



# NATIONALLY DETERMINED CONTRIBUTION (NDC) OF THE PLURINATIONAL STATE OF BOLIVIA

**NDCs update for the 2021-2030 period within the framework of the Paris Agreement**

Ministerio de Medio Ambiente  
y Agua - Autoridad Plurinacional  
de la Madre Tierra.







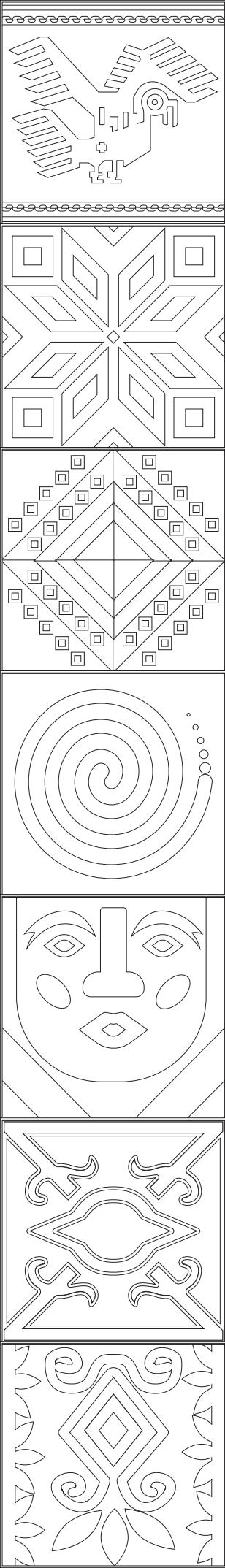
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# Update of the Nationally Determined Contribution (NDC) of the Plurinational State of Bolivia

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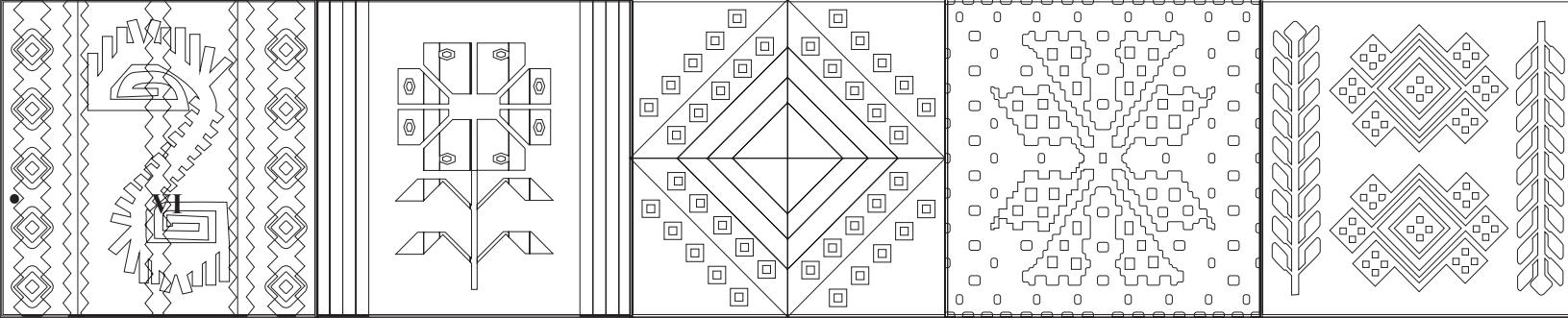
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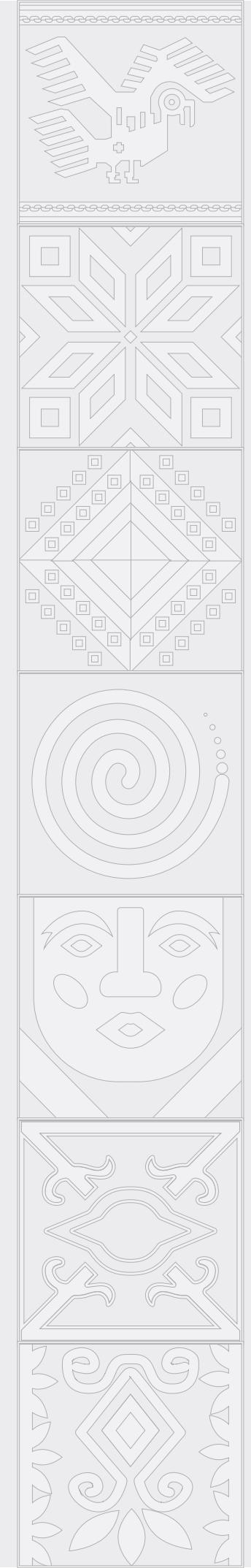
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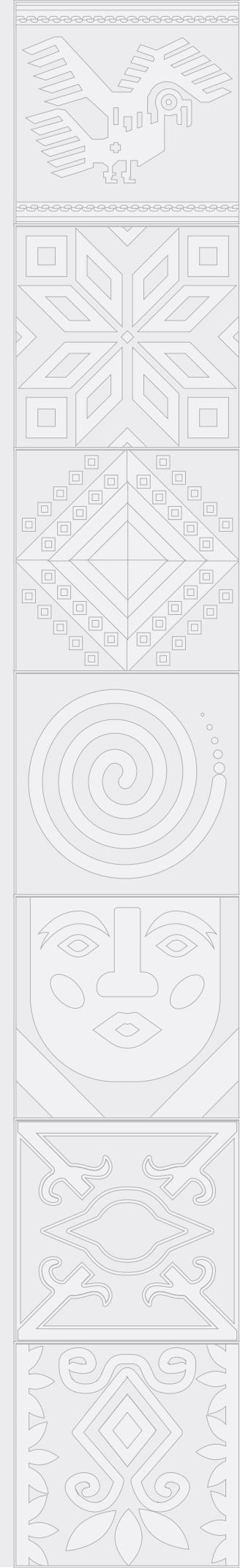
## Acronyms

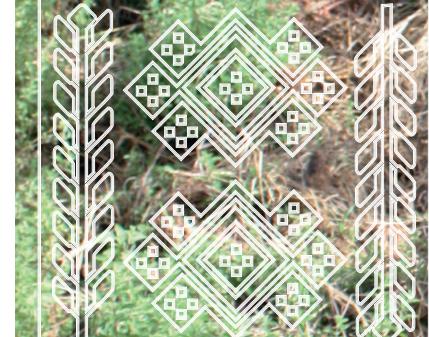
<b>ABT:</b>	Regulatory Authority and Social Control of Forests and Land
<b>ACE:</b>	Action for Climate Empowerment
<b>AACC:</b>	Climate Ambition Alliance
<b>AFOLU:</b>	Agriculture, Forestry and Other Land Use Sector
<b>APMT:</b>	Plurinational Authority of Mother Earth
<b>BAU:</b>	Business as usual
<b>BUR:</b>	Biennial Update Report
<b>BTR:</b>	Biennial Transparency Report
<b>CEPAL:</b>	Economic Commission for Latin America and the Caribbean
<b>CN3:</b>	Third National Communication
<b>CN4:</b>	Fourth National Communication
<b>CND:</b>	Nationally Determined Contribution (NDC)
<b>CIMPDES:</b>	Interinstitutional Follow-up Committee NESDP, SDGs and NDCs
<b>CMNUCC:</b>	United Nations Framework Convention on Climate Change (UNFCCC)
<b>COVID-19:</b>	SARS-CoV-2
<b>CO2:</b>	Carbon Dioxide
<b>D.S.:</b>	Supreme Decree
<b>DGGDF:</b>	Forestry General Direction
<b>EIF:</b>	Financial Intermediary
<b>EEAA:</b>	Alternative Energy Sources
<b>EERR:</b>	Renewable Energy
<b>EPSAS:</b>	Water and Sanitation Public Social Enterprise
<b>ETA:</b>	Territorial Autonomous Entity



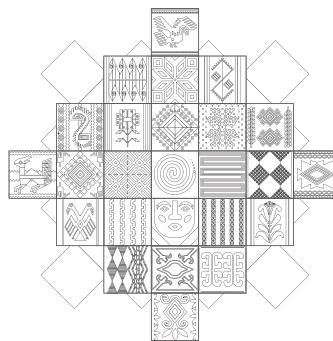
<b>FONABOSQUE:</b>	National Forestry Development Fund
<b>GEI:</b>	Greenhouse Gases
<b>GFW:</b>	Global Forest Watch
<b>GISB:</b>	Integral and Sustainable Forest Management
<b>IBIF:</b>	Bolivian Institute of Forestry Research
<b>IBT1:</b>	Biennial Transparency Report
<b>ICTU:</b>	Information Clarity Transparency Understanding
<b>INRA:</b>	National Institute for Agrarian Reform
<b>IPCC:</b>	Intergovernmental Panel on Climate Change
<b>IPPU:</b>	Industrial Processes and Product Use
<b>IRC:</b>	Global Climate Risk Index
<b>INE:</b>	National Institute of Statistic
<b>InGEI:</b>	Greenhouse Gas Inventory
<b>IVSB:</b>	Sustainable Live in Forests Index
<b>MHE:</b>	Ministry of Hydrocarbons and Energy
<b>MIC:</b>	Integrated Watershed Management
<b>MMAyA:</b>	Ministry of Environment and Water
<b>MPD:</b>	Ministry of Development Planning
<b>NDC:</b>	Nationally Determined Contribution
<b>NIB:</b>	Unsatisfied Basic Needs
<b>NF3:</b>	Nitrogen Trifluoride
<b>ODS:</b>	Sustainable Development Goals
<b>ONG:</b>	Non-Governmental Organizations
<b>PDC:</b>	Basin Master Plans
<b>PDES:</b>	National Economic and Social Development Plan (NESDP)
<b>PEA:</b>	Economically Active Population

PESFA:	Source Water Sustainability Strategic Plan
PIB:	Gross Domestic Product (GDP)
PNC:	National Watershed Plan
PNCC:	National Climate Change Program
PNFR:	National Forestation and Reforestation Program
PTDI:	Integral Development Territorial Plans
PSDI:	Integral Development Sector Plan
SF6:	Sulfur Hexafluoride
PyMES:	Small and medium-sized enterprises
PGDES:	National Economic and Social Development Plan
RIME:	Register of Monitoring and Evaluation Indicators
PFC:	Perfluorocarbons
IS:	Isolated Systems
SERNAP:	National Service of Natural Areas Protected
SIMTCC:	Plurinational System of Information and Integral Monitoring of Mother Earth and Climate Change
SPIE:	State Planning System
SIN:	National Interconnected System
SNAP:	National System of Protected Area
TCN:	Third National Communication
UCB:	Bolivian Catholic University
UPA:	Agricultural Production Units
WCS:	Wildlife Conservation Society
ZEF:	Center for Development Research.
ZEF:	Center for Development Research.





# Prologue



The Plurinational State of Bolivia with the adjustment of its Nationally Determined Contribution (NDC) ratifies its commitment to Mother Earth and the Paris Agreement, reaffirming that the civilizational horizon of Living Well in harmony with Mother Earth is a fundamental State Policy to advance towards the country's climate action.

Globally, Bolivia is among the countries most affected by the impact of climate change throughout its territory and in its cultural, social, productive, energy and industrial structure, and despite this it is making efforts to advance its comprehensive development to Living Well with a growth in annual public investment in the last 14 years from 629 (2005) to 3,769 millions of US dollars per year (2019)<sup>1</sup>, highlighting that there is a greater international commitment to address the climate crisis, including losses and damages management

Bolivia's updated NDC maintains the ambition of the first document and commits Bolivia to take actions aligned with a trajectory consistent with the global goal of limiting the increase in global average temperature to 1.5°C, with climate justice within the framework of the principles of equity and common but differentiated responsibilities and respective capabilities, in light of national circumstances. We also emphasize that it is an urgent need for greater commitment and cooperation on the part of Annex I Developed Countries, so that Bolivia, and the world, can achieve adequate comprehensive management of the climate crisis in terms of mitigation, adaptation and damage and loss management, with an adequate provision of financing, technology transfer and capacity building.

At the same time, the actions resulting from the contributions proposed in this update of Bolivia's NDC increase the country's adaptive capacity, strengthen resilience and reduce its vulnerability to the climate crisis. This NDC represents a true commitment of the Plurinational State of Bolivia to achieve its supreme objective of Living Well in harmony with Mother Earth in a context of climate crisis, with national effort and goals conditioned to international cooperation as appropriate under Article 4.7 of the United Nations Framework Convention on Climate Change and the Paris Agreement.

Furthermore, the NDC update includes a commitment to greater transparency in the monitoring of the proposed adaptation, mitigation and implementation targets, considering the submission of Biennial

<sup>1</sup> Ministry of Economy and Public Finance (2021)

Update Reports and National Adaptation Communications before the global review scheduled for 2023.

Finally, in compliance with the Plurinational Climate Change Policy and Plan, under the leadership of the Plurinational Authority of Mother Earth (APMT) and the Ministry of Development Planning (MPD), work will be done to prepare a National Adaptation Plan and a National Mitigation Strategy, which will guide the actions and agreements necessary to comply with the commitments established in the NDC update.

**Luis Arce Catacora**

Constitutional President of the Plurinational State of Bolivia

**Juan Santos Cruz**

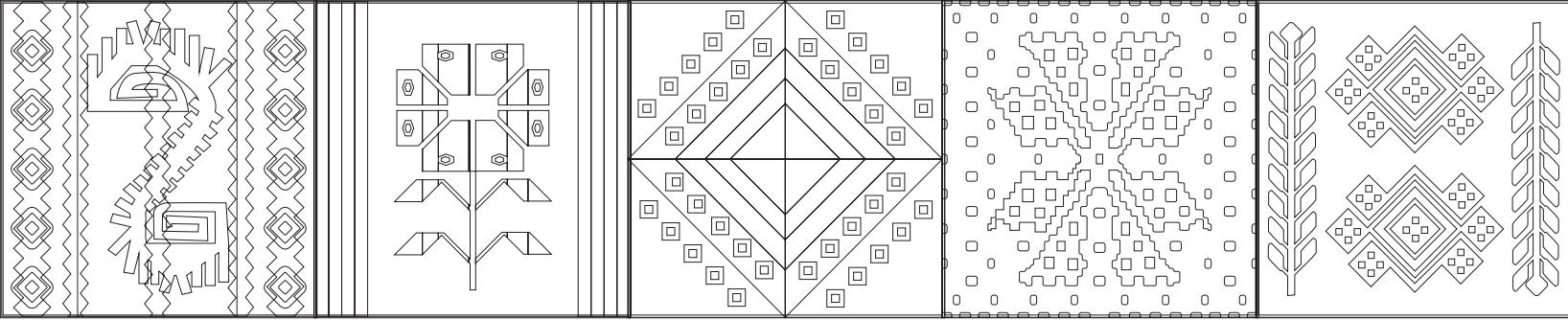
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Executive Director - Plurinational Authority of Mother Earth



## Executive Summary

**A**ccording to IPCC reports, the warming of the climate system is indisputable, as is the human influence associated with it. In Bolivia, the climate crisis poses high risks to human, economic, social, productive and natural systems. The Global Climate Risk Index 2021 (CRI) places Bolivia as the tenth most vulnerable country in the world, taking into account the impacts of extreme climate events and associated socioeconomic data.

Bolivia proposes a structural solution to the global climate crisis in the paradigm of Living Well in balance with Mother Earth, understanding an alternative civilizational horizon and the resulting cultures linked to IPLC's and other living cultures throughout the globe as an alternative to capitalism and the vulnerability associated with the global civilization at present. Thus, the respect for the rights of Mother Earth and climate justice, based on the principles of common but differentiated equity and responsibility; and a much needed strengthening of integral development for Living Well and the enhancement of the economy of Mother Earth.

In keeping with the commitments assumed with the Paris Agreement, Bolivia presents the update of its Nationally Determined Contribution (NDC) for the period 2021-2030, with an update that demonstrates an increase in Bolivian ambitions for adaptation and mitigation.

The Plurinational Climate Change Policy, in harmony with the NDCs, will promote the resilience of productive systems and livelihoods, increase adaptive capacity, and reduce the vulnerability of the different social, economic and environmental sectors with climate justice, a gender approach and intergenerational equity.

All Bolivians, especially groups vulnerable to climate change, including families living in poverty, indigenous peoples, women and children, will have reduced their exposure, and will have increased their adaptive capacity to climate change.

Bolivia, within the framework of its economic capacities, has proposed an ambitious NDC and will be implemented through sovereign efforts and others will be completed conditioned to international cooperation. Furthermore, additional financing mechanisms from international cooperation, particularly from developed countries, in accordance with the commitments of the UNFCCC and the Paris Agreement, will considerably increase mitigation ambitions and increase adaptation actions.

Bolivia is committed to have strategic basins, sub-basins and micro-basins with adequate multilevel and multi-sectoral *water management*, adapted and resilient, that allow an efficient, equitable and inclusive use of water resources in their multiple uses and whose management is focused on the welfare of people and

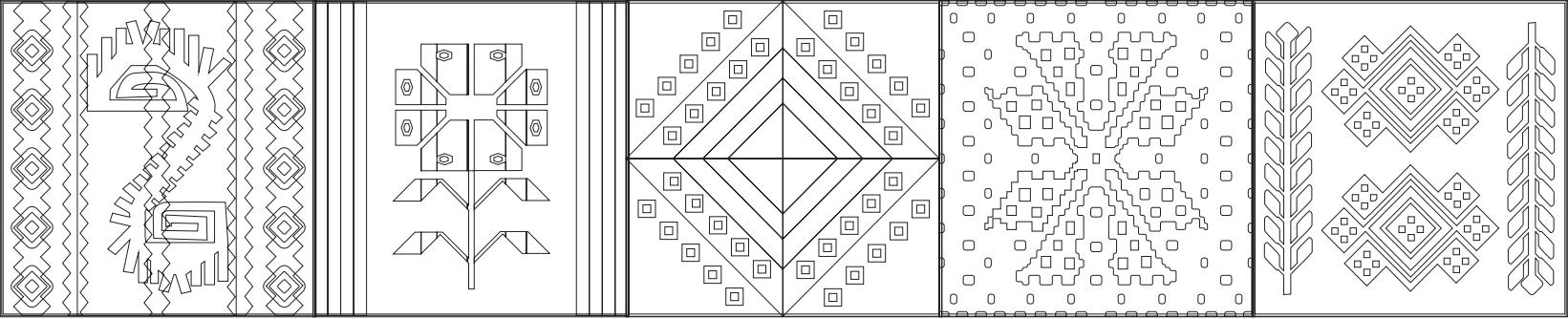
the balance of Mother Earth. It is also committed to making water resource use systems more resilient, both in terms of guaranteeing equitable and safe access to drinking water and improved sanitation and services at the urban and rural levels, as well as protecting and restoring water sources and surface and groundwater recharge areas and improving water recovery, treatment and storage systems, including multipurpose systems and water harvesting techniques for irrigation and human consumption.

In the *agricultural sector*, Bolivia is committed to strengthening production facilities and diversifying agricultural and food systems to increase food production, food sovereignty and security, generating goods for export of surpluses and resilient local consumption, and to consolidate an agricultural system based on productive efficiency with increased production and productivity. Bolivia's contribution to agriculture will be focused on strengthening and diversifying indigenous peoples and local communities productivity, increasing resilience, risk management and consolidating adaptive capacities and climate resilience.

*Integral and sustainable forest management* will be promoted, aimed at the conservation and sustainable use of forest resources, and increasing and maintaining environmental functions based on the strengthening of livelihood systems. The NDC proposes to reduce deforestation, carry out afforestation and reforestation actions, increase the areas with integrated and sustainable forest management, implement adaptive measures inside and outside protected areas, promote greater control of forest fires, among others, with a strong role and participation of indigenous peoples and local communities, intercultural communities and Afro-Bolivian people.

In the *energy sector*, the use of different renewable energy sources will be strengthened to consolidate and diversify its electricity generation capacity, so that it can cover the national domestic demand, guarantee the capacity and resilience of the electricity system, improve the conditions of populations connected to the national system, promote access to energy and the interconnection of isolated populations. In addition to the efforts designed to improve energy generation and access conditions, Bolivia will also make efforts to improve energy consumption conditions, implementing energy efficiency measures and electrification of particular services in areas such as streetlights or the transportation sector and its mobilities. Finally, although not considered as specific goals, Bolivia is expected to develop and take advantage of its potential in lithium and biofuels, which would gradually reduce the use of fossil fuels, thus promoting an energy transition to a more sustainable system.

The Plurinational State of Bolivia presents the update of the NDC in order to comply with the Paris Agreement and make efforts towards an economic recovery in harmony with Mother Earth. More so, this NDC is articulated to the National Economic and Social Development Plan 2021-2025 of the Plurinational State of Bolivia, to the SDGs, with national efforts and goals conditioned to international cooperation within the framework of international agreements on climate change.



# Update of the Nationally Determined Contribution (NDC) of The Plurinational State of Bolivia

## 1. Introduction

**B**olivia presents its Nationally Determined Contribution (NDC) in the framework of its vision to address the structural causes of the climate crisis in time to build a new civilizational horizon based on Living Well in harmony with Mother Earth, and comprehensively taking into account the principles and provisions of the United Nations Framework Convention on Climate Change (UNFCCC), as well as the Paris Agreement to address the climate crisis in the framework of equity and common but differentiated responsibilities.

In order to contribute to the solution of the climate crisis from the alternative vision of Living Well, contributing to implement proposals that allow the world to move forward with structural solutions to the climate crisis, Bolivia presented its national contribution in three dimensions: the first, linked to structural solutions to climate change; the second, to national results and actions in the framework of integral development; and the third to the implementation mechanisms.

Bolivia argues that solutions cannot be separated between those of mitigation and those of adaptation, as well as the losses and damages management caused by the climate crisis. In this sense, it proposed the joint mitigation and adaptation approach through the management of Mother Earth's life systems. This approach is related to the vision of Living Well in harmony and balance with Mother Earth, which is based on respect for the rights of Mother Earth, in a context of climate change, and the realization of the rights of peoples to their integral development.

Bolivia's contribution proposes different integrated and complementary expected results linked to the achievement of Living Well in a context of climate crisis, in water, energy, forests and agriculture. The objective in water is to comprehensively increase adaptive capacity and systematically reduce the country's water vulnerability; in energy, the goal is to increase electricity generation capacity through renewable energies for local and regional development; in forests, it is planned to increase joint mitigation and adaptation capacity through integrated and sustainable forest management; in the agricultural sector, the aim is to attend to vulnerable groups, increase production and yields, as well as reduce risk and increase the resilience of production systems.

Bolivia presents its planned contribution in a manner consistent with its vision of comprehensive development, in accordance with the provisions of the Political Constitution of the State, Law No. 777 Integrated National Planning System, Law No. 071 on the Rights of Mother Earth and Law No. 300 Framework of Mother Earth and Integrated Development for Living Well, guided by the National Economic and Social Development Plan and the Patriotic Agenda of the Bicentennial to 2025 and the planning of the General Economic and Social Development Plan 2021-2025.

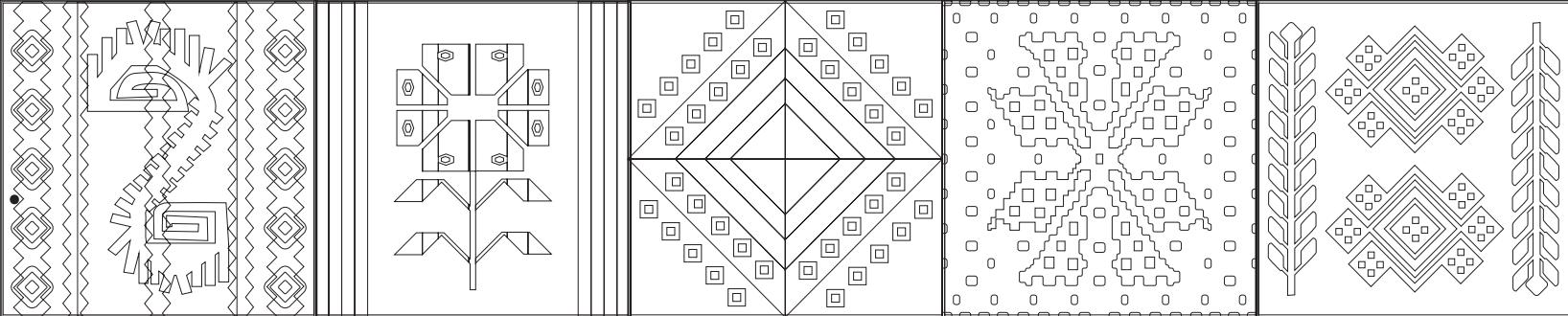
The update of the Bolivian NDC (2021-2030) was built in coordination between the Plurinational Authority of Mother Earth (APMT), the Ministry of Development Planning (MPD), the Ministry of Environment and Water (MMAyA), the Ministry of Rural Development and Land (MDRyT), the Ministry of Hydrocarbons and Energy (MHE) and the Vice Presidency of the Plurinational State of Bolivia, in addition to other relevant sectors.

Bolivia's 2016 NDC contained targets that were quite ambitious and fair for the Bolivian context and national circumstances. On that occasion, the goals were set for mitigation and adaptation in the energy, water, forestry/agriculture sectors. Progress in their fulfillment was strongly based on national effort and in close relation to the National Economic and Social Development Plan (NESPD 2016-2020) and the Patriotic Agenda 2025. It was not possible to achieve all that was planned due to the absence of means of implementation in the framework of the provision of financing and means of implementation to the country. In the updated NDC, the ambition is ratified, with adjustments made to targets according to the country's current national circumstances.

Bolivia will make an ambitious contribution within the framework of its national efforts; however, it will be able to further increase its mitigation and adaptation results and actions if it has the means of implementation foreseen through international cooperation mechanisms within the framework of the Convention, in accordance with the principles and provisions of the Convention, in particular Articles 4.4 and 4.7.

Despite the devastating impact in the social, economic and productive spheres as a result of the COVID-19 pandemic, Bolivia will not back down from its intentions to contribute to the solution of the climate crisis and its ambition in the NDCs; moreover, Bolivia proposes as the best path the reunion with Mother Earth within the framework of its Productive Social Community Economic Model for Living Well.

Bolivia's updated NDC incorporates four axes: *i*) water; *ii*) forests; *iii*) energy; *iv*) agriculture and livestock. It also incorporates the necessary means of implementation as an instrumental component for its implementation.



## 2. National Circumstances

### 2.1. Bolivian vision on the fight against the climate crisis

#### Structural solutions to address the climate crisis

**B**olivia recognizes the structural causes of climate change to the current anthropocentric model, which places human beings above nature and other living beings, and in particular with the capitalist world system of the last two centuries, which has caused the current climate crisis and is modifying the life cycles of Mother Earth, causing the collapse of several ecosystems, the extinction of species, the change in the ways of life of hundreds of millions of people around the world, the spread of hunger and poverty in the world and a growing climate migration.

There is an urgent need to give rise to a new civilizational horizon based on a cosmo-biocentric vision where human beings live in harmony with all living beings of Mother Earth. The present Nationally Determined Contribution is based on a cosmo-biocentric horizon of life that respects life and the rights of Mother Earth, as a living and sacred being.

Bolivia reaffirms its proposal for structural solutions to the climate crisis through the:

- i) Worldwide adoption of a civilizational horizon of Living Well in harmony with Mother Earth as opposed to the current anthropocentric and capitalist model.
- ii) Creation of a climate system based on responsibility towards Mother Earth, the culture of life and the full realization of humanity in its integral development.
- iii) Protection of the rights of Mother Earth in an articulated and complementary manner with the rights of peoples to their integral development.
- iv) Defense of universal common goods, such as the seas and oceans, water, atmospheric space and technological knowledge, promoting the access of peoples to the common heritage.
- v) Elimination of patents on technologies and recognition of the human right to the science and technology of life.
- vi) Effective implementation by governments of the human right to water and nature's right to water.
- vii) Constitution of the International Tribunal of Climate Justice and Mother Earth to facilitate the fulfillment by countries of their international commitments to climate change and the payment of the historical climate debt.
- viii) Allocate the resources of the war machine of the imperial powers and the promoters of war to finance the actions of the peoples against the climate crisis.
- ix) Eradication of the commodification of the environmental functions of nature, of carbon markets and nature-based solutions that promote millionaire climate business and do not solve the problem of the climate crisis.

- x) Confronting models of “carbon colonialism” to combat the climate crisis that impose models of the countries of the North on the countries and peoples of the South.

### **Climate justice, equity and common but differentiated responsibilities**

Developed and industrialized countries have disproportionately used atmospheric space to benefit from irrational development, while the peoples of developing countries are the victims who suffer the consequences at present, and are the ones who have not contributed significantly to the alteration of atmospheric composition, but who nevertheless bear a large part of the current impacts. The solution to the climate crisis must come from a vision of climate justice whereby fair treatment is given to all countries and peoples, particularly developing countries and vulnerable groups facing the consequences of climate variability, who, although they have not caused the climate crisis, bear the significant burden of its impacts and potential solutions.

Developed countries must assume their responsibility and leadership to face the climate crisis, assuming the payment of the climate debt that corresponds to them, within the framework of the principle of equity and common but differentiated responsibilities, which should consider the equitable distribution of the remaining carbon budget, considering the right to integral development of the countries, the historical and cumulative responsibility of the countries' emissions, the ecological footprint, the financial and technological capacity of the countries.

At the present juncture of additional pressures caused by the COVID-19 pandemic and its ongoing impacts on the Bolivian economy, the above becomes even more urgent and demands immediate action to maintain socio-economic progress for a dignified life of the Bolivian population and the stabilization of key ecosystems.

### **Sense of urgency and climate ambition**

Although Bolivia is not one of the main responsible for producing the greenhouse gases causing the present climate crisis, it is one of the main stakeholders in slowing down the pace of deepening climate impacts and thus avoiding the worst projected scenarios, due to our high socio-environmental vulnerability and aware that, given the current state of affairs, it will no longer be enough just to wait for others to act.

This update of Bolivia's NDC reflects an unprecedented sense of urgency that seeks to reinterpret the current situation and considerably expand national ambitions and possibilities to contribute significantly to international efforts to solve the global climate challenge.

### **2.2. National context of mitigation, adaptation and losses and damages**

Bolivia is a country with wide altitudinal (from 70 to 6542 meters above sea level), climatic and geological variations that make up diverse and complex ecosystems and life systems that harbor high biodiversity, they are important carbon sinks and provide broad environmental functions; therefore, the impacts of climate change and variability are diverse.

In this sense, it is the most affected country in South America and the tenth most at risk of climate change in the world<sup>2</sup> due to the extreme events that have occurred in the last 20 years. It has been documented that global warming in Bolivia has generated a significant increase in average temperature of 1.1°C<sup>3</sup>, reaching differences with respect to the 1970s of between 1 and 2.5°C in the Andean Mountain range, between 0.5 and 2°C in the Amazon region and 2°C in the plains.

2 Global Climate Risk Index (CRI) measured by German Watch in 2021

3 Berkeley Earth (2020), Instituto Agrario Bolivia (2020).

Climate change is causing pressures in the tropical and Amazonian region of the country that are modifying the continental Amazonian ecosystem, particularly from the interruption of regional water cycles and temperature deregulation, which will eventually turn the largest tropical forest on the planet into an extensive and unproductive savannah or pampas dominated by recurrent cycles of droughts, fires and temporary floods. For the Amazon region this could mean that, in the medium and long term, this part of the country, in addition to being incapable of hosting stable food production systems, would also contribute to the global worsening of the climate change phenomenon, with enormous additional volumes of greenhouse gases.

On the other hand, the clear signs of interregional dependence evidenced through the recycling of moisture and rainfall promoted by evapotranspiration from the Amazon forests and its redistribution towards the higher parts of the Andean mountain ranges and valleys, imply that the livelihoods and productive systems of the Andean population of the country, and the region as a whole, will also suffer major impacts caused by the decrease in humidity and reduced water availability related to the loss and degradation of the lowland forest. Major losses of the Amazon Forest are expected to have significant effects on the agricultural activities on which most of the agriculture in the southern region of South America depends, also affecting the arrival of rains in that part of the continent, in addition to an irreversible loss of the associated biodiversity.

Similarly, the altiplano region and the inter-Andean valleys of the country have suffered the substantial reduction of water regulation provided by glaciers which in recent years have lost between 40 and 50 percent of their glacier ice volume. This phenomenon, along with the consistent increase in temperatures and rainfall deregulation for the region, is putting additional pressures on traditional agricultural systems and demands urgent measures for the expansion of irrigation systems and infrastructure for water treatment and reuse, within the framework of integrated water resource management systems.

The risk of climate change in Bolivia is particularly high for vulnerable groups such as indigenous peoples, people living in extreme poverty, women, children, people with disabilities, people living in rural areas and people with limited access to decision-making and resources. More than 2.7 million children and adolescents (24% of the population) live in areas at high risk of floods and droughts. Rural poverty affects 54% of the population (98% indigenous), which, given their dependence on natural resources and agricultural production, makes them particularly vulnerable to climate variability. The deterioration of livelihood systems and reduction of resilience, reduction of food production due to climate change, makes this vulnerable population bear a greater burden of food insecurity and malnutrition, water and energy insecurity, as well as higher mortality rates<sup>4</sup>.

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<sup>4</sup> Vulnerability is understood as the relationship between exposure, sensitivity and adaptive capacity (see official statistics INE (National Statistics Institute) (2021), Torrico (2020) and UNICEF (2021).



### **2.3. Context of NDC implementation**

In this NDC, Bolivia is in agreement with the national position expressed during the last decade in multilateral negotiations on climate change and reflected in the Plurinational State's own regulations. In particular, we highlight the following:

1. Bolivia prioritizes limiting the temperature increase to below 1.5°C in relation to pre-industrial levels within the framework of equity and common but differentiated responsibilities with real emission reductions now on the part of developed countries.
2. Bolivia assumes a holistic vision of the interventions to face the climate crisis, articulating mitigation, adaptation, losses damages, and the integral development of the country. Non-tradable mitigation actions in markets are considered as effective contributions to the integrity of Mother Earth.
3. Bolivia considers the need for national effort (unconditional commitments) to achieve the goals identified in this NDC but highlights the fundamental importance of the international commitment of developed countries towards developing countries to achieve the country's goals in relation to mitigation, adaptation, sustainable development (conditional commitments), in the framework of Article 4.7 of the Convention, and the significant allocation of public resources by developed countries provided for in Article 9 of the Paris Agreement.
4. Bolivia considers that the financing schemes provided by the carbon markets do not represent an option to make ambitious national policies viable in the country, and opposes any form of commodification of the environmental functions of nature; on the contrary, it assumes the effective implementation of Article 6.8 of the Paris Agreement of the framework of non-market-based approaches, which will allow for the scaling up and acceleration of the goals identified in the present NDC of Bolivia. In this sense, financial, technical and other cooperation processes should be strengthened in the framework of compliance with the provision of financing and other means of implementation by developed countries to developing countries.
5. Use of joint mitigation and adaptation approaches linked to the strengthening of the country's sustainable production systems for the integrated and sustainable management of forests and forest systems within the framework of Article 5 of the Paris Agreement.

Everything described above shows a scenario in which Bolivia is definitely committed to contribute, but it also makes clear that the limited capacities to finance national programs of sufficient scale place very concrete obstacles that need to be solved through the accelerated implementation of additional financing mechanisms that allow unlocking the possibility of considerably increasing national contributions.

This NDC has a focus on integrating joint mitigation and adaptation actions in efforts to strengthen local, regional and national productive development with impacts on integral and sustainable development, which will make it possible to reduce the country's carbon emissions into the atmosphere, expand the capacity for adaptation and resilience to the climate crisis, and advance in risk management to mitigate the impacts of losses damages caused by the increase in natural disasters.

Bolivia considers that this NDC will be effectively implemented through cooperation between the parties, in particular through Climate Ambition Alliance (bilateral or multilateral), to be subscribed between Bolivia and international partners, in the framework of non-market based approaches that contemplate: i) provision of financial resources for the fulfillment of the goals; ii) provision of technologies

and means of implementation; iii) and access to markets for Bolivian product portfolio derived from sustainable and resilient management to the climate crisis resulting from the foreseen goals.

This NDC describes in a transparent and clear way the goals, programs and actions, the modalities and the implementation framework of the Bolivian commitments based on approaches that are not linked to markets but to the defense of the rights of Mother Earth.

## **2.4. COVID-19 and economic recovery**

At the end of 2019 and in 2020, the country faced a complex situation due to the impacts of a political crisis, which added to the COVID-19 pandemic, caused the national economy to accumulate a drop in Gross Domestic Product (GDP) of 8.33%, a situation that had a significant impact on social, economic, productive and employment indicators.

Thus, Bolivia was immersed in the double challenge of responding to the pandemic while at the same time carrying out a process of economic recovery. The country has great needs for continued financial support from international climate change mechanisms, technology transfer and innovation, and capacity development and strengthening to achieve its goals.

In this framework and despite the difficult health, economic and social situation, the State decided to submit the NDC update in order to contribute to global climate action and align the economic recovery packages to the commitments set out in the Paris Agreement and international contribution based on green recovery.

### **Healthcare**

The climate crisis is causing an increase in the burden of climate-related diseases, showing how climate change has exacerbated the problems already faced by urban and rural populations. The pandemic caused by COVID-19 has once again demonstrated the importance of access to quality health services, the need for the use of scientific information for decision-making, and the relevance of coordinated action between sectors. Therefore, the response and recovery actions to the COVID-19 emergency are configured as an opportunity to rethink and build healthier, sustainable and resilient societies to these and other future problems.

In order for the National Healthcare System in Bolivia to anticipate, prepare, prevent, respond and recover quickly from the risks associated with the consequences of climate change, the sector must seek to maximize the health benefits of intersectoral climate action. This includes strengthening national and subnational governance structures, organizing observatories to generate data to inform early warning systems for climate-related diseases, emergencies and disasters, preparing health vulnerability assessments and a national health sector adaptation plan, reducing greenhouse gas emissions by the sector, and increasing the resilience of health infrastructure and services.

### **Education**

Education, contemplated in Article 12 of the Paris Agreement, has broad support from Parties. In May 2018, countries agreed on a proposed Action for Climate Empowerment (ACE) decision. To the date, it is known that the risks associated with the climate phenomenon can be enhanced if combined with local conditions of vulnerability and social inequality, however, these risks could be reduced through appropriate efforts, some of them aimed at education, training, awareness raising, participation and capacity development and strengthening at all levels of civil society, thus strengthening the adaptive capacity of the population, the social fabric and governance conditions.

To achieve this, it is essential to convince all levels and sectors of the Bolivian population to implement actions to transform the behavior of our society in accordance with the indications of climate science and local and ancestral knowledge. This process commits, in terms of capacity building and strengthening, the updating of the Strategy for Capacity Building and Climate Empowerment to be promoted by the PAME, which would aim to strengthen the capacities of individuals and social organizations, civil society and public and private organizations in coordination with academia and the Ministry of Education.

## Energy

A particularity of the NDCs in the energy sector is that the goals and objectives that have been proposed by Bolivia are strongly linked to the development of the electricity sector, leaving aside other potential contributors. However, within this sectorization, Bolivia's first NDC presented ambitious and clear goals focused on achieving a transition process in the national electricity generation matrix towards a system strongly based on renewable energies.

In this sense, a review of the current state of the electricity sector confirms that the country has made representative progress with respect to the mitigation goals and objectives that were proposed, with an installed capacity of 3150 MW by 2020 and a participation of 38% of renewable energies and 4.2% of alternative energies in relation to the electricity produced/consumed at the national level<sup>5</sup>, representing progress in the conditions of 2015 towards the goals proposed in the first NDC. It is also possible to observe that the interest in other components of the energy sector has been developing in parallel, either by its inclusion in official documents such as the Plurinational Policy on Climate Change (PPCC) or its mention in the Third National Communication, that makes a compilation of the mitigation measures that have been developed to date at the national level. Additionally, at the national or subnational level, it is possible to see several initiatives and projects developed in the energy sector that have maintained the thematic axes and objectives for climate change mitigation proposed above: energy efficiency in the different consumption sectors, use of new non-polluting technologies for energy generation or provision of services, and the development of a regulatory framework to encourage good environmental practices in the sector.

In this sense, considering the national advances and the mitigation proposals in the sector presented by countries in the region , the energy sector has decided to reaffirm its initial goals, elaborate on the characterization of these, reevaluate amounts according to the current context of the country and increase the ambition of the sector. For this purpose,<sup>6</sup> lines of work are proposed in the area of mitigation and adaptation to climate change in the energy sector, from which a total of 10 goals are proposed that the sector has assumed as challenges until 2030.

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5 Vice-Ministry of Electricity and Alternative Energy (2021).

6 Overview of National Contributions in Latin America (ECLAC, 2019).

## **Integrated water resources management**

Bolivia has high per capita water availability in general, but water is unevenly distributed across its territory and threatened by the climate crisis and pollution. Many water bodies in strategic watersheds are polluted, affecting public health, increasing drinking water treatment costs and reducing potential use for other sectors such as agriculture and industry. Hence the increasing pressure on water resources into the future, given the current increased water stress in the different regions of the country. The imbalance of supply and demand and water pollution and the increased recurrence of climate hazards are clear warning signs of water scarcity and the country must act quickly to address them adequately within the framework of the NDC. Failure to control these trends could derail the country's aspirations for sustained and resilient growth over the next decade. The State continues to recognize the strategic, multi-sectoral and multi-level importance of water for the country's development.

Although the impacts of climate change are already being felt in the country, there is still uncertainty about how these impacts will play out in the future. Robust adaptation decision-making is fundamental for social and economic development in harmony with Mother Earth by reducing water-related climate vulnerabilities and developing capacities. To this end, the State has adopted Integrated Water Resources Management (IWRM) in a multisectoral and multilevel manner as official policy, recognizing watersheds as life systems and water management units. The National Watershed Plan works on governance, social management and environmental protection in watersheds, guiding investments with climate rationality. Along these lines, the goals set forth in the NDCs are aimed at taking advantage of the productive potential of water and mitigating climate risks.

## **Agriculture and livestock**

Agricultural activity contributes 11% of the national GDP<sup>7</sup>; nearly 40% of the economically active population (EAP), of which 29% is directly related to agricultural production, and 11% to its industrialization and commercialization. Of the 871,927 Agricultural Production Units (APU), 91% are family farmers (58% community-family, 24% reciprocity-family), who are classified as highly vulnerable<sup>8</sup>.

As mentioned above, extreme weather events have increased, mainly droughts in high regions and floods in low regions, reducing agricultural and livestock productivity, with consequences for the food industry and exports, in addition to endangering the lives of indigenous and peasant populations and their livelihoods.

## **Forestry and biodiversity**

Bolivia has 46%<sup>9</sup> of its national territory covered by forests, most of it in the Amazon basin and is one of the 15 mega-diverse countries in the world. Considering that forests are not only a national but a global heritage, 24% of its forests are protected under the National System of Protected Areas (NSPA). Moreover, there are many smaller but equally important protected areas at the municipal level. The State recognizes that forests are life systems, with populations whose development depends on their adequate conservation and integral and sustainable management. The climate crisis is having an important impact not only on the populations that live in and around the forests, but also on the forest ecosystems themselves, diminishing the provision of their multiple economic, social and cultural benefits, among others.

7 INE (National Statistics Institute) data excluding the contribution of Forestry and Coca.

8 Data from INE (2021) and EAPD (Economic Analysis and Policy Division) (2020).

9 Authority of Fiscalization and Social Control of Forests and Lands.



## **Climate governance**

Based on the Political Constitution of the State, Law No. 071 on the Rights of Mother Earth, Law No. 300 Framework of Mother Earth and Integral Development for Living Well, guided by the Patriotic Agenda of the Bicentennial 2025 and its 13 pillars, as well as the long and medium term national plans generated in compliance with the enactment of Law No. 777 of the Integral Planning System of the State, the normative bases are laid for the creation of a multilevel and multi-actor institutional framework and governance for climate action in Bolivia.

The fulfillment of the NDC goals is framed from its planning, financing, implementation and monitoring in a vision of human and integral development and plural economy, with a focus on life systems management, risk management and climate change, consolidating over time a structural transformation of development towards a more sustainable and integral development.

Bolivia has integrated climate change as a state policy within the framework of Living Well in balance with Mother Earth, so it structures its governance scheme understanding the need to combine its development with climate action, the multidimensional and cross-cutting nature of its impacts, and the need to generate a profound paradigm shift towards Living Well for its population. It is in this sense that the Law of Mother Earth (Law No. 300) and the Comprehensive State Planning System (Law No. 777) are fundamental norms for the implementation of climate action in the plurinational government and the Autonomous Administrative Division with a focus on life systems management, risk management and climate change.

### **2.5. Related Aspects**

The most important related aspects of climate crisis management in climate planning in Bolivia are the following:

- i) **Climate justice.** For this reason, Bolivia raises in the international arena the recognition of the principles of equity and common but differentiated responsibilities, to facilitate a fair and equitable transition of the country and Bolivian society towards a low carbon economy, denouncing the new “carbon colonialism” that is trying to be imposed by developed countries for all countries, which will increase the dependence of southern countries towards the developed countries of the global north.
- ii) **Interculturality.** Bolivia is a free, independent, sovereign, democratic, intercultural, decentralized and autonomous Unitary Social State of Plurinational Communitarian Law. Bolivia is based on plurality and political, economic, legal, cultural and linguistic pluralism, within the integration process of the country. Interculturality plays a fundamental role in Bolivian climate policy. This principle recognizes and integrates local knowledge, ancestral and cultural knowledge, values and practices, uses and customs and life systems.
- iii) **Complementarity of rights.** In accordance with Law No. 300 Framework of Mother Earth, Integral Development for Living Well, climate planning and management must be developed respecting the rights of Mother Earth, the rights of the Bolivian people to their integral development, the rights of the indigenous native peasant nations and peoples, and the right of the population to live without material, social or spiritual poverty. Likewise, the State guarantees to all persons and collectivities, without any discrimination whatsoever, the free and effective exercise of the rights established in the laws and international human rights treaties.

- iv) **Fight against poverty and integral development for a better life.** All actions must lead to poverty reduction in Bolivia. Protecting livelihood systems, the climate system and supporting vulnerable groups must be a priority, but it must also become an opportunity to improve the living conditions of people and their communities in their different livelihood systems.
- v) **Environmental education.** Environmental education should be a critical social practice that promotes environmental and climate education (formal and non-formal) for the formation of a sensitive and responsible citizenship in the exercise and defense of the rights of Mother Earth.
- vi) **Gender and intergenerational equity.** Bolivia will integrate a gender perspective to reduce inequality gaps in its different dimensions in the Plurinational Policy for Climate Change. In recognition of the differentiated impact that climate change has on women and men, and the central role that women play in aspects such as water management, agricultural production, food and energy security, and community resilience, Bolivia is committed to ensuring that the gender and intergenerational approach is integrated into the country's climate policy.
- vii) **Adaptation based on life systems and cosmo-biocentrism.** Life systems are organized and dynamic communities of plants, animals, microorganisms and other beings and their environment, where human communities and the rest of nature interact as a functional unit, under the influence of climatic, physiographic and geological factors, as well as productive practices and cultural diversity. Operationally, life systems are established on the basis of the interaction between life zones (ecosystems) and the predominant socio-cultural units that inhabit each life zone and identify the optimal management systems that have developed or can develop as a result of this interrelationship.
- viii) **Integrated climate risk management.** Climate change is considered one of the critical factors contributing to increased disaster risk, adding additional pressure to environmental degradation and rural and urban growth, especially unplanned growth. It is therefore essential to ensure the identification, forecasting and prevention of risks and hazards arising from climate change, as well as to strengthen local response capacities and the organized participation of communities in building resilience.
- ix) **Innovation, science and technology.** The development of science, technology and innovation policies in the context of climate change is essential for the adoption of appropriate strategies and applied technologies for mitigation and adaptation. The incorporation of innovation as a related axis in climate policy will be the basis for deepening and accelerating, through projects, disruptive actions and the development and transfer of technologies, the achievement of global climate action objectives.



### 3. Mitigation, adaptation and joint mitigation and adaptation goals



**Mitigation:** The Plurinational State of Bolivia, until 2030, plans to make efforts in terms of transition in the national electricity generation matrix towards a system strongly based on renewable energies; improve energy efficiency and integral and sustainable forest management that contribute to the reduction of GHG emissions.



**Adaptation:** Bolivia will promote the integrated and sustainable management of forests, the resilience of productive systems, increase the adaptive capacity of societies and their livelihood systems, and reduce the vulnerability of the different social, economic and environmental sectors with climate justice, with a focus on livelihood systems, gender and intergenerational justice.



**Attention to vulnerable groups:** All Bolivian men and women, and especially groups vulnerable to the climate crisis, including indigenous people, women and children, will have reduced their exposure, sensitivity and increased their adaptive capacity to climate change.



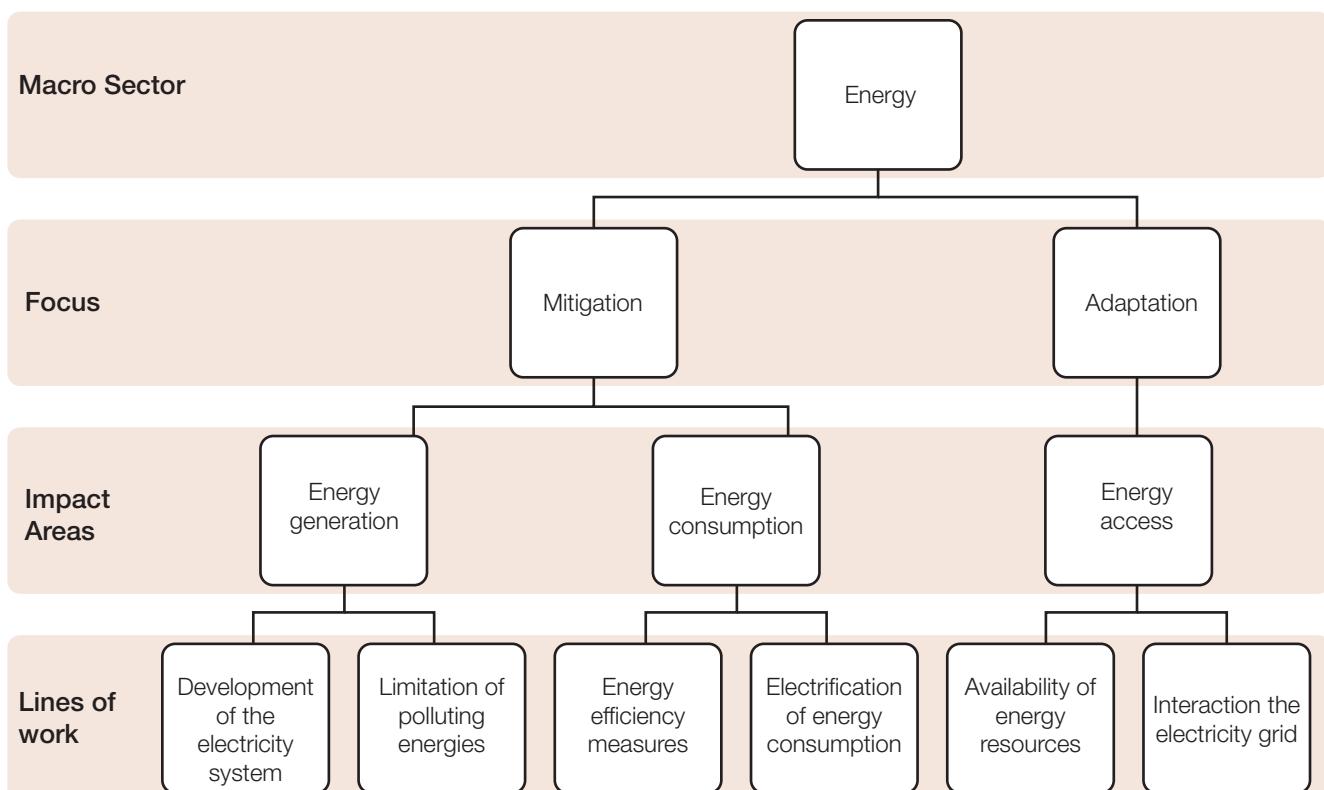
**Implementation:** Bolivia, within the framework of its national circumstances, proposes an ambitious NDC in accordance with current public policies and regulations that includes conditional and unconditional goals.

### 3.1. Energy sector goals

**B**olivia's energy sector is historically recognized as the second largest contributor to the country's GHG emissions (after AFOLU) and, due to its strategic relevance for development, it is one of the sectors that has been monitored in greater detail and whose development can show progress with respect to the targets proposed in the first NDC, making it possible to show that the country can increase its ambition.

The energy sector includes the *Mitigation* approach to reduce GHG emissions in the sector and the *Adaptation* approach to improve the conditions and resilience of the population with respect to the effects of climate change; the management areas that make up the sector or the areas where an impact is expected to be achieved, defined as *Electricity generation*, an area that considers variables that affect the production and processing of energy from the supplier's point of view, *Electricity consumption*, which takes into account the variables that affect the consumer sectors and their energy *consumption* patterns, and *Electricity access*, which analyzes variables that affect the coverage, access and availability of energy in the general population; The lines of work, which would represent a set of measures and indicators to be worked on in the energy sector according to macro objectives to be achieved, such as the *development of the electricity system*, the *limitation of polluting energies* in the electricity matrix, the application of *energy efficiency measures*, the *electrification of energy consumption*, the expansion of the availability of energy resources, the improvement of *interaction capacities with the electricity grid* (Figure 1).

Figure 1. Impact Chain Analysis of the Energy Sector.



Based on this reorganization, the following measures have been defined with their corresponding goals and expected results up to the year 2030:

## ***Universal access***

**Goal (1) By 2030, 100% Universal Access to electricity coverage will be achieved.**

*2020 baseline: 99.1% urban, 80% rural.*

*Conditionality:* Goal will be covered with national effort. With international cooperation, implementation could be accelerated.

*Description:* This goal seeks to reach the maximum coverage, focuses on improving the adaptive capacities of the most vulnerable population to climate change, through the provision of basic services in the energy area. In this context, and reevaluating the national situation, it is expected that by 2025 electricity coverage will reach 100% in urban areas and 95% in rural areas<sup>10</sup> and that by 2030 universal access will be achieved, 100%<sup>11</sup> electricity coverage, taking into account the populations connected to the national electricity grid (SIN), provided by medium and low voltage systems supplied by microgrids (SA) and isolated communities supplied by low power alternative systems (isolated family photovoltaic systems).

*Contribution to SDGs:* The goal will contribute to SDGs 1, 4, 7 and 10.

## ***Distributed energy systems***

**Goal (2) By 2030, users are expected to produce approximately 76.9 GWh of electricity demanded nationwide (37MW of installed capacity).**

*Baseline 2020: 0 MWh / 0 MW*

*Conditionality:* Goal will be met with national effort. With international cooperation the goal could be achieved by 2025.

*Description:* This goal seeks to develop the capabilities and operational conditions of the general population, allowing them to interact in a personal way with the distribution power grids, by means of low power renewable generation systems. It is intended that self-generation and injection of electrical energy to the local networks of distributors will promote energy autonomy of the population and the replacement of energy produced by the electrical grid with renewable energy sources, mainly solar and wind.

*Contribution to SDGs:* The goal will contribute to SDGs 7, 10, 11, 12 and 13.

## ***Renewable Energy Participation***

**Goal (3) By 2030, 79% of the energy consumed will come from renewable energy plants (50% of installed capacity).**

*2020 baseline: 37% in energy, 27% in power.*

*Conditionality:* Goal will be covered with national effort. With international cooperation, implementation could be accelerated.

*Description:* This measure seeks to define shares of renewable energy-based power plants in the national electricity generation matrix, taking into account that a greater share of these will represent a decrease in the emissions intensity of the sector, stabilizing and, in the long term, reducing Greenhouse Gas (GHG) emissions from the electricity sector. The distinction between energy and power shares is included as they are different but complementary variables.

*Contribution to SDGs:* The goal will contribute to SDGs 7, 8, 12 and 13.

<sup>10</sup> Vice-Ministry of Electricity and Alternative Energies. It is expected that the population growth and its dynamics could oscillate the goal.

<sup>11</sup> National goal for the development of electricity coverage.



### ***Alternative Energy Participation***

**Goal (4) By 2030, 19% of the energy consumed will come from power plants based on alternative energies (13.25% of installed capacity).**

*2020 baseline:* 5% in energy, 6% in power

*Conditionality:* Goal conditional on international cooperation.

*Description:* This measure seeks to define shares of power plants based on alternative energies in the national electricity generation matrix, taking into account that a greater share of these will represent a decrease in the emissions intensity of the sector, stabilizing and, in the long term, reducing greenhouse gas emissions from the electricity sector. In this sense, reaffirming and developing on the ambition of the goals presented in the previous NDC, it is expected that by 2030, 19% of the energy consumed (GWh) at the national level will come from alternative power plants (Biomass, Solar, Wind and Geothermal). Likewise, it is expected that by 2030, the installed capacity of alternative energy sources in the SIN will be 771 MW.

*Contribution to SDGs:* The goal will contribute to SDGs 7, 8, 12 and 13.

### ***Installed capacity***

**Goal (5) By 2030, the installed capacity of the interconnected electricity system will reach 5,028 MW.**

*Baseline 2020:* 3.177 MW

*Condition:* Goal will be met with national effort.

*Description:* This measure seeks to define the total size of the national electricity system in the long term, based on installed capacity, so that this value can be used as a reference for the macro conditions of the electricity system that are expected to be achieved, as well as to set a quantitative basis of analysis for the relative goals of participation of generation plants.

A new evaluation of the national context and development expectations allows us to estimate that by 2030 the installed capacity of the interconnected electricity system will reach 5,028 MW.

*Contribution to SDGs:* The goal will contribute to SDGs 7, 8, 9 and 10.

### ***Isolated Systems Interconnection (IS) to the SIN***

**Goal (6) By 2030, the interconnection of 5 Isolated Systems to the SIN has been achieved.**

*Baseline 2020:* 0

*Condition:* Goal will be met with national effort.

*Description:* This measure has a mixed mitigation and adaptation approach due to the fact that it proposes the interconnection of ISs to the SIN, achieving on the one hand to reduce emissions associated with electricity consumption in ISs and on the other hand to improve the conditions of the energy resource that is provided to isolated populations. It is expected to achieve the interconnection of at least 5 isolated systems to the SIN by 2030.

*Contribution to SDGs:* The goal will contribute to SDGs 1, 7, 8, 8, 9, 10, 11, 12 and 13.

### ***Hybrid systems in medium and low voltage***

**Goal (7) By 2030, 8 Isolated Systems will be hybrid, including renewable sources in their generation matrix.**

*Baseline 2020:* 3 Hybrid ISs

*Condition:* Goal will be met with national effort.

*Description:* This measure seeks to develop clean generation capacities in the country's ISs through the inclusion of medium and low power renewable generation plants complementary to existing plants operating under microgrid schemes.

It has been estimated that by 2030 a total of 8 ISs will be able to include in their electricity systems generation plants based on renewable sources (photovoltaic, wind or microhydro).

*Contribution to SDGs:* The goal will contribute to SDGs 7, 12 and 13.

### ***Efficient street lighting***

**Goal (8) By 2030, 6% of the national public lighting inventory has been replaced with LED technology.**

*Baseline 2020:* <1%

*Conditionality:* Goal will be covered with national effort. With cooperation, approximately 12% would be reached.

*Description:* Specifically, the goal is to implement at the national level the pilot experiences developed at the subnational level of replacing conventional street lighting fixtures with LED technology. The national goal to date, until 2030, is to replace a total of 38,108 conventional luminaires<sup>12</sup> (6% of the national inventory) with LED technology.

*Contribution to SDGs:* The goal will contribute to SDGs 8, 11, 12 and 13.

### ***Electric mobility***

**Goal (9) By 2030, an annual growth of 10% in the share of electric vehicles in the Bolivian public transportation fleet has been achieved.**

*Baseline 2020:* <1%

*Conditionality:* Goal to be met with national effort. With cooperation the goal would be increased.

*Description:* The measure is considered due to its inclusion within the national development plans that seek to promote the introduction of electric vehicles in the vehicle fleet and has as a goal that the adoption of the new technology (electric mobility) allows to achieve a gradual penetration that reaches 10% of the growth of vehicles in the public transport sector in Bolivia until 2030.

*Contribution to the SDGs:* The goal will contribute to SDGs 7, 8, 9, 11, 12 and 13.

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<sup>12</sup> Conventional luminaires are expected to be high-pressure sodium lamps with wattages of 150W, which can be replaced by 54W LED luminaires.

### **Introduction of electricity storage**

**Goal (10) By 2030, 3 pilot projects for electric energy storage and management technologies have been implemented.**

*Baseline 2020: 0*

*Conditionality:* Goal conditional on international cooperation.

*Description:* This measure seeks to develop, through technology transfer processes, national capacities for the adequate management of an electrical system with a high degree of penetration of generation plants based on intermittent alternative energy sources. The aim is to develop energy storage systems/projects for the control and management of the electrical grid in the short, medium and long term (battery banks, pumping stations and green hydrogen production, respectively). The measure is taken into account as a complement to the proposals to expand the participation of Renewable Energy and Alternative Energy Sources in the electricity system and as a way to achieve a complete energy transition in the long term.

*Contribution to SDGs:* The goal will contribute to SDGs 7, 9, 12 and 13.

### **3.2. Forestry sector goals**

The total forested area of Bolivia in 2020 was 51,749,332 ha<sup>13</sup>, detecting that in the forest area there are clear synergies between adaptation and mitigation. In the last decade Bolivia has established the legal and institutional framework for a more effective management of its territory to achieve integrated management and conservation of its forests, zones and life systems. In the last three-five years, Bolivia has managed to significantly reduce the poverty levels of its population, although deforestation continues.

Deforestation not only causes the emission of large amounts of CO<sub>2</sub> into the atmosphere (on average about 393 tCO<sub>2</sub> per deforested hectare<sup>14</sup>), but also causes changes in the micro-climate in deforested areas, increasing the maximum temperature and increasing the risk of droughts and floods. This is why the NDC proposes a goal to reduce deforestation and increase the integrated and sustainable management of forests, within the framework of a policy to strengthen access to natural resources by small rural indigenous and aboriginal peasant producers and intercultural communities.

The impact areas proposed by the NDCs are i) Increasing forest cover and forest area, reducing deforestation and biodiversity conservation through the development of capacities for forest control, oversight and restitution; ii) Strengthening environmental functions through complementary and sustainable integrated forest management, guaranteeing conservation through sustainable practices; iii) Reducing poverty and contributing to GDP through the strengthening of integrated resource management (Figure 2).

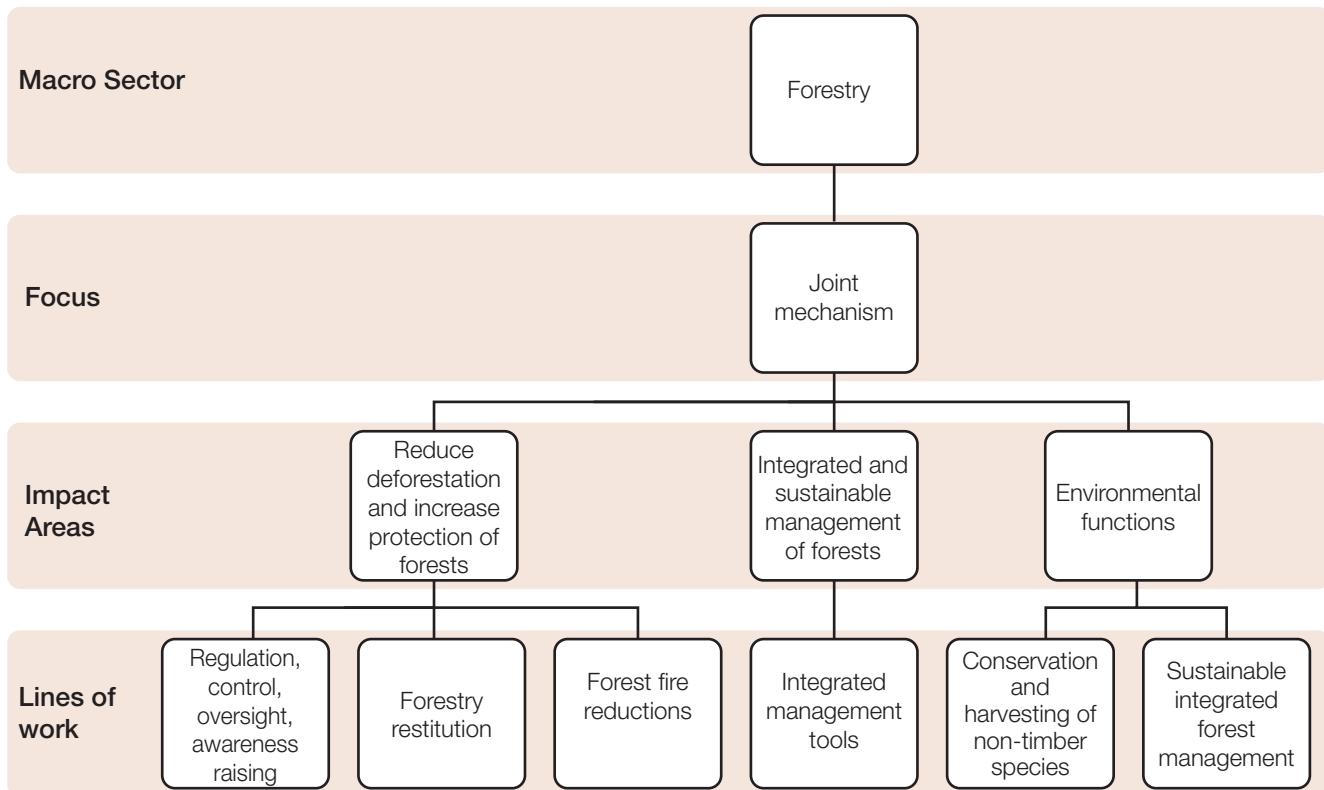
The joint mechanism of Mitigation and Adaptation for the Integral and Sustainable Management of Forests is aimed at promoting an integral management of the territories that allows confirming the vocation of land use, establishing spaces for food production, livestock and the integral management of the forest, strengthening environmental functions.

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13 Estimate based on the General Directorate of Forestry Forest Map and ABT public accountabilities. EAPD reports 50,485,120 ha.

14 Tier 3 study of the dynamics of emissions and removals in each pixel in Bolivia, below and above ground, between 1990 and 2010, on average reaches 393 per deforested hectare (see Andersen et al. (2016)).

Figura 2. Análisis de cadena de impacto del sector bosques.



This result will be achieved through:

***Strengthening of oversight and control capacities***

**Goal (11) By 2030, reduce deforestation to 80% compared to the baseline.**

*2020 Baseline:* Deforestation: 262,178 ha/year (average 2016-2020)<sup>15</sup>.

*Conditionality:* Regarding the proposed goal, 40% of the reduction will be with national effort and the remaining 60% will be conditional.

*Description:* The most important joint mitigation and adaptation measure is to reduce deforestation and eliminate illegal deforestation by 2030. This requires strengthening the institutional framework and its capacities for regulation, control, oversight, monitoring, and awareness-raising among local stakeholders involved in forest management in the country.

*Contribution to the SDGs:* The goal will contribute to SDGs 13, 15 and 16.

**Goal (12) Reduce deforestation in National Protected Areas by 100% by 2030.**

*Baseline 2020:* In the period 1990-2000, 0.2% of the forests within protected areas were lost and in the period 2000 to 2010, 0.5% of the forests were lost<sup>16</sup>.

*Conditionality:* Regarding the proposed goal, 40% of the reduction will be with own effort and the remaining 60% will be conditional.

*Description:* This goal focuses on improving mitigation and forest conservation capacities in Protected

<sup>15</sup> Based on The Forest and Land Inspection and Social Control Authority (2021).

<sup>16</sup> National Protected Areas Service, 2013. Deforestation and forest regeneration in Bolivia and its national protected areas for the periods 1990-2000 and 2000-2010. Ed. Servicio Nacional de Áreas Protegidas, Museo de Historia Natural Noel Kempff Mercado and Conservation International - Bolivia. La Paz, Bolivia. 36 pp.

Areas, through institutional strengthening and territorial governance, so as to boost prevention, control, and monitoring of deforestation and other related illicit activities in Protected Areas.

*Contribution to SDGs:* The goal will contribute to SDGs 13, 15 and 16.

**Goal (13) Reduce the area with forest fires by 60% compared to the baseline by 2030.**

*2020 Baseline:* Wildfires: 1.447.070 ha/year (average 2019-2021)<sup>17</sup>.

*Conditionality:* Regarding the proposed goal, 50% of the reduction will be with own effort and the remaining 50% will be conditional.

*Description:* The measure seeks to develop fire prevention, management and control capacities in territories vulnerable to the expansion of the agricultural frontier and natural events, for which it is planned to promote projects, programs and actions based on early warning, increase attention and response capacity. In this regard, it is expected that by 2030, the area of forest fires will be reduced by 60%.

*Contribution to the SDGs:* The target will contribute to SDGs 13, 15 and 16.

**Integral and sustainable forest conservation and management**

**Goal (14) Double the areas under integrated and sustainable forest management by 2030.**

*2020 Baseline:* 10.8 million hectares<sup>18</sup>.

*Conditionality:* Regarding the proposed goal, 40% will be national effort and the remaining 60% will be conditional.

*Description:* This measure seeks to promote an integral and sustainable management of forests, considering the importance of their environmental functions, the cultural, ecological and biological importance for the species, as well as for the local and national economy; in addition, to promote the integral development of territories with forest cover.

In particular, the need to access international markets for products derived from integrated and sustainable forest management is considered important.

*Contribution to SDGs:* The goal will contribute to SDGs 1, 2, 13 and 15.

**Forestry restitution**

**Goal (15) Increase forest cover gain by one million hectares by 2030.**

*Baseline 2012:* 86,800 ha in forest cover gain afforestation and reforestation until 2020<sup>19</sup>.

*Conditionality:* 500,000 ha will be regenerated with national effort and an additional 500,000 ha conditional.

*Description:* This measure seeks to promote forest regeneration and restoration processes through afforestation, reforestation and natural and assisted forest regeneration actions.

*Contribution to SDGs:* The goal will contribute to SDGs 2, 13, 15 and 16.

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<sup>17</sup> DGGDF & ABT Sistema de Información y Monitoreo de Bosques (SIMB). Obtenido de SIMB: <https://datos.siarh.gob.bo/simb>

<sup>18</sup> ABT (2021)

<sup>19</sup> Forestry Directorate and FONADIN 2021.



## **Encouraging sustainable practices**

### **Goal (16) Double authorized timber production compared to the 2016-2020 average by 2030.**

*Baseline 2020:* Average production (2016-2020): 1,371,223 m<sup>3</sup>/year equivalent to 685,611 tons of wood)<sup>20</sup>.

*Conditionality:* Regarding the proposed goal, an increase of 30% is achieved with national effort and an additional 70% conditional.

*Description:* The measure is essential to promote the harvesting of timber resources in a legal manner, and framed in actions of restitution and maintenance of the environmental functionality related to the forest. Planned activities include support for strengthening regulations, control and monitoring and, above all, the search for international timber markets.

*Contribution to the SDGs:* The goal will contribute to SDGs 1, 8, 13, 15 and 16.

### **Goal (17) Double the production of non-timber forest products compared to the 2016-2020 average by 2030.**

*2020 Baseline:* 103,732 tons (average 2016-2020)<sup>21</sup>.

*Conditionality:* 150,000 tons will be reached with national effort and 200,000 tons conditional.

*Description:* This measure seeks to strengthen and promote the use of non-timber forest products (Brazil nuts, wild cacao, asaí, majo, carob, cusi and other harvesting products characteristic of Bolivian forests) through the implementation of agroforestry crop systems. Progress is expected to be made in the scalability of technified and industrial harvesting processes in order to expand the benefits associated with their commercialization.

*Contribution to the SDGs:* The goal will contribute to SDGs 1, 8, 15 and 16.

## **Sustainable Forest Life Cycle Index**

Bolivia's NDC goals in forests include the dimensions of adaptation and mitigation in the framework of integral and sustainable development. These dimensions are integrated into the "Sustainable Forest Life Cycle - IVSB", which summarizes the objectives of sustainably managing forests to maintain their environmental functions, increase timber and non-timber forest production, and improve the quality of life of the population in forest municipalities.

In order to obtain additional results for Bolivia, it was calculated using the LB of the 2020 management. In order to add indicators of different scales, it is necessary to normalize them.

From the normalized municipal indicators, the simple average of each indicator and the aggregate is obtained to determine the IVSB.

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20 ABT (2021)

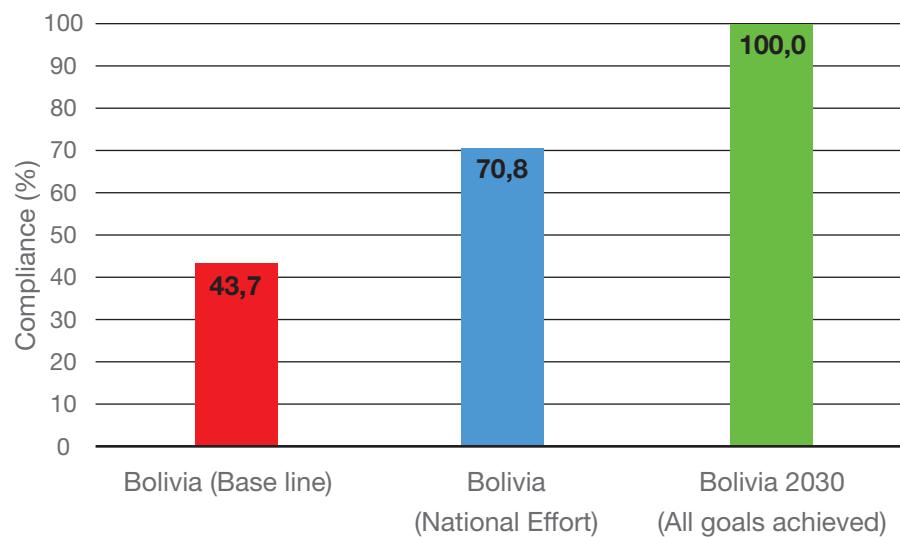
21 ABT (2020)

$$VSB = Prom (IVSB1xNorm, \dots, IVSB7xNorm)$$

Where:

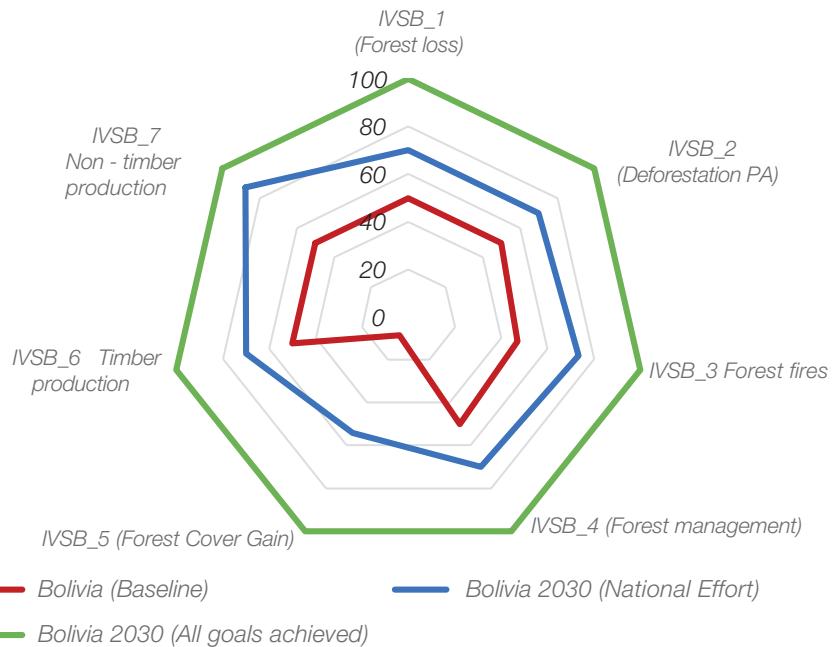
- IVSB\_1xNorm: Area of forest cover loss
- IVSB \_2xNorm: Area of deforestation in Protected Areas
- IVSB \_3xNorm: Area of forest affected by forest fire
- IVSB \_4xNorm: Area of forest area that has management plan
- IVSB \_5xNorm: Gain in forest cover
- IVSB \_6xNorm: Authorized timber production
- IVSB \_7xNorm: Non-timber production

*Figure 3. Sustainable Forest Life Index (%), baseline and 2030 scenarios.*



For the baseline, for the 2016-2020 period, a IVSB of 44.6 was obtained. The goal is to reach 100 by 2030. With national effort, a IVSB of 71.2 would be reached in 2030 and with international cooperation, the goals would be completed at 100% (Figure 3 and 4).

*Figure 4. Multidimensional Forest Sustainable Living Index.*

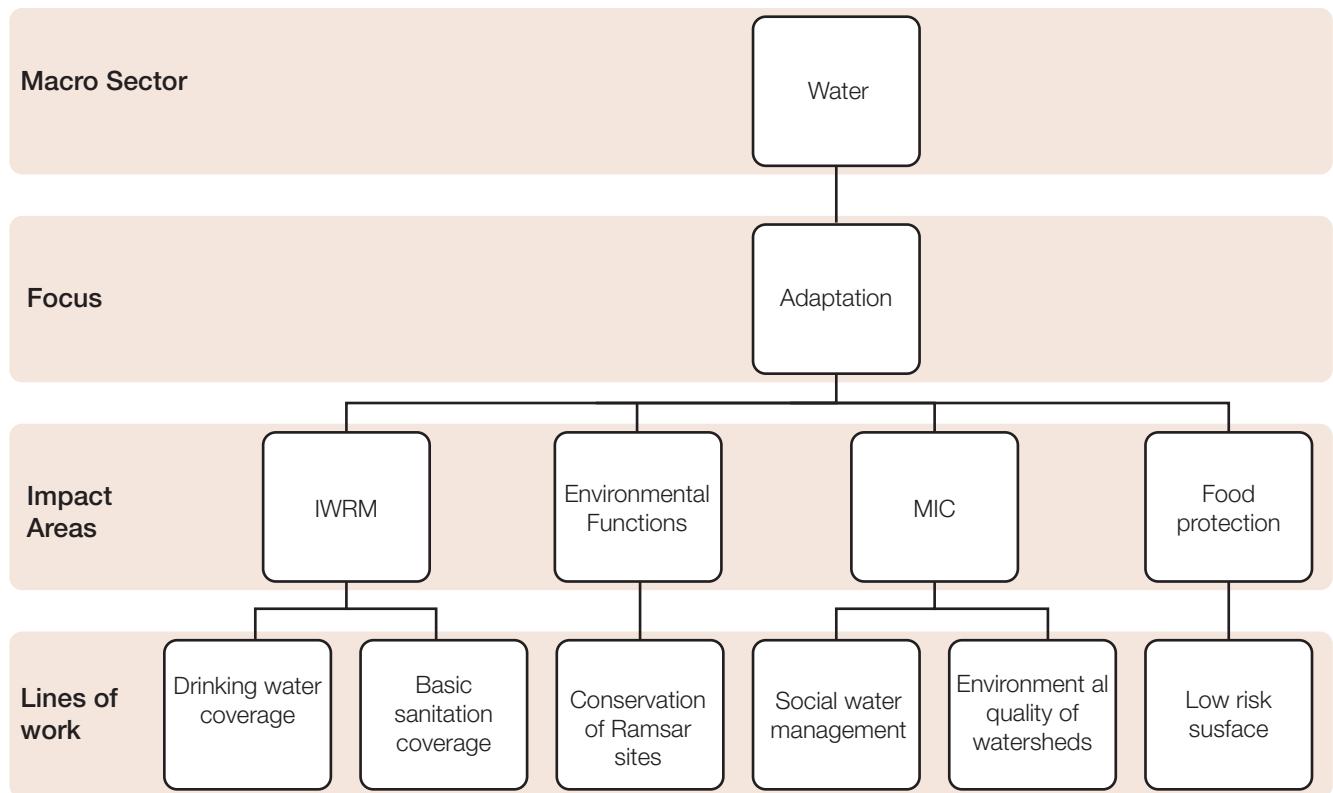


### 3.3. Water sector goals

The integrated management of water resources is a multilevel and multisectoral effort as well as an increasingly complex and urgent need for the country due to population growth in recent decades, the concentration of the population in cities, the degradation of water quality, changes in land use, the growing impact of floods, droughts, landslides and other hydrological effects related to climate change, and the increase in conflicts arising from the territoriality of water.

Given this situation, the updating of national contributions in the fight against climate change in the “water” sector towards 2030, responds to the country’s progress in four impact sub-sectors: (i) Promoting increased coverage of drinking water, drinking water safety and basic sanitation; (ii) Increasing environmental functions through conservation of wetlands and wetlands; (iii) Promoting integrated water resource management in watersheds through social water management, ecosystem restoration, planning and improvement of integrated water resource management; and (iv) Improving adaptation through increased area under irrigation and more efficient use of water for agricultural production. (Figure 5)

*Figure 5. Impact Chain Analysis of the Water Sector.*



The measures that are considered critical to achieve strategic results in relation to the climate crisis are those of adaptation, which seek to reduce the vulnerability of the population and ecosystems regarding the effects of climate change (adaptation based on livelihood systems, community management, climate risk management).

Taking into consideration the sector's progress at the national and subnational levels, a total of six goals have been identified to be developed at the national level.

#### ***Integrated water resources management***

**Goal (18) 100% drinking water coverage has been achieved with resilient service delivery systems by 2030.**

*Baseline 2020:* 94.6% urban areas, 68.7% rural areas.

*Conditionality:* With national effort 89.7% and with cooperation (conditional) 100% potable water coverage will be reached by 2030.

*Description:* This goal focuses on contributing to the adaptation of the population to climate change by increasing the availability of water for human consumption through improved coverage and water supply. In this sense, it is expected that by 2030 drinking water coverage will reach 89.7%, through the development of works based on the different ecosystems, in order to reduce water losses, promote the use of water saving and micro-metering technologies, as well as the management of sanitation services in such a way that adaptation and risk reduction measures are included.

*Contribution to SDGs:* The goal will contribute to SDGs 1, 3, 6, 9 and 17.

## **Goal (19) 100% basic sanitation has been achieved by 2030.**

*Baseline 2020:* 70.6% urban areas, 45% rural areas.

*Conditionality:* With national effort 70.9% and with cooperation (conditional) 100% coverage of basic sanitation will be achieved by 2030.

*Description:* *The goal seeks to develop capacities and operational conditions for the adequate management of wastewater in a way that does not affect nor contaminate water sources and adequate water quality management is carried out.* The goal is to achieve 70.9% sanitation coverage by 2030 through the implementation of projects that increase the coverage of sewerage and sanitation services in urban areas with a focus on reuse and co-responsibility of the population in the proper use and maintenance of the system. The actions planned for compliance are the expansion of sewerage and sanitation coverage in rural areas with participation and appropriate technology and relevance to the culture of the communities, in addition to the rehabilitation and improvement of wastewater treatment plants with a focus on reuse.

*Contribution to SDGs:* The goal will contribute to SDGs 3, 6, 9 and 13.

## **Goal (20) 1.4 billion m<sup>3</sup> of water storage capacity will be reached by 2030.**

*Baseline 2020:* 919 million m<sup>3</sup>

*Conditionality:* 60% of the goal will be achieved with national efforts and 40% with international cooperation.

This measure seeks to increase water storage capacity as the main strategy to contribute to water security and risk reduction due to climate change. To this end, it is planned to implement systems for planting and harvesting water, irrigation and drinking water systems fed by small and medium-sized reservoirs (excluding hydroelectric plants) to manage periods of drought and contribute to increasing the income of food insecure families. It does not include planned investments in hydropower generation.

*Contribution to SDGs:* The goal will contribute to SDGs 1, 3, 6, 9 and 17.

## **Food production**

### **Goal (21) 1.3 million hectares under efficient irrigation will have been reached by 2030.**

*Baseline 2020:* 519.597 ha of low risk.

*Conditionality:* 1 million ha with national effort (77%), and with cooperation (conditional) could reach 1.3 million hectares (23%).

This measure seeks to increase the irrigated area as the main measure for adapting to climate change, for which the construction of revitalized irrigation systems, irrigation with dams and water harvesting with innovation and technological development is planned, promoting cooperation among water users and technology transfer. Technical assistance for the use and maintenance of water and irrigation systems.

*Contribution to SDGs:* The goal will contribute to SDGs 2, 8, 13 and 17.

## **Integrated Watershed Management**

**Goal (22) 12 million hectares have been achieved with Integrated Watershed Management (MIC) by 2030.**

*Baseline 2020:* 3.254.200 ha with MIC

*Conditionality:* Goal conditioned at 100%.

The measure aims to contribute to increase the availability of water resources in quantity and quality and the restoration of environmental and water functions of the basins, through the implementation of actions to protect water sources, harvesting and planting water, recovery of water bodies and ecosystems, and sustainable land management in local populations and communities, as climate adaptation measures, par excellence, which contribute to resilience to the effects of climate change. The aim is to ensure water for life systems and therefore for human consumption and production in the upper, middle and lower basins. For this reason, it is expected that by 2030 there will be 12 million hectares with resilient Integrated Watershed Management actions implemented.

*Contribution to SDGs:* The goal will contribute to SDGs 1, 6, 9 and 15.

**Goal (23) 51 planning instruments have been approved for the management of prioritized watersheds, of which 60% are being implemented until 2030.**

*Baseline 2020:* 14 planning instruments have been approved.

*Conditionality:* Goal conditioned at 100%.

This measure seeks to increase the development of strategic instruments for sectoral and territorial planning and management in watersheds and their implementation which will territorially guide investment in Integrated Watershed Management actions and recovery of water bodies, guaranteeing the availability of surface and groundwater resources (aquifers) in quality and quantity in a sustainable manner in the face of scenarios of water stress and Climate Change, for different uses, by establishing complementary agreements with Mother Earth within the framework of the water-environmental governance that is intended to be achieved in the life systems.

*Contribution to SDGs:* The goal will contribute to SDGs 5, 6, 11 and 13.

**Goal (24) 900 km of resilient infrastructure for hydraulic control will have been achieved by 2030.**

*Baseline 2020:* 672 km.

*Conditionality:* 718 km unconditional with national effort and with cooperation (conditional) 900 km.

This measure seeks to increase and meet the needs of warning systems and the expansion of the hydro-meteorological network and works and/or resilient hydraulic control infrastructure to mitigate vulnerabilities to flooding in local populations and communities, which have increased with climate change in recent years. The multi-hazard risk information system (e.g., floods, droughts) at the national level, prioritizes immediate attention in more than 20 municipalities, which require hydrological and hydraulic modeling to implement protection works (walls, defenses, among others) in places where scour is a major factor to avoid loss of property and human lives. Analyses show that the implementation of these preventive protection and risk management measures has a significant avoided cost for the country, in addition to increasing the resilience of populations and ecosystems that are exposed to these risks, thus initiating the so-called “resilient communities”.

*Contribution to SDGs:* The goal will contribute to SDGs 1, 6, 9 and 11.

### ***Environmental functions***

**Goal (25) 16 million ha of wetlands designated as Ramsar Sites will have been maintained and conserved by 2030.**

*Baseline 2020:* 100% (16 million ha in Ramsar Sites)

*Conditionally:* Goal conditioned at 100%.

The measure seeks to promote the restoration, maintenance, conservation, storage and good management of the life systems of wetlands, giving priority to those that have the Ramsar site designation, in order to favor the sustainable use and exploitation to ensure the regulation of ecological processes, water recharge, the recovery of high Andean and Amazonian native flora and fauna, and environmental functions for the benefit of local populations and society as a whole, preserving the integrity of the components of Mother Earth and its natural balance.

*Contribution to SDGs:* The goal will contribute to SDGs 6, 9, 13 and 17.

### ***Integrated and Sustainable Water Management Cycle (IGlySA)***

The “Integrated and Sustainable Water Management Cycle Index -IGlySA” aims to measure the development of resilience actions to ensure the efficient use and access to surface and groundwater (aquifers) towards water security, from the development of conservation practices of the components, areas and life systems of Mother Earth (Ramsar Sites of wetlands), in order to meet the water needs for human consumption, ecosystems and promote sustainable production processes that promote sustainable production processes, areas and life systems of Mother Earth (Ramsar sites of wetlands), in order to meet the needs of water for human consumption, ecosystems and promote sustainable production processes that contribute to sovereignty with food security and quality of life of the Bolivian population.

From the standardized municipal indicators, the simple average of each indicator and the aggregate is obtained to determine the IGlySA.

$$\text{IGlySA} = \text{Prom} (IGIySA1x_{Norm}, \dots, IGIySA8x_{Norm})$$

Where:

IGlySA\_1 xNorm: Drinking Water

IGlySA\_2 xNorm: Basic Sanitation

IGlySA\_3 xNorm: Irrigation

IGlySA\_4 xNorm: Water Storage

IGlySA\_5 xNorm: MIC Projects

IGlySA\_6 xNorm: Water Planning

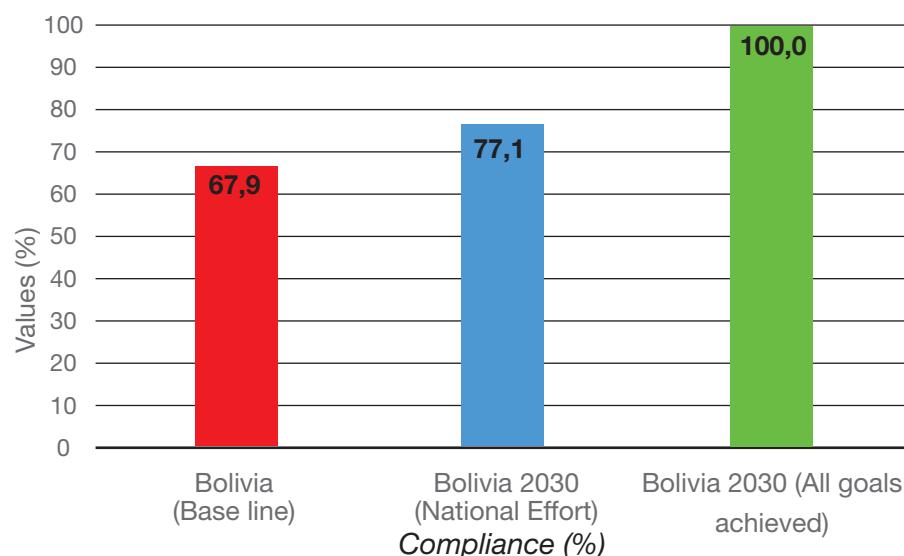
IGlySA\_7 xNorm: Water Protection

IGlySA\_8 xNorm: Ramsar

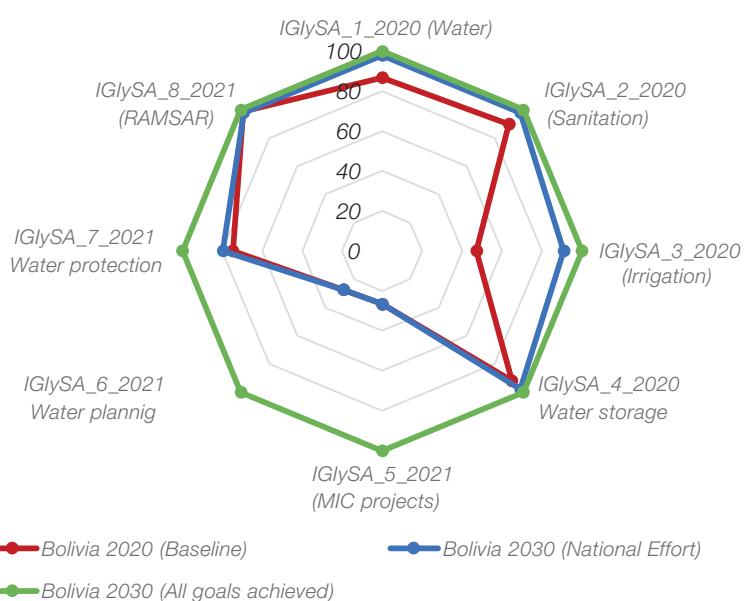
The higher the index, the higher the water management cycle indicates that integrated, multisectoral, resilient and sustainable water management is being carried out, which implies an increase in the coverage of drinking water, basic sanitation and resilient services, an increase in efficient irrigation systems, an increase in the resilience of the population in the basins as a result of actions for the management, conservation and restoration of environmental functions (MIC), and surface and groundwater planning based on robust decisions with a basin and climate change approach, as well as the maintenance, restoration and conservation of wetlands in Ramsar sites.

All the planned actions will contribute to increasing water resilience and adaptation to the imminent context of climate change impacts that greatly affect the scarcity of water resources, both for human consumption and food production, and therefore the integrated management of water resources, with emphasis on the most vulnerable rural and urban population.

*Figure 6. Integrated and Sustainable Water Management Index, 2030 scenario.*



*Figure 7. Multidimensional Integrated and Sustainable Water Management Index.*

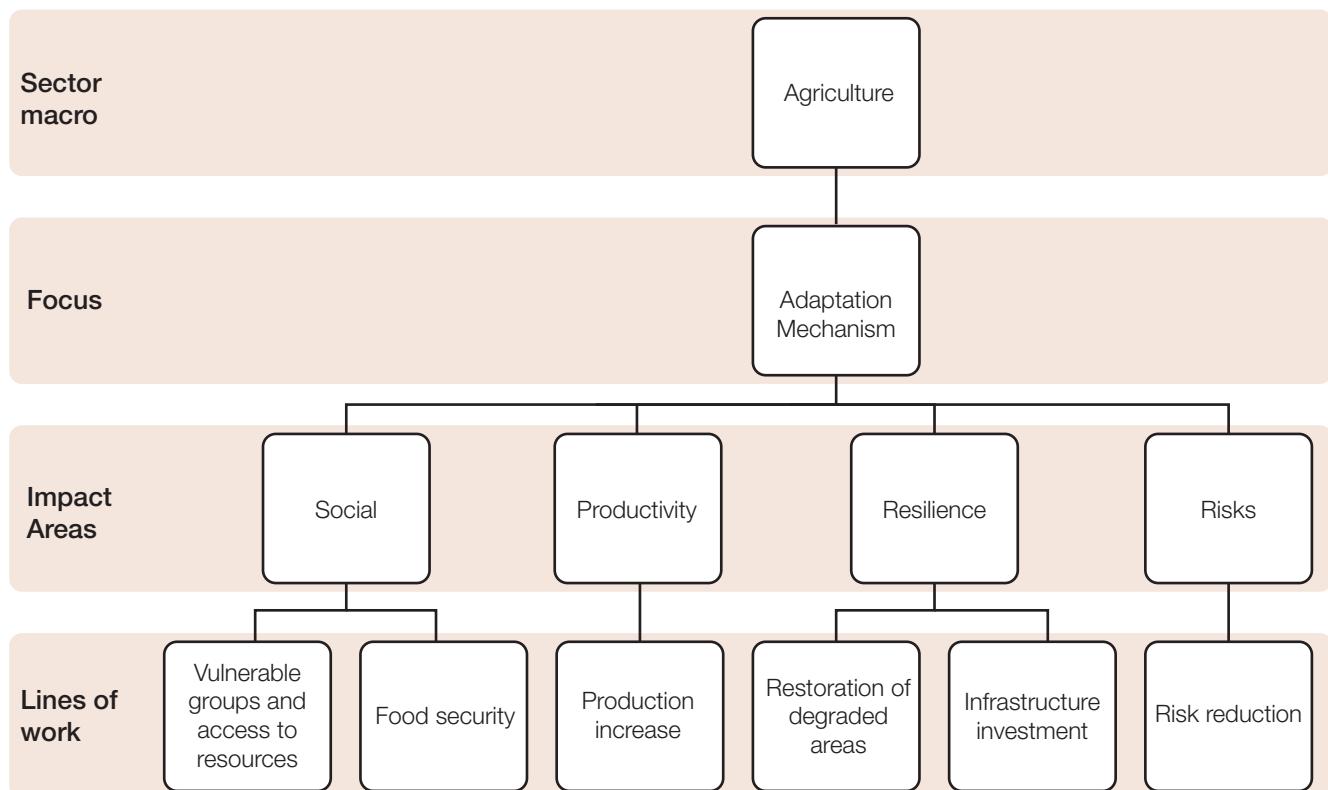


### 3.4. Agricultural sector goals

The agricultural sector in Bolivia is one of the most important sectors, both socially and economically. It is the sector that generates the most jobs in Bolivia and its contribution to GDP is between 11 and 15%. This sector is the most vulnerable to climate change, and the one that most requires investments to improve adaptation and climate resilience of productive systems and household economies.

Bolivia's NDC is oriented towards five aspects: social, productive, governance, resilience and risk management (Figure 8). Among the priority lines of action are the following: (i) attend to families in a state of extreme poverty and lift them out of that situation; (ii) reduce food insecurity; (iii) expand land access and titling for women; (iv) recover degraded areas for food production; (v) improve food availability and production; (vi) improve yields of main crops to contribute to food security and reduce the expansion of the agricultural frontier; (vii) improve land use under suitability maps; (viii) significantly increase productive and resilient infrastructure; and (ix) reduce risk.

*Figure 8. Impact Chain Analysis of the Agricultural Sector.*



**Goal (26)** **The number of rural and peri-urban inhabitants with high food insecurity will have been reduced by 75% by 2030.**

*Baseline 2020:* 1.1 million inhabitants of rural areas and peri-urban sector, with high food insecurity.

*Conditionality:* With national effort up to 60% would be reduced and with international cooperation up to 75% of inhabitants in rural areas and peri-urban sector, with high food insecurity.

*Description:* The actions will make it possible to reduce the number of inhabitants identified in the category of high food insecurity in rural areas and peri-urban sectors of cities through the implementation of public policies, programs and comprehensive projects aimed at improving the availability, access and use of the food. Strategic actions that will improve the food security and sovereignty of Bolivians;

improving and strengthening the resilience and adaptation of small, medium, community and vulnerable indigenous native peasant producers through practices that contemplate balanced life systems in the face of the significant effects of climate change. This goal also contributes directly to the reduction of the number of producers in the extreme poverty category by increasing economic income and thus improving the quality of life of producers.

These multidimensional actions will require greater investment in productive infrastructure that will increase production, improve yields and reduce losses caused by adverse climatic events resulting from climate variations. Likewise, this implemented productive infrastructure will optimize production and product transformation costs, guaranteeing the necessary means of production and improving competitiveness in internal and external markets.

*Contribution to the SDGs:* The goal will contribute to SDGs 1, 2, 3, 8 and 12.

**Goal (27) 100% of agrarian land titling will be completed, with at least 43% of land ownership rights for women by 2030.**

*Baseline 2020:* 641 thousand (31%) women with identified legal land tenure rights.

Conditionality: With national effort 100% of the national land titling goal will be achieved.

*Description:* Rural women represent 40.4% of the total population of women in the country. They carry out many of the agricultural productive tasks, and even more so in the current context of climate change, as they are responsible for many of the productive tasks. The gender issue has gained more strength in recent years, as is the case of women's political participation in the different territorial political and decision-making spaces.

The defined goal is to reach 100% of productive land regulation at the national level of which women with the right to legal land tenure will increase to 43% through processes of access, regulation and titling of land, guaranteeing the distribution and redistribution of land with productive aptitude, and regulating the land market. Avoiding latifundia and guaranteeing the technical security of ownership rights in favor of women.

*Contribution to the SDGs:* The goal will contribute to SDGs 3, 5, 8, 10 and 16.

**Goal (28) At least 725,000 additional hectares of degraded soils will have been recovered and increased for food production by 2030.**

*Baseline 2020:* 0

Conditionality: 60% of the goal will be achieved with national effort and the remaining 40% with international cooperation.

*Description:* The goal aims to sustainably increase the area with agricultural production, reaching 4.3 million hectares, considering an efficient use of soil through increased agricultural productivity, in addition to developing activities for the improvement and conservation of agro-genetic heritage, adequate cultural practices, reduction of harvest and post-harvest losses, improvement of productive infrastructure, technification, mechanization, digitalization and virtualization of production.

In addition to considering actions to reduce pressure on soils with conflicting uses (physical, chemical and biological) through nutrient replenishment, restoration of beneficial microorganisms, incorporation of green fertilizers, structural soil management practices, among others. To this end, comprehensive strategic actions will be defined and implemented for the recovery of productive soils through projects



for the recovery and rehabilitation of degraded soils in order to add these areas to the current food production surface. Another necessary measure to guarantee the goal is the development and implementation of the Productive Information System - SIP to collect, store, process and monitor agricultural production, land use and management, etc., through the implementation of medium and long term actions of the sector.

*Contribution to SDGs:* The goal will contribute to SDGs 2, 8, 13 and 15.

**Goal (29) Production will have increased by 70% of strategic crops at the national level by 2030.**

*Baseline 2020:* 20,196,561 Metric tons of food production.

*Conditionality:* The goal will be increased with national effort by 64% and a 100% of the goal will be reached (34 million tons) with international cooperation

*Description:* The goal is to increase national production of strategic crops (cereals, stimulants, fruit, vegetables, oilseeds and industrial crops, tubers and roots, fodder, among others) by improving the agricultural production system, financial investment mechanisms and technology transfer for food production per agricultural production unit in vulnerable situations; strengthening the institutional framework and governance for the development of sustainable agriculture in small, medium, community and indigenous native peasant producers. Improving institutional coordination mechanisms for the provision of goods and services. Enabling access to differentiated financing with a focus on resilience and adaptation to climate change and commercial articulation.

*Contribution to the SDGs:* The goal will contribute to SDGs 2, 8 and 15.

**Goal (30) The average yield of strategic crops at the national level will have increased by 60% by 2030**

*Baseline 2020:* 7.6 ton/ha national average.

*Conditionality:* 80% of the goal will be achieved with national effort. 100% of the target will be reached with international cooperation.

*Description:* For the defined goal, the aim is to increase average yields in strategic crops (cereals, stimulants, fruit, vegetables, oilseeds and industrial crops, tubers and roots, fodder, among others) by up to 60% through financial and technological investments aimed at developing agricultural technological innovations (improved seeds resistant to climate variations, integrated pest management, among others); recovery of good practices and ancestral knowledge; implementation of focused technical irrigation; promotion and strengthening of mechanization and appropriate technification processes; strengthening of productive capacities through technical assistance, among other strategic comprehensive actions.

*Contribution to SDGs:* The target will contribute to SDGs 2, 8 and 15.

**Goal (31) 15 billion will be invested in productive resilient infrastructure by 2030.**

*Baseline 2020:* 517 million.

*Conditional:* 10 billion will be invested with national effort. It would increase to 15 billion with international cooperation.

*Description:* This goal seeks to increase investment in productive infrastructure in the agricultural sector in order to consolidate food sovereignty and security through the implementation of resilient

infrastructure in consensus with the stakeholders, the same that will prioritize sustainable and resilient management of their territories and sustainable productive systems, for the implementation and strengthening of collection and transformation centers for agricultural products, germplasm and seed banks, focused technical irrigation systems, sheds, stables, livestock enclosures, drinking troughs, feeding troughs, protection and risk reduction infrastructure (thermal blankets, anti-hail nets, protection gabions, among others); as well as programs that include resilient production mechanisms to ensure food security and sovereignty for producers and strengthen resilience to climate change in sustainable production systems.

*Contribution to SDGs:* The goal will contribute to SDGs 8, 9, 11, 12 and 16.

#### **Dimension: Risks**

***Agricultural insurance and integrated natural hazards (flood, drought, frost and hail).***

**Goal (32) At least 50% of families with crops that are vulnerable to adverse natural phenomena will be served by 2030.**

*Baseline 2020:* 421 thousand families affected and 142 thousand families benefited (33%).

*Conditionality:* With national effort it is intended to increase the attention to vulnerable groups in case of disasters and/or emergencies up to 50% of the target and 100% of the target with international cooperation.

*Description:* In this goal, it is projected to increase coverage from 33% to 50% (211,000 families) of agricultural insurance in attention to the number of families, whose crops were affected by various adverse weather events (flood, drought, frost, hailstorm, among others), in addition to the implementation of comprehensive actions for risk management and adaptation to Climate Change.

#### **Productive Vulnerability Index in harmony with Mother Earth**

The scope of the NDC in the agricultural sector is represented in the Productive Vulnerability Index (IVP) in harmony with Mother Earth, which aims to comprehensively increase adaptive capacity and systematically reduce agricultural vulnerability in the Plurinational State of Bolivia.

## Productive vulnerability reduction index (IRVP)

$$ivp_j = \theta_1 \tilde{soc}_j + \theta_2 \widetilde{prod}_j + \theta_3 \widetilde{conf}_j + \theta_4 \widetilde{res}_j + \theta_5 \widetilde{rn}_j$$

Where:

- $\tilde{vp}_j$  : Productive Vulnerability Index
- $\tilde{soc}_j$  : Social Dimension
- $\widetilde{prod}_j$  : Dimension: Productivity
- $\widetilde{res}_j$  : Resilience Dimension
- $\widetilde{rn}_j$  : Dimension: Risks
- $\theta_1$  : Importance of variables

Figure 9. Productive Vulnerability Reduction Index (IRVP, %), 2030 scenario.

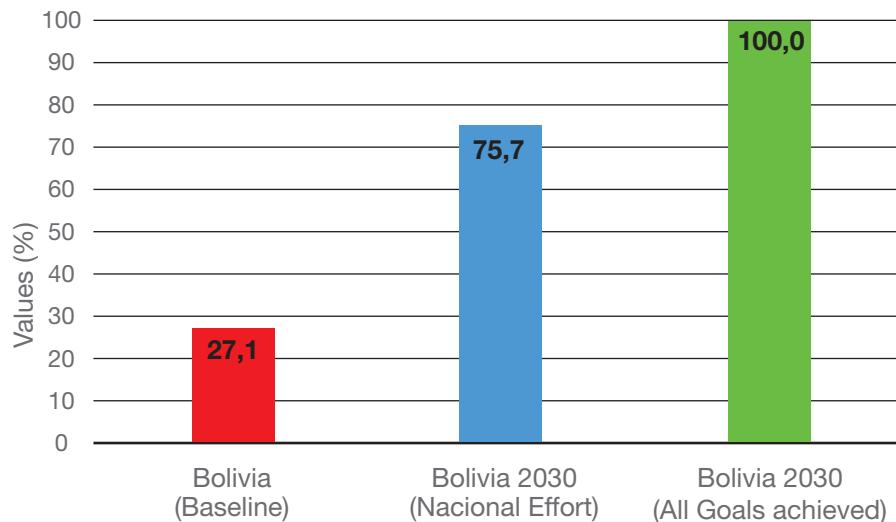
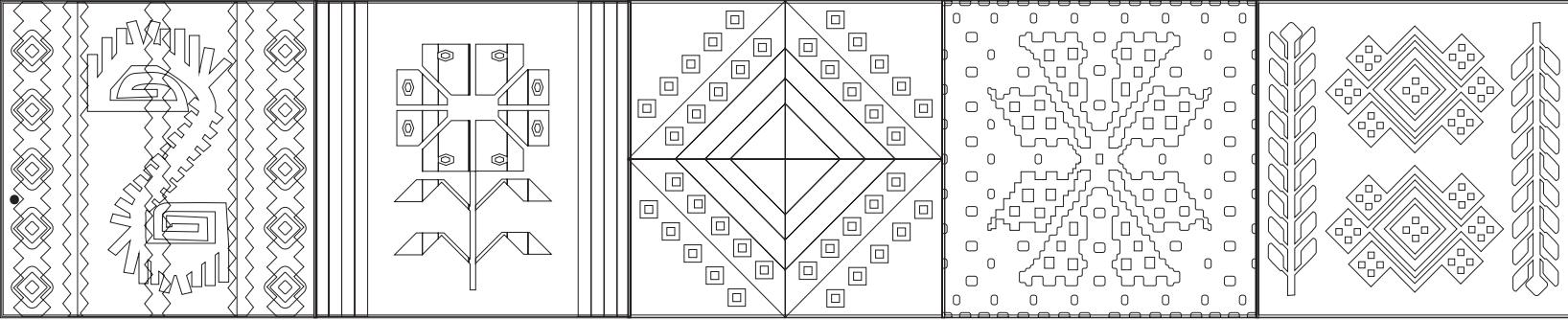


Figure 10. Multidimensional Productive Vulnerability Reduction Index (IRVP).







#### 4. Means of implementation

**B**olivia's Nationally Determined Contribution (NDC) is formulated within the framework of strict compliance with Article 4.7 of the UNFCCC, which establishes differentiated commitments for developed and developing countries, and support with means of implementation from the former to the latter, particularly in relation to financing, technology provision and capacity building. We assume that for the fulfillment of this NDC there must be a national effort according to the capacities of the country and significant international cooperation within the framework of the mechanisms established by the UNFCCC and the Paris Agreement for the fulfillment of the conditional goals. In addition, Bolivia notes that its NDC will be fully implemented within the framework of non-market-based approaches as defined in Articles 6.8 and 6.9 of the Paris Agreement.

In the framework of transparency and climate justice that should govern multilateral climate change negotiations, it is essential to understand that a global scenario that does not provide the sufficient international support required for the important transformations of key sectors in Bolivia and other countries of the world. It runs the risk of leading to a gradual worsening of national conditions, including the increase of emissions and the crossing of regional and national ecological thresholds that make the recovery of key ecosystem functions impossible and put at risk central elements of national and global security.

##### 4.1. Contributions with national effort (unconditioned)

The Bolivian NDCs are designed in such a way that a large part of them will be implemented with national effort (unconditional contributions) through the competent State bodies and the Plurinational Authority of Mother Earth (PAME).

The PAME (under Law No. 300 and D.S. 1696) is the entity that formulates and implements the Plurinational Climate Change Policy and Plan with a horizontal and intersectoral approach. It coordinates with all levels of the State and is responsible for the elaboration, execution and coordination of strategies, plans, programs and projects related to the processes and dynamics of climate crisis management with a focus on life systems and non-commercialization of environmental functions (non-market-based approach).

The implementation of climate actions is given through its three mechanisms: (i) Joint Mitigation and Adaptation Mechanism for the Integral and Sustainable Management of Forests and Mother Earth, (ii) the Mitigation Mechanism for Living Well and (iii) the Adaptation Mechanism for Living Well. As well as the Plurinational Fund of Mother Earth, whose purpose is to manage and transfer financial resources for climate action.

The NDCs will also be implemented through the Territorial Platforms Joint Mechanism, Territorial and Sectoral Plans for Integral Development with a focus on climate change management and risk management, promoting horizontal and vertical articulation with the different sectors.

## **4.2. Contributions conditioned to international cooperation**

Bolivia, within the framework of its national circumstances, has mobilized national resources for the implementation of climate action; however, the goals and actions committed in the NDCs must be complemented with international cooperation to increase climate ambition, which is why Bolivia proposes in its NDC goals conditioned to the provision of financing, technology transfer, and capacity development, among others. The climate crisis greatly exceeds the local and national resources and capacities needed to address its impacts and consequences that are affecting the country with greater intensity. Therefore, the country considers that it will require international financial, technological and capacity development support to meet the conditional targets, within the framework of non-market-based approaches.

The implementation of the NDCs with international cooperation should be framed within the development of “Climate Ambition Alliance - CAA” (bilateral or multilateral) within the framework of Art. 6.8 (non-market-based approach) mainly through: i) direct transfer of resources to meet NDC targets; ii) provision of technology and capacity development; iii) agreements for access to international markets of developed countries for products based on an integrated and sustainable management.

The Plurinational State of Bolivia is open to international cooperation to help achieve and increase its mitigation, adaptation and joint goals in line with the objective and provisions of the Paris Agreement, based on the achievement of integral development for Living Well and eradication of material, social and spiritual poverty.

As highlighted, Bolivia's NDC will be implemented taking into account Article 6.8 of the Paris Agreement, which highlights integrated, holistic and balanced non-market approaches that help countries implement their nationally determined contributions, in the context of sustainable development and poverty eradication and in a coordinated and effective manner, and taking into account, *inter alia*, mitigation, adaptation, finance, technology transfer and capacity development.

## **4.3. Implementation Guide**

By 2023, when the global review of the Paris Agreement takes place, and by 2025, when a new update of its NDCs will be presented, the Plurinational State of Bolivia will have made progress with its own efforts and with international cooperation in the following lines of implementation.

### ***Improve government coordination mechanisms to drive the NDC implementation process.***

The NDCs are part of the State's Comprehensive Planning System and, as such, are fully aligned with the National Economic and Social Development Plan (NESPD) 2021-2025 with projection to 2030. In addition, the NDCs have been aligned with the Sustainable Development Goals.

The need for sectoral and territorial coordination and articulation mechanisms, as provided for in S.D. 1696 and the PAME Mechanisms. This coordination mechanism will be the basis for intersectoral, multilevel and multi-stakeholder articulation, integrating coordination channels with the productive sector, the academic sector, indigenous and aboriginal peasant nations and peoples, youth, women's organizations and civil society in general.

The coordination mechanisms will facilitate the implementation of the NDC, within the framework of the NESPD 2021-2025, access to climate finance resources, and the monitoring, evaluation and reporting processes.

### ***Strengthen institutional capacities and functions and human talent.***

This line of action expects to strengthen institutional capacities and human talent for the effective implementation of climate actions in accordance with national plans and strategies at different levels and territorial scales and with the involvement of public, social and productive actors.

### ***The Joint Mechanism<sup>22</sup> is fully operational and develops its potential in its institutional, technical, operational and financial dimensions.***

The operationalization of the Joint Mechanism will be developed in coordination with Article 25 of Law No. 300 and Law No. 777 and the forestry sector programs established in S.D. 2914 for the Control of Deforestation and Forest Degradation and S.D. 2912. Therefore, an articulated implementation is promoted among public actors (DGGDF, National Forest Funds, ABT, INRA, SERNAP) as well as at the level of the ETAs and the communities and productive actors.

Strengthening the areas of the Joint Mechanism: Area 1: Governance of forests and life systems of Mother Earth<sup>23</sup>; Area 2: Participatory processes of territorial community management in the framework of the management of life systems, with a focus on mitigation and adaptation to climate change; Area 3: Establishment of local territorial agreements regarding objectives and/or goals for the development of sustainable productive systems with a focus on mitigation and adaptation to Climate Change; Area 4: Integral support for sustainable productive systems and the integral and sustainable management of Mother Earth's forests and life systems; Area 5: Integral information and monitoring of Mother Earth's components, environmental functions and life systems.

### ***Improved capabilities to generate and manage climate change information for decision making.***

Strengthen and promote basic and applied research to offer practical and resilient solutions that promote adaptation and mitigation. Actions should also produce information and low-cost applied technology to scale solutions in rural and urban areas. Solutions for agricultural production, production, consumption and efficient storage of renewable energy, climate change resilient infrastructure; determine the impacts and adaptation in all sectors, with special emphasis on the productive sector, health, education and natural resources; promote sustainable management of natural resources including glaciers and water reservoirs, soils, biodiversity, resilience of ecosystems and local economies, etc.

In particular, the support of the best available science at regional and international level is required to establish the processes that allow the Plurinational State of Bolivia to effectively link to the mechanism of damages and losses according to Article 8 of the Paris Agreement.

### ***Progressively improve access to and management of climate financing.***

Taking into consideration Bolivia's national circumstances and financial capabilities, and based on the needs prioritized in the NDC, access to international financial mechanisms for climate change, technology development, and capacity development established in the framework of the UNFCCC and the Paris Agreement is essential.

### ***Consolidate a transparent and differentiated monitoring, evaluation and reporting system.***

The Plurinational System of Information and Integral Monitoring of Mother Earth and Climate Change (SMTCC) in the framework of the NDCs will promote: a) cross-sectoral data collection,

<sup>22</sup> Submitted to the UNFCCC as the Bolivian proposal for the development of new non-market approaches in the framework of decision 2/CP.17: [https://unfccc.int/files/cooperation\\_and\\_support/financial\\_mechanism/standing\\_committee/application/pdf/annex\\_1.\\_the\\_joint\\_mitigation.pdf](https://unfccc.int/files/cooperation_and_support/financial_mechanism/standing_committee/application/pdf/annex_1._the_joint_mitigation.pdf)

<sup>23</sup> Within the framework of the IPBES document "Conceptualization of the multiple values of nature and its benefits" IPBES/2/INF/7

b) development of methodologies and protocols for NDC indicators integrated into the Monitoring and Evaluation Indicator Registry System (RIME), c) indicator sheets and protocols for the measurement and assessment of NDC parameters and process, outcome and impact indicators of mitigation, adaptation and joint mechanism; d) generate reports for follow-up and monitoring of NDC progress at both national, sectoral and subnational levels.

Bolivia is committed to ensure transparency and openness of key information related to: *i*) reports to the UNFCCC (National Communication and InGEI, BUR and BTR reports, among others); *ii*) climate change impacts (on the population and ecosystems); *iii*) progress in the implementation of the NDC and *iv*) results in terms of emission reductions and vulnerability of our communities, ecosystems and productive systems.

As established in the Glasgow Climate Pact, the country's NDCs will be updated every 5 years, starting in 2025, with a time horizon of 10 years.

## 5. ICTU Guidelines

### Summary of information to facilitate clarity, transparency and understanding of Bolivia's updated NDC to 2030.

The following table quantifies Bolivia's ambition in terms of climate change mitigation, responding to the Information on Clarity, Transparency and Understanding (ICTU) guidelines, Decision 4/CMA 1 (Table 2).

*Table 1: Information Clarity, Transparency and Understanding (ICTU) Guidelines.*

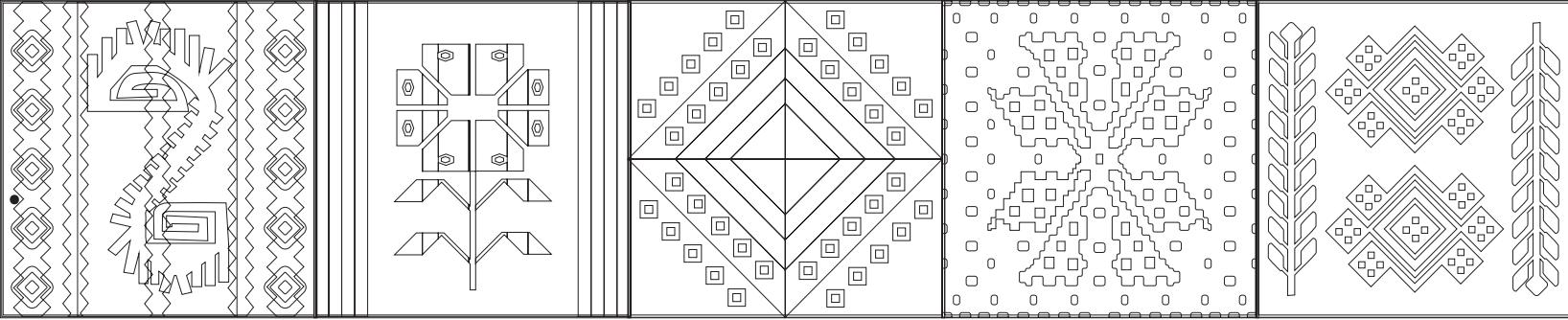
1. Quantifiable information on the baseline	
a) Reporting period	2021-2030.
b) BAU Stage	Based on CAIT data 2018 cumulative total emissions were 126.21 Mt CO2eq.
c) Mitigation goals	In preparing the first Biennial Transparency Report (IBT1), the baseline scenario for Bolivia will be developed more precisely and will include mitigation targets in the energy, forestry and agriculture sectors.
d) Sources	The Third National Communication (CN3) includes historical emissions up to 2008, so for the establishment of the BAU scenario it was necessary to use data from the CAIT Climate Data Explorer. .
e) Circumstances in which the Party may update the values of its reference indicators.	Once the estimates of historical GHG emissions in the Fourth National Communication (CN4) have been updated, and when preparing the First Biennial Transparency Report (IBT1), the reference scenario for Bolivia will be elaborated and presented with more precision.
2. Application period	
a) Duration (years)	Climate change adaptation efforts began in 2010, while mitigation efforts are planned for the period 2021-2030.
b) Overall goal	The overall goal will be calculated when preparing the First Biennial Transparency Report.

### 3. Scope and coverage

a) General description of the mitigation goal, including geographic and reference framework.	<p>The mitigation goal is focused on:</p> <p>Forestry:</p> <ul style="list-style-type: none"> <li>• Reduced deforestation</li> <li>• Reduction of forest fires</li> <li>• Increase in forest cover</li> <li>• Increase in areas under forest management for timber and non-timber forest products.</li> </ul> <p>Energy:</p> <ul style="list-style-type: none"> <li>• Increased energy efficiency</li> <li>• Increase of renewable energies in the energy matrix.</li> </ul>
b) IPCC gases, categories and sinks addressed in NDCs	<p>When the cumulative target is calculated when preparing the First Biennial Transparency Report, the GHGs to be included in Bolivia's NDC will be:</p> <ul style="list-style-type: none"> <li>• CO2 (carbon dioxide mainly from deforestation and fossil fuel combustion),</li> <li>• CH4 and N2O (mainly from enteric fermentation of livestock), and</li> <li>• HFCs (hydrofluorocarbons mainly from refrigeration processes).</li> </ul> <p>The NDC excludes SF6, PFCs and NF3 gases, which do not contribute significantly to Bolivia's total emissions.</p> <p>The NDC excludes CO2 removals in mature forests, which are beyond the control of Bolivians.</p> <p>The sectors included in Bolivia's NDC are:</p> <ul style="list-style-type: none"> <li>• LULUCF</li> <li>• Energy</li> <li>• Industrial Processes</li> <li>• Agriculture and livestock</li> <li>• Waste</li> </ul>
c) (c) How the Party has taken into account paragraph 31 (c) and (d) of decision 1/ CP.21;	<p>If the next National GHG Communication includes evidence of significant new emissions sources (&gt;2% of total emissions), it will be included in the next NDC.</p>
d) Mitigation co-benefits resulting from the Party's adaptation and/or economic diversification measures.	<p>Reducing emissions caused by deforestation would provide important co-benefits in terms of reducing risks of extreme weather events, protection of biodiversity and other environmental functions of the forest.</p> <p>The stimulation of alternative activities to extensive agriculture (e.g., tourism) could generate alternative jobs of better quality and perspective, especially for women and young people in the country.</p> <p>Investment in energy efficiency and renewable energies will allow the development of some alternative economic sectors.</p>

<b>4. Planning process</b>	
a) Information on planning processes for the development of NDC plans	The construction of the NDCs has had three phases, evaluation of compliance with the first NDC (2016). 42 intersectoral workshops and determination of Goals with national effort based on the Economic and Social Plan 2021-2025 and projections to 2030. A participatory exercise has also been carried out from the sectors for the formulation of their goals and sectoral contributions.
<b>5. Assumptions and methodological approaches used to quantify anthropogenic GHG emissions/removals.</b>	
a) Assumptions and methodological approaches used to account for anthropogenic GHG emissions and removals.	The overall goal will be calculated when preparing the First Biennial Transparency Report.
b) The assumptions and methodological approaches used to account for the implementation of policies, measures and strategies in the NDC.	Each sector presented its mitigation plans and initiatives between 2021 and 2030 in two scenarios (national effort and with international cooperation or conditional). Investments financed with international loans were counted as own effort, since Bolivians would have to repay this debt, while international donations and offsets for reductions in deforestation emissions were counted as international cooperation in the conditional scenario.
c) IPCC methodologies and measurement systems used to estimate anthropogenic greenhouse gas emissions and removals.	The overall goal will be calculated when preparing the First Biennial Transparency Report.
e) Assumptions, methodologies and approaches specific to each sector, category or activity, consistent with IPCC guidance.	The overall goal will be calculated when preparing the First Biennial Transparency Report.
<b>6. How does the Party consider its NDC to be fair and ambitious in light of its national circumstances?</b>	
a) General considerations	The main factor to consider in the new NDC is the inclusion of targets related to agriculture and livestock; additionally, the energy, forestry and water goals have been adjusted and improved. Considering that several commitments are included in the National Economic and Social Development Plan 2021-2025 and are in line with the country's national circumstances. The means of implementation described above have been developed or are in the process of being developed.
<b>7. The way in which the NDC contributes to the achievement of the objective of the UNFCCC, as stated in its Art. 2</b>	
a) General considerations	Bolivia's NDC focuses on strengthening efforts for better adaptation to climate management with co-benefits in mitigation. In this way, a holistic and integral vision is articulated in relation to the management of the climate crisis that includes action in mitigation, adaptation and integral development for Living Well.





## 6. Literature

ABT. (2020). *Producción de productos forestales no maderables*. La Paz: Autoridad de fiscalización y control social de bosques y tierras.

ABT. (2021). *Con base en rendiciones públicas de cuentas de la ABT*. La Paz - Bolivia: Unidad jurídica y planificación de la ABT, Ministerio de Justicia.

ABT. (2021). *Planes de Gestión Integral de Bosques y Tierra (PGIBT)*. La Paz: Ministerio de Medio Ambiente y Agua. La paz: Autoridad de Fiscalización y Control Social de Bosques y Tierra Autoridad.

Andersen , L. E., Doyle, A., Del Granado, S., Ledezma, J., Medinaceli, A., Valdivia, M., & Weinhold, D. (18 de marzo de 2016). Emisiones netas de carbono por deforestación en Bolivia durante 1990-2000 y 2000-2010: resultados de un modelo de contabilidad de carbono. *PLOS ONE. COLLECTION*. doi:<https://doi.org/10.1371/journal.pone.0151241>

APMT. (2015). *Política Plurinacional de Cambio Climático (Documento de Trabajo)*, Ministerio de Medio Ambiente. La Paz: Autoridad Plurinacional de la Madre Tierra.

APMT. (2020). *Autoridad Plurinacional de la Madre Tierra*. Obtenido de Marco legal: <https://madretierra.gob.bo/>

Berkeleyearth. (10 de 07 de 2021). *Climate data Bolivia*. Obtenido de <http://berkeleyearth.lbl.gov/regions/bolivia#>

BID, Naciones Unidas, CEPAL. (2014). *La economía del cambio climático en el Estado Plurinacional de Bolivia*. Obtenido de <https://www.cepal.org/es/publicaciones/37280-la-economia-cambio-climatico-estado-plurinacional-bolivia>

Bobka, S., Gonzales-Carrasco, L., Malky, A., & Mendizabal, C. (2021). Medición del impacto económico de las medidas de descarbonización de las NDC de Bolivia con proyecciones a 2050.

Bolivia. (2004). *Primera comunicación nacional*. Obtenido de PNCC: [http://euroclimaplus.org/intranet/\\_documentos/repositorio/01Comunicaci%C3%B3n%20Bolivia%20ante%20la%20Convenci%C3%B3n%20ONU%20Cambio%20Clim%C3%A1tico\\_2009.pdf](http://euroclimaplus.org/intranet/_documentos/repositorio/01Comunicaci%C3%B3n%20Bolivia%20ante%20la%20Convenci%C3%B3n%20ONU%20Cambio%20Clim%C3%A1tico_2009.pdf)

Bolivia. (2009). *Segunda Comunicación Nacional del Estado Plurinacional de Bolivia ante la Convención Marco de las Naciones Unidas sobre Cambio Climático*. La Paz: Programa Nacional de Cambios Climáticos.

Bolivia. (2009b). *Nueva Constitución Política del Estado Plurinacional de Bolivia*. La Paz: Bolivia.

- Bolivia. (22 de 12 de 2010). Ley 71. Obtenido de Gaceta Oficial de Bolivia: <http://www.gacetaoficialdebolivia.gob.bo/normas/buscar/71>
- Bolivia. (2012). *Bolivia Rio+20*. Obtenido de Cancilleria: <http://www.cancilleria.gob.bo/webmre/sites/default/files/libros/12%20brochure%20rio20.pdf>
- Bolivia. (12 de 10 de 2012). Ley 300. Obtenido de Gaceta oficial de Bolivia.
- Bolivia. (2013). *Agenda Patriótica 2025. Trece pilares de la Bolivia digna y soberana. La Paz*. . Obtenido de Agenda Patriótica: [comunicacion.presidencia.gob.bo/docprensa/pdf/20130123-11-36-55.pdf](http://comunicacion.presidencia.gob.bo/docprensa/pdf/20130123-11-36-55.pdf)
- Bolivia. (14 de 8 de 2013). DS 1696. Obtenido de Gaceta Oficial de Bolivia.
- Bolivia. (25 de 01 de 2016). Ley 777. Obtenido de Gaceta oficial de Bolivia : <http://www.gacetaoficialdebolivia.gob.bo/normas/buscar/777>
- Bolivia. (2020). *Análisis del estado de situación de la implementación de la Contribución Nacionalmente Determinada (NDC)*. La Paz: GIZ.
- Bolivia. (2020). *Tercera Comunicación Nacional de cambio climático del Estado Ante la Convención Marco de las Naciones Unidas sobre Cambio Climático*. Ministerio de Medio Ambiente y Agua, Autoridad Plurinacional de la Madre Tierra. Obtenido de <https://unfccc.int/sites/default/files/resource/NC3%20Bolivia.pdf>
- Bolivia, G. . (2020). *Análisis comparativo de los reportes nacionales 2017 y 2020 respecto al ODS 6.5.1: “Grado de implementación de la gestión integrada de los recursos hídricos” en Bolivia*.
- Brienen, R., Phillips, O., Feldpausch, T., Gloor, E., Baker, T., Arends, E., & Pena Claros, M. (2015). Long-term decline of the Amazon carbon sink. *Nature*, 519(7543), 344–348. doi:10.1038 / nature14283
- ClimateWatchData. (11 de 11 de 2021). *GHG-Emissions*. Obtenido de [https://www.climatewatchdata.org/ghg-emissions?end\\_year=2018&regions=BOL&start\\_year=1990](https://www.climatewatchdata.org/ghg-emissions?end_year=2018&regions=BOL&start_year=1990)
- CMPCC. (2010). Conferencia Mundial de los Pueblos sobre el Cambio Climático y los Derechos de la Madre Tierra. *Acuerdo de los pueblos* (pág. 6). Cochabamba: CMPCC. Obtenido de <https://cmpcc.wordpress.com/derechos-madre-tierra/>
- DGGDF. (01 de 08 de 2021). *Sistema de Información y Monitoreo de Bosques*. Obtenido de SIMB: [http://simb.siarh.gob.bo/simb/map\\_heat\\_source](http://simb.siarh.gob.bo/simb/map_heat_source)
- DGGDF. (2021). *Sistema de Información y Monitoreo de Bosques (SIMB)*. Obtenido de SIMB: <https://datos.siarh.gob.bo/simb>
- DGGFD & ABT. (2021). *Sistema de Información y Monitoreo de Bosques (SIMB), Focos de calor e incendios*. Obtenido de SIMB: <https://datos.siarh.gob.bo/simb>
- Energía, M. d. (2014). *Plan Eléctrico del Estado Plurinacional 2025*.
- Fernández, C., & Fernández, M. (2018). *Evaluación de la viabilidad económica de sistemas de generación fotovoltaica para el área urbana de Bolivia, basada en 6 casos de estudio*.

Gatti, L. V., Basso, L. S., Miller, J. B., Gloor, M., Gatti Domingues, L., Henrique, L., . . . Cassol, G. (2021). Amazonia as a carbon source linked to deforestation and climate change. *Nature*, 595, 388–393.

GERMANWATH. (2021). *Índice de riesgo climático global 2021*. Obtenido de <https://www.germanwatch.org/en/cri>

Harris , N. L., Gibbs, D. A., Baccini, A., Birdsey , R. A., De Bruin, S., Fatoyinbo , L., . . . Houghton, R. A. (2021). Global maps of twenty-first century forest carbon. *Naturaleza Cambio Climático*, 11, 234-240. Obtenido de <https://www.nature.com/articles/s41558-020-00976-6.pdf>

Hidrocarburos, M. d. (2017). *Plan Sectorial de Desarrollo Integral de Hidrocarburos 2016-2020*.

IBIF. (2021). *Reporte de Evaluacion del Cumplimiento de las Contribuciones Determinadas*. Santa Cruz: IBIF.

INE. (2015). *Censo agropecuario 2013 Bolivia*. La Paz: Instituto Nacional de Estadística. Obtenido de La Paz. 143 p. : [www.ine.gob.bo](http://www.ine.gob.bo)

INE. (07 de 2020). *Actualización de las lineas de pobreza*. Obtenido de Publicaciones: <https://www.ine.gob.bo/index.php/publicaciones/nota-tecnica-actualizacion-de-la-canasta-basica-de-alimentos-y-de-las-lineas-de-pobreza/>

INE. (2020). *Estadísticas sociales y económicas de bolivia*. Obtenido de <https://www.ine.gob.bo/>

INE. (2021). *Estadísticas sociales y económicas de bolivia*. Obtenido de [www.ine.gob.bo](http://www.ine.gob.bo)

Instituto-Agrario-Bolivia. (2018). *Impactos del cambio climático en Bolivia*. La Paz - Bolivia. Recuperado el 15 de 11 de 2019, de [www.institutoagrario.org/analisis](http://www.institutoagrario.org/analisis)

Instituto-Agrario-Bolivia. (2018). La seguridad y soberanía alimentaria frente al cambio climático. *Revista Análisis*.

IPCC. (2007). *Climate change the physical science basis*. NY: CMNUCC.

IPCC. (2019). *Reporte especial del IPCC“ Calentamiento gloval de 1.5° C“*. Bonn: ntergovernmental Panel on Climate Change.

IPCC. (2021). *AR6 Climate Change 2021: The Physical Science Basis*. Bonn: IPCC.

IPCC. (2021). *AR6 Climate Change 2021: The Physical Science Basis*. Bonn: IPCC.

IPCC. (2021). Summary for Policymakers. (V. P. Masson-Delmotte, Ed.) *Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change*. Obtenido de [https://www.ipcc.ch/report/ar6/wg1/downloads/report/IPCC\\_AR6\\_WGI\\_SPM.pdf](https://www.ipcc.ch/report/ar6/wg1/downloads/report/IPCC_AR6_WGI_SPM.pdf)

MDRyT. (2010). *Plan de Desarrollo Económico y Social, Plan Sectorial Agropecuario*. La Paz: Ministerio de Desarrollo Rural y Tierras.

ME. (2019). *Ministerio de energías de Bolivia*. Obtenido de Estadísticas y boletines informativos: <https://www.minenergias.gob.bo>

Ministerio de Medio Ambiente y Agua – VRHR. (2016). *Programa Nacional de Riego 2016-2020.*

Ministerio de Hidrocarburos y Energía. (s.f.). *Balance Energético Nacional 2006-2018.*

Ministerio de Hidrocarburos y Energía. (2012). *Ministerio de Plan Optimo de Expansión del Sistema Interconectado Nacional 2012-2022.* La Paz.

Ministerio de Hidrocarburos y Energía. (2014). *Plan Eléctrico del Estado Plurinacional 2025.*

Ministerio de Medio Ambiente y Agua – VAPSB. (2016). *Plan Sectorial de Desarrollo de Saneamiento Básico 2016-2020.*

Ministerio de Medio Ambiente y Agua - SERNAP. (2013). *Deforestación y Regeneración de Bosques en Bolivia y en sus Áreas Protegidas Nacionales para los periodos 1990-2000 y 2000-2010.*

Ministerio de Medio Ambiente y Agua – VAPSB. (2016). *Marco de evaluación de desempeño del sector de agua potable y saneamiento 2016 – 2020.*

Ministerio de Medio Ambiente y Agua – VAPSB. (2016). *Plan Sectorial de Agua y Saneamiento 2016-2020.*

Ministerio de Medio Ambiente y Agua - VRHR. (2017). *Programa Plurianual de Gestión Integrada de Recursos Hídricos y Manejo Integral de Cuencas 2017-2020.*

Ministerio de Medio Ambiente y Agua – VRHR. (2016). *Programa Nacional de Riego 2016-2020.*

Ministerio de Medio Ambiente y Agua. (2013). *Memoria Técnica Mapa de Bosque 2013.*

Ministerio de Medio Ambiente y Agua. (2016). *Plan Sectorial de Desarrollo Integral de Medio Ambiente y Agua 2016-2020.*

Ministerio de Medio Ambiente y Agua. (2017). *Programa Plurianual de Gestión Integrada de Recursos Hídricos y Manejo Integral de Cuencas. 2017-2020.* La Paz: Ministerio de Medio Ambiente y Agua Viceministerio de Recursos Hídricos y Riego.

Ministerio de Medio Ambiente y Agua -VRHR. (2017). *Programa Plurianual de Gestión Integrada de Recursos Hídricos y Manejo Integral de Cuencas 2017-2020.*

Ministerio de Planificación y Desarrollo. (s.f.). *Plan de Desarrollo Económico y Social 2016-2020.*

MMAYA. (2017). *Programa Plurianual de Gestión Integrada de Recursos Hídricos y Manejo Integral de Cuencas. 2017-2020.* . La Paz: Ministerio de Medio Ambiente y Agua Viceministerio de Recursos Hídricos y Riego.

Müller, R., Pacheco, P., & Montero, J. (2014). *El contexto de la deforestación y degradación de los bosques en Bolivia: Causas, actores e instituciones.* Documentos Opcionales 100. Indonesia: CIFOR. Obtenido de [https://www.cifor.org/publications/pdf\\_files/OccPapers/OP-100.pdf](https://www.cifor.org/publications/pdf_files/OccPapers/OP-100.pdf)

NU. CEPAL. OLADE. (2019). *Evaluación de escenarios para la formulación de la Estrategia Energética Sustentable SICA 2030.* Chile. Obtenido de <https://repositorio.cepal.org/handle/11362/44948>

Pacheco, D. (2013). *Vivir Bien en Armonía y Equilibrio con la Madre Tierra.* La Paz: Universidad de la Cordillera - Fundación de la Cordillera.

Paz, E. (2020). *Cuantificación de la reducción de emisiones de Gases Efecto Invernadero por introducción de electromovilidad*. La Paz- Bolivia: Informe elaborado para el Ministerio de Energías de Bolivia con financiamiento de GIZ.

Phillips, O. L., Lewis, S. L., Baker, T. R., Chao, K.-J., & Higuchi, N. (2008). The changing Amazon forest. *Philosophical Transactions, The Royal Society B*, 363(1819–1827). doi:10.1098/rstb.2007.0033

Phillips, O., & Brien, R. (2017). Carbon uptake by mature Amazon forests has mitigated Amazon nations' carbon emissions. *Carbon Balance Manage*, 12(1). Obtenido de DOI 10.1186/s13021-016-0069-2

Saavedra, C. (2020). *Los desafíos de la seguridad hídrica en Bolivia*.

SENAMHI. (2019). *Servicio Nacional de Meteorología e Hidrología*. Obtenido de SENAMHI: <http://senamhi.gob.bo>

SERNAP. (2013). *Deforestación y regeneración de bosques en Bolivia y en sus áreas protegidas nacionales para los períodos 1990-2000 y 2000-2010*. La Paz: SERNAP-Museo de Historia Natural Noel Kempff Mercado y C.I.

Tierra, M. d. (2010). *Plan de Desarrollo Económico y Social, Plan Sectorial Agropecuario*. La Paz: Ministerio de Desarrollo Rural y Tierras.

Torrico-Albino, J. (2020). Escenarios climáticos Bolivia. *Análisis - Instituto Agrario Bolivia*, 2020 (1) 101-108.

Torrico-Albino, J. (2020). Vulnerabilidad climática en Bolivia. *Cienciagro*, 62-74.

Torrico-Albino, J., Peralta-Rivero, C., Cartagena, P., & Petellier, A. (2018). *Capacidad de resiliencia de sistemas agroforestales, ganadería semi-intensiva y agricultura bajo riego: beneficios alcanzados por la PEP del CIPCA*. Cuaderno de investigación N° 84. La Paz: CIPCA.

UDAPE. (2013-2018). Séptimo informe de progreso de los Objetivos de Desarrollo del Milenio en Bolivia. Obtenido de [http://www.udape.gob.bo/portales\\_html/ODM/Documentos/InfProgreso/7mo\\_Informe\\_de\\_progreso.pdf](http://www.udape.gob.bo/portales_html/ODM/Documentos/InfProgreso/7mo_Informe_de_progreso.pdf)

UDAPE. (2018). *Objetivos de desarrollo del milenio*. Obtenido de [http://www.udape.gob.bo/portales\\_html/ODM/ODM\\_010\\_ODM.php](http://www.udape.gob.bo/portales_html/ODM/ODM_010_ODM.php)

UDAPE. (2020). *Dossier de Estadísticas Sociales y Económicas*. Obtenido de <http://www.udape.gob.bo/>

UDAPE. (2021). *Dossier de Estadísticas Sociales y Económicas*. Obtenido de <http://www.udape.gob.bo/>

UNFCCC. (2015b). *Adoption of the Paris Agreement*. Obtenido de <https://unfccc.int/resource/docs/2015/cop21/eng/I09r01.pdf>

UNFCCC. (2019). *UN Climate change annual report*. Luxembourg: Imprimerie Centrale.

UNFCCC. (2020). *NDC Bolivia*. Obtenido de <https://www4.unfccc.int/sites/NDCStaging/pages/All.aspx>

- UNFCCC. (2020b). *UNFCCC*. Obtenido de Paris agreement: <https://unfccc.int/process/conferences/pastconferences/paris-climate-change-conference-november-2015/paris-agreement>
- UNFCCC. (2020c). *El Acuerdo de París y las contribuciones determinadas a nivel nacional*. Obtenido de UNFCCC: <https://unfccc.int/es/process-and-meetings/the-paris-agreement/the-paris-agreement/contribuciones-determinadas-a-nivel-nacional-ndc>
- UNICEF. (2021). *Los Niños, Niñas y Adolescentes de Bolivia Frente al Cambio Climático*. La Paz: APMT.
- UN-WATER. (2013). *Water security and the Global Water Agenda. A UN-Water Analytical Brief*. Hamilton, Ontario, Canada. Obtenido de <https://www.unwater.org/publications/water-security-global-water-agenda/>
- UN-WATER. (2020). *The Sustainable Development Goal 6. Global Acceleration Framework*. Geneva, Switzerland. Obtenido de <https://www.unwater.org/publications/the-sdg-6-global-acceleration-framework/>
- UN-WATER. (2021). *Summary Progress Update 2021: SDG 6 – water and sanitation for all*. Geneva, Switzerland.
- Viceministerio de Recursos Hídricos y Riego, M. d. (2016). *Programa Nacional de Riego 2016-2020*.
- Wildlife Conservation Society (WCS) y Servicio Nacional de Áreas Protegidas (SERNAP). (2020). *El Aporte de las Áreas Protegidas Nacionales en el Marco de las Contribuciones Determinadas Nacionalmente (CDN)*. La Paz.
- WRI. (11 de 11 de 2021). *Historical Country GHG emissions - CAIT*. Obtenido de <http://cait.wri.org/historical/Country%20GHG%20Emissions>



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