



Agriculture in the new climate action plans of **Latin America**

(Intended Nationally Determined Contributions)



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Executive summary

During recent years, agriculture has played a much more prominent role in the climate negotiations. In the Paris Agreement, the importance of addressing climate change to ensure food security and reduce the vulnerability of food production systems was stated more clearly than ever before. The level of commitment and priorities of each country in support of the Paris Agreement were made explicit in their intended nationally determined contributions (INDCs), submitted to the Secretariat of the United Nations Framework Convention on Climate Change (UNFCCC). This study analyzes the INDCs submitted by 17 Latin American countries,¹ and examines the way in which agriculture was addressed within them.

Every country of the region included the issue of agriculture in its INDC, with the priority generally being on the adaptation of the sector. However, all 17 countries also included mitigation goals or actions related directly or indirectly to agriculture. The pledges made by the countries denote the importance of the sector for the region's development goals and the need to channel technical and financial support towards the sector. Agriculture also has great potential to achieve the integration of mitigation and adaptation approaches in policies, strategies and programs. The commitments made by each country, both through the Paris Agreement and in their respective INDCs, provide a solid foundation for tackling the global challenge of climate change with concrete actions reflecting national contexts and priorities.

1. Belize and the Dominican Republic are included here given their participation in the Central American Integration System.

Foreword

The 21st Conference of the Parties of the United Nations Framework Convention on Climate Change, celebrated in Paris in 2015, was a landmark event in the global efforts to confront climate change. Aside from the adoption of the Paris Climate Agreement by 195 countries, 187 submitted their Intended Nationally Determined Contributions – INDCs – wherein they specified the ways and means they would use to address climate change in their country, through both mitigation and adaptation measures, and committed themselves to take appropriate actions to reach their specified goals. In the process of developing their INDCs, the countries identified the priority sectors in which these actions would be taken, and most countries – including those of Latin America – specified agriculture and food production as fundamentally important areas for action. Collectively, the countries, through their INDCs, have explicitly given a new and well-deserved prominence to the agriculture and livestock sectors, as well as the visibility that has been largely missing in the international climate change discussions prior to Paris.

The Inter-American Institute for Cooperation on Agriculture (IICA) is pleased to present this publication, which synthesizes how agriculture is addressed in the INDCs of the Latin American region. Together with its partners, IICA has been working for several years to promote a more active and informed participation of the agriculture sector in the international climate negotiations and national planning processes. This study, which was supported by the EUROCLIMA Program financed by the European Commission, complements other efforts already being made to contribute to the process of capacity building and dissemination of technical information regarding the commitments of countries to the UNFCCC. It is both timely and relevant for the 18 Latin American countries that are part of the EUROCLIMA-IICA Project.

The INDCs constitute a bottom-up recognition of the important contributions that the agriculture and livestock sector can make, not only in terms of reducing the greenhouse gas emissions generated by the sector, but also in bringing about the changes in policies and practices that will be needed to adapt the sector to novel climatic conditions in order to ensure the future food security of a burgeoning human population.

David E. Williams

IICA- San José, Costa Rica



PARIS2015
UN CLIMATE CHANGE CONFERENCE
COP21·CMP11

With the Paris Agreement, “the world now has a universal, flexible and durable agreement.”

Ban Ki Moon, United Nations Secretary General

The Paris Agreement as the foundation for climate action

Since its establishment at the Rio Earth Summit in 1992, the United Nations Framework Convention on Climate Change (UNFCCC) has provided the umbrella structure under which its 195 member states, or parties, have negotiated the international agreements aimed at reducing climate change. A key year for the climate negotiations, 2015 culminated with the adoption of the Paris Agreement at the Twenty-first Session of the Conference of the Parties (COP 21). This new agreement, due to enter into force in 2020 and replace the Kyoto Protocol, reinforces the pledges that each country has made to reduce its greenhouse gas (GHG) emissions in a more urgent, ambitious way. The Agreement takes into account the principles of both common but differentiated responsibilities, as well as equity and transparency.

It strengthens the global resolve to limit the temperature increase to a maximum of two degrees Celsius, while encouraging movement towards a 1.5 degree limit. The Agreement also raises the profile of adaptation, underlining the need for “enhancing adaptive capacity, strengthening resilience and reducing vulnerability to climate change, with a view to contributing to sustainable development and ensuring an adequate adaptation response in the context of the temperature goal” (UNFCCC 2015).

In recent years, agriculture has played a much more prominent role in the climate negotiations than ever before. Agriculture is one of the sectors most vulnerable to the impacts of climate change, and also has great potential to mitigate its GHG emissions. The two-way nature of the sector’s relationship with mitigation and adaptation objectives has led to the development of a growing number of actions and proposals at the local, national, and regional levels designed to address the issue from both perspectives. Although the Paris Agreement does not contain specific decisions for the agriculture sector, the text makes explicit mention of the importance of taking into account “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).

The UNFCCC notes the importance of the sector in its ultimate objective, which states that greenhouse gases should be stabilized “within a time-frame sufficient to allow ecosystems to adapt naturally to climate change, to ensure that food production is not threatened, and to enable economic development to proceed in a sustainable manner.” (UNFCCC 2015).

The level of commitment that each country has assumed and the approach that each has adopted to comply with the Paris Agreement are stated explicitly in the intended nationally determined contributions (INDCs) submitted to the UNFCCC. In these contributions, most countries

The importance of agriculture

The agriculture sector continues to play a key role in the economic development, rural poverty reduction, food security, and environmental sustainability of Latin America. Agriculture will become increasingly important as environmental pressures, food price volatility and the need to guarantee food security for a burgeoning world population increase (Beddington et al. 2012). Conservative forecasts suggest that another six million hectares of land will be brought into production every year from now until 2030 in the developing countries, and that two-thirds of that expansion will take place in Sub-Saharan Africa and Latin America (Deininger et al. 2011). Climate change and climate variability place additional pressures on production systems and limit the possibilities for development of the most vulnerable populations that depend directly on natural resources for their subsistence (United Nations 2015). In this context, agriculture is faced with challenges but also opportunities for contributing to the achievement of human well-being and the sustainability Earth's ecosystems.

differentiated responsibilities, considering their past and current emissions levels and differing capacities.

The Paris Agreement was adopted during the COP 21 in December 2015, and will be open for ratification from April 22, 2016 onwards. Once countries ratify the Agreement, their pledges will no longer be regarded as “intended” and therefore will be referred to simply as nationally determined contributions (NDCs). Countries will, however be able to decide whether their first NDC will be the INDC originally submitted or another.

Before the INDCs were drafted, countries were urged to present their information in a clear and quantifiable manner, guided by the principle of transparency. The UNFCCC did not establish a specific format for the presentation of goals or the preparation of the INDCs. However, several guides were developed to support countries, and advised they should explicitly include the time period for implementation, detail the scope and coverage of actions, and present ambitious but achievable goals.

In the mitigation components of their INDCs, countries presented the goals in various ways, including concrete results, specific actions, or a combination of both. Quantifiable goals facilitate aggregation of goals and comparison between nations, enabling a better understanding the true mitigation impact and potential at the global level, with respect to the capabilities and political will of countries. Figure 1 shows the different ways in which countries reported the GHG emissions reduction targets in their INDCs.

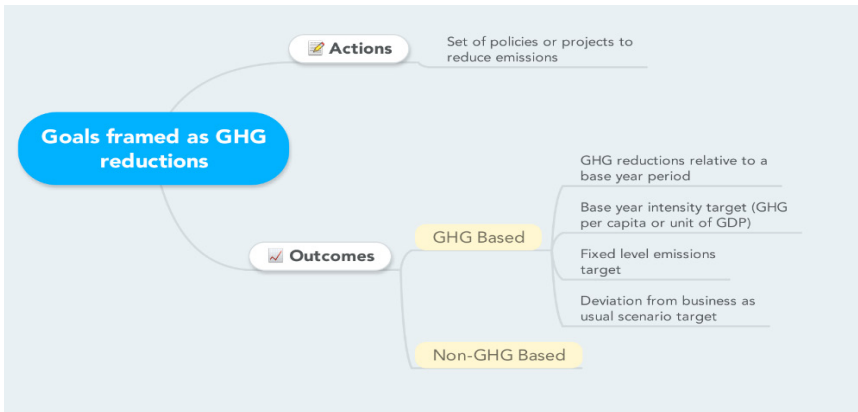
referred directly or indirectly to agriculture and its role in both adaptation and mitigation efforts. This document presents an overview of the INDCs submitted by 17 Latin American countries, examines their scope and describes how agriculture was included.

What are intended nationally determined contributions (INDCs)?

INDCs are individual and voluntary commitments and goals for post-2020 climate action that both developed and developing countries submitted before or shortly after the COP 21. Eighteen of the 19 Latin American countries have already submitted documents containing their INDCs to the UNFCCC,² in which they communicated their priorities and intentions to the rest of the international community. The goals set in the INDCs were based on national priorities, and on each country's circumstances and capacity to assume mitigation and adaptation challenges that would allow them to advance toward resilient patterns of development based on low emissions. All the INDCs include a mitigation component, and the vast majority of them also describe priority adaptation actions that the countries intend to carry out. The process of developing INDCs allowed the countries to establish common but

2. Nicaragua has yet to submit an INDC to the UNFCCC, and Panama's was submitted after this analysis was completed.

Figure 1: Types of GHG reduction goals set in the INDCs



Source: Prepared based on Levin et al. 2015.

In addition to mitigation goals, countries were invited to “consider communicating their undertakings in adaptation planning or consider including an adaptation component in their intended nationally determined contributions” (UNFCCC 2014). Summaries of climate change impacts and vulnerabilities, long-term adaptation goals, shorter-term actions, priorities, barriers, and support required to strengthen resilience to climate change were included in many the INDCs. In numerous cases, these factors were framed in terms of national goals (e. g., poverty reduction, food security) or sectoral plans. Submissions included both unconditional goals, as well as conditional goals that are contingent on external financial or technical support being received.

INDCs at the global level

By April 1, 2016, the Convention had received 161 documents representing 188 countries, including the 28 member states of the European Union (see Figure 2). Those 188 countries accounted for almost 99% of global emissions in 2010 (excluding land use, land use change and forestry - LULUCF) and represent 98% of the global population (WRI 2016). Eighteen of the INDCs submitted included only a mitigation section³, while 142 included both sections - mitigation and adaptation.



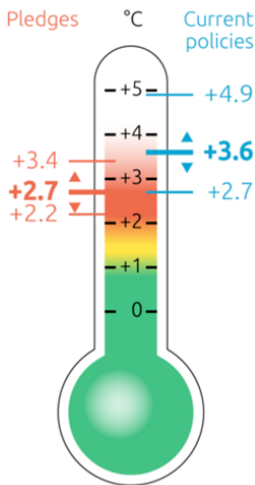
Figure 2. Countries that had submitted INDCs as of April 1, 2016

Source: WRI 2016.

3. Four countries in the Americas -the U.S., Trinidad and Tobago, Canada and Belize- did not include adaptation, though Belize is planning to do so, and did incorporate an appendix on its existing climate change adaptation plan which includes adaptation.

As the UNFCCC did not mandate the format of the pledges, a number of countries presented their goals as different types of targets, as noted above. More than two thirds of the countries submitted GHG reduction targets. Some framed their contributions in terms of GHG reduction outcomes, e.g., a determined percentage reduction in GHG emissions by a specific year using another year as a baseline. Others framed their goals as non-GHG targets (for example, the achievement of a certain percentage of renewable energy by a certain year) or in terms of actions (such as the implementation of certain policies, projects, etc.). Several included more than one type of goal.

Figure 3. Global mean temperature increase (and uncertainty range) by 2100 above pre-industrial temperature



Source: Jeffery et al. 2015

if they wish to meet the targets set in the Paris Agreement. Adopting mitigation measures in the short-term is more cost-effective than postponing such actions and allowing GHG concentrations in the atmosphere to continue to rise, thereby increasing climate risks, impacts, and adaptation costs (World Bank 2010).

The INDCs represent an important step forward in fulfilling international climate commitments, but their success will depend on adequate implementation and the monitoring and the evaluation of results. Stipulations were made in the Paris Agreement to ensure the goals are

In the Copenhagen Agreement (2009), it was decided that the increase in temperature should be limited to a maximum of 2°C, which is essential to keep climate change within the boundaries of manageable risks without superseding nature or humankind’s capacity to adapt to it, and thus enable the achievement of the UNFCCC’s ultimate objective of addressing climate change (UNFCCC 2009). As already noted, the Paris Agreement urges countries to be more ambitious and strive to limit the temperature increase to 1.5°C above pre-industrial levels (UNFCCC 2015).

The GHG reduction goals established by the countries in their respective INDCs will undoubtedly result in significant emissions reductions being achieved (see Figure 3). However, even if countries fully achieve their targets, the temperature increase will still be approximately 2.7°C, compared with the projected 3.3-3.9°C were the INDCs not be implemented (Jeffery et al. 2015).⁴ Therefore, countries will have to be more ambitious

4. There are differing estimates of the rise in temperature depending on the assumptions made and the time-frames and models used. The conclusion arrived at is the same, however: that the actions to which the countries are committed are not sufficient to meet the goal of achieving a 2°C reduction.

met and “ratcheted up” or increased in ambition over time. Countries will be required to submit emissions and progress reports on the implementation of their INDCs and develop revised, more ambitious plans every five years.

Summary of the INDCs commitments made by Latin American countries

The information presented below is based on the INDCs prepared and submitted to the UNFCCC by Argentina, Belize, Bolivia, Brazil, Chile, Colombia, Costa Rica, Dominican Republic, Ecuador, El Salvador, Guatemala, Honduras, Mexico, Paraguay, Peru, Uruguay, and Venezuela.

The Lima Call for Climate Action did not require least developed countries and small island developing states to set mitigation targets (International Partnership on Mitigation and MRV 2016) but rather that those countries “may prepare and communicate strategies, plans and actions for low greenhouse gas emission development reflecting their special circumstances” (UNFCCC 2014). In spite of this, all the Latin American countries that submitted INDCs included a section on mitigation, in which they detailed GHG reduction actions or goals, in addition to the section on adaptation.

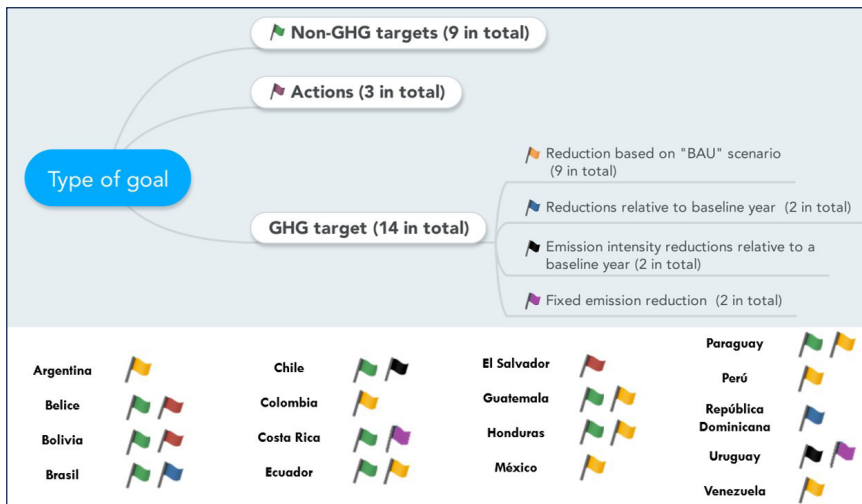
A number of countries mentioned that, historically, their contribution to total global GHG emissions has been minimal. Nine of them pointed out that they account for less than 0.5% of global emissions. Yet even though their emissions represent only a small fraction of total global emissions, the countries demonstrated their commitment to the international emissions reduction efforts. This is important given that the world’s developing economies have increased their emissions year after year; GHG emissions from developing countries have increased 57% over the last 40 years (Blanco et al. 2014).

Mitigation

Seven of the 17 Latin American countries that submitted INDCs included only GHG reduction targets, while seven others specified both GHG and non-GHG reduction goals (see Figure 4). Two countries included non-GHG targets and actions, and one country (El Salvador) included only actions. Most of the non-GHG targets are related to renewable energy, while four countries also included targets for forests. Costa Rica reaffirmed its goal of achieving a carbon-neutral economy by 2021.

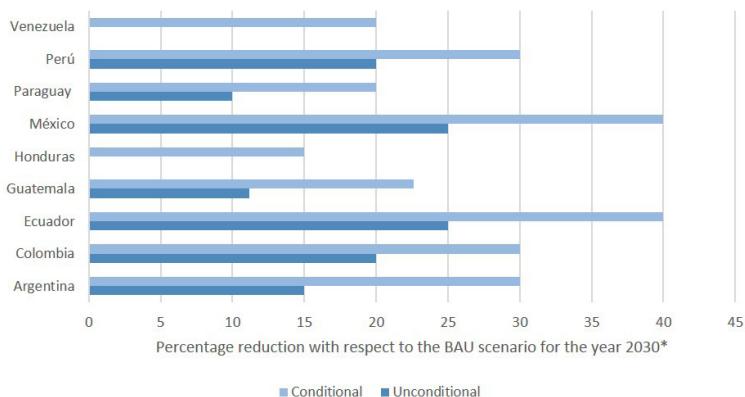
Six INDCs covered all the sectors mentioned in the methodological guides produced by the Intergovernmental Panel on Climate Change (IPCC). All of the countries included the energy sector, 15 included the agriculture and waste sectors, and 12 cover industrial processes. The transport and LULUCF sectors were also included in several INDCs.

Figure 4. Types of mitigation goals included in the INDCs of 17 Latin American countries



Given that the countries utilized different types of goals, it is difficult to compare respective levels of ambition. Nonetheless, several countries that decided to report their goals based on the reduction of GHG emissions used the business as usual (BAU) emissions scenario as their starting point and pledged to achieve a specific percentage of emissions reduction based on that scenario by the year 2030. As shown in Figure 5, the ambition and conditionality of the pledges vary.

Figure 5: Emissions reduction goals of countries that reported them linked to the BAU scenario.



Source: Prepared using data contained in the INDCs

* Unlike the rest of the countries, Ecuador presented its goal for the year 2025 and only for the energy sector.

With regard to the countries that included GHG targets not linked to a BAU scenario, Costa Rica proposed a fixed reduction in emissions with an absolute maximum of 9,374,000 net tCO₂e through 2030, combined with its goal of achieving a carbon-neutral economy in 2021. By 2030, Uruguay intends to remove 13,200 Gg of carbon dioxide per year in the LULUCF sector. Two countries pledged to achieve reductions linked to a base year: the Dominican Republic pledged a 25% reduction in emissions by 2030 compared with 2010, while Brazil pledged to reduce emissions by 37% between 2005 and 2025. The last two GHG targets set in the region were proposed by Chile and Uruguay, which intend to reduce the intensity of their emissions with respect to a base year. Chile intends to reduce its emissions by 30% per unit of GDP by 2030 compared to 2007 levels, while Uruguay proposed eight targets for reducing the intensity of its CO₂, CH₄, and N₂O emissions by 2030 with respect to 1990.

As shown in Table 1, all the countries that reported on the type of GHG in their INDCs mentioned carbon dioxide (CO₂) and, except for Belize, all of them also included nitrous oxide (N₂O) and methane (CH₄). This means that agriculture's contribution will be key in meeting the reduction targets set for these last two types of gases. At the global level, the sector accounts for 55%-60% of all CH₄ emissions and 65%-80% of all N₂O emissions (IPCC 2007). Methane and nitrous oxide emissions increased by 0.9% per year during the period 1990-2010 (Tubie-llo et al. 2013), with the developing countries accounting for the most significant increases (Smith et al. 2014).

Table 1. Types of GHG included in the Latin American INDCs*

Type of GHG	Carbon dioxide (CO ₂)	Nitrous Oxide (N ₂ O)	Methane	Hidrofluoro carbonos (HFC)	Otros (PFC, SF ₆ , NO, carbono negro)
Number of countries including it in their INDC	14	13	13	7	8

* Bolivia, El Salvador and Venezuela did not specify the gases included in their INDC.

Of the 17 INDCs submitted by Latin American countries, 11 included unconditional goals, while 15 presented goals conditional on receiving international support (see Figure 6). Such support may take the form of financial contributions, investment, technology development and transfer, or capacity development. Brazil was the only country in the region that explicitly included only unconditional goals. Five countries in the region made all their targets conditional on support being received.

Figure 6. Conditionality of the goals set in the INDCs



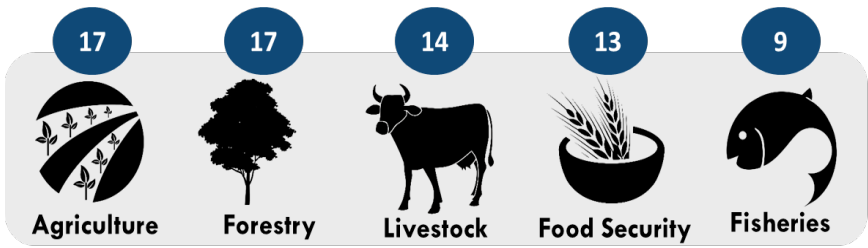
Adaptation

In their INDCs, the Latin American countries emphasized the urgent need to increase resilience and adapt to climate change. In addition, they emphasized the vulnerability of several sectors, including agriculture, water resources, health, tourism, marine-coastal resources, and biodiversity. Eight of the Latin American countries mentioned the importance of adopting a gender-sensitive approach or taking women into account, given their differentiated levels of vulnerability. Seven stressed the need to include indigenous groups and five noted that young people and children were particularly vulnerable. Notably, Peru is engaged in the participatory development of its Gender and Climate Change Action Plan, which it aims to complete in 2016.

The agriculture sector in the INDCs

The importance of increasing food security and promoting an agriculture sector that is more productive, sustainable and resilient to climate variability in Latin America is reflected in the fact that all of the region's INDCs mention these topics (see Figure 7). Fifteen of the 17 countries emphasized the importance of the agriculture sector and its high level of vulnerability. Several countries, including Argentina, Uruguay, and Paraguay, underscored their contribution to global food security and the role of agriculture in achieving well-being through its contributions to the economy, trade and employment. Others emphasized the need to promote a culture of more sustainable production and consumption.

Figure 7. Number of countries and topics related to the agriculture sector in the INDCs



Six countries (Bolivia, El Salvador, Guatemala, Honduras, Peru and Venezuela) mentioned the need to develop approaches for and focus especially on smallholders or subsistence farmers, and the factors that make them highly vulnerable. Three countries (Bolivia, Guatemala and Venezuela) referred to the importance of valuing and incorporating local, traditional, and ancestral knowledge into efforts to combat climate change and implement the INDCs.

Among the climate change impacts mentioned were an increase in temperatures, the increased frequency and scale of floods, droughts, frosts and hailstorms, and changes in precipitation patterns. A number of countries have already undertaken actions to address those impacts, and 13 countries made specific reference to climate change plans or actions designed for the agricultural sector. Bolivia, Brazil, Guatemala, Honduras and Mexico have established climate change laws, and the Dominican Republic amended its Constitution to include the issue. Other countries have devised sectoral policies, such as the Policy for Climate Smart Agriculture instituted by Uruguay in 2010 to promote more efficient, resilient, low-carbon production. In addition, several countries, including Belize, Chile, El Salvador, Colombia, and Peru, have either already developed, or are engaged in developing, specific adaptation plans for the sector. These public policy instruments represent a major step towards identifying medium and long-term climate risks and adaptation needs for the sector. They also demonstrate that, regardless of the progress made with agriculture under the UNFCCC, the Latin American countries have already recognized that designing actions and strategies to address the climate change in the sector is a priority.

It should be noted that El Salvador's INDC is different from that of the other countries. Instead of stipulating concrete goals, it focuses on the development of institutional frameworks and public policies to facilitate adaptation and mitigation. The specific actions mentioned include the creation of a framework law on climate change and the updating of "regulations governing the management of the agriculture, aquaculture, forestry and water sectors" (MARN 2015). The information included on each sector's contribution to the INDC serves broader monitoring and reporting purposes for El Salvador.

With regard to the agriculture sector, the INDCs principally focused on adaptation as the primary sectoral priority. To a lesser degree, all the countries also included actions, programs, policies or goals that will contribute to reducing emissions from the sector. The targets set by Chile, Ecuador, and Venezuela are related more to the LULUCF sector, which in

many cases involves the agriculture sector indirectly. Mexico, Peru, and Dominican Republic included emissions reduction as an overarching goal but did not specify concrete mitigation actions for agriculture.

It is important to acknowledge that the agriculture and LULUCF sectors present substantial opportunities to simultaneously mitigate climate change and adapt to its effects, often with additional co-benefits. Some countries, especially Bolivia, El Salvador and Guatemala, emphasized their intention of prioritizing joint approaches designed to contribute to both adaptation and mitigation. Bolivia, for example, specified that “[that] is the only way to tackle climate change systematically, which includes the close coordination of the different social, economic, and environmental dimensions” (Estado Plurinacional de Bolivia 2015). Other INDCs propose adaptation actions such as the restoration of ecosystems and landscapes, the establishment of agro-forestry or silvopastoral systems (e.g., Bolivia, Colombia, Costa Rica, El Salvador and Honduras), the reduction of soil degradation, the promotion of conservation agriculture and other efforts that simultaneously provide mitigation benefits. One strong focus in the region is the restoration, conservation and sustainable use or management of forests, which figure in 15 INDCs. Mexico set a goal of reducing the deforestation rate to zero by 2030. Finally, five countries mentioned another action that contributes to both adaptation and mitigation: efficient or reduced use of agrochemicals.

The agriculture sector and mitigation

Although agriculture is one of the sectors most vulnerable to climate change, it is also the source of 11% of global GHG emissions (Blanco et al. 2014). The figure rises to 24% when emissions generated by deforestation and land use change, often due to agricultural expansion, are included (Blanco et al. 2014). According to FAO data, GHG emissions from the agriculture sector (including fishing) have almost doubled in the last 50 years and can potentially continue to increase as a result of the growing demand for food (Tubiello et al. 2014).

In 2011, 25% of global agricultural and livestock-related GHG emissions were generated in Latin America and the Caribbean (Tubiello et al. 2014), making the sector’s emissions in this region quite significant. For example, in Uruguay they account for 76% of the country’s total emissions (República Oriental del Uruguay 2015). A number of countries in the region, especially Argentina and Uruguay, have stated emphatically that emissions cannot be mitigated at the expense of food production. Therefore, mitigation efforts in the sector are often focused on improving the efficiency of emissions per unit of product (emission intensities).

Of the INDCs submitted by the Latin American countries, Uruguay’s includes the most explicit goals for mitigation in the sector; they are also unconditional. As the only country that prioritizes mitigation in the livestock sector unequivocally, Uruguay intends to reduce the intensity of methane and nitrous oxide emissions by 33% and 41%, respectively, for every kilogram of beef by the year 2030 (using 1990 as the base year). It set even more ambitious goals conditional upon international support, such as the reduction of the intensity of methane emissions from other agricultural activities, including rice and dairy production,

and fishing. Uruguay also included the goal of achieving a reduction of 13,200 Gg CO₂ in the LULUCF sector, which will be achieved by increasing the amount of native forest as well as using zero tillage and conservation agriculture techniques to increase carbon sequestration in degraded grasslands and eroded arable lands.

Another country that places great emphasis on reducing sectoral emissions is Costa Rica. One of the actions proposed involves the management of carbon sinks (using land use plans, reforestation, deforestation avoided), as one of the four different mitigation options included in the hence the country sees the opportunity to improve efficiency and increase competitiveness and to implement “measures which can both reduce emissions, while increasing productivity and the range of environmental services provided by agriculture and livestock production (...). Among investment mechanisms available to improve acknowledgement of the agricultural sector’s contribution to emission reduction, the market may play an important role in financing, at the farm level, additional mitigation efforts, with a payment for results scheme, 13 carbon auctions, and financial mechanism to promote initial investments and guarantee financial sustainability beyond international cooperation” (Ministerio de Ambiente y Energía de Costa Rica 2015). Costa Rica already has a nationally appropriate mitigation action (NAMA) under way in the coffee subsector, and is in the process of developing two more NAMAs for the livestock and biomass subsectors.

In relation to agriculture and bioenergy, Belize aims to promote and facilitate technologies for processing agricultural and forestry waste and biomass to produce biodiesel and other energy sources. Another eight countries (Argentina, Bolivia, Brazil, Guatemala, Honduras, Paraguay, Peru and Uruguay) mentioned that they intend to use more biofuels produced from biomass. Brazil has a specific target for sustainable biodiesel: an 18% increase in the proportion of biodiesel in the energy matrix by 2030.

In addition to the development of renewable energy from biomass, Argentina highlights different initiatives that the agricultural sector intends to implement that help to both reduce emissions and increase food production. Some of those highlighted are direct seeding, crop rotation, and precision agriculture.

With respect to the links between the agriculture and forest sectors, Brazil is already implementing its Low-Carbon Agriculture Plan (Plan ABC), designed to guide the development of sustainable agriculture in the country. The plan includes the concrete goal of restoring 15 million hectares of degraded grassland by 2030, and improving five million hectares of integrated agrosilvopastoral systems. Guatemala states that it will continue to implement several instruments under its forest management policy, including the Forest Incentives Program for Small Forest and Agroforestry Landholders (PINPEP) and the National Strategy to Restore the Forest Landscape, whose goal is to bring 1.2 million hectares under improved management.

Table 2. Summary of topics included in the INDCs by country

Country		Argentina	Belize	Bolivia	Brazil	Chile	Colombia	Costa Rica	Ecuador	El Salvador	Guatemala	Honduras	Mexico	Paraguay	Peru	Dominican Republic	Uruguay	Venezuela	TOTAL	
General Topics	Importance and vulnerability of the ag sector	x	x	x		x	x	x	x	x	x	x	x	x	x		x	x	15	
	Agriculture sector actions/plans already in progress	x	x	x	x	x	x	x	x	x		x	x	x	x		x		13	
Subsectors mentioned	Agriculture	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	17	
	Forestry/Forests	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	17	
	Livestock		x	x	x		x	x	x	x	x	x	x	x	x			x	14	
	Water resources	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	17	
	Marine and coastal resources		x			x		x	x	x	x	x	x		x		x	x	11	
Agricultural adaptation/mitigation priorities or actions included	Restoration, conservation, sustainable management and use of forests	x	x	x	x	x		x	x	x	x	x	x	x	x			x	15	
	Ecosystem-based adaptation, maintenance of ecosystems and their services	x	x	x		x	x	x	x	x	x	x	x				x	x	14	
	Efficient use and management of water	x	x	x	x	x	x		x	x	x	x		x			x	x	14	
	Improved agricultural practices (e.g.: conservation agriculture, direct seeding, precision agriculture, agro-silvopastoral systems, etc.)	x	x	x	x		x	x	x	x	x	x						x	x	12
	Early warning systems/better agro-climatic information	x		x			x	x	x		x		x	x			x	x	11	
	Improved ag policies/strategies and their implementation;					x	x	x	x			x	x					x	x	9
	Energy from Biomass	x	x	x	x							x	x		x	x			x	9
	Improved soil management/reducing degradation	x	x	x						x	x	x	x						x	8
	Diversification, conservation and use of agrobiodiversity		x	x						x	x		x	x						7
	Smallholders/subsistence farmers			x							x	x	x			x				6
	Research, identification and use of improved varieties				x	x	x							x					x	6
	Insurance	x	x	x									x							5
	Irrigation (expansion, efficiency)	x	x	x									x							5
	Sustainable land/landscape management and conservation			x				x	x	x				x						5
	Efficient or reduced use of agrochemicals	x									x		x						x	5
Local and traditional knowledge			x								x								3	
Support Required	Financing	x	x	x	x ^A	x	x	x	x	x	x	x	x	x	x	x	x	x	17	
	Non-financial support	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	x	16	

Note: This table reflects the contents of the NDCs and does not include information from other sources.

^ABrazil indicates that while financial support is welcome, it is not essential for the implementation of their INDC.

The agriculture sector and adaptation

Most countries underlined the need for policies and actions designed to improve the sector's response to climate change and contribute to food security and sustainable food production (see Table 2). In general, the INDCs lean heavily towards ecosystem-based adaptation and the conservation of ecosystems and the services they provide (14 countries mentioned this explicitly). Another priority approach emphasized is the reduction of water risk by improving the water management and enhancing water use efficiency (14 countries). Five countries specifically mentioned the need to increase or improve the efficiency of irrigation systems.

Twelve countries included a strong focus on actions designed to improve on-farm practices, including conservation agriculture, direct seeding, water harvesting, precision agriculture and agrosilvopastoral systems (see Table 2). Nine countries intend to work to reduce soil degradation and improve soil management. Six specifically mentioned research on, and the identification and use of, improved varieties.

Nine countries cited the need to strengthen sector institutions and improve the design and implementation of agricultural policies, plans, and strategies. For example, as part of the public policy efforts already under way, Guatemala emphasized the “existence of an agricultural policy to strengthen the National Rural Extension System (SNER), among other programs linked to the Action Plan for the Implementation of the National Policy for Integrated Rural Development, the presentation of annual institutional operating plans linked to the agricultural sector programmed in relation to micro-watersheds, and the implementation of the irrigation policy adopting an integrated water resource approach” (República de Guatemala 2015). Another important focus, mentioned in 11 INDCs, is on the efforts to improve the collection, management, and dissemination of agro-climate information and the establishment of early warning systems. Five countries included the need to develop or strengthen insurance systems to cover risks that cannot be managed. Seven countries will attempt to diversify the sector and as well as promote the conservation (in situ and ex situ) and use of the wealth of agrobiodiversity that exists in the region, where two centers of origin are located and a wide range of crops are grown.

The region's governments clearly recognize the importance and vulnerability of the agriculture sector in their INDCs. The general priority is to increase sectoral resilience and thereby guarantee food security while achieving related development objectives, such as the reduction of hunger and poverty. Key aspects identified included the improvement of natural resources management, the promotion and implementation of best practices, the promotion of diversification, and the strengthening of policies. The countries also recognized that a combination of policies, investment, research, technology, and capacity development will be required at the local, national and regional levels to transform Latin American agriculture into a low-emission, climate resilient sector.

Next steps needed to meet the challenge of climate change in agriculture

The year 2015 was critical for advancing international commitments made towards climate action, not only through the UNFCCC process, but also through the approval of the Sendai Framework for Disaster Risk Reduction and the new Sustainable Development Goals. In the years ahead, the success of these agreements will depend on the degree to which political commit-

ments are translated into action on the ground at the regional, national and sub-national levels. This will likely require the evolution of public policy frameworks, and the materialization of sufficient funding and other forms of support for developing countries. All of the Latin American countries mentioned the need for additional financing in their INDCs, with 16 stating that they would require technical support of various kinds, including capacity building and technology transfer. Although most countries will dedicated some of their own national resources towards the implementation of their INDCs, several pointed out that they could do more to reduce their emissions were they to receive external support. In this context, South-South cooperation and triangular cooperation can play an important role.

The agriculture sector will play a central role in the achievement of the goals set in the Paris Agreement and the INDCs. However, the sector will have to become more engaged and proactive to capitalize on the opportunities that these agreements provide. The challenge still lies in channeling the financing, knowledge, and technology required for sustainable development towards the sector. Each country now faces the challenging task of articulating and aligning public policies, institutions and programs at different levels required to drive progress towards meeting the collective goals laid out in their INDCs. Given limited resources, countries will have to identify which adaptation measures provide the most benefit and which sectors will take on the responsibility and leadership for their implementation. Coordination between sectors and stakeholders will be key to channeling resources and efforts effectively.

Agriculture can be a leader in incorporating both climate change mitigation and adaptation approaches into sectoral policies, strategies and programs. This will enable countries to reap additional co-benefits and better achieve overarching development goals such as food security, poverty reduction, and sustainable development. The commitments made by the countries, both in the Paris Agreement and their INDCs, provide a solid basis for meeting the global challenge of climate change with concrete actions that respond to national contexts and priorities. Time will tell if pre-2020 ambition and actions taken in the first implementation period of the INDCs will be sufficiently catalytic to stimulate the more determined commitments that will be required to effectively mitigate climate change in the upcoming years. In this context, the agriculture sector can be instrumental by exemplifying the synergies possible between adaptation and mitigation, as well as the close links between a healthy environment and human well-being.

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