ADAPTATION FUND

CONCEPT NOTE PROPOSAL FOR SINGLE COUNTRY

PART I: PROJECT/PROGRAMME INFORMATION

Title of Project/Programme: Enhancing climate resilience and protecting agricultural productivity in critical climate-vulnerable areas of Bolivia through the recovery of water recharge.

Country: Bolivia

Thematic Focal Area: Agriculture and water management

Type of Implementing Entity: Multilateral Implementing Entity

Implementing Entity: International Fund for Agricultural Development (IFAD)

Executing Entities: Ministry of Rural Development and Lands

Amount of Financing Requested: 10,000,000 (in U.S Dollars Equivalent)

Project Formulation Grant Request (available to NIEs only): Yes ☐☐ No ☐ ☒

Amount of Requested financing for PFG: (in U.S Dollars Equivalent)

Letter of Endorsement (LOE) signed: Yes ☒ ☐ No ☐ ☐

NOTE: LOEs should be signed by the Designated Authority (DA). The signatory DA must be on file with the Adaptation Fund. To find the DA currently on file check this page: https://www.adaptation-fund.org/apply-funding/designated-authorities

Stage of Submission:

X☐ This concept has been submitted before

☐ This is the first submission ever of the concept proposal

In case of a resubmission, please indicate the last submission date: 22 December 2023

Please note that concept note documents should not exceed 50 pages, including annexes.

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Abbreviations and Acronyms

AF- Adaptation Fund
APR - Annual Project Report

CCKP- Climate Change Knowledge Platform
CMIPs- Climate Model Intercomparison Project (por sus siglas en inglés)
ESA - Environmental and Social Assessment
ESCMP - Environmental, Social and Climate Management Plan
ESP - Environment and Social Principles
ESP - Environment and Social Policy
GCRI- Global Climate Risk Index 2021
ENSO El Niño Southern Oscillation
FAO - Food and Agriculture Organisation of the United Nations
FPIC- Free Prior and Informed Consent
GCF - Green Climate Fund
GDP - Gross Domestic Product
GEF - Global Environment Facility
GHG - Greenhouse Gas Emission
GIZ- Gesellschaft für Internationale Zusammenarbeit
IE- Independent Evaluation
INE- Instituto Nacional de Estadísticas
GRM - Grievance and Redress Mechanism
IFAD - International Fund for Agricultural Development
IPCC - Intergovernmental Panel on Climate Change
LMMC- Like Minded Megadiverse Countries
IWRM- Integrated Water Resources Management
IRM- Integrated Watershed Management
M&E - Monitoring & Evaluation
MDR&L- Ministry of Rural Development and Lands – MDRyT (Spanish)
MDP- Ministry of Development Planning
MTR - Mid-Term Review
MTS- Movement toward Socialism
NBS - Nature-based solutions
NDA - National Designated Authority
NDC - Nationally Determined Contribution
NIE- National Implementing Entity
PDES – National Development Plan
PMU- Project Management Unit
PPR - Project Performance Report
RCP- Representative Concentration Pathways
SAMS- South American Monsoon System
SDG - Sustainable Development Goal
SECAP - Social Environmental and Climate Assessment Procedures
SPEI - Standardized Precipitation Evapotranspiration Index
SSP- Shared Socioeconomic Pathways
TNC - Third National Communication
UN - United Nations
UNDP - United Nations Development Programme
UNFCCC - United Nations Framework Convention on Climate Change
WB - World Bank
UPA – Production farmers units

Project/Programme Background and Context:

The Global Climate Risk Index 2021 (GCRI) identifies Bolivia as the top-ranking nation in Latin America and the tenth most vulnerable country worldwide due to its exposure to natural disasters and delicate ecosystems. The country faces challenges exacerbated by heightened instances of droughts and irregular rainfall, particularly impacting agricultural regions like Valles, Altiplano, and Chiquitanía. Despite initiatives such as the "Nuestro Pozo" program, aimed at constructing wells to adapt to diminishing surface water availability during droughts, Bolivia still grapples with escalating unmet demands, aquifer depletion, and contamination concerns. Insufficient monitoring exacerbates the situation, highlighting the critical need for investment and innovations to enhance preparedness.

To address these challenges, the Ministry of Rural Development and Lands (MDRyT) proposes a comprehensive project focusing on climate change adaptation. This project aims to improve infiltration zones for vulnerable aquifers, implement water harvesting, and enhance irrigation systems. Additionally, it seeks to establish a network of piezometers and climate stations, conduct studies on aquifer dynamics, and map recharge zones to address the scarcity of groundwater data. Through community collaboration and climate-responsive technologies, the project aims to confront immediate drought challenges and foster resilient groundwater management. Its overarching goal is to assist vulnerable communities severely affected by climate change-induced drought in adopting climate-resilient measures and benefiting from enhanced water recharge.

A. Geography

1. Bolivia, situated in central-western South America, shares borders with Argentina, Brazil, Chile, Paraguay, and Peru. Covering an area of 1,098,581 square kilometers, Bolivia is divided into five macro-regions: the highlands, the Chaco, the tropical plains, the valleys, and the Amazon region, as outlined by the Ministry of Rural Development and Lands (MDR&T). Its climate is influenced by tropical and humid air currents from the Equatorial Amazonian Current and cold air masses from the Southern Current, resulting in a diverse climate. Bolivia is among the 15 most megadiverse countries globally, with over 80% of the planet's ecosystems represented within its borders. It boasts 14 Ecological Zones, 36 eco-regions, and 205 ecosystems, with 48% of its surface covered by forests, including 22 natural parks like the renowned Madidi Park, famous for its exceptional global biodiversity. Bolivia's diverse geography encompasses fragile mountain ecosystems in the Andes and expanding arid areas, making it highly vulnerable to the adverse impacts of climate change. These regions are particularly susceptible to phenomena such as droughts, landslides, and glacial melting, which pose significant challenges to the country's environmental sustainability and socio-economic stability.

B. Governance and administration

2. Bolivia, with its administrative divisions consisting of 9 departments, 112 provinces, 327 municipalities, and 1,384 cantons, has a complex political history marked by frequent military coups and periods of dictatorship following its declaration of independence from Spain in 1825. However, the country transitioned to democratic civilian rule in 1982, reaffirmed by the new constitution of 2009, which defines Bolivia as a representative, participatory, and communitarian democracy. President Luis Alberto Arce Catacora assumed office in November 2020, representing the Movement toward Socialism (MTS) party, which maintained a legislative majority following elections in the same year.

3. In the realm of agricultural development, the Ministry of Rural Development and Lands (MRD&L) plays a pivotal role in formulating and implementing policies that foster sustainable growth in rural

sectors, including agriculture, forestry, and indigenous communities. Prioritizing principles such as transparency, inclusivity, and food sovereignty, the ministry aims to promote comprehensive rural agricultural development, equitable land access, employment creation, and cultural identity preservation. Notably, the creation of the National Program for Drilling Groundwater Wells, known as "Nuestro Pozo," under Supreme Decree No. 2852, underscores Bolivia's commitment to ensuring water availability for food security, particularly in regions with limited or insufficient water access. The "Unidad Pozos" entity oversees the execution of this project, reflecting Bolivia's strategic efforts to address critical water resource challenges while promoting sustainable development initiatives across the nation. Additionally, the Ministry of Planning for Development (MPD) plays a crucial role in implementing the Integrated Planning System, facilitating long-term, medium-term, and short-term planning at both sectoral and territorial levels throughout Bolivia.

C. Economy

4. In 2022, Bolivia's economy demonstrated resilience, with a GDP growth rate of 3.1%, indicating stabilization following fluctuations in the preceding years (6.1% in 2021 and -8.7% in 2020), reaching a total value of USD $43.07 billion. Despite being classified as a lower-income country, Bolivia experienced positive economic momentum driven by higher non-natural gas commodity export prices, notably zinc and soybean, and sustained public spending. Moreover, annual inflation remained low at 1.7% in 2022, attributed to a fixed exchange rate, subsidized fuel prices, and price controls. The consistent economic expansion has contributed to a reduction in poverty from 5.3% in 2011 to 2% in 2021, although challenges persist in fully recovering domestic labor demand, characterized by a significant share of low-quality self-employment. The agricultural sector, contributing 12.9% to the GDP, faces challenges due to the country's challenging climatic conditions, rugged topography, and soil limitations, with approximately 45% of the national territory affected by degradation processes.

5. Despite Bolivia's economic progress, challenges at the micro level, such as the prevalence of low-quality jobs and low productivity in the informal job market, impede efforts to address economic vulnerability and persistent inequalities. Although significant investments have been made in the past decade, there is a pressing need for more targeted development in both physical and human capital to create opportunities and promote agricultural productivity and resilience. Additionally, Bolivia remains highly exposed to various natural disasters, including floods, landslides, droughts, and forest fires, which pose severe consequences for communities, infrastructure, agriculture, and the overall economy. Addressing these challenges requires comprehensive strategies that integrate sustainable practices, enhance resilience, and foster inclusive growth to ensure Bolivia's long-term economic sustainability and development.

D. Population

6. In 2021, Bolivia's population reached approximately 12 million, with a growth rate of 1.2%, marking a significant increase from 8.2 million in 2001 to over 11 million in 2015. Despite this growth, rural population growth experienced a decline from 0.008% in 2021 to -0.019% in 2022, with around 70% of the population now residing in urban centers, including cities and peri-urban areas, which are witnessing rapid expansion. Bolivia boasts a diverse population comprising more than three dozen native groups, with Quechuas and Aymaras being the largest, followed by Chiquitano and Guarani communities. However, Bolivia maintains the lowest population density in Latin America and the Caribbean, with only 10 inhabitants per square kilometer, presenting challenges in service provision, state presence, and territorial planning across its municipalities.

7. As Bolivia's population ages, women increasingly outnumber men, particularly in urban settings, while smaller towns exhibit a lower proportion of women across all age brackets. Climate change exacerbates existing vulnerabilities, with droughts in highlands and valleys reducing productivity

and increasing production costs, prompting migration and imposing additional burdens on women, who often face limited access to resources, education, and healthcare. Women, especially within indigenous and marginalized communities, play pivotal roles in addressing climate-related challenges, as a significant portion of Bolivia's population relies on agriculture and natural resources for their livelihoods, making them particularly susceptible to food insecurity and economic instability caused by changes in climate patterns and extreme weather events.

E. Biodiversity and forestry

8. Deforestation and biodiversity trends are also altering the weather and water recharge dynamics, making them less resilient to climate variability. Although the country has invaluable biodiversity[1] it is increasingly endangered by deforestation and habitat loss. The deforestation trends are extremely concerning: between 1985 and 2018, Bolivia lost 3,670 million hectares of forest. These trends have been on the rise, reaching a peak in forest cover loss of 852,000 hectares in 2019.

F. Water resources

9. Bolivia confronts significant water challenges despite its relative abundance of water resources[2]. The country's per capita water availability is high, yet uneven distribution, compounded by climate change impacts like irregular precipitation patterns and pollution, threatens its water security. Deforestation, habitat loss, and glacier retreat in the Andean region exacerbate these pressures, while limited access to clean water and energy compounds the issue, particularly affecting rural populations. The effective recharge of aquifers poses a critical challenge, especially amid recurring drought events, aggravated by reduced precipitation and rising temperatures. Climate change-induced glacier decline further strains groundwater aquifer replenishment, highlighting the need for improved infrastructure and understanding of underground water cycles to address these issues comprehensively. Moreover, limited access to clean water and energy is a significant issue in Bolivia, with over 40% of the rural population lacking piped water distribution systems and a 67.5% coverage of clean water[3]

10. In response, Bolivia is committed to developing a holistic water management strategy encompassing watersheds, sub-watersheds, and micro-watersheds to ensure efficient, equitable, and inclusive water resource utilization while prioritizing population well-being and environmental protection. Efforts outlined in its Nationally Determined Contributions (NDCs)[4] aim to bolster water supply system resilience, expand safe access to drinking water and sanitation services, and safeguard and restore water sources. Bolivia's dedication to sustainable water resource management aligns with its commitments to biodiversity conservation and climate change adaptation, yet further support is required to enhance understanding and management of underground water resources, especially in the context of climate change's impacts.

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[1] CBD. (2020). Bolivia (Plurinational State of) – Main Details, Biodiversity Facts. Convention of Biological Diversity Recuperado de https://www.cbd.int/countries/profile/?country=-bo#:~:text=Bolivia%20is%20among%20the%2015,plants%20and%20their%20wild%20relatives.

[2] Bolivia has a wealth of water resources, including a wide variety of rivers, lakes, and basins, ranging from the tropical plains in the north and east to the high-mountain lakes in the Andean highlands, such as the iconic Lake Titicaca.

[3] Ministerio de Salud, 2020. https://www.paho.org/es/noticias/15-10-2020-bolivia-promovera-participacion-ciudadana-como-clavepara-ampliar-derechoal#:~:text=Seg%C3%BAn%20datos%20proporcionados%20por%20el,s%C3%B3lo%20el%2044%2C3%25 .

[4] Contribución Nacionalmente Determinada del Estado Plurinacional de Bolivia 2021-2030 : https://unfccc.int/sites/default/files/NDC/2022-06/CND%20Bolivia%202021-2030.pdf

G. Agriculture and food security

11. Between 2005 and 2012, Bolivia's agricultural sector constituted 34.6 percent of the nation's employment, with over 90 percent of agricultural workers located in rural areas. Approximately 35 percent of Bolivia's land is agricultural, with 72 percent of its agricultural value concentrated in urban centers such as Santa Cruz, Cochabamba, and La Paz Departments. The 2013 Agricultural Census identifies 871,921 Agricultural Production Units (APUs), predominantly campesino family farming, utilizing only 40 percent of cultivated land compared to agroindustry's 60 percent. Despite variations in farm sizes, the majority range between 1 and 5 hectares[5], with rain-fed agriculture predominant but with 32.9 percent of farms employing various irrigation methods, concentrated in valleys and the Altiplano regions. Agriculture remains pivotal to Bolivia's economy, supporting a significant portion of the population, yet confronts challenges including water scarcity, extreme weather events, and the vulnerability of smallholder farmers to climate-related risks such as irregular rainfall, floods, and prolonged droughts, which undermine food production and threaten livelihoods.

12. At the national level, more than 2.4 million people across 116 municipalities in Bolivia are grappling with food insecurity, with 11% experiencing extreme food insecurity and 13% highly food insecure. In the 2023 Global Hunger Index (GHI), Bolivia ranks 71st among 125 countries[6], indicating significant challenges in ensuring food security for its population. Malnutrition remains a pressing public health concern, with high rates of diabetes, anaemia among women, childhood obesity, and stunting, despite improvements in exclusive breastfeeding rates. Rapid urbanization, coupled with food insecurity and climate-related risks, threatens the living conditions of many Bolivians, particularly vulnerable farmers. Climate change exacerbates challenges through rising temperatures, rainfall variability, and poor soil management, heightening the urgency to support traditional agricultural practices and enhance infrastructure for water treatment and reuse to sustain small-scale food producers and farmers.

F. Climate Change

13. The Global Climate Risk Index 2021 (GCRI) ranks Bolivia as the tenth most vulnerable country in the world, and the first in Latin America, considering the impacts of extreme weather events and related socio-economic data. Its vulnerability is exacerbated by its exposure to natural disasters. The country hosts a substantial part of its population in fragile mountain ecosystems and expanding arid areas. According to the ND-GAIN, Bolivia finds itself in the upper-left quadrant of the ND-GAIN Matrix, marked by a high vulnerability score and a low readiness score. This positioning underscores a significant need for investment and innovations to enhance readiness, coupled with a pressing urgency for action. Bolivia is ranked as the 79th most vulnerable country and the 161st most ready country out of 185 countries assessed. Notably, the sub-indicator for "Agricultural capacity" vulnerability is alarmingly high, scoring 0.974 out of 1, indicating an exceptionally high vulnerability to climate change in this domain. Additionally, Bolivia's "Water" vulnerability indicator is positioned at 138th out of 170 globally classified countries, signifying one of the most vulnerable nations worldwide in terms of water vulnerability to climate change.

Current climate

14. Due to its proximity to the equator, Bolivia does not experience clearly defined seasons throughout the year. Instead, the average temperature of any part of the country depends largely on its altitude and, to a lesser extent, its latitudinal position. The Bolivian climate is primarily

[5] https://webapps.ifad.org/members/eb/131R/docs/EB-2020-131-R-R-15.pdf?attach=1

[6]

influenced by three key factors: the South American monsoon, topography, and the presence of the Amazon rainforest.

15. The South American monsoon, known as the South American Monsoon System (SAMS), plays a central role in transporting moisture from the Atlantic Ocean through the Amazon region and, consequently, in the distribution of precipitation in Bolivia. This climatic system establishes two clearly differentiated seasons: a wet season during the summer and a dry season in the winter.

16. In terms of altitudes, approximately 60% of Bolivia's territory is located in regions with elevations below 500 meters above sea level, such as the Gran Chaco and tropical plains, where average annual temperatures range between 22°C and 25°C. About 24% of the country is situated at elevations ranging from 500 to 3,500 meters above sea level, in areas like the valleys and the Amazon region, where the average temperature is around 18°C. Finally, the remaining 16% of the territory is at elevations higher than 3,500 meters above sea level, mainly in the Altiplano, where temperatures vary widely between -6°C and 16°C. The majority of precipitation in Bolivia is concentrated during the wet season, which spans from December to March, representing between 60% and 78% of the annual precipitation. In contrast, during the dry season, which extends from 0% to 15% of the annual precipitation, a significantly lower amount of rainfall is recorded. Precipitation varies widely across the country, ranging from over 6,000 mm annually in areas near the first Andean ridge (e.g., the Chapare region) to as little as 100 mm southwest of the Salar de Uyuni. Along the way, there are regions with precipitation ranging between 300 and 500 mm annually on the peaks of the Western Cordillera, 500 to 1,000 mm on the Altiplano plateau, and 600 to 2,000 mm in the plains near the Andes. These differences in precipitation amounts reflect the characteristic climatic variability of Bolivia.

The Niño and the Niña

17. The El Niño and La Niña phenomenon is part of what is known as the El Niño Southern Oscillation (ENSO). These events have a significant impact on the climatic behavior in various regions of Bolivia. In general terms, La Niña tends to cause drier and cooler than usual conditions, while El Niño is associated with increased temperatures, resulting in warmer and rainier weather. The El Niño phenomenon alters the pattern of winds coming from the Amazon, causing rainfall in the regions of Yungas and Chapare. These warm, moist winds accumulate on the coasts of Peru, generating precipitation in the Andean mountains, leading to strong storms and rainfall. As these warm winds cross the mountains to reach the Altiplano and Bolivian valleys, they disrupt the normal flow of moist air coming from Brazil towards the west, resulting in intense rains and floods in the eastern areas and droughts in the Altiplano. In contrast, La Niña is a complex phenomenon with variable episodes, but it is generally associated with intense rains in the Altiplano, which can lead to floods caused by river overflow and rising water levels.

Historical Climate Trends

18. In Bolivia, a significant trend toward an increase in annual average temperatures has been observed, indicating a warming process in the country. This phenomenon is accompanied by a notable rise in the number of days with heat indices exceeding 35°C.

19. The trend of increasing temperatures, both minimum and maximum, is not uniformly manifested throughout the Bolivian territory, as illustrated in Figures 1. Significant upward trends are observed, particularly in specific regions of the country. These trends become more notable in the central-western part of Bolivia, which includes the Andean mountain range and a portion of the Chaco. A trend towards a decrease in annual precipitation has been observed overall, as seen in Figures 4, decade-wise annual precipitation trends. However, in recent decades, there

has been an increase in accumulated precipitation during 5-day periods. This suggests a pattern of more concentrated rainfall over shorter periods and less precipitation spread throughout the year. The distribution of precipitation trends across Bolivia is not uniform, as depicted in Figures 5. Notably, there is a substantial decline in annual precipitation observed in the central, eastern, and south-western regions of the country over the years, starting from 1981.

20. The drought index (SPEI, 4 months) since 1981 indicates that droughts are occurring more frequently nationwide in Bolivia. However, these trends are not reflected in the long-term drought index (SPEI 18 months) at the national level, suggesting variations in drought patterns at different time scales. The SPEI is categorized from extremely [wet, dry] (2, -2) to moderately [wet, dry] (1, -1) and near normal [wet, dry] (0.5, -0.5). A portion of the country is affected by long-term drought, with significant impacts on groundwater reserves. Provinces most vulnerable to recurring long-term droughts (SPEI 18 months) include Chuquisaca, Potosi, Cochabamba, Santa Cruz, and Tarija, emphasizing the importance of addressing water resource management in these particularly affected areas.

Figure 1: Trend of minimum temperatures (left) and maximum temperatures (right) in Bolivia (1958-2018). Sources: TerraClimate.

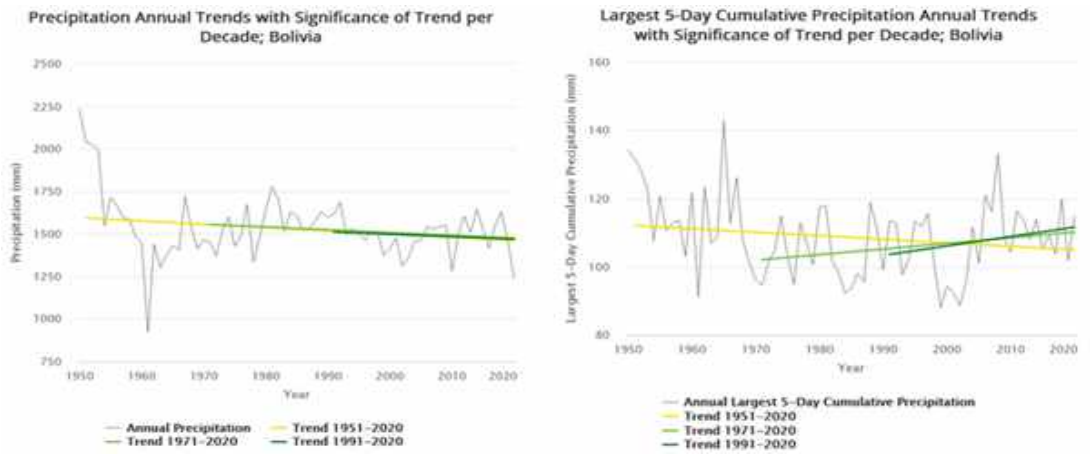


Figure 2: Trends in annual precipitation and accumulated precipitation over 5 days in Bolivia. Sources: World Bank CCKP.

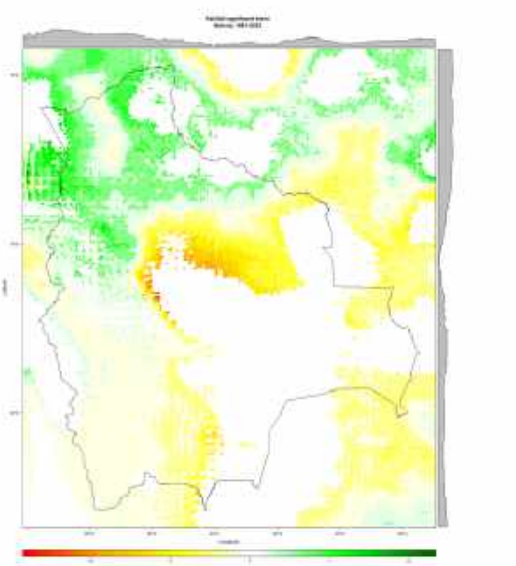


Figure 3: Trend of annual precipitation in Bolivia (1981-2022). Sources: CHIRPS.

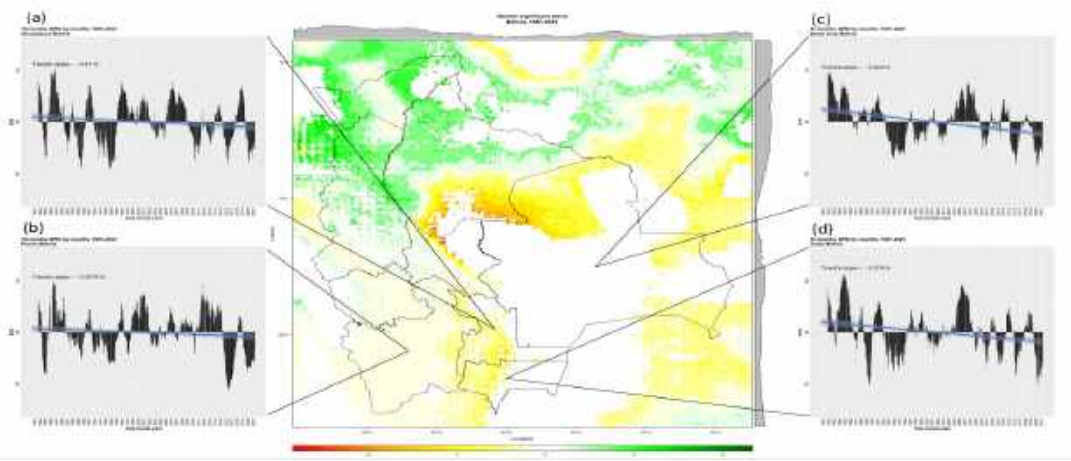


Figure 3: Drought index (SPEI, 18 months, 1981-2022) in Chuquisaca (a), Potosi (b), Santa Cruz (c), and Tarija (d). Sources: CHIRPS & TerraClimate.

21. In recent years, significant droughts have been experienced, reflected in a drought index lower than 2 (classified as extremely dry) over a short-term period (4 months). These events affected the soil surface, being notably observed in 2016 in Oruro and Potosí, in 2017 in Chuquisaca, and in 2020 in Cochabamba, Santa Cruz, and Pando. Additionally, episodes of long-term drought (18 months) were recorded, impacting groundwater depth. These events were evident in 2016 in Oruro, in 2017 in Chuquisaca and Potosí, in 2020 in Santa Cruz, and in 2021 in Cochabamba and Tarija.

Future Climate Scenarios

22. The data for climate projection comes from global climate models compiled within the framework of the Coupled Model Intercomparison Projects (CMIP), overseen by the World Climate Research Programme. The data presented here is based on CMIP6, corresponding to the Sixth phase of the CMIPs. The CMIPs form the database used in the Intergovernmental Panel on Climate Change (IPCC) Assessment Reports. CMIP6 supports the IPCC's Sixth Assessment Report. The data is presented at a resolution of 0.25º x 0.25º (25 km x 25 km).The Shared Socioeconomic Pathways (SSP) are representations of potential global socioeconomic changes projected up to the year 2100. The SSPs are closely linked to Representative Concentration Pathways (RCP), the scenarios used in CMIP5, which are solely based on concentrations of greenhouse gases in the atmosphere. These representations are employed to generate greenhouse gas emission scenarios, considering various climate policies. The five scenarios are as follows:

- SSP1[7]-1.9 or 2.6 (Sustainability - Opting for an Environmental Focus): This scenario emphasizes sustainability, with a strong commitment to environmental conservation. It represents a future where efforts are made to limit global warming to 1.9 or 2.6 degrees Celsius above pre-industrial levels.
- SSP2-4.5 (Middle-of-the-Road): This scenario represents a middle-of-the-road path, balancing socioeconomic development and environmental considerations. It envisions moderate efforts to mitigate climate change, resulting in a radiative forcing level of 4.5 W/m².

[7] The Shared Socioeconomic Pathways (SSP) scenarios outline different possible global futures based on varying levels of socioeconomic and environmental considerations. Each SSP is associated with a specific radiative forcing pathway, represented by a range of possible future levels of greenhouse gas concentrations.

- SSP3-7.0 (Regional Rivalry - A More Challenging Path): This scenario portrays a future marked by regional rivalries and challenges. It assumes a world where efforts to address climate change are limited, resulting in a radiative forcing level of 7.0 W/m².
- SSP4-3.4 (Inequality - A Path Marked by Divisions): This scenario highlights a future characterized by significant socioeconomic inequalities. It represents a world where mitigation efforts are limited, leading to a radiative forcing level of 3.4 W/m².
- SSP5-8.5 (Fossil-Fuel-Driven Development - Following the Path of Intensive Industrialization): This scenario envisions a future where development is driven by the intensive use of fossil fuels. It represents a pathway with high greenhouse gas emissions, resulting in a radiative forcing level of 8.5 W/m².
- These SSPs provide a framework for exploring how different societal choices and policy decisions may influence future climate conditions.

23. According to these models, it is anticipated that Bolivia will experience a continuation of the climate trends observed over the past decades. In the future scenario, the trend of increasing national average temperatures is expected to persist, with a particular emphasis on increases during winter and early spring. Additionally, a decrease in the number of frost days is anticipated during the fall and winter compared to the reference period of 1995-2014. By the year 2050, it is projected that the average number of frost days will decrease to 65 days in Oruro (according to the SSP5-8.5 scenario), whereas there were 127 frost days in the period from 1995 to 2014 (see Figure 7).

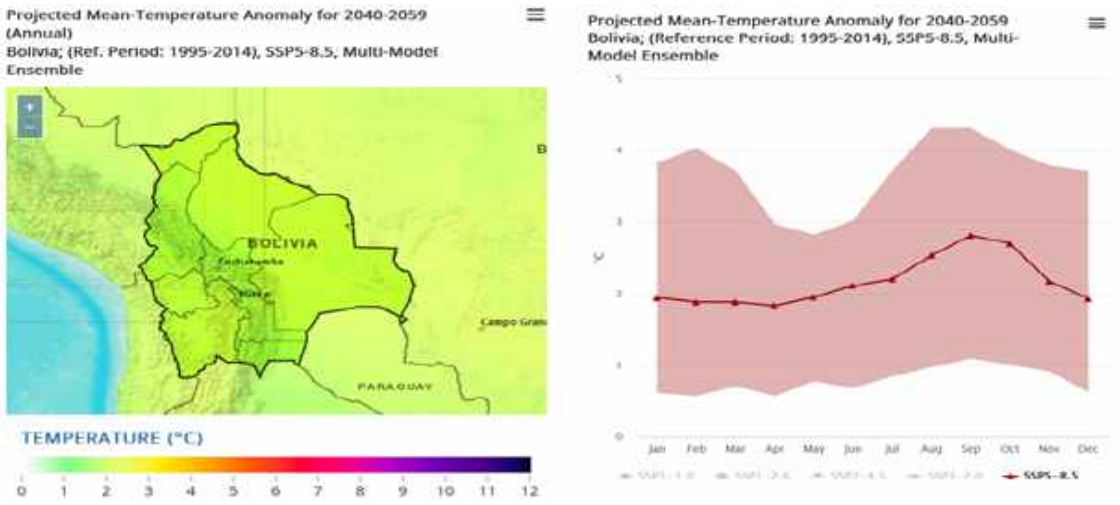


Figure 4: Trend of future average temperatures (2050) with the SSP5-8.5 scenario in Bolivia. Sources: World Bank CCKP.

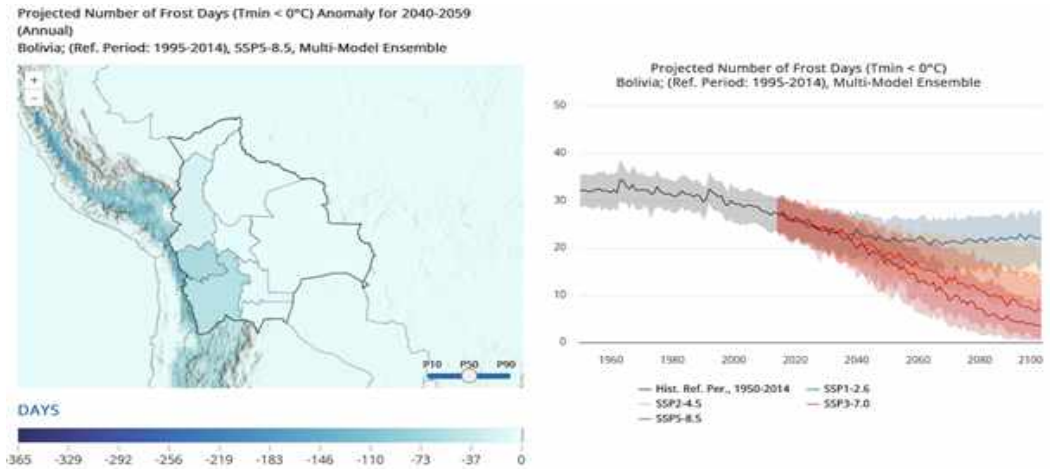


Figure 5: Trend in the annual number of frost days (<0°C, 2050) with the SSP5-8.5 scenario (left) and projections with all scenarios (right) in Bolivia. Sources: World Bank CCKP.

24. In the future scenario, a decrease in precipitation is projected throughout Bolivia, with the exception of southern Santa Cruz, during the late winter and spring. Furthermore, by the year 2050, it is anticipated that the Drought Index (SPEI) will decrease nationwide, indicating a higher likelihood of droughts during that period.

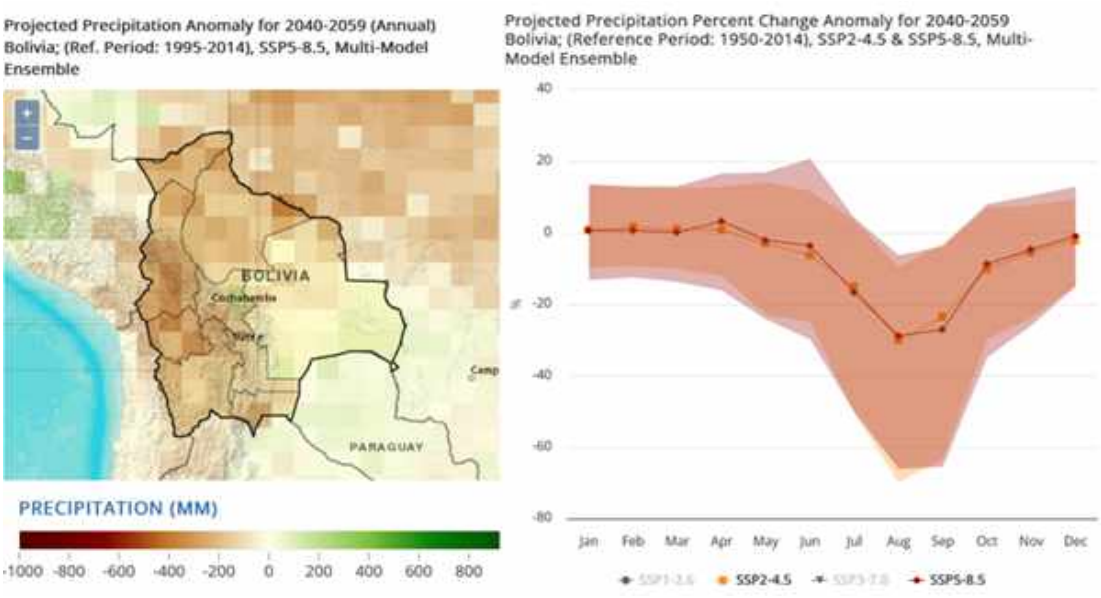


Figure 6: Trend in precipitation (2050) with the SSP5-8.5 scenario (left) and projections with SSP2-4.5 and SSP5-8.5 scenarios (right) in Bolivia. Sources: World Bank CCKP.

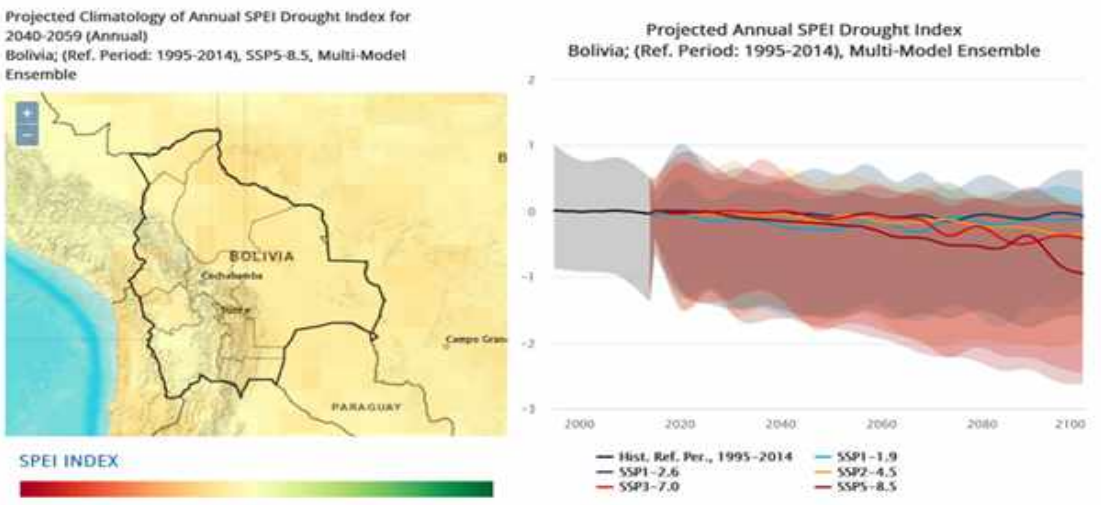


Figure 7: Trend of the Standardized Precipitation Evapotranspiration Index (SPEI, 2050) with the SSP5-8.5 scenario (left) and projections with all scenarios (right) in Bolivia. Sources: World Bank CCKP.

25. In future projections, it is anticipated that the number of storms with daily precipitation exceeding 50 mm will increase annually, especially in mountainous areas, where there is a higher risk of landslides.

Figure 8: Trend in the annual number of days with precipitation >50mm (2050) with the SSP5-8.5 scenario in Bolivia. Sources: World Bank CCKP.

26. In summary, the analysis of historical climate change in Bolivia reveals concerning trends, with a clear increase in annual average temperatures, particularly evident in specific regions such as the central-western part of the country. This warming is not uniform and is more pronounced in the Andean mountain range and the Chaco region. Furthermore, annual precipitation is experiencing a general decrease, with a pattern of more concentrated rainfall in shorter periods, particularly affecting the central, eastern, and south-western parts of the country. The frequency of droughts, measured by the Standardized Precipitation Evapotranspiration Index (SPEI), is increasing, with significant impacts on groundwater reserves, especially in provinces like Chuquisaca, Potosí, Cochabamba, Santa Cruz, and Tarija. Looking to the future, projections indicate a continuation of these climate trends, with an emphasis on increasing temperatures, a decrease in frost days, and a reduction in precipitation, leading to an increased risk of droughts. These future climate changes are also projected to bring about an increase in the frequency of storms with intense precipitation, especially in mountainous areas, implying a higher risk of landslides. In this context, sustainable water resource management and the implementation of adaptation strategies become crucial, especially in areas identified as most vulnerable to the impacts of climate change in the analysis.

H. Climate Change Impacts on Agriculture and Hydrological Resources

27. Between 2009 and 2015, Bolivia experienced a series of extreme climatic events. During this period, droughts were recorded in approximately 67% of the country's municipalities, with a significant impact in Santa Cruz, Tarija, and Cochabamba. Additionally, there were episodes of frosts and snowfalls associated with the El Niño and La Niña phenomena, which particularly affected Tarija. Floods also became a recurrent hydro meteorological event, causing significant damage to crops and livestock in regions such as La Paz and Santa Cruz. Recently, flooding has impacted the municipalities of Guanay, Mapiri, and Tipuani in the Larecaja Province of the La Paz Department. This occurred in early February 2023 due to heavy rainfall and the overflow of the Tipuani and Mapiri rivers. The government has reported that more than 1,375 families were affected across the La Paz Department. Furthermore, floods have also affected various municipalities in the Santa Cruz Department. According to local media reports, over 30,000

hectares of crops, including soybeans, rice, and sugarcane, have been destroyed.[8] In the years 2013 and 2014, the Chaco experienced the most severe droughts in the last five decades, accompanied by serious floods in the northern part of the country. In 2023, Bolivia is facing a severe drought amid the hottest winter in its history, with temperatures rising up to 40 °C, leaving the population on the brink of acute chronic malnutrition and dehydration. The regions of Potosí and Oruro have been the most affected in 2023, while other departments, such as Chuquisaca and Cochabamba, have declared a state of emergency due to the effects of the drought. More than 71 municipalities—20 percent of the country—have been officially declared in a disaster situation.[9]

Reduction in Water Availability

28. One of the most important challenges facing Bolivia is the recharge of aquifers, particularly as an alternative water source during repeated drought events. The lack of infrastructure and knowledge about water cycles hinders the country's ability to effectively store and manage water resources. This situation is exacerbated by decreased precipitation and rising temperatures, which impact the recharge of underground aquifers. Inadequate aquifer recharge can also lead to overexploitation of water resources, posing an additional risk to the country's water security. (TNC 3) In Bolivia, one of the most notable impacts of climate change is the reduction of glaciers. There has been a significant retreat of tropical glaciers, with substantial losses observed between 1980 and 2010. Among the most prominent cases are the Apolobamba (with a 40% loss of its surface), Tres Cruces (27%), and Real (37%) mountain ranges. Similar rates of decrease have been recorded in other mountains in the same region. On average, the area lost between 1980 and 2009 amounts to 37.4%, equivalent to 119 square kilometers (TNC 3). The dramatic reduction of glaciers in the region can be attributed to the combination of two main factors: the spatial and temporal frequency of the 'El Niño' phenomenon since the mid-1970s and global warming. This phenomenon can also impact aquifer recharge.

Table 1: Climate Effects and Possible Observed Impacts on the Water Cycle and Agriculture

Observed effects	Possible impacts observed
Increase in atmospheric temperature	• Reduction in water availability in watersheds fed by disappearing glaciers, as observed in cities along the Andes. • Changes in the distribution and abundance of flora across ecological zones (monitored by the Gloria Project UMSA-IE).
Increase in water temperature	• Reduction in dissolved oxygen and self-purification capacity. • Increased presence of algae and the potential for an increase in eutrophication processes.
Changes in precipitation patterns	• Changes in water availability due to alterations in precipitation and other phenomena. • Alteration and/or impact on the agricultural calendar.
Increase in interannual precipitation variability	• Increased difficulty in flood control and reservoir usage during the flood season. • Reduction in groundwater replenishment.
Increase in Evapotranspiration	• Reduction in water availability. • Salinization of water resources. • Low groundwater levels.

[8] https://floodlist.com/america/bolivia-floods-la-paz-santa-cruz-february-2023

[9]

Higher frequency and intensity of extreme events	• Floods impact water quality, infrastructure integrity, and increase river erosion, introducing various contaminants to water resources. • Droughts affect water availability and quality. • Impact on the distribution and abundance of hydrobiological resources.

29. This phenomenon, combined with the ongoing rise in temperatures and the erratic rainfall patterns in the region, is exerting additional pressures on traditional agricultural systems. Urgent measures are needed to expand irrigation systems and develop water treatment and reuse infrastructure within the framework of integrated water resource management systems.

Reduction in crop and livestock productivity

30. Bolivia faces increasing economic and social vulnerability due to its limited capacity in productive and social structures, and its strong dependence on sectors particularly sensitive to climate, such as agriculture. The agricultural sector, a pillar of the Bolivian economy, contributes significantly to the Gross Domestic Product (GDP), representing between 11 and 15% of it. Family farming plays a fundamental role in food production in the country. Extreme weather events, such as droughts in highland regions and floods in low-lying areas, have become more frequent and have serious consequences. These phenomena reduce agricultural and livestock productivity, affecting the food industry and exports, while also jeopardizing the lives and livelihoods of indigenous and peasant populations. The rise in temperatures and climate variability have led to health issues, including the spread of diseases such as malaria and dengue. The increase in pests could be a consequence of the decrease in frost days in higher-altitude production areas. Rising temperatures lead to increased evapotranspiration and irrigation demand, while reducing water availability. Additionally, it accelerates the decomposition of soil organic matter and affects fertility.

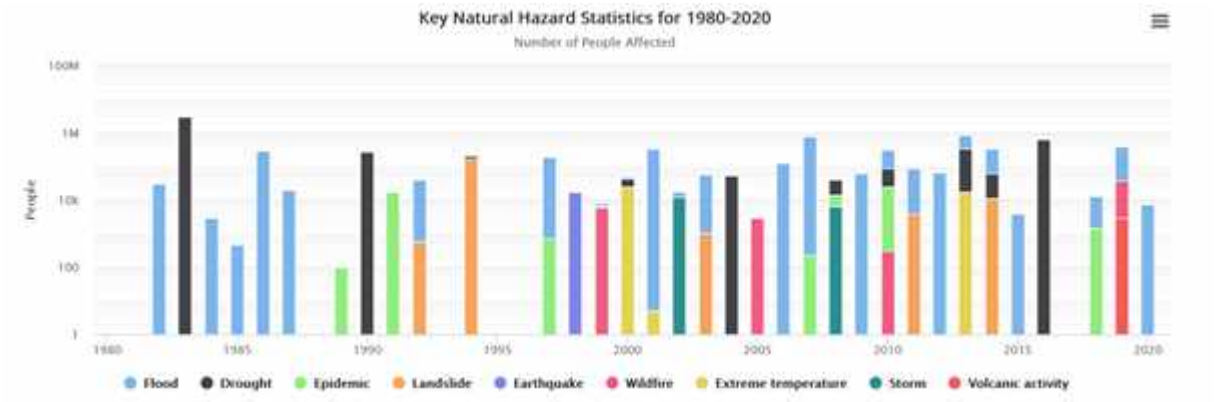


Figure 9: Key statistics of natural hazards 1980-2020 in Bolivia. Sources: World Bank CCKP

31. Intense rainfall has led to significant soil erosion on mountain slopes, which is particularly problematic in areas with shallow soils due to historical erosion processes. Floods, droughts, and landslides have resulted in losses of productive land, crops, and their value. The risk of climate change in Bolivia is particularly high for vulnerable groups, such as indigenous peoples, people living in extreme poverty, women, children, persons with disabilities, residents of rural areas, and those with limited access to decision-making and resources (CND, 2022). More than 2.7 million children and adolescents, equivalent to 24% of the population, reside in areas at high risk of floods and droughts. Rural poverty affects 54% of the population, of which 98% are indigenous. Given their strong connection to natural resources and agricultural production, these groups are especially vulnerable to climate variations. The decline of subsistence systems and reduced resilience, along with diminished food production due to climate change, place this vulnerable population at a heavier burden of food insecurity and malnutrition, water and energy insecurity,

as well as higher mortality rates. Climate change also threatens the country's biodiversity. According to the 6th IPCC Report, 85% of Bolivia's natural systems will be negatively affected by climate change. In this context, Bolivia faces the pressing need to develop climate change adaptation strategies to protect its productive systems, the health of its population and the region's unique biodiversity.

I. Strategy for adaptation to climate change in Bolivia

32. The Bolivian government holds that the planet is an entity with inherent rights that must be protected by states. In tune with this ideology, the legislature adopted the Law of the Rights of Mother Earth in 2010 and the Law of Mother Earth and Integral Development for Living Well in 2012. Under the Mother Earth Law, a government authority, the Plurinational Mother Earth Authority, is established to oversee the implementation of climate change mitigation and adaptation principles. This authority operates within the Ministry of Environment and Water, which includes a sub-secretariat of Climate Change. Given the inseparable relationship between agricultural activities and the environment, with support in coordination with the Ministry of Planning, as well as the Plurinational Authority of Mother Earth, the MDRyT has been incorporating climate change mitigation and adaptation into its work and in particular the projects with IFAD: ProCamelidos and Frontera. These projects are an example of the MDRyT 's strategy to address climate change transversally, as well as the successful collaborative work between the MDRyT and IFAD. Bolivia is a party to the United Nations Framework Convention on Climate Change (UNFCCC), a party to the Kyoto Protocol (since 1999) as well as the Paris agreement (since 2016) and is eligible to access the Adaptation Fund. The 'Designated Authorities' of the AF are government officials who act as points of contact. On behalf of their national governments, Designated Authorities endorse: a) applications for accreditation of National or Regional Implementing Entities before they are sent to the fund secretariat for evaluation, and/or b) proposals from National, Regional or Multilateral Implementing Entities for adaptation projects and programs in the country of the Designated Authority. In Bolivia, the Ministry of Development Planning is the 'Designated Authority' to the Adaptation Fund. Bolivia ratified the Paris Agreement on October 5, 2016 and the associated Nationally Determined Contribution (NDC) in 2017, which was updated in 2022. The updated NDC includes a commitment to greater transparency in monitoring proposed adaptation, mitigation and implementation targets. Bolivia commits to submit Biennial Update Reports and National Adaptation Communications prior to the global review scheduled for 2023.

33. Bolivia's NDC focuses on strengthening efforts for better adaptation to climate management with additional mitigation benefits. It seeks an integral and holistic vision in the management of the climate crisis that includes actions in mitigation, adaptation and integral development for Living Well. The updated NDC mentions that, although the impacts of climate change are already being felt in the country, there is still uncertainty about how they will develop in the future. Robust adaptation decision-making is fundamental for social and economic development in harmony with Mother Earth, reducing water-related climate vulnerabilities and building capacity. In this sense, 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. In line with these objectives, the targets established in the NDCs focus on harnessing the productive potential of water and mitigating climate risks. Specifically, Target (22) of 12 million hectares with Integrated Watershed Management (IRM) by 2030 and Target (28) of recovering and increasing at least 725,000 additional hectares of degraded soils for food production by 2030 have been achieved. The objective is to secure water for livelihood systems and thus for human consumption and production in the upper, middle and lower watersheds.

34. The Third National Communication (NC3) of the Plurinational State of Bolivia to the United Nations Framework Convention on Climate Change (2020) defines the country's community-based adaptation strategy, based on local and ancestral knowledge and resilience to climate change. In coherence with national mandates and policies, Bolivia seeks the valorisation and recovery of ancestral knowledge as important components of climate change adaptation actions. Thus, both governmental and non-governmental institutions incorporate this element in the development of their projects.

J. Climate change adaptation approach of the project

35. As explained in previous sections, Bolivia has experienced an increase in droughts and torrential rains, which has specifically affected the agricultural sector. In other words, it is raining less but in shorter seasons, while temperatures are increasing. This is especially true in the Valles, Altiplano and Chiquitanía regions (south of the tropical plains), where surface water sources are not sufficient to meet the productive demands of crops and animal watering. Faced with this reality, the Ministry of Rural Development and Lands (MDR&T), through the "Nuestro Pozo" program, has implemented the construction of wells as a measure to adapt to the growing shortage of surface water during times of drought. Despite efforts to meet the demand for wells, there is an increase in requests that cannot be fully met, ranging from 4% to 17% satisfaction, depending on the year. This measure, which has emerged as an organic response to water scarcity, has generated concern as some aquifers are drying up or becoming contaminated.

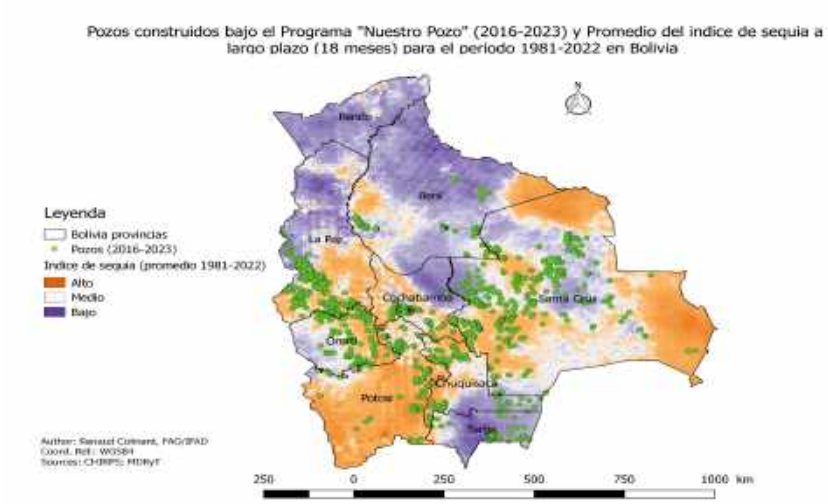


Figure 10: Wells constructed under the "Nuestro Pozo" Program (2016-2023) and Long-term average drought index (18 months) for the period 1981-2022 in Bolivia. Sources: CHIRPS&MDRyT

Table 2: Unsatisfied Demand " Nuestro Pozo" Program

Year	# of requests	Aproved	Existing	Unmet Demand
2019	1157	198	959	83%
2020	764	104	660	86%
2021	3057	127	2930	96%
2022	1600	236	1364	85%
JUNE 2023	1012	98	914	90%

36. Unfortunately, it has been observed in the requests and contacts through the Wells project that some aquifers are drying up or becoming contaminated, which is why the MDRyT requested support for this project. This need is increased by the fact that there are only a few scarce data monitoring points, and this coupled with a lack of studies on aquifers and their recharge in the country, which are necessary to address this phenomenon. The lack of monitoring in the constructed wells aggravates the situation, since there is a lack of information on the state of the aquifers and their recharge in the country. This limitation is reflected in the decrease of water and water quality in the wells, according to reports from the beneficiary communities, which is why the MDRyT requested support for this project. Given the urgency of addressing this problem, a comprehensive action is required. The proposed project focuses on climate change adaptation, addressing from: (1) water infiltration zones for aquifers at risk, with infiltration improvement technologies both at the plot level and at the small community infrastructure level, generating productive resilience benefits for agricultural communities; to (2) areas affected by droughts and decreasing groundwater supply, with implementation of infiltration improvement technologies and water harvesting, as well as efficient strategies in irrigation systems. Given the limited information available on groundwater resources in Bolivia, the project will establish a network of piezometers and climate stations in existing wells and other key locations. In addition, studies will be carried out to understand aquifer dynamics and map recharge zones. The MDR&T's "Nuestro Pozo" program will be provided with guidelines for the study and planning of well drilling, considering recharge variables and efficient water management practices to ensure their sustainability. This comprehensive approach, which includes climate change resilience technologies and direct collaboration with communities, seeks to address not only immediate drought, but also the sustainable management of groundwater resources. The active participation of communities, with a special focus on gender equity, will be essential to achieve sustainable and adaptive water management outcomes.[10]

K. Project area and target groups

70. **Project area and geographic focus.** The project will be carried out in Bolivia. At this concept stage, the project is planned to be located in specific municipalities in three main regions: Valles, Chiquitanía and Altiplano, within the department of La Paz, Oruro, Cochabamba and Potosi (see map below). During the concept mission, the decision was made to prioritize these three regions in accordance with MDRyT and MPD recommendations, as they are the macro zones most likely to be affected by drought and water scarcity. The geographic targeting will be revised during the full proposal design process, in agreement with the MDRyT, to reflect criteria of groundwater scarcity and agricultural vulnerability to climate change. The criteria for targeting municipalities within the regions in the full proposal will encompass: (i) An integrated analysis of climate vulnerability, combining significant climate risks and socio-economic indicators to establish a vulnerability index[11]; (ii) cooperative initiatives to ensure coordination, complementarity, and synergies for improved results; (iii) verifying the presence of local organization, involving organized communities and government entities, to secure the necessary governance conditions for project implementation and sustainability; (vii) exploring the potential to align adaptation

[10] An IFAD study found that with respect to mainstreaming gender and climate change adaptation in different types of projects. EA (Gender and Environment Approach) based projects consistently outperformed others, with the highest percentage of integration of climate change resilience activities, followed closely by partially EA projects, while non-EA projects lagged significantly. An impressive 96% of AE-based projects successfully incorporated climate change considerations, while non-EA projects barely reached 18%. Partially EC projects also showed remarkable progress, with 60-83% of projects integrating climate change adaptation into their activities.

[11] The project will adopt the conceptual approach of the Intergovernmental Panel on Climate Change (IPCC, 2014), which defines that the level of vulnerability of human and natural systems to climate-related impacts is a result of the level of sensitivity and adaptive capacity to cope with climate change. Both changes in the climate system and socio-economic processes are drivers of vulnerability, defined as the propensity of exposed elements to suffer adverse effects when impacted by hazard events.

actions with agrobiodiversity production; (v) prioritizing proximity and interconnectedness to optimize intervention efficiency.

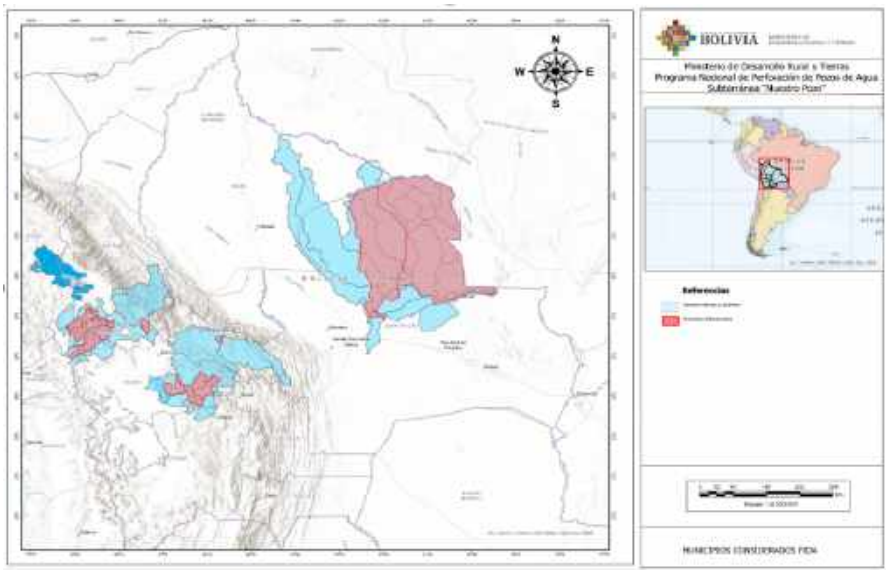


Figure 11: Pre-selected municipalities for the Adaptation Fund project "Enhancing climate resilience and protecting agricultural productivity in critical climate-vulnerable areas of Bolivia through the recovery of water recharge".

71. The government has undertaken a preliminary prioritization of municipalities within the selected regions as listed below. This set of municipalities will be reviewed and refined to meet the requirements of the fund and the criteria of the project in the proposal stage. It is estimated that the project will have around 15-20 thousand beneficiaries, in 15 to 20 communities, within 3 to 6 municipalities. These numbers were estimated using the beneficiaries database of the “Nuestro Pozo” program and Bolivia´s Census projections, but will be revised in the proposal stage.

Table 3. Municipalities prioritized by the government

No.	Department	Province	Municipality
1	Cochabamba	Arani	Arani
2	Potosí	Chayanta	Colquechaca
3	Potosí	Chayanta	Pocoata
4	Oruro	Eduardo Avaroa	Challapata
5	La Paz	Loayza	Yaco
6	La Paz	Pacajes	Corocoro
7	La Paz	Pacajes	Caquiaviri
8	La Paz	Pacajes	Santiago de Callapa
9	La Paz	Pacajes	Calacoto
10	Santa Cruz	Velasco	San Ignacio
11	Santa Cruz	Ñuflo De Chávez	Concepción

72. **Target groups and targeting strategy.** The concept note uses a combination of targeting strategies, including geographic strategies (above), self-selection, and prioritization of beneficiaries according to the various consolidating entities and programs (i.e. IFAD and "Nuestro Pozo" program) to effectively address the diverse needs of rural communities. IFAD focuses primarily on rural people and low-income smallholder farmers as its target groups. During the project design stage, it will be crucial to actively involve local communities and stakeholders, and to base the targeting strategy on project-specific studies and consultations. According to the

socio-economic assessment and the SECAP Review Note, the project should focus on the following groups:

(i) Smallholder farmers: with limited access to water, especially those near or below the poverty line, facing economic challenges in climate-affected areas.
(ii) Groups with additional vulnerabilities, such as ethnic minorities and households and individuals with disabilities, supporting equitable access to resources, skills development and employment opportunities.
(iii) Rural youth: addressing the challenges of unemployment, migration and exclusion.
(iv) Rural women and female-headed households as one of the most vulnerable groups of farmers. Targeting women farmers and unemployed/self-employed women, especially those without land and natural resource rights.

73. In addition, the communities where the project will be implemented correspond to those where the "Nuestro Pozo" program has already worked, or where applications for the program have been made and approved. In this way, it is important to mention the following criteria, which are aligned with the program criteria, as additional focus criteria for this project:

(i) Agricultural projects whose objective is oriented to water systems for irrigation or livestock consumption, whose collection will be through the drilling of water wells with a groundwater source.
(ii) Areas that frequently suffer the effects and threat of drought or communities that do not have any type of water supply system for irrigation or livestock consumption, which contribute to food security, prevailing the magnitude of drought risk
(iii) Number of beneficiaries (at least 20 families per well).
(iv) relevant information, such as: geology, hydrology, hydrogeology, topography, vegetation, climate and reports or data on the hydraulic characteristics of wells already drilled in the region or zone where the execution of the water supply system is requested, which will be complemented with specific geophysical or endoscopic studies as appropriate to verify the feasibility of drilling or implementing the well.
(v) Geographic location

74. However, these criteria may be revised under the results of aquifer studies and sustainable aquifer management guidelines to be produced by the project.

Preliminary gender assessment.

75. Women comprising 40.8%of the population, Bolivia ranks 99nd in the UNDP's Gender Inequality Index[12] Disparities persist between males and females in the Human Development Index scores. For example, while the population of males with at least some secondary education has reached 70%, for women, it remains at 60%. The adolescent birth rate is 68% per 1,000 women aged 15-19 as of 2022, maternal mortality ratio (Per 100,000 live births) is 155[13]. Moreover, women hold only 18.0% of positions in executive/ministerial roles (cabinets). Women are disproportionally outside the labour market, representing 60 per cent of the economically inactive population. Young women are employed in fragile jobs, with low wages and a greater burden of care.[14] In Bolivia's, gender inequality is evident in various ways, especially in rural areas: women face job segregation, working in low-productivity sectors with precarious conditions, leading to job insecurity and a higher involvement in informal work (67% more than men). Despite increased female labor participation, income disparities persist, with women earning lower incomes and facing fewer opportunities compared to men, particularly in lower-skilled occupation. Many women lack economic autonomy,

[12] UNDP (2022). Human Development Report 2021/2022.

[13] UNDP (2022). Human Development Report 2021/2022.

[14] https://www.undp.org/sites/g/files/zskgke326/files/2023-01/Bolivia%20CPD%202023-2027%20ENG.pdf

with a significant percentage having no income source (34% women, 6.8% men), leading to dependency within families. Unpaid care work, predominantly done by women, contributes to economic inequality by burdening them with unequal workloads and impacting their education and well-being. Overall, Bolivia's system perpetuates gender inequality through unequal job opportunities, income gaps, economic dependency, and undervaluation of care work primarily performed by women.[15] 35.4% of women in Bolivia assume the headship of their households, which means 3 out of every 10 women. Meanwhile, 64.5% of men take on this responsibility (INE). Despite Bolivia being a signatory to numerous international human rights treaties, including those addressing discrimination against women and violence prevention, women's rights and their economic agency remain insufficiently recognized in national law. Gender-based violence, particularly feminicide, has positioned Bolivia as one of the most violent countries against women in South America. According to data published by the Public Prosecutor's Office in 2022, the number of women experiencing violence has increased significantly. More than 90 feminicides were recorded in 2022. Gender-based violence increased by 30% compared to 2021.[16] Indigenous and rural women encounter barriers in participating fully in decision-making processes and continue to face high levels of violence persistently. Promoting gender equality in Bolivia requires a comprehensive approach that addresses various aspects of societal, economic, and cultural structures.. Special emphasis ought to be given to support women's economic empowerment, including access to credit, vocational training, entrepreneurship support, and initiatives to close the gender wage gap. Encouraging the participation of women in traditionally male-dominated sectors can also help. Conduct awareness campaigns to challenge harmful gender stereotypes, traditional gender roles, and discriminatory attitudes. Engage men and boys as allies in promoting gender equality and preventing violence against women. To address these challenges, the proposed project will incorporate targeted activities and conduct a comprehensive gender analysis during its full design phase.[17] As part of the preliminary gender assessment, the project aims to promote gender equality and women's empowerment through its targeting strategy. This includes ensuring alignment with the gender inclusion policies of both the Adaptation Fund and IFAD during the development of the comprehensive project proposal. In line with these policies, the project will consider the percentage of women engaged in the agricultural sector in Bolivia to promote gender equality. The project sets a target of having a minimum of 40% percent of the beneficiaries be women, adhering to the principles outlined in project targeting. Addressing gender-related issues in Bolivia involves implementing various strategies and actions aimed at promoting equality, empowering women, and eliminating discrimination. The project will conduct a Gender analysis examining the roles, responsibilities, needs, challenges, barriers and opportunities of women within the country's social, economic, political, and cultural contexts. Active participation of women will be ensured in the planning process through methods such as focus group discussions. Gender aspects will be integrated throughout the project's lifecycle, not just in the initial stages, creating mechanisms for continuous feedback, monitoring, and evaluation to ensure that women's perspectives are integrated and valued at every stage of the planning and decision-making process. The project will also promote the integration of gender perspectives, and ensure that climate change plans and policies are more inclusive, responsive, and impactful for all communities in Bolivia. It can also serve as powerful platforms for fostering empowerment, exploring themes related to leadership development, self-empowerment, and mentorship opportunities for women to inspire confidence and ambition. Through these measures, the project aims to prioritise gender inclusion and create a more equitable and inclusive environment for women in the agricultural sector of Bolivia.

Project Objectives:

[15] https://lac.unwomen.org/sites/default/files/2022-07/Inclusio%CC%81n_financiera_%20ONU%20Mujeres%20Bolivia.pdf

[16] https://promujer.org/portal/2023/08/25/pro-mujer-bolivia-opens-new-office-to-manage-gender-based-violence-cases/

[17] At full design, an Annex on Gender Assessment, Strategy and Action Plan will be developed.

76. **Goal.** The overall goal of the project is to support vulnerable communities particularly affected by climate change-related drought in adopting climate-resilient measures and benefit from improved water recharge. .

77. **Objective.** The specific objective of the project is to enhance the climate resilience and adaptive capacity of agricultural communities in Bolivia. The Project will achieve the objective through a people-centred approach assessing the requirements of farmers and the vulnerable population, identifying their specific needs, and implementing tailored solutions to effectively adapt to the impacts of climate change. The project aims to support smallholder farmers in improving water recharge systems and resilient productive practices.

Table 4: Project Components and Financing

Project/Program Components	Expected Outcomes	Expected Concrete Outputs	Amount (US$)
Component 1: Establishment of integrated water Recharge Infrastructure and Climate-Resilient Practices (Water Recharge Zones)	Outcome 1.1. Communities are enabled to improve agricultural productivity and enhance resilience to climate change impacts	Output 1.1.1. Resilient agricultural practices enhanced at the household level	600,000
		Output 1.1.2. Promoting participation in the development of agricultural resilience practices at the household level	180,000
	Sub component subtotal		780,000
	Outcome 1.2. Climate vulnerabilities and exposure to risks in agriculture sector are reduced through the identification of recharge zones implementing infiltration improvement practices	Output 1.2.1 Promoting studies of aquifers, surface, subsurface, and groundwater flows to identify recharge areas and the small infrastructure technologies or agricultural practices	1,500,000
		Output 1.2.2 Community-led enhanced water infiltration management towards aquifers at the catchment level	150,000
		Output 1.2.3. Construct small-scale water recharge infrastructure project	1,500,000
	Sub component subtotal		3,150,000
Component subtotal			3,930,000
Component 2: Introduction of innovative climate and water smart technologies and practices (Zones for productive use of groundwater)	Outcome 2.1. Households supported with increased water efficiency, harvesting techniques and management technologies	Output 2.1.1. Improved water efficient and irrigation management technologies	300,000
		Output 2.1.2. Strengthened water harvesting technologies	1,500,000
	Sub component subtotal		1,800,000
	Outcome 2.2. Strengthened ownership and awareness of social practices and technologies for Climate Change Resilience at local level	Output 2.2.1. Increased participation in the social construction of water harvesting/collection technologies to reduce climate risk	360,000
	Sub component subtotal		360,000
Component subtotal			2,160,000

Component 3: Institutional Strengthening and Generation of Practical Knowledge in Sustainable Water Resource Management and Climate Change.	Outcome 3.1. Reduction in community vulnerability through the implementation of participatory systems for monitoring climate change variables	Output 3.1.1. Enhanced c limate monitoring support	1,050,000
		Output 3.1.2. Strengthening technical assistance on climate monitoring	150,000
	Sub component subtotal		1,200,000
	Outcome 3.2. Knowledge on Sustainable Water Recharge Practices disseminated and promoted among institutions	Output 3.2.1. Knowledge building for municipalities and professionals monitoring wells and climatic variables through a specific institutional structure	250,000
		Output 3.2.2 Institutional c apacity improved through the development of a manual and hiring of specialists	802,978
	Sub component subtotal		1,052,978
Component subtotal			2,252,978
Project operational total			8,342,978
4. Project/Program Execution cost			873,612
5. Total Project/Program Cost			9,216,590
6. Project/Program Cycle Management Fee charged by the Implementing Entity (8.5%)			783,410
Amount of Financing Requested			**10,000,000**

Projected Calendar:

Table 5: Project milestones

Milestones	Expected Dates
Start of Project/Programme Implementation	2025 Q2
Mid-term Review (if planned)	2028 Q3
Project/Programme Closing	2030 Q2
Terminal Evaluation	2030 Q4

PART II: PROJECT/PROGRAMME JUSTIFICATION

A. Project components

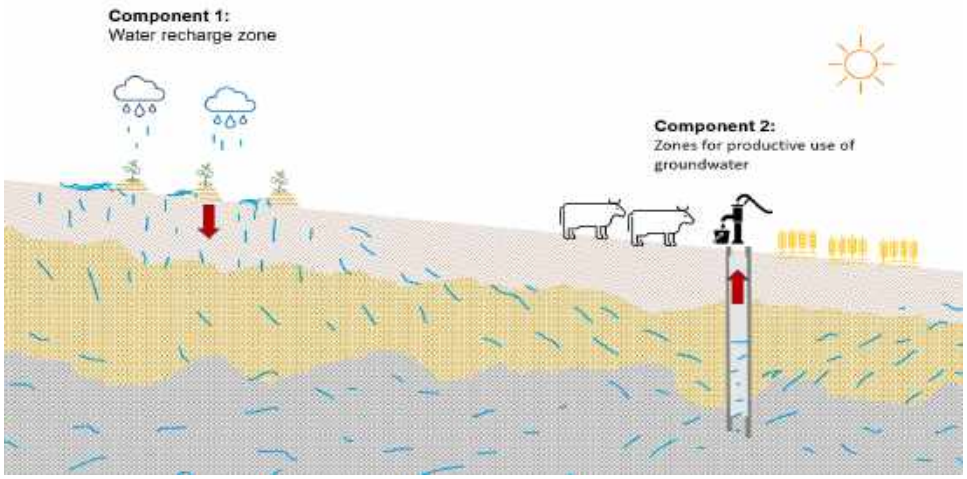
78. The project is structured in three operational components, composed of two technical elements and a component dedicated to institutional and community strengthening, as well as knowledge management. The synergy between these components arises from the combination of two fundamental approaches that will guide project implementation: first, the promotion of resilient agricultural practices in water recharge areas, and second, the promotion of water management and irrigation technologies, in areas prone to groundwater scarcity, with the aim of improving the adaptive capacity of communities to the impacts of climate change and reducing their vulnerability. In addition, the project recognizes the vital importance of institutional strengthening

and community participation, and knowledge building with a special focus on the inclusion of women, in order to ensure the sustainability and scalability of the project.

79. The project will promote adaptation to climate change and reduce the risk of water depletion in groundwater wells, with a particular focus on generating practical knowledge in sustainable water resources management and climate change. Interventions will promote the inclusion of the most vulnerable populations (women, youth and indigenous communities) and address new and innovative technologies and practices that take into account indigenous knowledge to improve existing techniques by making them more efficient or environmentally sustainable. All beneficiaries will be supported by Technical Assistance teams throughout project implementation, including water management practices and technologies (Component 2) and the construction and improved management of water infrastructure and technologies (Component 1).

80. The first component will be focused on improving aquifer recharge through technologies to increase water infiltration on farms and small community infrastructure. The second objective of the component is to strengthen resilience to the impacts of climate change of communities in recharge zones to improve agricultural productivity. The second component focuses on the efficient use and improvement in water management in areas that depend on water from aquifers, also promoting, if appropriate, community water harvesting technologies. The objective of the second component is to promote innovations and introduction of new technologies and smart practices in the face of climate change in areas for the productive use of groundwater through awareness, capacity development and investments. The third component proposes to provide the monitoring and management of the information necessary to be able to develop better investments for the first components. The objective of the third component is to increase Institutional knowledge and generate practical knowledge in the Sustainable Management of Water Resources and Climate Change to ensure the scalability of the project

Figure 12: Project Work Areas



81. The components, their outputs and outputs, and their activities are summarized below. This combination of activities makes it possible to address the problem of drought risk working throughout the water cycle. It is based on quality information, which makes it possible to understand, work and measure the causes and effects of the project's activities, as well as to fill an information gap on groundwater processes in the country. The project has a participatory adaptation approach to existing technologies, where social work is the basis of water management agreements and adaptation to the context of each municipality and community. The project will take into consideration and value existing social conditions by working in a participatory manner from the outset, ensuring that communities are part of the consultative

decision-making process and that they are empowered to reduce their vulnerabilities to climate change.

Component 1: Establishment of integrated water Recharge Infrastructure and Climate-Resilient Practices (Water Recharge Zones) (USD 3.555 million)

82. Water recharge is a natural phenomenon in which water from rain enters the subsoil (aquifers) and surface waters, whether in static or moving bodies of water. The place where this process occurs periodically with greater intensity compared to other areas is called an area, zone or site of water recharge. These areas may be close to, coincide with, or be at significant distances from areas where groundwater is used. Component 1 of the project focuses on critical areas of groundwater recharge, strategically addressing the challenges of climate change at two fundamental levels: at the farm level and at the community level.

83. At the farm level, measures will be implemented to optimize water management, both rain and surface, with the aim of preventing landslides, combating erosion and strengthening the climate resilience of producers in these areas. These actions will not only protect croplands, but also improve infiltration into aquifers, thus contributing to the effective recharge of groundwater reserves.

84. At the community level, small infrastructure projects and potentially ecosystem-based adaptation projects will be carried out to improve soil retention and water collection and infiltration, focused on enhancing the capacity of communities to sustainably manage their water resources.

Outcome 1.1. Communities in recharge zones are empowered to enhance agricultural productivity and strengthen resilience to the impacts of climate change.

Output 1.1.1. Resilient agricultural practices enhanced at the household level

85. The project will work at the farm and farmer level in aquifer recharge zones, proposing a menu of water management practices and techniques to avoid landslides and erosion and improve infiltration, from which resilience practices will be built together with producers. There is a wide menu of technologies designed with these objectives and used worldwide. During the final design mission, the analysis and preselection of this set of practices will be carried out in collaboration with the stakeholders of the project. A list of common on-farm water infiltration practices includes:

- Cover Cropping: Cover crops are planted primarily to protect and enrich the soil during periods when the primary crop is not growing. Their root systems help break up compacted soil layers, enhancing water infiltration and retention.
- No-Till or Reduced Tillage: No-till farming involves planting crops without disturbing the soil through tillage. Reduced tillage practices minimize soil disturbance. Both methods help maintain soil structure, reduce erosion, and enhance water infiltration by preserving organic matter and soil aggregates.
- Contour Farming: Contour farming involves plowing and planting crops perpendicular to the natural slope of the land. By following the contour lines, water runoff is minimized, allowing more time for water to infiltrate into the soil.
- Mulching: Applying mulch on the soil surface helps reduce evaporation, regulate soil temperature, and prevent soil erosion. Organic mulches also contribute organic matter to the soil, improving its structure and water-holding capacity, thus enhancing water infiltration.
- Permeable Barriers and Swales: These are structures built along the contours of the land to slow down and capture water runoff. They allow water to infiltrate gradually into the soil, reducing erosion and promoting groundwater recharge.
- Keyline Plowing: Keyline plowing involves creating small furrows along contour lines to

direct water flow evenly across the landscape. This technique helps distribute water more effectively, promoting infiltration and reducing erosion.

- Ridge and Furrow Systems: This system involves creating raised beds (ridges) and furrows between them. The ridges serve to protect crops from waterlogging while the furrows facilitate water infiltration and drainage.
- Soil Amendments: Adding organic matter, such as compost or manure, to the soil improves soil structure, porosity, and water-holding capacity, enhancing water infiltration.

Output 1.1.2. Promoting participation in the development of agricultural resilience practices at the household level

86. The project has a participatory approach, where the producers themselves must be leaders and pilot of the technologies implemented. Such participation must be guided and promoted through workshops and capacity building in communities and directly with farmers. The project proposes to hire and capacitate local project promoters, who can provide technical support for the implementation of the technologies.

Outcome 1.2. Climate vulnerabilities and exposure to risks in the agricultural sector are reduced through the identification of recharge zones and the implementation of infiltration improvement practices and small-scale infrastructure.

87. In areas identified as water recharge zones, prompt action is crucial, utilizing cost-effective, practical small-scale infrastructure for efficient water recharge. This infrastructure must be claimed, owned, and managed by the communities to ensure its sustainability. Additionally, to effectively manage groundwater exploitation and recharge, having access to accurate and up-to-date information is essential. The Bolivian government has acknowledged the deficiency of suitable information for these purposes. To meet this challenge, the project will invest in groundwater recharge studies to identify recharge areas and dynamics.

Output 1.2.1 Promoting studies of aquifers, surface, subsurface, and groundwater flows to identify recharge areas and the small infrastructure technologies or agricultural practices

88. The project will carry studies[18] to identify water recharge zones for each of the three zones prioritized by the project, at least one per zone, but corresponding to the selected aquifers. These studies must provide information on the functioning of water bodies and their priority recharge zones, which must identify a menu of small infrastructure technologies suitable for these areas (e.g. infiltration pools) and suitable places for them. The studies must include an analysis of the quantity and quality of groundwater, in addition to evaluating the current water demand and usage practices and encompassing conservation actions, demand management, protection of recharge zones. Mapping and modelling of underground aquifers will help enhance water management. Mobile underground water modelling resistivity meters will be considered and are available on the market.

Output 1.2.2. Community-led enhanced water infiltration management towards aquifers at the catchment level

89. Recognizing the pivotal role of robust governance mechanisms in ensuring the effective operation

[18] See examples of larger studies in Bolivia and other countries:
Rodriguez-Levy, I. E., Centellas-Levy, M. A., Ferreira, W. J., Mustafa, S. M. T., Rivera-Rodriguez, L., Gonzales Amaya, A., & Huysmans, M. (2023). Development and Application of a Methodology for the Identification of Potential Groundwater Recharge Zones: A Case Study in the Virvini Micro-Basin, Tiraque, Bolivia. *Water*, *15*(7), 1268.
Martínez, E. B., Mora, M. F. G., & Paredes-Tavares, J. (2021). Determinación de sitios potenciales de recarga artificial de agua subterránea en cinco acuíferos de la Zona Metropolitana del Valle de México. *Cuadernos Geográficos*, *60*(3), 73-94.
Singh, S. K., Zeddies, M., Shankar, U., & Griffiths, G. A. (2019). Potential groundwater recharge zones within New Zealand. *Geoscience Frontiers*, *10*(3), 1065-1072.

and long-term sustainability of small-scale water recharge infrastructure, this initiative aims to empower participating communities as owners of such infrastructure. By elucidating its benefits for both the communities and groundwater users, and by enhancing supervision and control over water extraction, the project strengthens communal management of new infiltration infrastructure.

90. We will initiate a grassroots approach to identify investment options together with the target communities. This process prioritizes transparent and participatory communication to underscore the significance of water infiltration infrastructure. Initially, seasoned consultants will be engaged to review the list of communities outlined in the project targeting strategy and groundwater studies. Consultations, aligning with environmental, social, and gender guidelines, will guarantee equal engagement of both women and men in the planning and execution phases. After pinpointing the communities, field visits will evaluate existing community entities like Community Development Associations or Water User Associations as potential entry points for project initiatives. Consultants will organize training sessions, finalize logistical arrangements, and appoint a community committee to refine infrastructure plans, ensuring both technical and social viability through collaborative efforts. Additionally, an expert in community conflict resolution will be integrated into the project areas to bolster conflict resolution capacities within the communities.

Output 1.2.3. Construct small-scale water recharge infrastructure projects

91. Community water recharge infrastructure for the improvement of infiltration includes a menu of technologies to be proposed, adjusted and appropriated in agreement with the communities. These small and medium-scale works may include, but are not limited to: infiltration surfaces, water banks, and do not exclude ecosystem-based adaptation technologies such as wetland restoration and natural areas. The basic concept of these technologies is to balance the wet and dry seasons, capturing and storing rainwater during the wet periods and recharging the aquifers and thus making it available for the dry periods. Collected examples of potential recharging technologies to include in the menu are listed bellow and will be revised and adjusted in the funding proposal work. Many of these technologies are used and common in other parts of the world and even in Latin America, but their use is not currently customary in the country, which is only now beginning to be consider them as necessary elements of adaptation to climate change.[19]

92. Small-scale recharge infrastructure technologies:
    - Percolation Ponds: Percolation ponds are shallow depressions or basins constructed to capture surface runoff and allow it to infiltrate into the soil. These ponds help recharge groundwater and prevent surface runoff, reducing erosion and flooding.
    - Infiltration Trenche: Infiltration trenches are shallow, excavated channels filled with coarse aggregate or gravel. They are designed to capture and channel runoff water into the ground, promoting infiltration and groundwater recharge.
    - Check Barriers: Are low barriers built across ephemeral streams or channels to slow down the flow of water and encourage sediment deposition. By impounding water, they facilitate infiltration and groundwater recharge.
    - Contour Bunds: Contour bunds are embankments constructed along the contours of the land to capture and retain surface runoff. They help reduce soil erosion, promote infiltration, and recharge groundwater in hilly or sloping terrain.
    - Grassed Waterways: Grassed waterways are natural or constructed channels planted with grass or vegetation to convey and slow down runoff water. By reducing flow velocity and promoting infiltration, they help recharge groundwater and prevent soil erosion.

93. These types of small-scale recharge infrastructure will be tailored to suit local hydrological

[19] https://www.agrecolandes.org/publicaciones/

conditions and land use practices of the communities, playing a vital role in sustainable water management and ensuring the availability of groundwater resources for the future.

Component 2: Introduction of innovative climate and water smart technologies and practices (Zones for productive use of groundwater) (USD 2.160 million)

94. Component 2 focuses on areas where water, rain, and groundwater shortages are occurring, at increasingly longer times each year. The project will work at the community and farm level, building and adapting rainwater harvesting technologies and improvements in water management in a participatory manner according to the identified need. This will ensure the sustainability of the project, improving the appropriation of new technologies by the communities.

Outcome 2.1. Households supported with increased water efficiency, harvesting techniques and management technologies.

95. The efforts aimed at enhancing aquifer recharge yield results over the medium to long term. Recognizing the immediate needs of communities grappling with water scarcity, the project will extend its initiatives in these critical areas. This extension involves the implementation of technologies promoting efficient irrigation and rainwater collection. Numerous successful experiences with diverse water collection technologies exist, and these will be customized to suit the Bolivian context, ensuring active involvement and collaboration with each community.

Output 2.1.1. Improved water efficiency and irrigation management technologies

96. The objective of this activity is to enhance water efficiency and promote effective irrigation management through the implementation of innovative, simple and low-cost technologies and practices. By adopting innovative irrigation techniques and optimizing water management strategies, the project aims to increase agricultural productivity, conserve water resources, and promote sustainable farming practices.

97. In this output, we will conduct an extensive in-farm diagnosis of irrigation systems within targeted agricultural areas. The primary objective is to identify outdated or damaged infrastructure that contributes to water wastage. By employing skilled technicians and utilizing modern diagnostic tools, we aim to assess the efficiency of existing irrigation systems. The diagnosis will provide valuable insights into areas needing immediate attention, enabling us to prioritize infrastructure upgrades. This proactive approach ensures the reduction of water waste and enhances overall irrigation performance on participating farms.

98. Building on the findings from the in-farm diagnosis, the second activity focuses on identifying farms within prioritized municipalities that stand to benefit from advanced water-efficient technologies. Specifically, we aim to introduce drip irrigation systems, precision agriculture methods, soil moisture sensors, and other innovative technologies tailored to the unique needs of each farm. By strategically implementing these technologies, we seek to optimize water usage, reduce wastage, and enhance overall farm productivity. This activity emphasizes a customized approach, ensuring that selected technologies align with the specific requirements of each farm, thereby maximizing the impact of water efficiency interventions across diverse agricultural landscapes.

Output 2.1.2. Strengthened water harvesting technologies

99. To complement the improvements in water management and irrigation efficiency, the project proposes to enhance the capacity of local communities and farmers to capture, store, and utilize rainwater effectively. Through this activity, various methods such as rooftop rainwater harvesting,

surface runoff collection, and storage systems will be proposed or improved to augment water availability for agricultural purposes. By providing and upgrading storage tanks and runoff collection surfaces the project aims to improve water harvesting capacity and resilience to seasonal variations in rainfall. Through this activity, the project endeavours to bolster water security, mitigate drought impacts, and foster socio-economic development in target areas.

Outcome 2.2. Strengthening local ownership and awareness of social practices and technologies for Climate Change Resilience.

100. For the success of the activities and support at the community level of this component, which are more efficient irrigation technologies or water collection, it is essential that all users or beneficiaries of the technology take ownership and collaborate so that its operation is successful and sustainable.

Output 2.2.1. Increased participation in the social construction of water harvesting/collection technologies to reduce climate risk.

101. The project, as in the previous component, proposes involving the community from the construction and adaptation of technologies, based on a menu of available technologies, strengthening the community bond around a common scarce resource. .

102. As mentioned in output 1, the project will use a bottom-up approach to identify investment options collaboratively with the communities. Ensuring open, transparent, and participatory communication mechanisms is a priority. To achieve this, the first activity involves hiring experienced consultants to revise a long-list of communities for inclusion in the project targeting strategy. The subsequent steps focus on comprehensive consultations. The design of specific training activities, including topics, timing, location, and format, will be discussed with beneficiaries. These consultations will adhere to environmental, social, and gender policies, ensuring women's equal participation in separate groups. The process will incorporate gender quotas, reinforcing the inclusion of women in planning and implementation.

103. Following the identification of a long-list of communities, exploratory visits will assess existing community institutions as potential entry points for project activities. These could include Community Development Associations, Village Councils, Community-Based Organizations, or Water User Associations. The selected community organization will facilitate an open village/community meeting to inform households about the project. If communities lack existing institutions, efforts will be made to form them. The initial phase will involve a community-wide dialogue meeting to inform households about the project's benefits and secure community buy-in.

104. Subsequently, follow-up consultations will identify potential participants for technological support and training components. The selected communities will designate lead resource persons for coordination, and a community committee will be formed to finalize infrastructure scheme details. This ensures technical and social feasibility, designed to meet beneficiaries' needs in a participatory manner. Furthermore, conflict resolution training is a core element, with selected Service Providers required to include experts in community conflict resolution. This approach aims to address potential conflicts during implementation, reinforcing the project's commitment to inclusivity, transparency, and community involvement.

Component 3: Establishment of integrated water Recharge Infrastructure and Climate-Resilient Practices (USD 2.626 million)

105. Component 3 is transversal support. Given the little information and studies that exist in the

country on the topic of underground aquifers, it is proposed to work at 2 levels: 1) improving the network of piezometers in the priority areas and strengthening the communities as owners of the information, 2) strengthening the municipalities, universities and the "Pozos" program with knowledge and information on the management of underground aquifers.

Outcome 3.1. Climate Change Variable Monitoring Systems reduce risks associated with climate-induced socio-economic and environmental losses.

106. Given the great deficiency in groundwater monitoring in the country, it is proposed to generate a network of piezometers and associated climate monitoring units in the areas prioritized by the project. This will allow us to better understand the functioning of the aquifers and strengthen communities to take action against climate change with pertinent information, while generating data to monitor the progress of the project.

Output 3.1.1. Enhanced climate monitoring support

107. In prioritized areas the piezometer information grid will be improved by improving or adding the necessary pizometers and climate monitoring stations. This activity aims to use existing wells as the first option for placing the piezometers, sustantially reducing costs. The piezometers will be coupled with low-cost climatological monitoring units and, again, adapted to the specific situation of each geographical location.

Output 3.1.2. Strengthening technical assistance on climate monitoring

108. Engaging community members in monitoring activities and fostering their active participation in groundwater management processes are integral to the success of the initiative. Farmers and other community members will receive training on accessing information through digital platform tools. As with other components of this project, the ownership of the monitoring tecnology will be vested in the local community. Monitoring will also be conducted by the community memebers to ensure sustainability, ownership, and benefits for the community, who will primarily utilize the information. Moreover, the network will have the capability to connect and contribute to central meteorological service platforms. Awareness-raising campaigns, will facilitate the long-term sustainability and effectiveness of community-based groundwater monitoring efforts. This integrated approach empowers communities to actively engage with technology, fosters local ownership, and facilitates the sharing of data for broader meteorological services.

Outcome 3.2. Dissemination and promotion of knowledge on sustainable water recharge practices among institutions.

109. The dissemination and promotion of knowledge regarding sustainable water recharge practices among municipalities, universities, and practitioners is a pivotal component in advancing the widespread adoption and effective implementation of water management strategies. These initiatives aim to enhance awareness surrounding the critical importance of replenishing groundwater sources, underscore the advantages of embracing sustainable recharge methodologies, and elucidate valuable insights gleaned from innovative technologies and successful practices across targeted regions. Through these endeavors, we aspire to bolster institutional capacity, and catalyze collaborative efforts toward attaining water security, resilience, and sustainability within communities and ecosystems.

Output 3.2.1. Knowledge building for municipalities and professionals monitoring wells and climatic variables through a specific institutional structure

110. To ensure the successful integration of community-generated data from the new piezometer network into municipal decision-making regarding groundwater, a series of coordinated activities

are essential. First, clear data sharing protocols must be established, outlining the formats, frequency, and methods of transmission between community networks and municipal authorities. Concurrently, capacity-building workshops are necessary to train both community members and municipal staff in the operation, maintenance, and interpretation of piezometer data. These sessions should emphasize the importance of groundwater monitoring and its relevance to municipal planning and resource management. Moreover, the deployment of the robust data collection infrastructure, including piezometers, climatic stations and communication devices, is important to facilitate data transmission from community networks to municipal and central systems.

111. Following the establishment of data-sharing mechanisms, integration with municipal information systems is key. This involves developing interfaces and integration tools to incorporate community-generated data seamlessly into existing municipal databases and decision-making processes. Through these coordinated activities, the integration of community-generated data into municipal decision-making processes will enhance groundwater management practices and contribute to sustainable resource utilization.

Output 3.2.2 Institutional capacity improved through the development of a manual and hiring of specialists and generating university curricula for water recharge specialists

112. To bolster the efficacy of the "Nuestro Pozo" program and enhance its ability to manage water recharge, the project will enlist two specialists dedicated solely to the initiative. These consultants will be proficient in utilizing new groundwater mapping and recharge technologies. Their task will also involve gathering information on the procedures developed in project areas under the project to compile a manual of best practices for aquifer management in drought-prone regions. This manual will serve as a valuable resource for inform the drilling of new wells and well as for scaling up of replicating the project in new areas.

113. Lastly, to strengthen the construction of new technologies for the study and management of groundwater, the project proposes to generate two curricula (or complement existing curricula), one at the university level and one at the technical level, with a focus on this topic. This will generate and improve the job offer with knowledge on this topic and will provide technicians and students, to be able to replicate the current project in other areas.

114. In summary, the first component will focus on improving aquifer recharge through technologies that optimize water infiltration on farms and small community infrastructure. Its main objective is to strengthen resilience and train communities in recharge zones, thus improving agricultural productivity in the face of the impacts of climate change. The second component will focus on the efficient use and improvement of water management in aquifer-dependent areas, promoting community-based water harvesting technologies where relevant. It seeks to promote innovations and the introduction of new technologies and smart practices in the face of climate change in areas that use groundwater for productive purposes, through awareness, capacity development and investments. The purpose of the third component is to provide the monitoring and management of the information necessary to develop the investments of the first two components. Its objective is to increase institutional knowledge and generate practical knowledge in the Sustainable Management of Water Resources and Climate Change, thus ensuring the scalability of the project.

115. This combination of activities addresses the problem of drought risk throughout the water cycle. The project is supported by quality information that allows us to understand, work with and measure the causes and effects of the project activities, thus filling an information gap on groundwater processes in the country. It adopts a participatory approach to adapting existing technologies, where social work forms the basis of water management agreements and

adaptation to the specific context of each municipality and community. From its inception, the project will consider and value existing social conditions, working in a participatory manner to ensure that communities are an integral part of the consultative decision-making process and are empowered to reduce their vulnerabilities to climate change in the future.

B. Economic, Social and Environmental Benefits

116. The project aims to deliver economic, social, and environmental advantages, emphasizing communities particularly prone to drought and the vulnerable subsets within those communities, with a specific focus on gender-related considerations. As the designated Implementing Entity, IFAD is dedicated to enhancing social, environmental, and climate resilience through its initiative. The productivity of the farmers, and therefore their livelihoods will be improved by the technologies promoted in components 1 and 2. These technologies will bring numerous benefits to agriculture, contributing to enhanced productivity and sustainability. Efficient management of groundwater resources ensures a reliable and consistent water supply for crops, reducing vulnerability to fluctuations in surface water availability and climatic conditions. Farmers can optimize irrigation schedules, tailoring water delivery to specific crop needs, thereby improving water-use efficiency and minimizing wastage. Groundwater management also supports crop diversification, allowing farmers to cultivate a variety of crops throughout the year. Additionally, sustainable groundwater practices contribute to the prevention of land degradation and salinization, maintaining soil health for long-term agricultural viability. By fostering responsible extraction and replenishment strategies, groundwater management not only safeguards water quality but also promotes resilience in the face of changing environmental conditions. Moreover, when applicable, nature-based solutions improve resilience against climate extremes, helping mitigate the impacts of droughts and floods. Additionally, nature-based solutions promote water conservation, and groundwater recharge, reduce soil erosion, and enhance nutrient cycling, leading to more sustainable and efficient agricultural systems. The integration of green infrastructure and ecological practices not only improves environmental outcomes but also supports the overall well-being of farming communities by offering diversified income sources and fostering a healthier living environment.

117. In the economic domain, this initiative strengthens local communities and small to medium-scale farmers by promoting advanced water management, enhancing infiltration, and building resilience in their livelihoods. The project aims to empower farmers through the implementation of integrated groundwater management solutions, equipping them with the knowledge and resources to adapt their production systems. This adaptation includes enhancing infiltration in recharge areas and implementing efficient management practices in water-scarce regions. These combined efforts contribute significantly to improving the quality and quantity of agricultural output, with a primary focus on mitigating risks associated with production. To be able to provide specific information on farmers' averted costs due to climate change adaptation measures proposed in the project one needs to consider various factors, including the type of adaptation measures selected and implemented, the scale of implementation, and the specific context of each farming operation. Therefore, providing average averted costs per hectare due to specific on-farm or community adaptation measures can be challenging due to the variability in agricultural systems, climates, and economic conditions across different regions and project components. Averted costs due to mulching and soil conservation practices may include savings from reduced soil erosion, improved soil moisture retention, and decreased weed control expenses. On average, adopting mulching and soil conservation practices can lead to savings ranging from $50 to $200 per hectare per year, considering reduced inputs and improved soil health. Averted costs of rainwater harvesting and storage systems include savings from reduced reliance on groundwater pumping, lower energy expenses for irrigation, and increased water availability during dry periods. On average, rainwater harvesting and storage systems can result in savings ranging from $100 to $400 per hectare per year, depending on rainfall patterns and storage capacity. It's important to

note that these figures are approximate and can vary significantly based on local conditions, management practices, and other factors.

118. The project places significant importance on fostering community engagement, actively involving vulnerable groups such as women and youth. Ensuring their participation and access to project activities is a key commitment, along with facilitating their involvement in decision-making processes. By incorporating their perspectives and addressing their specific needs, the project actively promotes social equity, empowers marginalized communities, and enhances the well-being of individuals and families. The participatory adaptation of the project investments brings about notable social benefits by fostering community engagement and empowerment. Involving local communities in the decision-making processes regarding water management as well as resilient productive practices ensures that their perspectives, needs, and traditional knowledge are considered. This participatory approach enhances social cohesion, as community members collaborate towards common goals related to water resource utilization. It promotes a sense of ownership and responsibility, instilling a shared commitment to the sustainable use and conservation of water. Moreover, involving communities in the planning and implementation of water management practices creates opportunities for skill development and knowledge transfer, empowering individuals with the tools needed to address water-related challenges. This collaborative model not only enhances the effectiveness of the project´s initiatives but also strengthens the social fabric by fostering a sense of collective responsibility and mutual support within the community. Furthermore, the initiative facilitates knowledge sharing and capacity development, leveraging the expertise of universities and master's students to assess innovative adaptive practices on farms. This approach not only enhances the project's impact but also contributes to the widespread dissemination of agroecological and climate change knowledge throughout the country.

119. The project's **environmental benefits** are significant. It promotes the sustainable use of natural resources, preservation of biodiversity, an increase of carbon sinks, and effective water management practices. Through measures such as the restoration of storm basins, implementation of green infrastructure projects like afforestation and windbreaks, and establishment of rainwater harvesting systems, the project mitigates the negative impacts of climate change on the environment.

120. Beyond the positive outcomes in agricultural productivity and risk mitigation, the project yields notable environmental benefits. It actively advocates for the sustainable utilization of natural resources, with a specific focus on water and soil, thereby enhancing biodiversity conservation. Through the execution of infrastructure projects, enhancement of small and medium-scale infiltration, and the establishment of rainwater collection systems, the initiative serves to alleviate the adverse effects of climate change not only on agricultural endeavors but also on the broader environment. In formulating the proposal, the project will adhere to a systematic approach, sustaining the consultative process initiated at the conceptual stage. Throughout this process, identification of entry points and potential barriers to participation will be meticulously undertaken, with a deliberate focus on actively engaging the most vulnerable groups, notably women and youth. The primary objective is to guarantee their comprehensive involvement, both in the design phase and across all project activities. This approach aligns closely with IFAD's overarching mission to support the most vulnerable populations, champion inclusivity, and integrate considerations of gender equity. The project's consultative process involved engaging with a wide range of stakeholders and the full design mission will adopt a systematic approach to continue the consultative process, defining entry points and inclusion barriers for actively involving the most vulnerable groups, including women and youth, to ensure their participation in the design process and all the activities of the project. This approach aligns with IFAD's mandate to support the most vulnerable people and promotes inclusivity and gender considerations.

121. A preliminary assessmment anticipates that the project will benefit approximately 15-20 thousand recipients across 15 to 20 communities spanning 3 to 6 municipalities. These estimates were derived from the beneficiary database of the “Nuestro Pozo” program and Bolivia's Census projections but will be subject to revision during the proposal stage. Drawing from the experience of previous FIDA projects, the proportion of female beneficiaries is expected to reach 40%.

122. By implementing these comprehensive measures, the project propels sustainable and inclusive development, aligning seamlessly with IFAD's dedication to fostering social, environmental, and climate resilience. This commitment remains fully under the Environmental and Social Policy and the Gender Policy of the Adaptation Fund, underscoring the project's adherence to robust environmental and social standards.

C. Cost-effectiveness

123. The proposed project´s cost-effectiveness is attributable to the integrated nature of its components and the strategic use of economically viable small-scale infrastructure and farm-based technology. Additionally, the inclusion of nature-based solutions (NBS) within the project design enhances its efficiency. These technologies are purposefully crafted to deliver invaluable environmental services, particularly in ensuring water availability during dry seasons. Furthermore, these technologies not only augment production but also mitigate the risk of complete yield loss. The water regulation technologies will be tailored to each project area through a participatory construction approach, facilitating local community ownership and fostering long-term sustainability.

124. Component 1, centers on a comprehensive groundwater analysis for prioritized regions, forming the basis for cost-effective investments in small-scale and farm-based technologies to enhance infiltration and reduce mudslides. Through a thorough examination of current aquifer dynamics, climate projections, and their interconnections, the project establishes a deep understanding of water recharge implications for agriculture and the environment in diverse drought zones. This knowledge facilitates targeted interventions and optimal resource allocation, thereby maximizing the efficiency of adaptation efforts. Furthermore, the information generated contributes to the replicability of similar initiatives, enhancing overall cost-effectiveness.The project's incorporation of Nature-Based Solutions (NBS) as a technological alternative aligns with evidence showcasing their cost-effectiveness in climate change adaptation. The World Bank's Climate Change Action Plan 2021-2025 emphasizes NBS as a promising approach to tackle climate change, emphasizing the protection, sustainable management, and restoration of ecosystems. The utilization of wetlands and watersheds offers cost-effective strategies for water resource management and disaster risk reduction. By leveraging the advantages of NBS, the project complements its utilization of traditional small-scale grey infrastructure, thereby reducing dependence on expensive engineering interventions.

125. Component 2, which includes on-farm as well as water management at a community level presents a cost-effective approach, focusing on efficiency for the current irrigation infrastructure, community coordination, and low-cost on-farm technologies, adapted to Bolivian circumstances. This new knowledge should enable precise interventions and efficient allocation of resources, also maximizing the effectiveness of future adaptation endeavors. Additionally, the generated information contributes to the reproducibility of comparable initiatives, improving overall cost efficiency.

126. Component 3, which focuses on institutional strengthening and knowledge integration, contributes to the project's cost-effectiveness, promoting sustainability and longer-term impacts. By documenting project outcomes and strategies in an Institutional Manual that addresses best practices for evaluating and constructing wells considering water recharge dynamics and climate change, we propose a method to integrate lessons learned in the project into a government

program. Moreover, in developing curricula at both technical and university levels, the project places significant emphasis on imparting future generations with a comprehensive understanding of aquifer recharge dynamics and the necessary skills to make informed decisions regarding optimal water resource utilization. This forward-thinking approach not only enhances the project's long-term cost-effectiveness but also fortifies the country's capacity to address climate change impacts on groundwater recharge in the years ahead. The specific National Determined Contribution Goals this project will be contributing to are: (#20) 1.4 billion m3 of water storage capacity will be reached by 2030, (#21) 1.3 million hectares under efficient irrigation will have been reached by 2030, (#26) the number of rural and peri-urban inhabitants with high food insecurity will have been reduced by 75% by 2030, and (#31) 15 billion will be invested in productive resilient infrastructure by 2030.

127. In summary, the proposed project demonstrates cost-effectiveness through its integrated components, utilization of low-cost small infrastructure, farm-based technology, and incorporation of nature-based solutions (NBS). These technologies focus on providing essential environmental services such as water during dry seasons and have shown positive benefits in previous evaluations, including effectiveness and efficiency. Apart from enhancing production, they also help mitigate the risk of yield loss. Additionally, these practices will be adapted, tailored, and co-constructed with the communities and farmers to make them more relevant to local conditions and ensure sustainability. The project emphasizes adaptability by employing participatory construction approaches for water regulation technologies in each project area, fostering local community ownership, and guaranteeing sustainability and long-term benefits.

128. Furthermore, the complete project design process will involve conducting a thorough cost-benefit analysis of all components and activities, alongside an alternatives analysis aimed at ensuring cost efficiency. This examination will assess the financial implications of each component, taking into account factors such as implementation costs, maintenance requirements, and long-term sustainability. Through this analysis, the project will aim to identify cost-effective strategies that can optimize resource allocation and prioritize interventions with the most significant economic, social, and environmental benefits. These alternatives will be considered for incorporation or scaling in Bolivia. This proactive approach to cost efficiency is intended to enable the project to maximize its impact and ensure the long-term viability of its outcomes.

129. Lastly, the project´s budget is designed under the full cost approach covering not only the direct project costs but also the indirect and administrative costs associated with planning, implementing, monitoring, and evaluating adaptation activities.The rationale is to ensure that Bolivia will have sufficient resources to effectively design and execute the activities in the prioritized regions without being burdened by additional financial constraints. The project will cover all relevant costs, including capacity-building, technical assistance, and overhead expenses, to achieve meaningful and sustainable adaptation outcomes specifically targeting sustainable use of water in particularly vulnerable municipalities of three diverse regions.

D. Strategies

130. The proposed Project will align with the government's national priorities in implementing adaptation activities to mitigate the adverse impacts and risks of climate change in the country. With a strong emphasis on targeting the most vulnerable populations living in rural areas, particularly in those areas severely impacted by climate change, the proposed project will align with the mandates and climate change strategies of both IFAD and AF, as well as Bolivia’s national strategies and policies. Bolivia has submitted its NDCs as part of the Paris Agreement, outlining its commitments to reducing greenhouse gas emissions, promoting renewable energy,

and increasing resilience to climate impacts.The proposed project will specifically align with the following laws and regulations,[20] with further details to be provided in the full proposal document:

- Law No. 71 - Law of Mother Earth's Rights; Law No. 2878 - Law for the promotion and support of the irrigation sector for agricultural and forestry production; Law No. 1255 declares the intangible cultural heritage of the Plurinational State of Bolivia, encompassing knowledge, wisdom, and ways of life related to water; Law No. 1333 - Environmental Law; Law No. 745 - Decade of Irrigation Law 2015-2025; Ministerial Resolution No. 265 approving the Policy for Efficient Water Use; Law No. 3330 - Interinstitutional Water Council; Law No. 1715 - National Service for Agrarian Reform; Resolution No. 001 - Regulation of Water for Irrigation; Law No. 1171 - Law on the Rational Use and Management of Burns; Law No. 310 - Declares the Prospecting and Exploration of Water Resources a national priority, allowing for a comprehensive assessment of the potential of surface and groundwater resources within the framework of the human right to water; Law No. 1255 declares the Intangible Cultural Heritage of the Plurinational State of Bolivia, encompassing knowledge, wisdom, and ways of life related to water; Departmental Law No. 44 - Water for the consumption of people and production; Law No. 300 - Framework Law of Mother Earth and Integral Development for Living Well; Law No. 338 - Law on peasant, indigenous, and community economic organizations for the integration of sustainable family farming and food sovereignty; Law No. 650 - Patriotic Agenda 2025; Law No. 622 - School Feeding Law within the framework of food sovereignty and plural economy; Law No. 801 Ratification of the International Treaty on Plant Genetic Resources for Food and Agriculture; Law No. 144 of the Communal Agricultural Productive Revolution (2011); The Law No. 3525 on Regulation and Promotion of Ecological Non-Timber Agricultural, Livestock, and Forestry Production which aimed at regulating and supporting agricultural, livestock, and forestry activities that are environmentally friendly and sustainable; Law No. 348 Comprehensive Law to Guarantee Women a Life Free from Violence; Risk Management Law No. 602 (2015). It encompasses risk reduction through prevention, mitigation, and recovery, as well as disaster and/or emergency care through preparedness, alert, response, and rehabilitation; Law No. 338 of 2013, Law of Peasant Indigenous Origin Economic Organizations (OECAS) and Community Economic Organizations (OECOM) for the integration of sustainable family agriculture and food sovereignty; Law of the State Planning System No. 777 (2016). Its purpose is to establish the Integral State Planning System (SPIE), which will lead the planning process for the comprehensive development of the Plurinational State of Bolivia within the framework of Living Well, linking the participation of all levels of government.

131. The relevant regulatory and policy framework for the Project:

- Framework Law on Mother Earth and Integral Development for Living Well: Bolivia passed this pioneering legislation recognizing the rights of nature in 2010. It emphasizes the concept of "Vivir Bien" (Living Well) and promotes a holistic approach to development in harmony with nature.
- National Development Plan (PDES) 2021-2025: The PDES incorporates climate change adaptation and mitigation measures into its framework, aiming to promote sustainable economic growth while considering environmental concerns.
- The **Patriotic Agenda 2025** was adopted in Bolivia in 2013 as a comprehensive and strategic program aimed at achieving sustainable development across various sectors in the country. [21]
- **Nationally Determined Contributions (NDCs)**: Bolivia has submitted its NDCs as part of the Paris Agreement, outlining its commitments to reducing greenhouse gas emissions, promoting renewable energy, and increasing resilience to climate impacts. In 2022, in line with the updated NDC including non-greenhouse gas (GHG) mitigation and adaptation targets and actions focusing on water, energy, forests and agriculture sectors, Bolivia establishes a total

[20] https://leap.unep.org/en/countries/bo/national-legislation/

[21] https://www.cbd.int/countries/profile/?country=bo

of 31 specific targets to be achieved by 2030 and for the water sector, the objective is to comprehensively increase the country's adaptive capacity and systematically reduce the country's water vulnerability[22]

- **Community Participation and Indigenous Rights**: Bolivia recognizes the knowledge and contributions of indigenous communities in environmental conservation and includes their participation in decision-making processes related to climate change policies (the National Comprehensive Forest Management Plan, the Comprehensive Forest and Land Management Plan).
- The **National Plan for Equality of Opportunity** ¨Women building the New Bolivia, to live well¨.

- **National Climate Change Adaptation Plan (PNACC)**: The PNACC establishes priority actions to adapt to the impacts of climate change in key sectors of the Bolivian economy, including agriculture, livestock, and natural resources. This plan aims primarily to reduce the vulnerability of rural communities to climate risks. The current PNACC for Bolivia is outdated and the process of updating it will be undertaken as an activity associated with the Plurinational Climate Change Policy (PCCP) of Bolivia (2023). In this regard, the current project will specifically be aligned to the following Strategic axes and guidelines of the PCCP: Strategic Axis (3): Climate Change Adaptation and Reduction of Damages and Losses, promoting climate resilience in vulnerable areas and livelihood systems - Guideline 8) Resilience of livelihood systems for food security with sovereignty; Guideline 9) Integrated management of water resources and comprehensive watershed management; Guideline 10) Adaptation and risk reduction from the impacts of Climate Change. Strategic Axis (4): Implementation of cross-cutting actions - Guideline 13) Gender and Intergenerational Climate Justice; Guideline 15) Innovation, climate research, and technological development in a dialogue of knowledge for climate change; Guideline 16) Strengthening the comprehensive monitoring system of Mother Earth and climate change.

132. In terms of water management and climate resilient agriculture practices, specifically under the component 1 and 2, the project will align its activities to the Strategic documents, such as the Framework Law on Mother Earth and Integral Development for **Living Well**. The Framework is an integrated instrument of comprehensive climate change and sustainable environment management planning, by incorporating the subjects of adaptation and mitigation into all sectors related to the environment, land and natural resources use. For instance, Article 16 section 2 establishes that the Plurinational State of Bolivia 'will promote the comprehensive and sustainable management of the components, zones, and life systems to ensure the sustainability of Mother Earth's regenerative capacities through [...] the planning and regulation of territorial occupation and the use of Mother Earth's components according to the ecological and productive vocations of life zones, climate change trends, and the desired scenarios by the population within the framework of Living Well [...].' In turn, Article 17 outlines specific activities to reduce vulnerability to climate change through a focus on prevention, risk management, and adaptation. Additionally, Article 19 foresees the establishment of equitable conditions for access to water for consumption, irrigation, and industrial use within the framework of comprehensive watershed and water resource management[23].

133. The project conforms to the **National Development Plan** (PDES) 2021-2025, especially with the strategic pillars 8 “sustainable and balanced environment in harmony with mother earth” and 3 “Food Security with Sovereignty”. The targets of pillar 8 focus on strengthening the integrated management of surface and groundwater resources to achieve water security and promoting mitigation, adaptation, and monitoring actions for climate change, with effective response

[22] https://climatepromise.undp.org/what-we-do/where-we-work/bolivia#:~:text=Bolivia's%20updated%20NDC%20includes%20non,to%20be%20achieved%20by%202030

[23] http://www.planificacion.gob.bo/uploads/marco-legal/Ley%20N%C2%B0%20300%20MARCO%20DE%20LA%20MADRE%20TIERRA.pdf

measures to its impacts in harmony and balance with Mother Earth, while the targets of pillar 3 rely on supporting greater availability and access to agricultural inputs to increase agricultural production. Moreover, the Plan -in alignment with the Gender plan[24]- highlights several key points related to women's empowerment and gender equality such as, among others, increased access to education for Women and Equal Pay and Employment Opportunities[25].

134. This project also lies in the **Patriotic Agenda 2025** that outlines a roadmap and sets forth specific goals and objectives to be accomplished by the year 2025, with the overarching aim of advancing Bolivia's socioeconomic development while ensuring social inclusion and environmental sustainability. Furthermore, it is also closely aligned with the **National Plan for Equality of Opportunity** ¨Women building the New Bolivia, to live well¨. The Plan includes different pillars: (1) Economic, productive and labour markets, (2) Education, (3) Health, (4) Violence and (5) Citizenship and political participation

135. Finally, the project will contribute directly to the following Sustainable Development Goals: **SDG 1** (No poverty), **SDG 2** (Zero hunger), **SDG 5** (Gender equality), **SDG 12** (Responsible consumption and production), and **SDG 13** (Climate action).

E. National Technical Standards and Environmental and Social Policy

136. The project is closely aligned with and in support of relevant national technical standards and complies with the Environmental and Social Policy of the Adaptation Fund. The project's design process is conducted collaboratively with the country's government, ensuring active participation from the relevant entities. The project will contribute to the following national priorities: eradicate extreme poverty; scientific and technological development; productive development with diversification; country-level food security; and environmental and comprehensive development

137. In terms of meeting national technical standards, the project incorporates infrastructure investments at the territorial level that comply with relevant guidelines. Water-related laws and regulations are crucial for the management, conservation, and equitable distribution of water resources. One of the significant laws concerning water in Bolivia is Law No. 2066, also known as the General Water Law or "Ley de Aguas." The Law No. 2066 was enacted in 1999 and serves as the primary legal framework governing water resources in Bolivia. Furthermore, The National Watershed Plan for Integrated Water Resources Management is a strategic plan in Bolivia designed to address the comprehensive and sustainable management of the country's watershed areas. This plan aims to ensure proper use, conservation, and protection of water resources at the watershed level, considering aspects such as water availability, quality, and equitable distribution. Project interventions will ensure compliance with established standards under the water management practices and technologies. Rainwater harvesting systems, small-scale infrastructures that increase water infiltration (mini-dams, infiltration trenches, infiltration ponds), will enable communities to improve agricultural productivity and enhance resilience to climate change impacts, especially during drought periods. Moreover, the Full Proposal will comprehensively analyze the laws, regulations, and relevant environmental and social impact assessments for each activity, as outlined in Section II.D., ensuring alignment with technical standards and benefiting from the support of Bolivian government technicians. The project will align with specific technical standards for water regulations, construction codes and Environmental Impact Assessment relevant to the Bolivian context, including: **Construction Codes:** the project will adhere to construction codes specified by Bolivian authorities, ensuring that all infrastructure development is in line with Decreto Supremo N° 1.641 and the Decreto

[24] Gender plan will be developed for the FP

[25] https://observatorioplanificacion.cepal.org/sites/default/files/plan/files/PDES_2021-2025a_compressed_0.pdf

N.3856 as presented below. **Environmental Impact Assessment (EIA) Standards:** The project will follow the EIA standards set by Bolivian regulatory bodies, as outlined in Decreto Supremo N° 1.641 and Decreto N.3856. Article 17 of the Reglamento de Prevención y Control Ambiental stipulates the categorization levels for EIA: **Category 1:** Comprehensive Analytical Environmental Impact Assessment (EEIA) with a Declaratoria de Impacto Ambiental (DIA).**Category 2:** Specific Analytical Environmental Impact Assessment (EEIA) with a DIA. **Category 3:** Prevention and Mitigation Program - Environmental Application and Monitoring Plan (PPM-PASA) with a Certificate of Dispensation. **Category 4:** No requirement for EEIA or PPM-PASA, as specified in Anexo "A" of Decreto N.3856. AOPs identified in this category within a Protected Area must communicate the start of activities to the respective AAC, attaching the Compatibility of Use Certificate issued by SERNAP. Article 17 of the Reglamento de Prevención y Control Ambiental stipulates that projects falling under Category 4 do not require a comprehensive EIA, mitigation measures, or the formulation of an Environmental Application and Monitoring Plan. The list of Category 4 projects has been expanded by the National Competent Environmental Authority (AAC) for activities related to Water Resources, Integrated Watershed Management, Basic Sanitation, Transportation, and Social Infrastructure. The expanded list will be applied to each project component. **EIA Procedure (Article 3 of Decreto Supremo N° 1.641):** The Legal Representative of the activities described in Article 2 must request the issuance of a Dispensation Certificate from the AAC. The request should include information that will be treated as a sworn statement. **Control and Monitoring (Article 4 of Decreto Supremo N° 1.641):** For environmental control and monitoring purposes, the Legal Representative of the activities provided in this Decreto Supremo must submit a report to the AAC at the end of the execution phase regarding environmental conditions. In case of observations to the aforementioned report, the AAC, within its powers, will communicate these observations to the Legal Representative of the activities for immediate corrective measures. **Water Quality Regulations:** The project will strictly comply with Bolivia's water quality regulations, as stipulated in Decreto Supremo N° 24.176 - Reglamentación de la Ley del Medio Ambiente, which specifically addresses water quality regulations. These regulations govern Law N° 1.333 of 1992, aiming to prevent and control water pollution within the framework of sustainable development. They apply to individuals or entities, whether public or private, engaged in various activities, including industrial, commercial, agricultural, domestic, and recreational, that may pose a risk of water resource pollution.Regarding water-related infrastructure, the project will align with the guidelines outlined in Decreto N.3856. For the sub-sector of irrigation, encompassing the construction, improvement, and rehabilitation of dams for family gardens and livestock watering, the project will consider the specific conditions specified in Decreto 3856 for the Sub-sector of Irrigation. Notably, constructions oriented for family gardens and livestock watering, falling under category 4, involve systems with a water volume less than 4,000 m3. This applies to family irrigation systems utilizing groundwater through wells with pumps for sprinkler and drip systems, covering areas smaller than 60 hectares. It's important to note that irrigation schemes exceeding 500 hectares and utilizing water from dams are subject to higher categorizations, either 1 or 2.

138. Moreover, the project ensures compliance with the Environmental and Social Policy of the Adaptation Fund which emphasises the importance of sustainable development, environmental safeguards, and social considerations. The project integrates these principles by incorporating resilient agriculture practices, water efficiency and irrigation management technologies and small-scale infrastructure to increase water infiltration.By meeting relevant national technical standards and complying with the Environmental and Social Policy of the Adaptation Fund, the project ensures that its activities are carried out in a manner that is environmentally sustainable, socially inclusive, and aligned with the country's established guidelines and policies.

139. The proposed project will be fully developed taking into account national and international policies, strategies and treaties. At the international level, ratified international treaties linked to the Project's approach include:

- The Ramsar Convention (1975)
- The Convention on the Conservation of Migratory Species of Wild Animals (1983)
- The Convention on Biological Diversity (1993)
- The United Nations Framework Convention on Climate Change (1994)
- The Convention to Combat Desertification and Drought (1996)
- The Sendai Framework for Disaster Risk Reduction (2015)
- Paris Agreement (2016)

140. Beyond the alignment with national strategies, the proposed project is aligned with IFAD policies and corporate priorities, including the strategic objectives of the COSOP approved by IFAD Executive Board in November 2020: (i) Improve the agricultural productive capacity of inclusive production systems in a way that is environmentally sustainable and resilient to climate change; ii) Facilitate market access and iii) access to finance; improved nutrition; empowerment of women and youth; and natural resource management and climate change. The project is also aligned with IFAD's strategic vision and comparative advantage, particularly its SOs: Increasing poor rural people's productive capacities and strengthening the environmental sustainability and climate resilience of poor rural people's economic activities. F. Duplication

141. After first set of consultations within the country, the project concept note mission has confirmed that there is no risk of duplication with other existing projects or programs. During the preparation of the project, a thorough needs assessment process was conducted, which included an analysis of synergies and potential overlaps with other projects (to be concluded during full design process). The findings, presented in the table below, demonstrate that the majority of the projects and initiatives either have complementary activities or do not have geographical overlap with the project's targeted intervention area.The careful analysis conducted during the project design phase ensures that the proposed project is well-positioned to avoid duplication and effectively contribute to addressing climate change in Bolivia. By leveraging existing initiatives, scaling up successful practices, and fostering partnerships, the AF project maximizes its impact while minimizing any potential overlap with other projects or programs.

Table 6: List of relevant projects

Other projects/partners	Summary And Geographic overlap with the project	Identified synergies
GCF - Upscaling Ecosystem Based Climate Resilience of Vulnerable Rural Communities in the Valles Macro-region of the Plurinational State of Bolivia (2023-2027)	The project is a climate adaptation investment aiming to enhance the resilience of livelihoods, ecosystems, irrigation infrastructure, and food security in the Valles Macro-region of Bolivia, to face the increasing hazards of climate change. The project structure and proposed activities are built on the close relationship between ecosystem functions and services (primarily hydrological regulation) on the one hand, and climate and social-ecological resilience on the other. The project aims to tackle climate change from an integral and systemic perspective.	Both projects will focus on water at different scales and part of the water cycle, allowing them to fill each other's gaps and potentiate their impact when coinciding geographically. It can geographically overlap the proposed project in the Valles Macro-region. However, the GCF project does not focus on groundwater, nor it performs any studies of groundwater dynamics or identifies specific recharge areas.
World Bank: PAR III **(2023-2027)**	The World Bank approved a US$300 million loan that will benefit nearly 130,000 families from rural communities and producers in Bolivia. The financing will contribute to increase food security, market access and the adoption of climate-smart agricultural practices in the country. At least 1,000 rural community associations are the main beneficiaries of the Innovation for Resilient Food Systems (Rural Alliances – PAR III) Project, which will help reduce vulnerability to acute and chronic food insecurity through small-scale investments in infrastructure and services and nutrition enhancement by inserting	The proposed project can complement the ongoing project of the World Bank. It aims to improve the quantity and quality of agricultural produce not only entails enhancing the income and competitiveness of rural producers, but also ensuring that Bolivia has enough food to meet its nutrition and social development targets, a key challenge in the country. Overall, the two projects complement each other by addressing different aspects of agricultural development. While the World Bank project focuses on small-scale investments in infrastructure and services for better nutrition and vulnerability reduction actions, the Adaptation Fund project contributes to improving resilience and

	technology in agricultural activities and training to manage it. The PAR III project will cover the entire national territory.	adaptation through enhanced water management. Together, they contribute to the overall development and resilience of the agricultural sector in Bolivia.
FAO - Technical Assistance- Harvesting Life Program, Safe Water Component (2017-2018)	The project aims at supporting the Ministry of Environment and Water in implementing its Planting Light Harvesting Life DS Program 2472, with the aim of ensuring access to water for human consumption and irrigation for at least 150 families.	The proposed project will leverage the lessons learned, best practices, and experiences gained from the previous FAO project. The design team is in direct contact with FAO Bolivia and will make sure to include good practices in the proposal.
GIZ - Integrated rural development at river basin level (PROCUENCA) (2018 to 2024)	The project aims to enhance responsible water resource use at national, regional, and local levels by implementing climate-sensitive measures, protecting water sources, and collaborating with stakeholders. It focuses on developing water management plans in key basins, strengthening governmental and organizational capacities, and establishing digital systems for improved climate and water resource understanding, contributing to enhanced water security and resilience to climate change effects.	The proposed project can synergize with the ongoing GIZ project by aligning efforts in integrated water management, capacity building, climate data systems, community engagement, policy coherence, and risk reduction. The GIZ project will end before the start of the AF project, avoiding duplication. Lessons learned from this project were integrated in the proposed project design and visits to GIZ activities should be organized during the Full Proposal design mission of the proposed project.
FONPLATA - Harvesting Water – Planting Light. Potosí (2018 - 2023)	Approximately 1,500 dispersed rural households living in areas of extreme poverty in the Department of Potosí benefits from the Harvesting Water Planting Light Program through the installation of water collection tanks and photovoltaic panels.	The proposed project will complement the FONPLATA-funded initiative by improving water efficiency in agriculture and ensuring the sustainable use of water from aquifers. The FONPLATA project will conclude before the proposed project commences, preventing any overlap in timelines
Enhancing Climate Services for Improved Water Management (CliMWaR) (2018-2022)	The overall objective of the project is to provide reliable climate services to monitor and forecast droughts and floods at the local level to improve national risk management strategies and to lower the impact of water-related hazards on vulnerable communities through improved communication and outreach.	Throughout the Full Proposal design mission, the design team will ensure the seamless integration of lessons learned from The CliMWaR initiative, particularly in terms of local-level weather forecasting and early warning systems.
HELVETAS- Andas Resilientes (2020-2024)	Andes Resilientes aims to contribute to the resilience and adaptive capacity to climate change among Andean rural populations (both women and men) living in conditions of poverty and vulnerability. The initiative focuses on enhancing their food and water security by coordinating efforts with public and private stakeholders specialized in rural development. The goal is to improve access to services that support the climate resilience of vulnerable Andean populations in Bolivia, Ecuador, and Peru.[26]	The proposed project will leverage the valuable experiences gained from this project ensuring that the lessons learned from the previous initiatives are applied and further advanced.
IFAD: FRONTERA (under design)	The objective of the IFAD project is to increase the resilience and food and nutritional security of small agro ecological producers' families and those in agroecological transition. Enhancing resilience capacity is key for a sustainable poverty alleviation for families engaged in family farming, as well as for the sustainability of agri-food systems to which family farming contributes, and upon which they depend for their family's nutrition. Based on MDR&T guidelines, the new project has as its main criterion for geographical targeting the border municipalities. These areas exhibit high vulnerability in socioeconomic, productive, environmental, climatic, and food and nutritional security dimensions.	The proposed project and IFAD can collaborate synergistically to enhance their respective efforts. They can exchange knowledge, share best practices, and communicate information on climate risks. Additionally, there is potential for collaboration (that will be further investigate during the full design) in some activities, the proposed project can share best practices regarding water management.

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G. Learning, Knowledge Management and Lessons Learned

142. The learning and knowledge management sub-component will be an integral part of the project's management framework. However, it is important to note that knowledge management is already inherent across all components of the project, since the technologies and investments will be constructed in a participatory manner and adapted within each community.

143. Components 1 and 2 of the project will generate knowledge through extensive studies focused on aquifers, surface and subsurface water flows, and groundwater dynamics. These investigations will pinpoint recharge areas and involve the development of small-scale infrastructure technologies or agricultural practices. Additionally, the project will concentrate on implementing infiltration improvement practices and sustainable solutions, which will be disseminated among beneficiaries and stored for future reference.

144. .At the territorial level, Component 3 may support the equipment of specialized institutions (water and soil) such as expanding the piezometer and climate change monitoring network to enhance understanding of underground water levels and the water cycle. This valuable information will better inform the country about water availability and the water cycle, it will also integrate participatory monitoring systems for climate change variables, collecting and centralizing data at the national meteorology and hydrology service level, if allowed. Furthermore, this component will enhance knowledge sharing through institutional engagement and project sustainability by developing procedural manuals and best practices. This effort aims to strengthen institutional development in Climate Change and water recharge for the Ministry of Rural Development and Land (MDR&T).Lastly, technological and professional curricula to study groundwater dynamics will be designed.

145. By incorporating these various measures, the project seeks to effectively capture and disseminate lessons. This ensures that valuable knowledge and insights gained throughout the project's implementation are shared widely benefiting stakeholders, policy-makers, and the broader agricultural community.

H. Consultative Process

146. During the concept note's preparation phase, a consultative process was undertaken in compliance with the Environmental and Social Policy and Gender Policy of the Adaptation Fund, as well as the mandate of IFAD to support the most vulnerable people. The consultative process began with a concept mission visiting Bolivia from 02 October till 7 October 2023. The team had the opportunity to meet representatives from both MDR&T and MDP. The mission team engaged with a range of stakeholders, including public sector counterparts, environmental protection and agriculture authorities, UN agencies, PMU of IFAD-funded projects, civil society organisations, academic institutions, and relevant sectoral experts with regard to project objectives, activities and implementation. Online meetings were also organized with WB after the mission in the country. A detailed list of individuals met during these engagements is provided in the Annex 2.

147. To ensure effective communication and collaboration, briefing sessions were organized between the mission team and the respective Ministries of Rural Development and Lands, Development and Planning. These sessions allowed for direct dialogue and information sharing with key decision-makers. The team had also the opportunity to directly engage with academic stakeholders in close coordination with the MDR&T and its existing Project Coordination Unit 'Unidad POZOS'. The project design team also consulted with PMUs of IFAD-funded projects mainly on Gender and youth. The full design mission will include field visits and continue the consultative process, ensuring the active participation of the most vulnerable groups, including women and youth, in discussions and engagements through workshops. By prioritizing their

inclusion, the project aligns with the IFAD mandate to support the most vulnerable people and promotes inclusivity and gender considerations. These efforts are in line with the Environmental and Social Policy and Gender Policy of the Adaptation Fund.

I. Justification for Funding

148. The imperative for the requested funding is grounded in a rigorous assessment of the full cost of adaptation, a critical consideration for the successful implementation of this project. The project aims to promote a shift away from the baseline scenario characterised by an over exploitation of agro-pastoral eco-services that are in turn being degraded both by direct anthropogenic pressures as well as those from an increasingly variable climate. The primary objective of this project is to enhance adaptation to climate change and bolster the resilience of three prioritized areas heavily reliant on depleted groundwater sources for their livelihoods. Through a comprehensive array of proposed components that tackle the groundwater dynamics issue from its source to utilization, backed by knowledge dissemination, monitoring, and scientific studies, the project aims to construct or modify existing technologies to enhance groundwater recharge.

149. The requested funding encompasses various essential components, including participatory climate change assessments, capacity building, infrastructure development, and community engagement. By adopting an agroecological approach, the project seeks to promote sustainable and resilient farming practices that integrate ecological principles, augmenting the adaptive capacity of agricultural systems.

150. The full cost of adaptation reasoning accounts for both direct and indirect expenses incurred throughout the project's lifespan. This involves investing in advanced practices and approaches to optimize water management and elevate long-term agricultural productivity, with the entire investment covered by Adaptation Fund resources. It further covers costs related to training farmers on agroecological practices, facilitating knowledge exchange, ensuring the enduring viability of sustainable farming methods, and restoring climate change-induced degraded agricultural land while preventing further degradation. In line with the United Nations Convention to Combat Desertification, investing in the restoration of degraded land in Bolivia is anticipated to yield significant returns. This project aligns with this perspective, emphasizing the economic incentive for bold actions against land degradation through the application of sustainable land management practices. The funding requested from the Adaptation Fund is pivotal for covering the full cost of adaptation, enabling the successful implementation of sustainable agricultural practices and water management strategies that can enhance the resilience of Bolivia's agricultural sector in the face of climate uncertainties. It also focuses on improving water management efficiency with community knowledge and ownership, intending these solutions to independently address the water scarcity issue without requiring additional funding from external donors. Furthermore, the requested funding encompasses the development and implementation of robust monitoring and evaluation systems to track the project's progress. These mechanisms will be aligned with and contribute to the national-level monitoring and evaluation system, ensuring evidence-based decision-making and maximizing the project's impact.

J. Project Sustainability

151. Sustainability considerations have played a pivotal role in shaping the design of this project. The emphasis is on securing the lasting impact of its activities across three key components: the first two encompassing technical and community investment, and the third involving information support and institutional strengthening.

152. **Component 1: Establishment of integrated water Recharge Infrastructure and Climate-Resilient Practices (Water Recharge Zones)** . This component is designed to facilitate the

implementation of structures for groundwater recharge, including mini-dams, infiltration trenches, and catchment ponds. It also advocates for the adoption of practices and technologies, such as animal ponds and erosion prevention, to mitigate the risks associated with climate change. The project is grounded in thorough studies of groundwater recharge zones, surface and subsurface water flow, and water distribution, enabling it to address climate variability effectively. Moreover, this initiative involves the collaborative construction of these solutions within the community and provides essential technical support. This strategic approach aligns seamlessly with the project's overarching commitment to sustainably enhance water availability and reduce climate-related vulnerabilities in the targeted and vulnerable regions of Bolivia.

153. **Component 2: Introduction of innovative climate and water smart technologies and practices (Zones for productive use of groundwater)** . This component is specifically crafted to encourage the uptake of climate-resilient agricultural practices in areas reliant on groundwater for agricultural purposes. Through the introduction of efficient water management and harvesting technologies, it enhances the resilience of agricultural systems. This, in turn, fosters the enduring viability and sustainability of agricultural activities, enabling farmers to adeptly navigate evolving climatic conditions. By leveraging insights gained from successful pilot projects and incorporating valuable lessons learned, this component significantly contributes to the lasting sustainability of agriculture and the prudent management of natural resources.

154. **Component 3: Strengthening Climate and Hydrological Monitoring, Institutional Development and Knowledge Transfer**. This pivotal component centers on enhancing climate and hydrological monitoring, bolstering institutional capacity, and facilitating knowledge transfer. The project envisions identifying potential groundwater recharge zones, installing monitoring equipment such as piezometers and climate stations, and consolidating data at the national meteorological and hydrological service. This meticulous approach, coupled with community monitoring, guarantees the systematic collection of climate data. Furthermore, the project conducts training sessions for municipalities and communities on monitoring wells and climate variables. It introduces academic curricula and technical training programs in climate change and groundwater recharge, imparting crucial skills to future professionals in the realm of sustainable agriculture.

155. These proactive measures underscore the project's steadfast commitment to long-term sustainability, knowledge dissemination, and institutional development. A notable initiative involves the creation of a comprehensive manual that will serve as a guiding resource, aiming to enhance procedures and promote best practices. This manual will specifically focus on institutional strengthening concerning climate change and groundwater recharge. By providing a robust reference point, the project ensures that forthcoming activities will uphold quality and consistency in alignment with the objectives of climate change adaptation and sustainable water resources management. Through the integration of locally adapted practices, small-scale low-cost infrastructure, and agro ecological principles at farm level, this project actively empowers communities, advocates for sustainable agricultural methodologies, and enhances resilience to climate change—specifically addressing variations in water supply. By facilitating adaptation measures to counter the impacts of climate change and mitigating risks associated with agriculture, the project significantly contributes to long-term sustainability.

K. Environmental and Social Impacts and Risks

156. The environmental and social screening conducted during the concept stage, as presented in the table below, indicates that the project has a category ‘B’ for the potential risks associated with the construction of small water infrastructure and the use of organic fertilizers, both will have appropriate safeguards in place. Any site-specific risks identified can be readily addressed, resulting in the project being categorized as a Medium-risk project. During the project preparation

phase, the proposal will undergo assessments in accordance with both the Adaptation Fund and IFAD Procedures, as well as gender policies. To ensure transparency and inclusivity, the full design mission will engage in public consultations at ministerial levels, with donor and partner organisations, other UN agencies, civil society, academia, and women, Indigenous Peoples and farmer associations operating in Bolivia. Comprehensive records will be maintained as evidence of all consultations conducted. The project will facilitate the gathering of gender-disaggregated data through the expertise of a gender design specialist. This process will adhere to IFAD gender guidelines, which encompass the following AF guidelines:

- Conduct consultations with male and female beneficiaries/stakeholders separately as well as in mixed groups.
- Conduct consultations with Indigenous Peoples separately as well as in mixed groups.
- Carefully consider the timing and location of consultation meetings to ensure balanced gender representation.
- Utilize appropriate communication methods to effectively engage both women and men.
- Set targets for gender attendance to ensure meaningful participation.
- During the design mission, deliberate efforts will be made to involve national women's machineries, structures within and outside the government ministry dedicated to women, youth, and gender equality agencies, in addition to the National Designated Authority (NDA). This inclusive approach will encompass women's networks, gender and women's rights organizations, civil society, and academia at both the national and local levels.

Table 7: Adaptation Fund Environmental and social checklist

Checklist of environmental and social principles	No further assessment required for compliance	Potential impacts and risks – further assessment and management required for compliance
Compliance with the Law		**Low/No risk** The proposed project is developed in close collaboration with the Bolivian government, ensuring strict compliance with relevant laws and regulations, thereby reducing the risk level associated with this ESP. As part of the ESA and ESCMP, the full project proposal will carry out an analysis of relevant laws and detail the project's compliance with said laws.
Access and Equity		**Low/No risk** By prioritizing transparency and accountability during design and implementation, the project aims to mitigate any adverse effects on affected individuals, ensure their rights are protected, and maintain a low/no risk level in terms of access and equity. When designing and planning the activities, ensure that any activity with communities targets vulnerable groups such as women, youth and Indigenous peoples. Throughout its implementation, the project will collaborate with the national authorities, specifically the Ministry of Ministry of Rural Development and Lands and Ministry of Planning for Development, to ensure that vulnerable and marginalized groups are not negatively impacted. To ensure inclusivity, the project will engage in participatory consultative processes, enabling all individuals to have a voice and address any concerns they may have. Additionally, IFAD will widely promote its grievance procedures, providing a means for anyone who believes they have been involuntarily displaced to seek appropriate remedies. By prioritizing transparency and accountability, the project aims to mitigate any adverse effects on affected individuals and ensure their rights are protected.
Marginalized and Vulnerable Groups		**Medium risk** The "Medium risk" classification indicates potential complexities in engaging marginalized and vulnerable groups, requiring careful planning to address challenges related to consultation, threat identification, empowerment, decision-making, transparent processes, and the respect for rights. Marginalized and vulnerable groups – especially women, youth and Indigenous Peoples - will be consulted during the proposal development process to ensure that their identified threats, priorities and mitigation measures are reflected. This project will empower vulnerable groups to make

		decisions on concrete adaptation actions, valuing their traditional and local knowledge. This project will create a space for women, and youth to choose adaptation activities in a transparent and participatory manner. Additionally, this project will respect land, property and customary rights.
Human Rights	X	**Low/no risk** This project is committed to upholding the rights of all individuals and does not violate any fundamental human rights principles or pillars
Gender Equality and Women's Empowerment		**Low risk** The "Low risk" classification for Gender Equality and Women's Empowerment is attributed to the project's comprehensive strategy, strict alignment with international gender inclusion policies, numerical targets, inclusive planning processes, stakeholder engagement, and analysis, fostering an equitable and inclusive environment for women in Bolivia's agricultural sector. The project will promote gender equality and women's empowerment through its targeting strategy. During the development of the comprehensive project proposal, the project will ensure alignment with the gender inclusion policies of both the Adaptation Fund and IFAD. This alignment will be reflected by considering the percentage of women engaged in the agricultural sector in Bolivia. To promote gender equality, the project aims to have a minimum of 40% percent of the beneficiaries be women, adhering to the principles outlined in project targeting. Furthermore, specific measures will include conducting gender analysis along with stakeholder engagement and analysis to recognize and address the rights, needs, and opportunities of women and men, as well as their different needs, roles, and barriers. Active participation of women will be ensured in the planning process through methods such as focus group discussions. The project will also facilitate women's involvement in policy formulation and discussion processes through committees representing the interests of specific groups or communities. By prioritizing gender inclusion, the project aims to create a more equitable and inclusive environment for women in the agricultural sector of Bolivia .
Core Labour Rights		**Medium risk** The project will ensure respect for international and national labour laws and codes, as stated in IFAD's policies. However, there is the possibility that the project operates in sectors or value chains that are characterized by working conditions that do not meet national labour laws or international commitments.
Indigenous Peoples		**Medium Risk** There are indigenous people in Bolivia. The project, aligned with IFAD's operational policies, involves indigenous people in Bolivia and will establish an Indigenous Peoples Plan and Free, Prior, and Informed Consent (FPIC), introducing a medium risk designation due to potential challenges related to effective implementation and engagement with indigenous communities.
Involuntary Resettlement	X	**Low/no risk** The project has no plans for resettlement.
Protection of Natural Habitats		**Medium** No activities envisioned to adversely impact protected areas or high value conservation areas. Relevant measures will be included in project Environmental and Social Management Plan. This risk will be further assessed during full proposal development.
Conservation of Biological Diversity	X	**Low risk** The risks to biodiversity are associated with intervention in protected areas. The execution of the project will consider the exclusion criteria and technical criteria from ESA for intervention in protected areas.
Climate Change	X	**Low/No risk** The project area is susceptible to climate shocks. The project will not generate any significant emissions of greenhouse gases and will not contribute to climate change in any other way.
Pollution Prevention and Resource Efficiency	X	**Medium risk** The project will actively promote the adoption of resilient practices, water conservation, and efficient technologies. Although there may be specific risks associated with each project site, these risks can be easily identified and effectively addressed. The project team will proactively work towards finding suitable solutions and mitigation measures to overcome any site-specific challenges that may arise, ensuring the successful implementation of the project activities.

Public Health	X	**No risk** No adverse impact on public health related issues is envisaged.
Physical and Cultural Heritage	X	**Low risk** There is a low probability that the project will be implemented in areas considered to hold archaeological (prehistoric), paleontological, historical, cultural, artistic, or religious value, or areas containing features considered critical cultural heritage. If this were to happen, the consequence would be low
Lands and Soil Conservation		**Low/no risk** The project will promote sustainable land management practices at territorial and farm level.

L. Grievance and Redress Mechanism

157. The proposed project aims to implement a dedicated Grievance and Redress Mechanism (GRM) modelled after IFAD's grievance mechanism[27] . This GRM will cater to individuals, authorities, or community representatives who may be affected by the project's implementation. It will provide them with a platform to voice concerns regarding potential non-compliance with its social and environmental policies or commitments.

- Multiple GRM channels should be used, depending on the context and group inclusion barriers. The Project will set up a system for receiving and handling complaints and denunciations with the adoption of an Ombudsman channel.
- The Project will implement an ongoing programme to disseminate integrity policies, as well as offering training and guidance on the use of whistleblowing tools to the target groups. It would be disseminated and shared with the communities, beneficiaries and other stakeholders during the project inception workshop and subsequent meetings
- As part of the grievance redress mechanism, the contact details of the project partners - Cluster Coordinator/ Project Manager would be made available to stakeholders including project beneficiaries and the community. The grievance mechanism will be available to the entire project intervention areas, and GRM % of resolution will be reflected and reported in M&E system

158. Communities and individuals who believe that they are adversely affected by this IFAD supported project may submit complaints to the existing project-level grievance redress mechanisms or to IFAD's established complaints procedure. IFAD's accountability and complaints procedures receive and facilitate resolution of concerns and complaints with respect to alleged non-compliance of IFAD's environmental and social policies and the mandatory aspects of its Social, Environmental and Climate Assessment Procedures in the context ofIFAD-supported projects. The procedure allows affected complainants to have their concerns resolved in a fair and timely manner through an independent process. IFAD may be contacted by e-mail at SECAPcomplaints@ifad.org or via its website at https://www.ifad.org/en/accountability-and-complaintsprocedures. Affected parties may also submit their grievances to the Adaptation Fund Ad Hoc Complaint Handling Mechanism (ACHM). Complainants should use the project level grievance redress mechanism and/or IFAD's complaints procedure as a first step. However, the Ad hoc Complaint Handing Mechanism (ACHM) of the Adaptation Fund can be directly used in cases where the Parties have failed to reach a mutually satisfactory solution through the implementing entities' grievance mechanism within a year. More information can be found in the AF website.

[27] Accountability and complaints procedures: https://www.ifad.org/en/accountability-and-complaints-procedures also on AF

Table 9: Results framework & Alignment with AF results framework

Project Outcomes	Project Outcome indicators	Adaptation Fund Outcome	Adaptation Fund Outcome Indicator	Grant Amount (USD)
Component 1. Water Recharge Zones				
Outcome 1.1. Enhanced resilience to climate change impacts and improved agricultural productivity	% of communities in recharge areas are enabled to improve agricultural productivity and enhance resilience to climate change impacts	**Outcome 8:** Support the development and diffusion of innovative adaptation practices, tools and technologies **Outcome 4:** Increased adaptive capacity within relevant development and natural resource sectors	8. Innovative adaptation practices are rolled out, scaled up, encouraged and/or accelerated at regional, national and/or subnational level. 4.1. Development sectors' services responsive to evolving needs from changing and variable climate	780, 000
Outcome 1.2 Climate vulnerabilities and exposure to risks in agriculture sector are reduced through the identification of recharge zones implementing infiltration improvement practices	Ha in Recharge Zones Implementing Infiltration Improvement Practices			3,150,000
Component 2. Zones for productive use of groundwater.				
Outcome 2.1. Rainwater harvesting systems, water management technologies and infrastructure for irrigation increased	% Households supported with increased water efficiency, harvesting techniques and management technologies	Outcome 4: Increased adaptive capacity within relevant development and natural resource sectors	4.1. Development sectors' services responsive to evolving needs from changing and variable climate	1,800,000
Outcome 2.2. Strengthened ownership and awareness of social practices and technologies for Climate Change Resilience at local level	# Households trained with increased water efficiency, harvesting techniques and management technologies	**Outcome 3:** Strengthened awareness and ownership of adaptation and climate risk reduction processes at local level	3.2 Percentage of targeted population applying appropriate adaptation responses	360,000
Component 3. Institutional Strengthening and Generation of Practical Knowledge in Sustainable Water Resource Management and Climate Change.				
Outcome 3.1. Reduction in community vulnerability through the implementation of participatory systems for monitoring climate change variables	# Communities Using and Sharing Pertinent Monitoring of Climate Change Related Variables	Output 3: Targeted population groups participating in adaptation and risk reduction awareness activities	3.1.1 No. and type of risk reduction actions or strategies introduced at local level	1,200,000

Outcome 3.2 Knowledge on Sustainable Water Recharge Practices disseminated and promoted among institutions	# institution´s personnel trained on Sustainable Water Recharge Practices	**Outcome 2:** Strengthened institutional capacity to reduce risks associated with climate-induced socioeconomic and environmental losses	2.1. Capacity of staff to respond to, and mitigate impacts of, climate-related events from targeted institutions increased	1,052,978
Project Outputs	**Project Outputs indicators**	**Adaptation Fund Output**	**Adaptation Fund Output Indicator**	**Grant Amount (USD)**
Component 1 Water Recharge Zones				
Output 1.1.1. Promoting participation in the development of agricultural resilience practices at the household level	# Farmers with resilient agricultural practices implemented	**Output 8:** Viable innovations are rolled out, scaled up, encouraged and/or accelerated.	8.1. No. of innovative adaptation practices, tools and technologies accelerated, scaled-up and/or replicated	600,000
Output 1.1.2. Promoting social adaptation of agricultural resilience practices tailored to local contexts at the household level	# Farmers participating in participatory adaption of agricultural resilience practices	**Output 3**: Targeted population groups participating in adaptation and risk reduction awareness activities	3.1.1 No. and type of risk reduction actions or strategies introduced at local level	180,000
Output 1.2.1 Promoting studies of aquifers, surface, subsurface, and groundwater flows to identify recharge areas and the small infrastructure technologies or agricultural practices	# Studies conducted for each aquifer	**Output 8:** Viable innovations are rolled out, scaled up, encouraged and/or accelerated.	8.2. No. of key findings on effective, efficient adaptation practices, products and technologies generated	300,000
Output 1.2.2 Community-led enhanced water infiltration towards aquifers at the catchment level	# Communities implementing practices to enhance water infiltration towards aquifers	**Output 3:** Targeted population groups participating in adaptation and risk reduction awareness activities	3.1.1 No. and type of risk reduction actions or strategies introduced at local level	225,000
Output 1.2.3. Constructing mall scale water rechargeinfrastructure project	# of small scale water recharge infrastructure project finished	Outcome 4: Increased adaptive capacity within relevant development and natural resource sectors	4.2. Physical infrastructure improved to withstand climate change and variability-induced stress	2,250,000
Component 2. Zones for productive use of groundwater.				
Output 2.1.1. Improved water efficient and irrigation management technologies	# Farmers implementing water efficient and irrigation management technologies	Output 6: Targeted individual and community livelihood strategies strengthened in relation to climate change impacts, including variability	6.1.1.No. and type of adaptation assets (physical as well as knowledge) created in support of individual or community-livelihood strategies	300,000

Output 2.1.2. Strengthened water harvesting technologies	# farmers implementing water harvesting technologies	Output 5: Vulnerable physical, natural, and social assets strengthened in response to climate change impacts, including variability	5.1. No. and type of natural resource assets created, maintained or improved to withstand conditions resulting from climate variability and change (by type of assets)	1,500,000
Output 2.2.1. Increased participation in the social construction of water harvesting/collection technologies to reduce climate risk	# farmers participating in the social construction of water harvesting/collection technologies to reduce climate risk and news released	Output 3.1: Targeted population groups participating in adaptation and risk reduction awareness activities	3.1.2 No. of news outlets in the local press and media that have covered the topic	360,000
Component 3. Institutional Strengthening and Generation of Practical Knowledge in Sustainable Water Resource Management and Climate Change.				
Output 3.1.1. Enhanced Climate monitoring support	# of Piezometers and Climate Monitoring Units Installed and monitored by community members	**N/A**	**N/A**	90 0,000
	# of monitoring stations providing information to the central platforms of the hydrological and meteorological services	**N/A**	**N/A**	150,000
Output 3.1.2. Strengthening of technical assistance on climate monitoring	# farmers trained and using on-farm tools for climate change monitoring	Output 3: Targeted population groups participating in adaptation and risk reduction awareness activities	3.1.1 No. and type of risk reduction actions or strategies introduced at local level	150,000
Output 3.2.1. Knowledge building for municipalities and professionals monitoring wells and climatic variables through a specific institutional structure	# municipalities monitoring wells and climate variables in their area	**Output 2.1:** Strengthened capacity of national and sub-national centers and networks to respond rapidly to extreme weather events	**2.1.1** No. of staff trained to respond to, and mitigate impacts of, climate-related events (by gender)	250,000
Output 3.2.2 Institutional Capacity improved through the development of a manual and hiring of specialists	# Manual in Water recharge best practices developed # Specialists hired		2.1.2 No. of targeted institutions with increased capacity to minimize exposure to climate variability risks (by type, sector and scale)	802,978

PART IV: ENDORSMENT BY GOVERNMENT AND CERTIFICATION BY THE EMPLEMETING ENTITY

A. Record of endorsement on behalf of the government[2]*:*

Mr. Carlos David Guachalla Terrazas *Vice Minister for Planification and Coordination* *Ministry of Planification and Development*	Date*: December, 8th, 2023*

B. Implementing Entity Certification

I certify that this proposal has been prepared in accordance with guidelines provided by the Adaptation Fund Board, and prevailing National Development and Adaptation Plans and subject to the approval by the Adaptation Fund Board, commit to implementing the project/programme in compliance with the Environmental and Social Policy and the Gender Policy of the Adaptation Fund and on the understanding that the Implementing Entity will be fully (legally and financially) responsible for the implementation of this project/programme.	
Implementing Entity coordinator: Mr Juan Carlos Mendoza Casadiegos, Director, Environment, Climate, Gender and Social Inclusion Division	
Date: 22 December 2023 / 08 March 2024	e-mail: juancarlos.mendoza@ifad.org
HQ focal point: Ms Janie Rioux Senior Technical Specialist – Climate Change- AF coordinator ECG division	email: j.rioux@ifad.org
Project contact person: Mr Oliver Page, Regional Lead Environment and Climate Specialist	
e-mail: o.page@ifad.org	
Mr Daniel Anavitarte, Country Director for Bolivia	
e-mail: d.anavitarte@ifad.org	

Annex 1 - Endorsement Letter

BICENTENARIO DE BOLIVIA

ESTADO PLURINACIONAL DE BOLIVIA

MINISTERIO DE PLANIFICACIÓN DEL DESARROLLO

ADAPTATION FUND

Letter of Endorsement by Government

PLURINATIONAL STATE OF BOLIVIA

December 8th, 2023

To: The Adaptation Fund Board
c/o Adaptation Fund Board Secretariat
Email: Secretariat@Adaptation-Fund.org
Fax: 202 522 3240/5

Subject: Endorsement for **"Enhancing climate resilience and protecting agricultural productivity in critical climate-vulnerable areas of Bolivia through the recovery of water recharge."**

In my capacity as designated authority for the Adaptation Fund in Plurinational State of Bolivia, I confirm that the above national project proposal is in accordance with the government's national priorities in implementing adaptation activities to reduce adverse impacts of, and risks, posed by climate change in the Plurinational State of Bolivia.

Accordingly, I am pleased to endorse the above project proposal with support from the Adaptation Fund. If approved, the project will be implemented by International Fund for Agricultural Development and executed by Ministry of Rural Development and Lands.

Sincerely,

Carlos David Gonzalo Chavez Terrazas
Viceminister of Planning and Coordination
Designated Authority for Plurinational State of Bolivia

"2023 AÑO DE LA JUVENTUD HACIA EL BICENTENARIO"

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Annex 2 - Mission schedule and list of people met

PLACE AND DATE	NAME	POSITION	INSTITUTION
Monday 2 October, La Paz	Dedy Gonzales	Director	General Direction for Planning - Ministry of Rural Development and Land
	Boris Roja	Chief Unit	Ministry of Rural Development and Land
	Jaime Vasquez	Professional	General Direction - Ministry of Rural Development and Land
Tuesday3 October, La Paz	Oscar Paz	Professional	
	Javier Gonzales	Professional	
	Efrem Sejas Cespedas	Environment specialist	"Nuesto Pozo"- Ministry of Rural Development and Land
	Boris Roja	Chief Unit	Ministry of Rural Development and Land
	Jaime Vasquez	Professional	General Direction - Ministry of Rural Development and Land
	Wilfredo C. Apaza	Responsible for studies and projects	Ministry of Rural Development and Land
Wednesday 4 October, La Paz	Eliodoro Baldiviezo	Manager	PROSUCO
	Luis Enrique Miranda Baez	Team Leader	BID
	Soeren Rued	Program Coordinator	GIZ
	Luis Javier Zubieta Herrera	Sub-program Head	HELVETAS
Thursday 5 October, La Paz	Jose Luis Montaño	Professor	UMSA
	Edson Ramirez	Researcher	UMSA
	Rosse Noda	Representative - Bolivia	FAO
Friday 6 October, La Paz	Eliodoro Baldiviezo	Manager	PROSUCO
Saturday 7 October, La Paz	Daniel Anavitarte	Country Director	IFAD
	Jorge Arcienega	Consultant	IFAD
	Humberto Gomez	Consultant	IFAD
	Frederico Lacerda	Programme Officer	IFAD