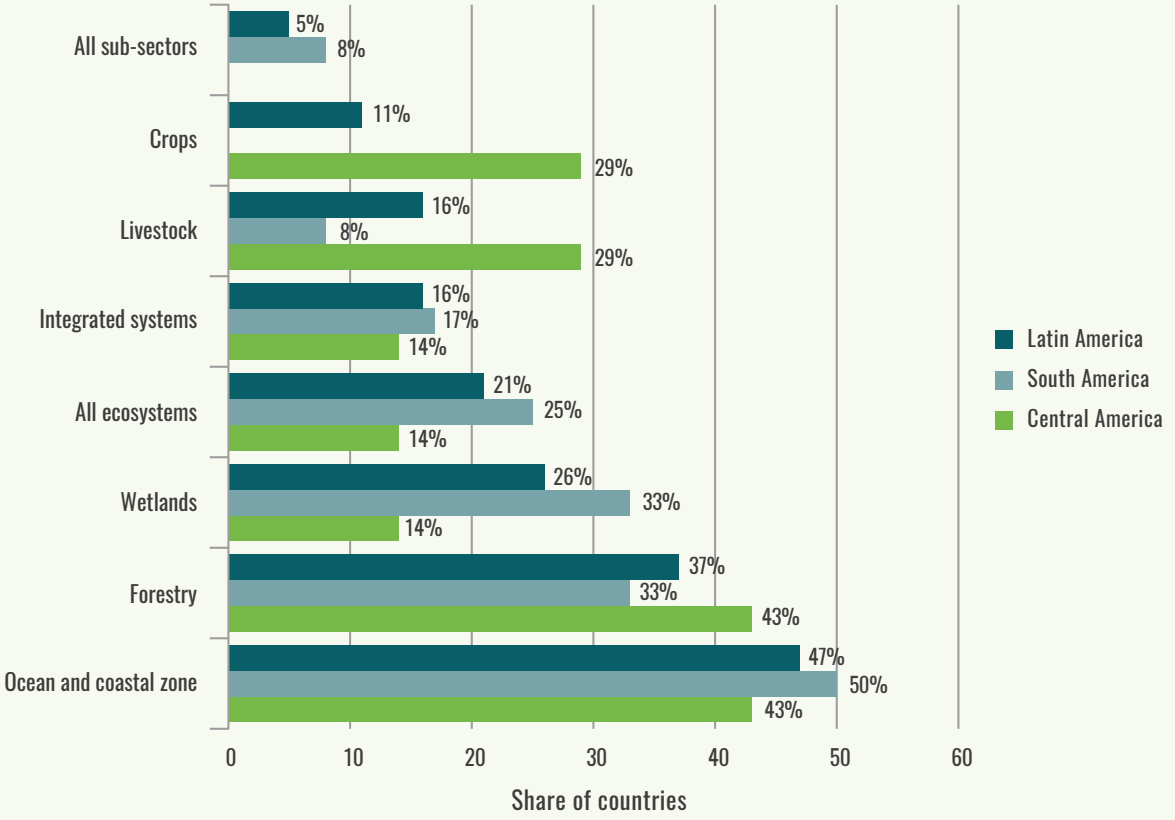


TABLE 25.

EXAMPLE OF MITIGATION CO-BENEFITS OF ADAPTATION REPORTED

COUNTRY	ADAPTATION MEASURE	MITIGATION CO-BENEFIT
BOLIVIA	STRENGTHENING COMMUNITY-BASED STEWARDSHIP IN FOREST MANAGEMENT AND FARMING SYSTEMS	MITIGATION
HONDURAS	IMPLEMENTATION OF AGRO-FORESTRY SYSTEMS "QUESUNGUAL"	MITIGATION

5.1.2 Adaptation co-benefits of mitigation

At the regional level, mitigation on forest land and in integrated systems represent the main areas in which adaptation and/or sustainable development co-benefits are most frequently reported (35 and 20 percent of countries with mitigation in agriculture and land use, respectively), followed by mitigation on cropland (15 percent), grassland (10 percent) and wetlands and organic soils (10 percent), amongst others. **Figure 74** illustrates the share of countries, at the regional and sub-regional level, with at least one mitigation measure with adaptation and/or sustainable development co-benefits explicitly referenced out of countries with adaptation in agriculture and land use sectors, by land use/sub-sector.

FIGURE 74.

ADAPTATION AND SUSTAINABLE DEVELOPMENT CO-BENEFITS OF MITIGATION IN AGRICULTURE AND LAND USE SECTORS REFERENCED IN THE NDCs OF LATIN AMERICAN COUNTRIES, BY LAND USE/SUB-SECTOR

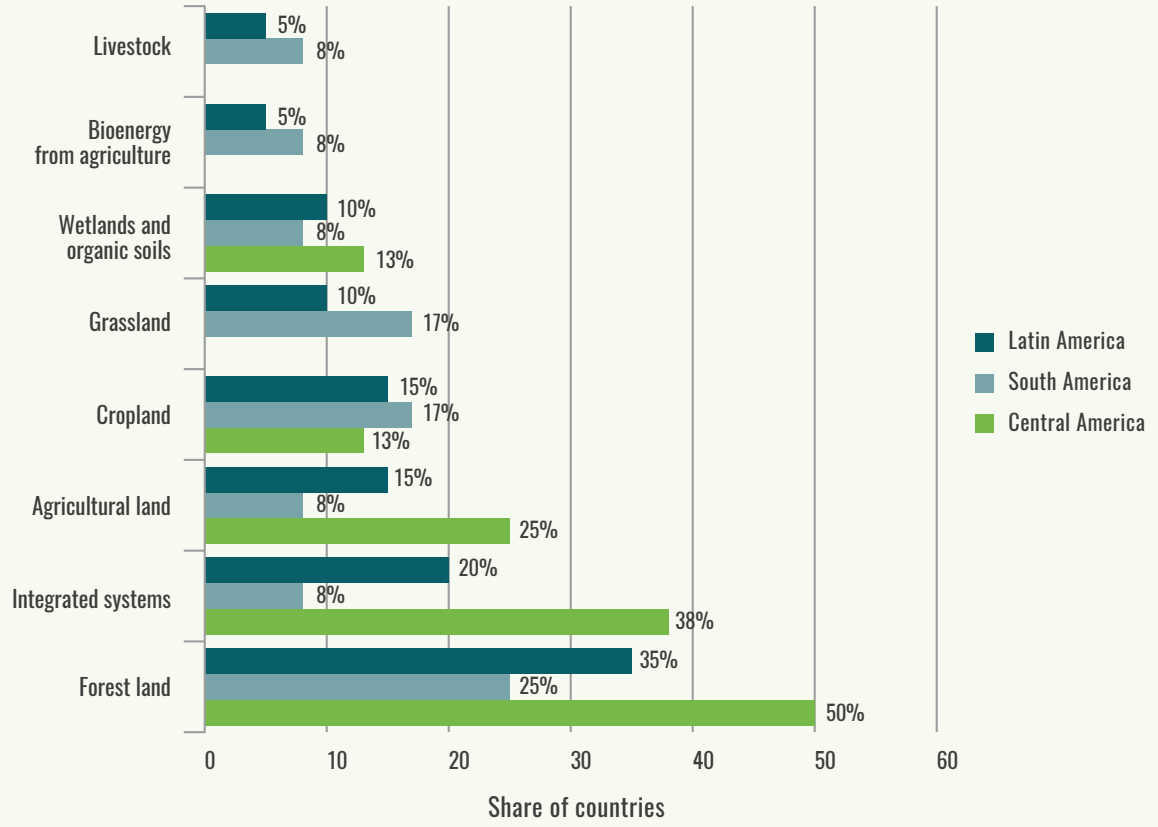


TABLE 26.

EXAMPLE OF ADAPTATION AND SUSTAINABLE DEVELOPMENT CO-BENEFITS OF MITIGATION MEASURES REPORTED

COUNTRY	MITIGATION MEASURE	ADAPTATION AND SUSTAINABLE DEVELOPMENT CO-BENEFITS
NICARAGUA	CONTINUE REFORESTATION	INCREASED BIODIVERSITY IN PROTECTED AREAS AND BIOLOGICAL CORRIDORS; PROTECTION AND RECOVERY OF WATER CATCHMENT AREAS AND WATER BODIES; AND REDUCED RISK OF EROSION AND SLIDING
URUGUAY	KEEP AREA OF NATIVE FOREST AT 2012 LEVEL, AVOIDING ANY FURTHER LOSS	FORESTS MITIGATE WEATHER EXTREMES AT LOCAL AND REGIONAL SCALES

BOX 2: MITIGATION AND ADAPTATION TRADE-OFFS IN THE NATIONALLY DETERMINED CONTRIBUTIONS OF LATIN AMERICAN COUNTRIES

Reconciling trade-offs amongst mitigation and adaptation measures is critical to a sustainable transition towards a low-emissions and climate resilient future. A mitigation and adaptation trade-off matrix was developed (FAO, 2020a) to assess the potential trade-offs amongst mitigation and adaptation measures in the agriculture and land use sectors set forth in country NDCs. A cross-sectoral and long-term approach is necessary for planning climate change responses that support – and do not limit – multiple objectives.

In Latin America, potential trade-offs emerge between adaptation measures promoting agricultural intensification[52] and mitigating emissions from crop and livestock production (13 percent of countries with adaptation measures). On the other hand, potential trade-offs arise from mitigation measures promoting biogas production and adaptation priorities, including nutrient and on-farm soil management (25 percent of countries with mitigation measures),[53] mitigation measures promoting liquid biofuel production and adaptation priorities, including nutrient and on-farm soil management, biodiversity protection and forest conservation (19 percent),[54] solid biofuel production and adaptation priorities including forest conservation, sustainable forest management and biodiversity protection (13 percent).[55]

5.2 SUSTAINABLE DEVELOPMENT GOALS

The high degree of convergence between the climate and sustainable development agendas[56] suggests that aligning their implementation provides a great opportunity to national and sub-national governments to accelerate progress across both agendas. Aligning planning and budgetary processes would not only maximize scarce resources, enhance capacities and multiply information and technology sharing opportunities but, most importantly, deliver on countries' adaptation and mitigation commitments in a way that advances development and includes the most vulnerable.

To understand the degree of convergence between "climate actions" in the agriculture and land use sectors communicated by countries in their NDCs and the 17 goals and 169 targets of the 2030 Agenda for Sustainable Development, the sectoral climate actions in the NDCs were mapped against the SDG targets. The variety of mitigation and adaptation measures in the agriculture and land use sectors (collectively referred to as "climate actions") serve as the data points for the analysis. Overall, around 300 potential data points were derived.

A NDC-SDG matrix was developed to map the alignment between each NDC climate action in the agriculture and land use sectors with one or more SDG targets (FAO, 2019a). A total of 1,500 potential climate action-sustainable development synergies were generated in the agriculture and land use sectors. The degree of convergence between NDC climate actions in the agriculture and land use sectors and SDG targets was assessed at the country level. The degree of convergence refers to the frequency of climate actions per SDG target (and does not reflect how much the climate action contributes in absolute terms to achieving a particular SDG target). The results were aggregated at sub-regional and regional levels. **Figure 75** illustrates the area of convergence between climate actions in the agriculture and land use sectors and the SDGs.

[52] Honduras and Paraguay.

[53] Costa Rica, Nicaragua, Guyana and Uruguay.

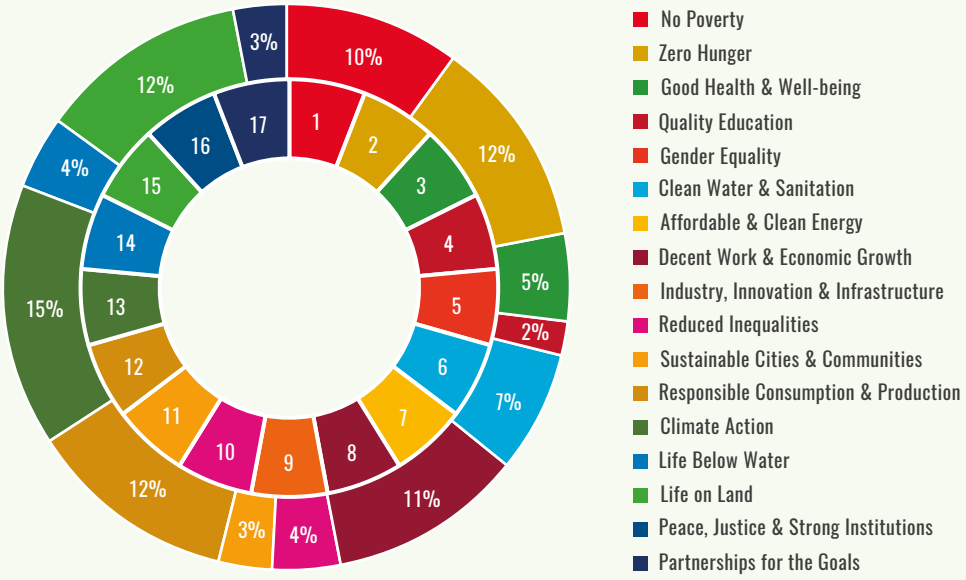
[54] Costa Rica, Brazil and Uruguay.

[55] Uruguay and Costa Rica.

[56] Northrop *et al.*(2016) find that climate actions are aligned with 154 of the 169 SDG targets, particularly around energy, forest, land use and agriculture. Conversely, GIZ and WRI (2018) finds that 49 targets across 13 SDGs contribute to climate mitigation and adaptation, with greatest potential to generate climate action synergies in agriculture, water, food waste and marine and forest ecosystems, amongst others.

FIGURE 75.

DEGREE OF CONVERGENCE BETWEEN CLIMATE ACTIONS IN THE AGRICULTURE AND LAND USE SECTORS IN LATIN AMERICA AND THE SDGs



In Latin America, the greatest areas of convergence[57] **between climate actions in the agriculture and land use sectors and the SDGs**, after SDG 13, are found (in descending order) around:

- SDG 2 Zero Hunger, primarily targets 2.3" Assure agricultural productivity for marginalized";
- SDG 12 Responsible consumption and production, primarily target 12.2 "Efficient use of natural resources";
- SDG 15 Life on Land, primarily targets 15.3 "Restore degraded land and combat desertification";
- SDG 8 Decent Work and Economic Growth, primarily target 8.1 "Sustainable economic growth"; and
- SDG 1 No Poverty, primarily targets 1.4 "Equal access of vulnerable to all type of resources".

5.3 LINKS TO THE SENDAI FRAMEWORK FOR DISASTER RISK REDUCTION

Climate change adaptation relies on the reduction and management of climate-related disaster risks, as countries are increasingly affected by both incremental climate change and more frequent and severe climate-related disasters. In agriculture, the two streams are strongly interrelated and mutually complementary. The overlaying nature of disaster and climate change impacts on agriculture calls for an integrated approach and working methods that enhance farmers' resilience to shocks and climate change. Convergence between DRR and climate change adaptation action can bring significant benefits to adaptation, disaster risk reduction and sustainable development.

The Sendai Framework for Disaster Risk Reduction (SFDRR) presents an opportunity to enhance coherence across climate and development agendas and promote cooperation, as appropriate, for linked

[57] Only convergence above or equal to a 3 percent share of climate action-sustainable development pathways are reported in the list.

implementation, monitoring and reporting processes. The Sendai Framework is a 15-year long, country driven and non-binding agreement that recognizes the importance of integrating systematic efforts and strategies at different levels to prevent new and reduce existing disaster risks, by reducing hazard exposure and vulnerability to disasters, increasing preparedness for response and recovery and thus strengthening resilience. The framework is built upon four priorities for action, which are:

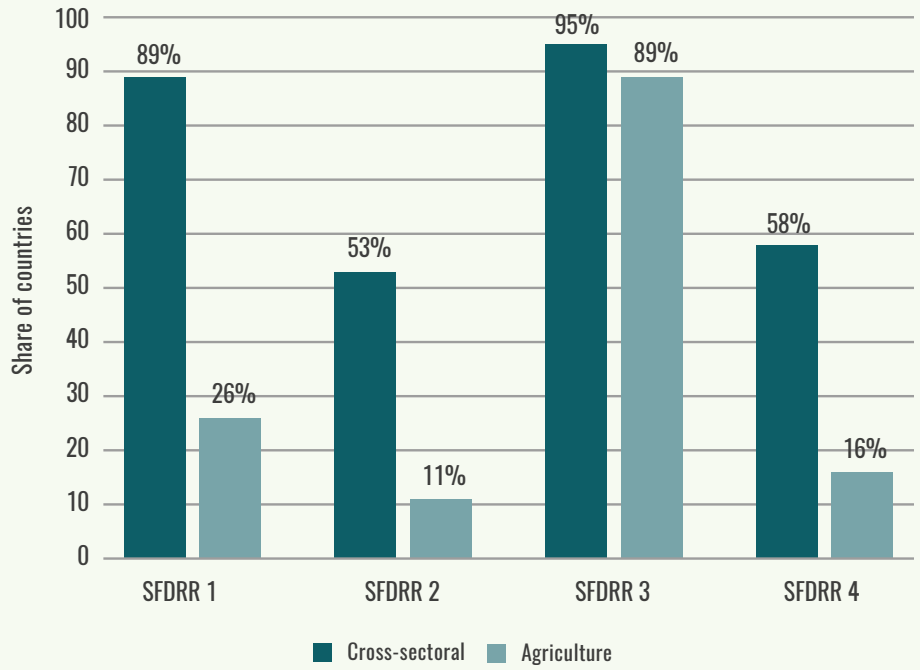
4. Priority for action I: understanding disaster risk
5. Priority for action II: strengthening disaster risk governance to manage disaster risk
6. Priority for action III: investing in disaster risk reduction for resilience
7. Priority for action IV: enhancing disaster preparedness for effective response and to "Build Back Better" in recovery, rehabilitation and reconstruction.

This section analyses the degree of alignment between adaptation measures set forth in country NDCs and the Sendai Framework, as per its four priorities for actions, to provide a better understanding of how climate change adaptation in the agriculture and land use sector and DRR and management are mutually reinforcing to promote policy coherence.

Overall, almost all countries in the region promote climate change adaptation measures that contribute to the Sendai Framework, with the greatest areas of convergence found around priority for action III "Investing in disaster risk reduction" and I "Understanding disaster risk." (95 and 89 percent of countries with adaptation, respectively). On the other hand, a gap is found in adaptation measures related to priority for action II "Strengthening disaster risk governance" (53 percent). **Figure 76** illustrates the share of countries with cross sectoral and/or agriculture-related adaptation priorities contributing to the SFDRR, per SFDRR priority for action, out of countries with an adaptation component.

FIGURE 76.

ALIGNMENT BETWEEN ADAPTATION MEASURES IN THE NDCs OF LATIN AMERICAN COUNTRIES AND THE SENDAI FRAMEWORK, PER SFDRR PRIORITY FOR ACTION PILLAR



5.3.1 SFDRR priority for action I: understanding disaster risk

Climate information

Improved climate information services are crucial for better understanding of disaster risks and are featured in many NDCs of the region. Several countries plan to improve the collection of climate information by increasing hydro-meteorological monitoring (including Argentina, Mexico and Peru). Climate information in the agriculture and land use sectors is specifically important to facilitate decision-making at farm-level. Venezuela promotes the continuous monitoring of climate extreme events that can negatively affect agricultural production. Colombia wants to enhance the access to climate information for farmers and, until 2030, ensure that 1 million producers receive agro-climatic information. Uruguay has in place a National Agricultural Information System, which seeks to facilitate decision-making processes and climate risk management.

Risk and vulnerability assessment

Many countries, including Argentina, Belize, Chile, Costa Rica, Grenada, Suriname and Uruguay refer to risk and vulnerability assessments, which can serve as a basis for risk-informed decision-making. Argentina, for example, sees the vulnerability and climate risk mapping as a "diagnosis tool" to identify adaptation needs. Uruguay's National Climate Change Response Plan encourages vulnerability assessments of different sectors, including of agricultural production and land ecosystems.

Education and awareness raising

Several countries in the region plan to develop and/or implement education and awareness raising programmes, although no country specifically refers to education and awareness raising in the agriculture and land use sectors. Some countries mention the planned target audiences of such initiatives. Uruguay, for example, plans to develop and implement a strategy for training, education in formal and non-formal ambits, and awareness, as appropriate, aimed at different target audiences (on management, communication and decision-making and on the institutional, political, productive and social issues, among others), that shall contribute to the implementation of the different measures and to risk-management empowerment of the population. Additionally, Uruguay has promoted knowledge building of medium-sized cattle farmers' on to climate and extreme weather events, including their effects on the livestock health and well-being.

5.3.2 SFDRR priority for action II: strengthening disaster risk governance to manage disaster risk

National plans, strategies and laws

The majority of the countries in the region plan to formulate or have already put in place DRR laws, regulations, public policies, strategies, plans and standards or have included DRR components in their climate strategies. Belize's National Climate Resilience Investment Plan (2013), gives special importance to building climate resilience and improving disaster risk management capacities across all sectors. Brazil, through its National Adaptation Plan (NAP), aims to integrate, where appropriate, vulnerabilities and climate risk management into public policies and strategies, as well as to enhance the coherence of national and local development strategies with adaptation measures. Other countries refer to already implemented or planned DRR plans. Costa Rica emphasizes that, although the country has improved its disaster risk management policies in the past years, it continues to experience negative consequences caused by extreme weather events. Costa Rica is therefore finalizing its National Disaster Risk Management Policy 2016¬2030 including Reduction, Disaster Response and Readiness, and Disaster Recovery, with climate change adaptation as a cross-cutting issue. Uruguay plans, amongst other DRR activities, to have in place, by 2020, six regional risk-management plans (covering the entire country), those taking into account climate change and variability, with focus on urban and rural population depending on specific vulnerability characteristics.

Mainstream DRR and management into the agriculture and land use sectors

The strategic integration of DRR into agriculture and land use sectors is an important factor for climate-resilient food systems and livelihoods. Some countries in the region, like Chile and Peru mention their ambition to mainstream DRR into sectoral policies in their NDCs. Peru, for example, has in place a Risk and Adaptation to Climate Change Management Plan, in the Agrarian Sector (PLANGRACC-A) and Chile's forestry and agriculture plan is made up of 21 measures which focus on different activities including risk management.

Strengthen cooperation and capacities

Uruguay outlines its plans to strengthen capacities in order to improve disaster risk management. Uruguay aims to have on-going trainings on climate change and climate risk management for decision-makers and the general population in place by the year 2020. Similarly, Venezuela plans to coordinate actions with all national entities in charge of territorial planning and disaster management and to foster the development of municipal and local adaptation plans for risk management scenarios that directly involve "co-responsibility between the State and People's Power".

5.3.3 SFDRR priority for action III: investing in disaster risk reduction for resilience

Investing in DRR and management and climate change adaptation measures for climate-resilient agriculture and land use sectors

The importance of investments in DRR and management measures to make the agriculture and land use sectors more resilient to the shocks from climate change is recognized by the majority of the countries in the region. While some countries only very generally mention the importance to reduce the negative impacts of climate risks in the agriculture and land use sectors, other countries outline specific agricultural good practices and technologies as part of their adaptation commitments. The most prominent sub-sector featured in the NDCs is the cropping sector, followed by fisheries, forestry, integrated systems and the livestock sector. Some countries plan for agricultural practices and technologies that are not only specific to one agricultural sub-sector, but can include several. Ecuador, for example, promotes silvopasture and Bolivia, El Salvador and Honduras suggest agro-forestry systems as adaptation and DRR measures in their NDCs.

Crop production

The cropping sector is by far the most prominently featured agricultural sector for adaptation in the NDCs of the region. To reduce disaster risks and adapt to climate change, countries invest in water management practices and technologies. These include irrigation technologies (outlined by e.g. Argentina, Guyana, Honduras, and Mexico) and water harvesting measures (outlined by e.g. Mexico). A variety of countries also plan for better soil management through, for example, restoration and recovery of degraded soils (e.g. Bolivia) or the development of soil use and management plans to reduce erosion and preservation of organic matter (e.g. Uruguay). A number of countries also plan to invest in seed varieties that are tolerant to extreme climate events and conditions, including to drought (e.g. Belize and Guyana), salinized water, floods and diseases (e.g. Guyana). Honduras encourages the production of creole seeds adapted to local conditions. Other proposed cropping practices and technologies include hydroponics (e.g. Guyana), reduced post-harvest loss (e.g. Belize and Honduras), changed crop calendar (e.g. Honduras), including organic fertilizer and practices of biological control of pests and diseases.

Forestry

In the case of forestry, practices and technologies that contribute to DRR management and adaptation outlined in the NDCs mainly focus on afforestation and reforestation and agroforestry. Bolivia, for example, plans to restore and recover degraded forests and to transition to integrated management of agroforestry and silviculture techniques. Belize aims to maintain and restore healthy forest ecosystems by sustainable

forest management, increasing afforestation and reforestation in order to increase the resilience of human communities. By 2030, El Salvador will establish and manage one million hectares through "Sustainable Landscapes and Resilient to Climate Change", where forest areas will be rehabilitated and conserved, biological corridors will be established through, for example the adoption of resilient agroforestry systems.

Livestock

In some countries, investments in the livestock sector are an important part of planned DRR and adaptation measures. Uruguay, for example, emphasizes that one of the main measures in the agriculture and land use sectors has attempted to enhance small and medium-sized cattle farmers' resilience, particularly for those located in the regions that are particularly vulnerable to droughts. This has been done by implementing a prevention approach in their productive system strategy and by widening their knowledge on climate and extreme weather events, including their effects on the livestock health and well-being. This includes increased access to drought-tolerant livestock breeds (Belize), diversification with species more resistant to climate change (Ecuador) and the usage of local adapted species suited for the climate and resistant to pests and diseases. Improved pasture management is also part of some countries' planned livestock practices. This includes the selection of pastures resistant to droughts and areas of watering (Venezuela) and changes in pasture time and sowing of improved pastures (Honduras).

Risk insurance

Many countries refer to insurance as a social safety net mechanism to reduce the impact of climate-related disasters on agricultural producers. Uruguay, for example, has developed a horticulture insurance, which provides coverage against excess water during harvest, and an insurance for extensive cattle farming on natural grasslands, which provides coverage against severe droughts.

5.3.4 SFDRR priority for action IV: enhancing disaster preparedness for effective response and to "Build Back Better" in recovery, rehabilitation and reconstruction

Countries from the region refer to disaster preparedness measures as part of their adaptation commitments to provide more effective response and recovery. Most commonly featured measures are the development or improvement of early warning systems, contingency planning, infrastructure protection methods and relocation of communities.

Contengency planning

Some countries in the region point to planning mechanisms that they have established to better prepare for climate-related disasters. Brazil already monitors extreme rainfall events for 888 municipalities and has in place an early warning system and action plans to respond to natural disasters. Uruguay outlines in its NDC its ambition to design and implement an Emergency and Sudden-impact Disasters Response Protocol as well as to develop, strengthen and decentralize the National Emergency System.

Early warning systems

The most prominently featured preparedness mechanism in the NDCs of the region is early warning systems (EWS). Argentina, for example, plans to intensify and increase the use of EWS for intense rains, floods, heat waves and systems for response to and recovery from climate disasters. Only two countries, Argentina and Uruguay, refer to EWS relating to the agriculture and land use sectors: Argentina plans to strengthen and widen its early alert systems and monitoring networks with contributions from the agro-industry and Uruguay aims to develop a new EWS within the DRR framework for several sectors, including the agricultural sectors.

Protection of infrastructure

In order to protect its infrastructure from the negative effects of climate-induced disasters, different measures are outlined by different countries. Mexico, for example, plans to relocate key infrastructure away from high-risk zones.

Relocation of communities

The resettlement of the population living in high-risk areas can reduce people's exposure to hazards. Some countries in the region, such as Uruguay, outline in their NDCs their plans to relocate communities to reduce climate-related disaster risk. Uruguay plans to have relocated, by 2025, between 3 500 and 6 000 of the households in flood or contaminated zones identified through the National Relocation Plan and other national and departmental instruments.

CHAPTER 6

CHAPTER

6

KEY FINDINGS

Without implementation of the NDCs, total economy-wide net emissions in Latin America in 2030 are expected to increase by around 45 percent compared to those reported in 2015. Under the mitigation scenario, countries representing 97 percent of 2015 emissions in the region committed to reduce aggregated net emissions by 36 percent in their NDCs compared to the 2030 counterfactual scenario.

The Agriculture, Forestry and Other Land Use sector represents the largest source of emissions in Latin America, at around 45 percent of total, particularly emissions from enteric fermentation, forest degradation, deforestation and managed soils. Achieving the 36 percent reduction in net emissions by 2030 as set forth in country NDCs will largely depend on greater investment in and uptake of mitigation options in the agriculture and land use sectors.

Around 80 percent of countries in the region are committed to mitigation in the agriculture and/or LULUCF sector, primarily through mitigation on forest land, including sustainable forest management and afforestation/reforestation policies measures, while around one-third include mitigation on cropland and in integrated systems. Only two countries communicate GHG targets in the LULUCF sector while no sectoral targets are set forth in agriculture.

At the regional level, very high mitigation policy coverage gaps are observed around emissions from enteric fermentation and deforestation, high gaps are found around emissions from managed soils and cropland, and moderate gaps are found around emissions from biomass burning of forestland, forest degradation and grassland.

Climate-related droughts, floods, water stress and sea surface temperature rise are threatening terrestrial and marine ecosystems in Latin America and agro-ecosystems, particularly crops and fisheries, and ocean and coastal zones are considered the most vulnerable. Genetic resource and land and soil resource degradation, changes in water availability and quality, changes in species range, abundance and extinction and coastal erosion constitute the most frequently reported climate-related impacts across all ecosystems in the region.

Climate-related losses of productive infrastructure and assets and climate-sensitive livelihoods and incomes constitute the most frequently reported risks in social systems, along with poverty and inequality – all exacerbated by the underlying economic dependence on agriculture and natural resources reported as the greatest non-climatic driver of vulnerability in the region.

Indeed, all but one country in the region includes adaptation priorities in the agriculture and land use sectors (92 percent)**, particularly in the crops, fisheries and forestry sectors**, as well as in ocean and coastal zones. Mangrove conservation and planting, plant management, irrigation and drainage and biodiversity conservation appear most frequently amongst adaptation strategies in the region. Health information and services, resilient infrastructure, credit and insurance services, as well as R&D, early warning systems, policy coherence and DRR are prominent in the adaptation priorities in social systems of Latin American counties.

At the regional level, very high adaptation policy coverage gaps are found in relation to climate-related impacts observed or projected in grassland and integrated systems, as well as inland water, mountain, ice and snow, desert and wetlands ecosystems.

High to very high policy coverage gaps are also found in relation to migration and displacement and gender and youth inequality, while moderate policy coverage gaps are found in relation to climate-related rural livelihoods and income loss and conflict.

Climate actions in forest, ocean and coastal zones and integrated systems present the greatest potential for leveraging mitigation, adaptation and sustainable development co-benefits in Latin America, as well as food loss and waste reduction. However, more can be done to understand disaster risk, strengthen disaster risk governance and enhance disaster preparedness and "build back better" in the agriculture and land use sectors.

Addressing the economic and financial, legal and regulatory and informational barriers to the uptake and dissemination of technologies will be key to upscaling climate action in the agriculture and land use sectors. Investments in sustainable agriculture and land use, oceans and coastal zones, genetic resource diversification, irrigation and drainage and mapping and monitoring technologies and capacities are needed for upscaling climate action in the agriculture and land use sectors. Over 95 percent of countries in Central and South America require additional financial support for NDC implementation.

By highlighting the gaps in the coverage of mitigation and adaptation in the agriculture and land use sectors, as well as illustrating opportunities for enhancing climate action ambitions in the next round of NDCs, this analysis can serve as an important roadmap for informing policies and directing future investments in support of low-emission and climate-resilient agriculture and food systems in the region.

BIBLIOGRAPHY

Barange, M., Bahri, T., Beveridge, M., Cochrane, K., Funge-Smith, S. & Pulain, F., eds. 2018. *Impacts of climate change on fisheries and aquaculture: Synthesis of current knowledge, adaptation and mitigation options*. FAO Fisheries and Aquaculture Technical Paper No. 627. Rome, Food and Agriculture Organization of the United Nations. 628 pp. (also available at http://www.fao.org/3/I9705EN/i9705en.pdf).

CEPALSTAT. undated. CEPALSTAT Home. In: *Economic Commission for Latin America and the Caribbean (CEPAL)* [online]. [Cited 7 January 2020]. https://estadisticas.cepal.org/cepalstat/portada.html?idioma=english

Dixon, J., Gulliver, A. & Gibbon, D. 2001. *Farming Systems and Poverty: Improving Farmers' Livelihoods in a Changing World*. Rome and Washington, Food and Agriculture Organization of the United Nations and World Bank. 49 pp. (also available at http://www.fao.org/3/a-ac349e.pdf).

EM-DAT. undated. EM-DAT | The international disasters database. In: EM-DAT | *The International Disaster Database - Centre for Research on the Epidemiology of Disasters (CRED)* [online]. Brussels. [Cited 7 January 2020]. https://www.emdat.be/

FAO. Forthcoming. *Update to 2016 Analysis of the Agriculture Sectors in the Intended Nationally Determined Contributions*. Rome, Food and Agriculture Organization of the United Nations.

FAO. 2013. *Our Priorities: FAO Strategic Objectives*. Rome, Food and Agriculture Organization of the United Nations. 16 pp. (also available at http://www.fao.org/3/mi317e/mi317e.pdf).

FAO. 2016a. *The Agriculture Sectors in the Intended Nationally Determined Contributions: Analysis*. Environment and Natural Resources Management Working Paper No. 61. Rome, Food and Agriculture Organization of the United Nations. 92 pp. (also available at http://www.fao.org/3/a-i5687e.pdf).

FAO. 2016b. *The Agricultural Sectors in Nationally Determined Contributions (NDCs): Priority areas for international support*. Rome, Food and Agriculture Organization of the United Nations. 32 pp. (also available at http://www.fao.org/3/a-i6400e.pdf).

FAO. 2016c. *El riego en América del Sur, Centroamérica y Caribe en cifras: Encuesta AQUASTAT 2015*. Rome, Food and Agriculture Organization of the United Nations. 197 pp. (also available at http://www.fao.org/3/CA3580ES/ca3580es.pdf).

FAO. 2016d. *Climate change and food security: risks and responses*. Rome, Food and Agriculture Organization of the United Nations. 110 pp. (also available at http://www.fao.org/3/a-i5188e.pdf).

FAO. 2016e. *The State of Food and Agriculture 2016: climate change, agriculture and food security*. Rome, Food and Agriculture Organization of the United Nations. 194 pp. (also available at http://www.fao.org/3/a-i6030e.pdf).

FAO. 2017a. Chronology of the Dry Corridor: The impetus for resilience in Central America. In: *Food and Agriculture Organization of the United Nations* [online]. [Cited 7 January 2020]. http://www.fao.org/in-action/agronoticias/detail/en/c/1024539/

FAO. 2017b. *FAO Strategy on Climate Change*. Rome, Food and Agriculture Organization of the United Nations. 48 pp. (also available at http://www.fao.org/3/a-i7175e.pdf).

FAO. 2017c. *Regional Analysis of the Nationally Determined Contributions of Eastern Africa: Gaps and opportunities in the agriculture sectors*. Environment and Natural Resources Management Working Paper No. 67. Rome, Food and Agriculture Organization of the United Nations. 120 pp. (also available at http://www.fao.org/3/a-i8165e.pdf).

FAO. 2017d. *Tracking adaptation in agricultural sectors: Climate change adaptation indicators*. Rome, Food and Agriculture Organization of the United Nations. 83 pp. (also available at http://www.fao.org/3/a-i8145e.pdf).

FAO. 2018a. FAO and WFP concerned about the impact of drought on the most vulnerable in Central America. In: *Food and Agriculture Organization of the United Nations* [online]. [Cited 7 January 2020]. http://www.fao.org/americas/noticias/ver/en/c/1150344/

FAO. 2018b. *The State of World Fisheries and Aquaculture 2018 - Meeting the sustainable development goals*. Rome, Food and Agriculture Organization of the United Nations. 227 pp. (also available at http://www.fao.org/3/I9540EN/i9540en.pdf).

FAO. 2018c. *Panorama de la pobreza rural en América Latina y el Caribe 2018*. Santiago de Chile, Food and Agriculture Organization of the United Nations. 116 pp. (also available at http://www.fao.org/3/CA2275ES/ca2275es.pdf).

FAO. 2019a. Hunger now affects 42.5 million people in Latin America and the Caribbean. In: *Food and Agriculture Organization of the United Nations* [online]. [Cited 1 July 2020]. http://www.fao.org/americas/noticias/ver/en/c/1201480/

FAO. 2019b. *Regional analysis of the Nationally Determined Contributions of the countries in Southern Europe, Eastern Europe and Central Asia – Gaps and opportunities in the agriculture sectors*. Environment and Natural Resources Management Working Paper No. 72. Rome, Food and Agriculture Organization of the United Nations. 132 pp. (also available at http://www.fao.org/3/CA3141EN/ca3141en.pdf).

FAO. 2019c. *Linking Nationally Determined Contributions and the Sustainable Development Goals through Agriculture*. Environment and Natural Resources Management Working Paper No. 75. Rome, Food and Agriculture Organization of the United Nations. 42 pp. (also available at http://www.fao.org/3/ca5003en/ca5003en.pdf).

FAO. 2019d. *Estado y perspectivas de los recursos naturales y los ecosistemas en América Latina y el Caribe (ALC)*. 2030 - Alimentación, agricultura y desarrollo rural en América Latina y el Caribe No. 9. Santiago de Chile, Food and Agriculture Organization of the United Nations. 44 pp. (also available at http://www.fao.org/3/ca5507es/ca5507es.pdf).

FAO. 2020a. *Regional analysis of the Nationally Determined Contributions in Asia: Gaps and opportunities in the agriculture and land use sectors*. Rome, Food and Agriculture Organization of the United Nations.

FAO. 2020b. Regional analysis of the Nationally Determined Contributions in the Pacific: Gaps and opportunities in the agriculture and land use sectors. Rome, Food and Agriculture Organization of the United Nations. 91 pp.

FAO. 2020c. *Regional Analysis of the Nationally Determined Contributions in the Caribbean: Gaps and Opportunities in the agriculture and land use sectors*. Rome, Food and Agriculture Organization of the United Nations. 86 pp.

FAO, IFAD, UNICEF, WFP & WHO. 2018. *The State of Food Security and Nutrition in the World 2018: Building climate resilience for food security and nutrition*. Rome, Food and Agriculture Organization of the United Nations. 202 pp. (also available at http://www.fao.org/3/I9553EN/i9553en.pdf).

Flores Nava, A. 2019. *Contexto, perspectivas y retos para incrementar la contribución de la pesca y la acuicultura a la seguridad alimentaria y nutricional y las economías territoriales en América Latina y el Caribe*. 2030 - Alimentación, agricultura y desarrollo rural en América Latina y el Caribe No. 16. Santiago de Chile, Food and Agriculture Organization of the United Nations. 19 pp. (also available at http://www.fao.org/3/ca5473es/ca5473es.pdf).

Gardi, C., Angelini, M., Barceló, S., Comerma, J., Cruz Gaistardo, C., Encina Rojas, A., Jones, A., Krasilnikov, P. & Mendonça Santos Brefin, M.L. 2015. *Atlas de suelos de América Latina y el Caribe*. Luxembourg, European Commission. 184 pp. (also available at https://op.europa.eu/es/publication-detail/-/publication/7e06def6-10cf-4c8f-90f4-b981f410ef68).

GIZ & WRI. 2018. *Connecting the Dots: Elements for a Joined-Up Implementation of the 2030 Agenda and Paris Agreement*. Bonn and Washington, Deutsche Gesellschaft für internationales Zusammenarbeit and World Resources Institute. 89 pp. (also available at https://www.transparency-partnership.net/system/files/document/GIZ-WRI%20Study%20Connecting%20the%20Dots.pdf).

IDB & CEPAL. 2018. *Proceso Regional de las Américas: Foro Mundial del Agua 2018: Informe regional América Latina y el Caribe: Resumen ejecutivo*. Washington DC, Inter-American Development Bank. 19 pp. (also available at https://publications.iadb.org/publications/spanish/document/Proceso-Regional-de-las-Am%C3%A9ricas-Foro-Mundial-del-Agua-2018-Informe-regional-Am%C3%A9rica-Latina-y-el-Caribe-Resumen-ejecutivo.pdf).

IPCC. 1996. *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories*. Hayama, Institute for Global Environmental Strategies (IGES). (also available at https://www.ipcc-nggip.iges.or.jp/public/gl/invs1.html).

IPCC. 2006. *Guidelines for National Greenhouse Gas Inventories*. Hayama, Institute for Global Environmental Strategies (IGES). (also available at https://www.ipcc-nggip.iges.or.jp/public/2006gl/).

IPCC. 2014. *Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part B: Regional Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*. C.B. Field, V.R. Barros, D.J. Dokken, K.J. Mach, M.D. Mastrandrea, T.E. Bilir, M. Chatterjee, K.L. Ebi, Y.. O. Estrada, R.C. Genova, B. Girma, E.S. Kissel, A.N. Levy, S. MacCracken, P.R. Mastrandrea & L.L. White, eds. Cambridge, United Kingdom and New York, NY, USA, Cambridge University Press. 1132 pp. (also available at https://www.ipcc.ch/site/assets/uploads/2018/02/WGIIAR5-PartA_FINAL.pdf).

Jarvis, A., Loboguerrero, A., Martinez-Baron, D., Prager, S., Ramirez Villegas, J., Eitzinger, A., Born, L., Gonzales, C. & Tarapues, J. 2019. *Situación rural de América Latina y el Caribe con 2 grados de calentamiento*. 2030 - Alimentación, agricultura y desarrollo rural en América Latina y el Caribe No. 10. Santiago de Chile, Food and Agriculture Organization of the United Nations. 41 pp. (also available at http://www.fao. org/3/ca5042en/ca5042en.pdf).).

Millennium Ecosystem Assessment. 2005. *Ecosystems and Human Well-being: Synthesis*. Washington, Island Press. 155 pp. (also available at https://www.millenniumassessment.org/documents/document.356.aspx.pdf).

Morales, C. & Parada, S., eds. 2005. *Probeza, desertificación y degradación de los recursos naturales*. Santiago de Chile, United Nations. 274 pp. (also available at https://repositorio.cepal.org/bitstream/handle/11362/2448/1/S0500967_es.pdf).

Northrop, E., Biru, H., Lima, S., Bouye, M. & Song, R. 2016. *Examining the Alignment between the Intended Nationally Determined Contributions and Sustainable Development Goals*. Washington DC, World Resource Institute. 56 pp. (also available at https://www.wri.org/publication/examining-alignment-between-intended-nationally-determined-contributions-and-sustainable).

OECD & FAO. 2019. *OECD-FAO Agricultural Outlook 2019-2028*. Paris, Organization for Economic Cooperation and Development. 326 pp. (also available at https://www.oecd-ilibrary.org/agriculture-and-food/oecd-fao-agricultural-outlook-2019-2028_agr_outlook-2019-en).

Pendrill, F. & Persson, M. 2017. Combining global land cover datasets to quantify agricultural expansion into forests in Latin America: Limitations and challenges. , 12(7). https://doi.org/10.1371/journal.pone.0181202

Ramsar Convention on Wetlands. 2018. *Global Wetland Outlook: State of the World's Wetlands and their Services to People*. Gland, Ramsar Convention on Wetlands. 88 pp. (also available at https://static1.squarespace.com/static/5b256c78e17ba335ea89fe1f/t/5ca36fb7419202af31e1 de33/1554214861856/Ramsar+GWO_ENGLISH_WEB+2019UPDATE.pdf).

Saravia-Matus, S.L. & Aguirre Hörmann, P. 2019. *Lo rural y el desarrollo sostenible en ALC*. 2030 - Alimentación, agricultura y desarrollo rural en América Latina y el Caribe No. 3. Santiago de Chile, Food and Agriculture Organization of the United Nations. 20 pp. (also available at http://www.fao.org/3/ca4704es/ca4704es.pdf).

Trivelli, C. & Berdegué, J. 2019. *Transformación rural. Pensando el futuro de América Latina y el Caribe*. 2030 - Alimentación, agricultura y desarrollo rural en América Latina y el Caribe No. 1. Santiago de Chile, Food and Agriculture Organization of the United Nations. 76 pp. (also available at http://www.fao.org/3/ca5508es/ ca5508es.pdf).).

UNEP. 2016. *GEO-6 Regional Assessment for Latin America and the Caribbean*. Nairobi, United Nations Environment Programme. 264 pp. (also available at http://wedocs.unep.org/bitstream/handle/20.500.11822/7659/GEO_LAC_201611.pdf?sequence=1&isAllowed=y).

UNFCCC. 2015. Decision 1/CP.21 Adoption of the Paris Agreement. *Decisions adopted by the Conference of the Parties*. p. 36. Paper presented at Conference of the Parties, 2015, Bonn. (also available at https://unfccc.int/sites/default/files/resource/docs/2015/cop21/eng/10a01.pdf).

UNFCCC. 2016. Decision 1/CP.22 Preparations for the entry into force of the Paris Agreement and the first session of the Conference of the Parties serving as the meeting of the Parties to the Paris Agreement. *Decisions adopted by the Conference of the Parties*. p. 45. Paper presented at Conference of the Parties, 2016, Bonn. (also available at https://unfccc.int/resource/docs/2016/cop22/eng/10a01.pdf#page=2).

UNFCCC. 2018. Draft decision -/CMA.1 Modalities, procedures and guidelines for the transparency framework for action and support referred to in Article 13 of the Paris Agreement. *Recommendation of the Conference of the Parties*. p. 36. Paper presented at Conference of the Parties, 2018, Bonn. (also available at https://undocs.org/FCCC/CP/2018/L.23).

WB-Open Data. undated. World Bank Open Data. In: The World Bank [online]. Washington DC. [Cited 7 January 2020]. https://data.worldbank.org/

ANNEXES

ANNEX 1.

SOURCE OF NATIONAL DATA FOR ANALYSIS

COUNTRY	NDC	NC	BUR	NGHGI	TNA
BELIZE	2016	2016			2017
COSTA RICA	2016	2014	2015		2012
EL SALVADOR	2017	2018	2018		2013
GUATEMALA	2017	2016			
HONDURAS	2016	2012			2016
MEXICO	2016	2019		2019	
NICARAGUA	2017	2018			
PANAMA	2016	2018	2019		2016/2017
ARGENTINA	2016	2015	2017		2013
BOLIVIA (PLURINATIONAL STATE OF)	2016	2009			
BRAZIL	2016	2016	2019		
CHILE	2017	2016		2019	
COLOMBIA	2018	2017		2019	2013
ECUADOR	2017	2017		2017	2013
GUYANA	2016	2012			2016
PARAGUAY	2016	2017	2018		
PERU	2016	2016			2012
SURINAME	2019	2016			
URUGUAY	2016	2017	2017		2016/2017
VENEZUELA (BOLIVARIAN REPUBLIC OF)	2017	2018			

ANNEX 2.

GENERAL MITIGATION CONTRIBUTIONS IN LATIN AMERICA, BY SCOPE, TYPE AND TARGET

COUNTRY	SOURCE	SCOPE OF CONTRIBUTION	TYPE OF CONTRIBUTION	TYPE OF GHG TARGET	2030 UNCONDITIONAL REDUCTION (PERCENT)	2030 CONDITIONAL REDUCTION (PERCENT)	2030 COMBINED REDUCTION (PERCENT)
BELIZE	NDC	MULTI-SECTORAL	ACTION ONLY	NA	NA	NA	NA
COSTA RICA	NDC	ECONOMY-WIDE	GHG TARGET	BASE YEAR	24.66	0.00	24.66
EL SALVADOR	NDC	MULTI-SECTORAL	ACTION ONLY	NA	NA	NA	NA
GUATEMALA	NDC	MULTI-SECTORAL	GHG TARGET	BAU	11.22	11.42	22.64
HONDURAS	NDC	MULTI-SECTORAL	GHG TARGET	BAU	NA	NA	15.00
MEXICO	NDC	ECONOMY-WIDE	GHG TARGET	BAU	25.00	15.00	40.00
NICARAGUA	NDC	MULTI-SECTORAL	ACTION ONLY	NA	NA	NA	NA
PANAMA	NDC	MULTI-SECTORAL	ACTION ONLY	NA	NA	NA	NA
CENTRAL AMERICA							
ARGENTINA	NDC	ECONOMY-WIDE	GHG TARGET	BAU	18.41	19.26	37.67
BOLIVIA (PLURINATIONAL STATE OF)	NDC	ECONOMY-WIDE	ACTION ONLY	NA	NA	NA	NA
BRAZIL	NDC	ECONOMY-WIDE	GHG TARGET	BASE YEAR	43.00	0.00	43.00
CHILE	NDC	MULTI-SECTORAL	GHG TARGET	BASE YEAR	30.39	14.71	45.10
COLOMBIA	NDC	ECONOMY-WIDE	GHG TARGET	BAU	20.00	10.00	30.00
ECUADOR*	NDC	MULTI-SECTORAL	GHG TARGET	BAU	9.00	11.90	20.90
GUYANA*	NDC	MULTI-SECTORAL	ACTION ONLY	NA	NA	NA	NA
PARAGUAY	NDC	ECONOMY-WIDE	GHG TARGET	BAU	10.00	10.00	20.00
PERU	NDC	ECONOMY-WIDE	GHG TARGET	BAU	20.00	10.00	30.00
SURINAME*	NDC	MULTI-SECTORAL	ACTION ONLY	NA	NA	NA	NA
URUGUAY*	NDC	MULTI-SECTORAL	GHG TARGET	BASE YEAR	48.15	3.70	51.85
VENEZUELA (BOLIVARIAN REPUBLIC OF)	NDC	ECONOMY-WIDE	GHG TARGET	BAU	0.00	20.00	20.00
SOUTH AMERICA							

** NDC end date set for 2025. Calculated based on reported data.*

ANNEX 3.

NATIONAL MITIGATION CONTRIBUTIONS IN THE AGRICULTURE SECTOR, BY TYPE AND TARGET

COUNTRY	SOURCE	TYPE OF CONTRIBUTION	TYPE OF GHG TARGET	2030 UNCONDITIONAL REDUCTION (PERCENT)	2030 CONDITIONAL REDUCTION (PERCENT)	2030 COMBINED REDUCTION (PERCENT)
BELIZE	NDC	NO CONTRIBUTION	NA	NA	NA	NA
COSTA RICA	NDC	POLICIES AND MEASURES ONLY	NA	NA	NA	NA
EL SALVADOR	NDC	POLICIES OR MEASURES ONLY	NA	NA	NA	NA
GUATEMALA	NDC	POLICIES OR MEASURES ONLY	NA	NA	NA	NA
HONDURAS	NDC	SECTOR INCLUDED IN GENERAL CONTRIBUTION ONLY	NA	NA	NA	NA
MEXICO	NDC	SECTOR INCLUDED IN GENERAL CONTRIBUTION ONLY	NA	NA	NA	NA
NICARAGUA	NDC	POLICIES OR MEASURES ONLY	NA	NA	NA	NA
PANAMA	NDC	NO CONTRIBUTION	NA	NA	NA	NA
CENTRAL AMERICA						
ARGENTINA	NDC	SECTOR INCLUDED IN GENERAL CONTRIBUTION ONLY	NA	NA	NA	NA
BOLIVIA (PLURINATIONAL STATE OF)	NDC	POLICIES AND MEASURES ONLY	NA	NA	NA	NA
BRAZIL	NDC	POLICIES AND MEASURES ONLY	NA	NA	NA	NA
CHILE	NDC	SECTOR INCLUDED IN GENERAL CONTRIBUTION ONLY	NA	NA	NA	NA
COLOMBIA	NDC	SECTOR INCLUDED IN GENERAL CONTRIBUTION ONLY	NA	NA	NA	NA
ECUADOR*	NDC	POLICIES AND MEASURES ONLY	NA	NA	NA	NA
GUYANA*	NDC	NO CONTRIBUTION	NA	NA	NA	NA
PARAGUAY	NDC	SECTOR INCLUDED IN GENERAL CONTRIBUTION ONLY	NA	NA	NA	NA
PERU	NDC	SECTOR INCLUDED IN GENERAL CONTRIBUTION ONLY	NA	NA	NA	NA
SURINAME*	NDC	NO CONTRIBUTION	NA	NA	NA	NA
URUGUAY*	NDC	POLICIES OR MEASURES ONLY	NA	NA	NA	NA
VENEZUELA (BOLIVARIAN REPUBLIC OF)	NDC	SECTOR INCLUDED IN GENERAL CONTRIBUTION ONLY	NA	NA	NA	NA
SOUTH AMERICA						

** NDC end date set for 2025. Calculated based on reported data.*

ANNEX 4.

NATIONAL MITIGATION CONTRIBUTIONS IN THE LAND USE, LAND USE CHANGE AND FORESTRY (LULUCF) SECTOR, BY TYPE AND TARGET

COUNTRY	SOURCE	TYPE OF CONTRIBUTION	TYPE OF GHG TARGET	2030 UNCONDITIONAL REDUCTION (PERCENT)	2030 CONDITIONAL REDUCTION (PERCENT)	2030 COMBINED REDUCTION (PERCENT)
BELIZE	NDC	POLICIES AND MEASURES ONLY	NA	NA	NA	NA
COSTA RICA	NDC	POLICIES AND MEASURES ONLY	NA	NA	NA	NA
EL SALVADOR	NDC	POLICIES OR MEASURES ONLY	NA	NA	NA	NA
GUATEMALA	NDC	POLICIES OR MEASURES ONLY	NA	NA	NA	NA
HONDURAS	NDC	NON-GHG TARGET	NA	NA	NA	NA
MEXICO	NDC	SECTOR INCLUDED IN GENERAL CONTRIBUTION ONLY	NA	NA	NA	NA
NICARAGUA	NDC	POLICIES OR MEASURES ONLY	NA	NA	NA	NA
PANAMA	NDC	NON-GHG TARGET	NA	NA	NA	NA
CENTRAL AMERICA						
ARGENTINA	NDC	SECTOR INCLUDED IN GENERAL CONTRIBUTION ONLY	NA	NA	NA	NA
BOLIVIA (PLURINATIONAL STATE OF)	NDC	POLICIES AND MEASURES ONLY	NA	NA	NA	NA
BRAZIL	NDC	POLICIES AND MEASURES ONLY	NA	NA	NA	NA
CHILE	NDC	GHG TARGET	BASE YEAR	1.20	1.20	1.41
COLOMBIA	NDC	POLICIES OR MEASURES ONLY	NA	NA	NA	NA
ECUADOR*	NDC	GHG TARGET	BASE YEAR	4.00	16.00	20.00
GUYANA*	NDC	POLICIES AND MEASURES ONLY	NA	NA	NA	NA
PARAGUAY	NDC	SECTOR INCLUDED IN GENERAL CONTRIBUTION ONLY	NA	NA	NA	NA
PERU	NDC	SECTOR INCLUDED IN GENERAL CONTRIBUTION ONLY	NA	NA	NA	NA
SURINAME*	NDC	POLICIES AND MEASURES ONLY	NA	NA	NA	NA
URUGUAY*	NDC	POLICIES AND MEASURES ONLY	NA	NA	NA	NA
VENEZUELA (BOLIVARIAN REPUBLIC OF)	NDC	POLICIES AND MEASURES ONLY	NA	NA	NA	NA
SOUTH AMERICA						

** NDC end date set for 2025. Calculated based on reported data.*

Annex 5-7 can be found online at http:/

This report provides a unique, sector-specific synthesis of the Nationally Determined Contributions (NDCs) from Latin America. It summarizes the substantial contributions already put forward by countries, opportunities for further action and the gaps, barriers and needs that will need to be addressed if the agriculture and land use sectors in Latin America are to raise mitigation and adaptation ambitions. The findings of this report will help member countries to reflect on their progress in advancing toward NDC priorities for agriculture and associated national climate goals including related targets under the Sustainable Development Goals (SDGs). The analysis also helps to clarify the links between the NDCs from the region and the Sendai Framework for Disaster Risk Reduction (SFDRR). Finally, the report serves as a guide to FAO, as well as other international actors, for the support that will be required to help countries in the region to move forward to implement agriculture and land use sector priorities in their NDCs and ensure that future commitments from the agriculture sector are quantifiable, verifiable and sufficiently ambitious.

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