FINAL EVALUATION OF THE PROJECT "CONSERVATION AND SUSTAINABLE USE OF LAND AND ANDEAN VERTICAL ECOSYSTEMS"

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LIST OF ACRONYMS AND ABBREVIATIONS

APMT	Plurinational Authority of Mother Earth
BID	Inter-American Development Bank
EVE	Andean Vertical Ecosystems
FAOI-NP	Federation of Native and Indigenous Ayllus of Northern Potosí
GEF	Global Environmental Facility
INE	Statistics National Institute
INRA	National Institute of Agrarian Reform
JAKISA	Jatun Ayllu Killakas Azanajaki
MMAyA	Ministry of Environment and Water
PDM	Municipal Development Plans
PDMIs	Demonstration Plots of Integral Management
PGTC	Community Territorial Management Plans for Living Well
PMOT	Municipal Plans of Territorial Planning
PTDI	Territorial Plans for Integral Development
SUNIT	Single National Land Information System
MTCC	Plurinational System of Information and Integral Monitoring of Mother Earth and Climate Change
SIG	Geographic information system
SPIE	State Planning System
UCDAP	Council Union for the Development of Ayllus in Paz

1. BACKGROUND

The Project "Conservation and use of biodiversity and land in Andean Vertical Ecosystems in the Ayllus of northern Potosí and southeastern Oruro "(hereinafter: EVA project), financed with FMAM / GEF resources (Global Fund for the Environment) through a Non-Reimbursable Investment Financing Agreement (GRT Nº / FM 12228 - BO) signed with the Inter-American Development Bank (BID) within the framework of the Andean Ecosystem Conservation Strategy, aims to promote the conservation of agricultural biodiversity and sustainable use of soil and water in the Andean Vertical Ecosystems (EVA), through the organizational structures of the Ayllus of Northern Potosí and Southeastern Oruro

The traditional use of vertical ecosystems has provided food products highly complementary to the populations of the Ayllus, as well as additional income from the sale of these products. Despite the importance of this strategy of using different ecological strata and the resources they generate for the communities, there is little information about their status, use and potential for the sustainable management of traditional land use practices.

The purpose of the project was to promote the conservation of agro-biodiversity and the sustainable use of soil and water in the EVA through the organizational structures of the Ayllus of Northern Potosí and southeast of Oruro, in order to strengthen food security and the long-term sustainability of the peasant-indigenous populations of this sector. The expected result was to demonstrate that the adaptive management model of the Ayllus promotes the conservation of agro-biodiversity and sustainable use of soil and water in the Demonstration Plots of Integral Monitoring (PDMI) located in the EVA and that this model can be incorporated in municipal territorial planning and family farming. The project should contribute to raising awareness, recovering and disseminating local traditional practices for the conservation of agro-biodiversity, soil and water. Also create synergies with other agricultural development projects, particularly the Rural Food Initiatives Creation Project (CRIAR), which would be implemented in coordination with the Ministry of Rural Development and Lands (MDRyT).

Initially, the project was planned with a five-year implementing time (from 2011 to 2015); but difficulties of an administrative nature extended its execution until December 2017, with the project activities being more intense from 2014 to 2017. Currently the EVA project is in a closing stage and it is expected that it will conclude its activities at the end of this year. Considering the life of the Project, the amount of resources invested, the importance of the region in terms of agrobiodiversity and the threat that natural resources suffer in general, it is necessary to carry out a final evaluation of the EVA project that allows to see the results and the impact of the actions that have been proposed and implemented to reduce and mitigate the degradation of agro-biodiversity and natural resources that exist in the project area.

It is important to mention that in the process of preparing the baseline the indicators were matched between the GEF matrices (21 indicators) and BID (9 indicators) and the units of measurement and means of verification were reviewed. The indicators of both matrices were adjusted according to the SMART criteria, and an analysis of complementarity of indicators was carried out. The adjustment process, review and approval of indicators was a consensus work with the BID and the Implementing Unit of the EVA Project in a previous instance.

The implementation of the EVA project generated a substantial amount of information that will be used in this evaluation. The document will conduct technical and economic evaluations of the EVA project in its activities throughout the next years and will collaborate with/use inputs to plan for possible next stages/steps based on the area's high susceptibility to climate change, high poverty index and high food insecurity. In this sense, a technical study will be prepared that will contribute to the management of project financing that will allow to confront these problems and threats through efficient management of life systems.

2. OBJECTIVES

General Objective

Carry out the final evaluation of the PROJECT implementation "CONSERVATION AND SUSTAINABLE USE OF ANDEAN LAND AND VERTICAL ECOSYSTEMS" in the operational and financial phases, in each of the components of the Program in accordance with 4.07 clause of the Special Provisions of the Non-Refundable Financing Agreement for Investments No. GRT/FM 12228 - BO.

Specific Objectives

a) Determine to what extent the objectives and expected results have been achieved.
b) Analyze the relevance of the products implemented and their assessment by users.
c) Analyze lessons learned and main findings.
d) Analyze the sustainability of the Program once the BID financing ends.

3. WORK METHODOLOGY.

In order to meet the expectations of the consultancy, the following activities were carried out:

a) A preliminary diagnosis and analysis

b) An update of the monitoring matrix up to year 2017 according to the indicators previously adjusted for the project.

c) An analysis on the perception of the activities implemented by the EVA project.

d) Verification in the infrastructure field and supplies delivered to the communities.

e) Two case studies were developed according to the specifications of the EVA project.

f) And a financial evaluation, considering the efficiency in terms of budget implementation.

the diagnosis includes a national and international legal framework under which the different activities of the EVA project have been developed, a thorough description of the intervention area, and an actor mapping that aims to identify possible alliances for the next stage. A SWOT analysis of each component is also carried out and a preliminary analysis of the monitoring matrix prepared with information up to year 2016 is submitted (Appendix A).

For the update of the monitoring matrix up to year 2017, information available from the EVA project was collected, such as semiannual technical reports, consulting reports and publications promoted by the EVA Project throughout the implementation of the same. With this information, the project

monitoring matrix was updated to year 2017. Subsequently, two analyzes were carried out with this information, a first analysis of compliance with the goals identified in the "Operation Manual", for which the work was carried out based on the indicators of the monitoring matrix. In this sense, there is nowadays a monitoring system that allows us to make an adequate follow-up of the scopes and level of compliance of the same (Appendix B). In this system, a baseline (2015) has been identified for each indicator and two measurements (2016 and 2017) of the compliance degree. For this analysis, an evaluation matrix was developed by component, objectives and identified goals. A second analysis was carried out considering the categories proposed in the analysis of complementarity of indicators carried out by the project. In this analysis, 6 categories are considered, which are: i) Integral management of natural resources, ii) Conservation of biodiversity, iii) Impact on local policies, iv) Dissemination and access to information, v) Generation of capacities, and vi) Threats to agro-biodiversity.

In order to know the beneficiaries' perception about the activities carried out or products implemented by the EVA project, 240 surveys were conducted in 32 communities previously selected having in mind a comparable distribution according to the EVA ethno-ecological level area (table 1). The communities surveyed would have participated in activities promoted by the EVA project, particularly in the Demonstration Plots of Integrated Management (PDMI) or in the "Protecting Mother Earth" contest.

Table 1. Number of surveys conducted by ethno-ecological level. The amounts are adjusted to those requested in the TdRs of the consultancy

Ethno-ecological level	Nro. of surveys
Suni	88
Chawpirana	146
Likina	6
Total	**240**

The field work was carried out in direct coordination with community authorities and in some cases it was supported by technicians who worked with the EVA project.

The visit to the communities was previously agreed with the authorities and once in the community, all the community members and authorities were informed in more detail about the final evaluation activities of the EVA project. It was explained that individual surveys would be conducted for the project beneficiaries and not beneficiaries (as would have been done for the baseline); but also that a community survey would be carried out in which all interested persons could participate, so that the participation of authorities and community members with experience in productive activity was involved.

In some communities, authorities or technicians could not be previously contacted due to outdated cell phone numbers. In this case, the authorities and community members were called upon and informed once they arrived in the community, which delayed the work but did not mean greater inconvenience.

The surveys were conducted mostly from 6:00 a.m. to 10:00 a.m. in the morning or in the afternoon, so as not to harm the daily tasks of the people.

In the communities where people organized and met, a list of the persons to be interviewed was drawn up (1st list of beneficiaries, 2nd list of non-beneficiaries) and the community survey was carried out simultaneously.

In communities where a meeting was not held, people were searched in the community to be able to carry out the survey and with each of them the explanation of the final evaluation activity of the EVA project was carried out.

The meetings scheduled in the communities with the authorities (Jilanko, Community Mayor or Corregidor) and people from the community were used to verify the infrastructure and actions implemented by the EVA project in the beneficiary communities. The group interviews gave a general overview of the activities carried out by the EVA project in their community, then the verification and photographic record of the results and infrastructure promoted by the EVA project, such as the Demonstration Plots of Integrated Managements (PDMI).), terraces, infiltration ditches, afforestation areas, irrigation systems implemented and / or improved by the project with the delivery of supplies (hoses, sprinklers, cameras with valves to regulate irrigation), water reservoirs or Q'otañas covered with geo-membranes. Likewise, we consulted about the perception of the different activities carried out by the project, the state in which they were found and if they were in operation.

Finally, as part of the final evaluation of the project, two case studies of two families suggested by the supervisors of the EVA project were carried out. For this, the questions that were to be addressed in relation to the participation of the community member in the EVA project were coordinated with the people in charge of the EVA project. Then an interview was scheduled and it was asked how the project supported its productive unit, a photographic record and a visit to the productive unit was made watching the construction of slow formation bench terraces with live and dead barriers, also checking other works accomplished with the support of the EVA project.

All this will allow an analysis of the level of achievement of the aims of the project and the results obtained throughout the years of the project implementation, from three aspects: 1) The scope of the results is evaluated through a monitoring system that uses the indicators previously adjusted with the Project Implementation Unit (UEP) and the Inter-American Development Bank (BID); 2) This information is used to evaluate the degree of compliance with the goals identified in the "Operations Manual" and 3) An analysis is made of the effectiveness and efficiency of the process of preparation and approval of investment projects in quality, time and cost.

Regulatory framework

In this section, the national and international legislation on the conservation of agrobiodiversity, water, soils, knowledge management and climate change is broken down in a general manner, aspects that were addressed by the EVA project.

As these documents are strategic for the country and mandatory, the results of the EVA project should be aligned to them, which will allow identifying the contribution of the project to national public policies.

Convention 169 of the International Labor Organization (ILA)

Bolivia is one of the countries that has signed and ratified this agreement, in that sense it is obliged to respect and guarantee the rights of indigenous peoples and their members. In terms of land administration and law on natural resources, the Agreement states that: "States must recognize and protect productive systems based on the extensive use of the territory, on the temporary use of crops, together with rotation and rests of the lands" since "Disowning these systems, or considering that these systems amount to the abandonment of the land, means depriving the communities of effective security and legal stability of their property rights ". The Ayllus and Marthas of the North of Potosí and the Southeast of Oruro where the EVA project had intervention have a communal management of their territory, which is managed by a "manthas" system.

Likewise, the Inter-American Commission on Human Rights (IACHR) has held that states are obliged "to grant free land in sufficient extension and quality for the conservation and development of their ways of life" The test to determine when the lands are of sufficient extension and quality is that one in which the territory where the members of the community live, guarantees them the continuous exercise of the activities from which they derive their sustenance and on which the preservation of their culture depends.

Similarly, the Inter-American Commission on Human Rights (IACHR) has maintained that the States are obliged "to provide free land sufficient in size and quality to allow for conservation and development of their ways of life." The land is sufficient in quality and size if all its inhabitants can continue to perform activities that allow them to derive their livelihood as well as to preserve their culture.

Convention on Biological Diversity (CBD)

This convention incorporates relevant provisions of particular relevance to the rights of indigenous peoples over their lands, territories and natural resources. Article 8 (j) calls on States to respect, preserve and maintain "the knowledge, innovations and practices of indigenous and local communities that involve lifestyles relevant to the conservation and sustainable use of biological diversity and [promote] its broader application, "with the participation of these communities, and for their benefit. The process of implementing the Agreement on Biodiversity is also relevant for the protection of the rights associated with the property of indigenous peoples over their lands, territories and resources.

The United Nations' 2030 Agenda for Sustainable Development

The 2030 Agenda for Sustainable Development, approved in September 2015 by the United Nations' General Assembly, establishes a transformative vision towards the economic, social and environmental sustainability of the 193 Member States that signed it and will be the reference guide for the work of the institution in pursuit of this vision during the following 15 years. The 2030 Agenda for Sustainable Development includes 17 Objectives and 169 goals in an ambitious vision of sustainable development, integrating its economic, social and environmental dimensions, and representing a historic opportunity for Latin America and the Caribbean, since it includes high priority issues for the region, such as the reduction of inequality in all its dimensions, inclusive economic growth with decent work for everyone, sustainable cities and climate change, among others.

The Sustainable Development Goals (SDGs) associated with this Agenda will help to evaluate the starting point and analyze and formulate the means to achieve this new vision of sustainable development that was embodied in the 2030 Agenda.

The SDGs are also a planning tool for countries, both nationally and locally. Thanks to their long-term vision, they will constitute support for each country in its path towards sustained development, inclusive and in

harmony with the environment, through public policies and budget instruments, monitoring and evaluation.

Some activities developed by the EVA project relate to some of the objectives of the 2030 Agenda, these are:

Goal 2. End hunger, achieve food security and improved nutrition, and promote sustainable agriculture

Goal 6. Ensure water availability and sustainable management and sanitation for all

Goal 8. Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all

Goal 12. Ensure Sustainable Methods of Consumption and Output

Goal 13. Take urgent action to combat climate change and its impacts

Goal 15. Promote the sustainable use of terrestrial ecosystems, fight against desertification, halt and reverse land degradation and halt the loss of biological diversity

Political Constitution of the Plurinational State of Bolivia

In agriculture and livestock, soil, water and biodiversity activities, CPE indicates the following:

Article 16.

3. Everyone has the right to water and food.

Article 373.

3. Water constitutes a fundamental right for life, within the framework of the sovereignty of the people. The State will promote the use and access to water on the basis of principles of solidarity, complementariness, reciprocity, equity, diversity and sustainability.

Article 374.

3. The State shall protect and guarantee the priority use of water for life. It is the duty of the State to manage, regulate, protect and plan the adequate and sustainable use of water resources, with social participation, guaranteeing access to water for all its inhabitants. The law shall establish the conditions and limitations of all the uses.

II. The State shall recognize, respect and protect the uses and customs of the communities, of its local authorities and the rural native indigenous organizations over the right, management and administration of sustainable water.

Article 380.

3. The renewable natural resources shall be used in a sustainable way, respecting the characteristics and natural value of each ecosystem.

II. In order to guarantee ecological equilibrium, the land must be used in accordance with its capacity for greater use within the framework of the process of the organization of use and occupation of land, considering their biophysical, socio-economic, cultural characteristics and institutional policies. The law will regulate its application.

Article 405. Comprehensive, sustainable rural development is a fundamental part of the economic policies of the State, which shall prioritize its actions to encourage all communitarian economic undertakings and those of the group of rural actors, placing emphasis on food security and sovereignty, by means of the following

1. The sustained and sustainable increase of agricultural, livestock, manufacturing, agro-industrial and tourism industry productivity, as well as their commercial capacity.

2. The articulation and internal complementarity form of the structures of agricultural, livestock and agro-industrial output.

4. The importance and respect of the rural native indigenous communities in all dimensions of their life.

5. The strengthening of the economy of the small agricultural and livestock producers and of the family and communitarian economy.

Article 406.

The State shall guarantee the sustainable comprehensive rural development by means of policies, plans, programs and comprehensive projects to encourage agricultural, artisan, and forestry production, and tourism, with the goal of obtaining better exploitation, transformation, industrialization and marketing of renewable natural resources.

The State shall promote and strengthen the rural economic productive organizations, among which are the artisans, the cooperatives, the associations of agricultural producers and manufacturers, and the micro, small and medium communitarian agricultural enterprises, which contribute to the country's economic and social development, in accordance to their cultural and productive identity.

Article 407. The objectives of the policy of the State for comprehensive rural development, in coordination with autonomous and decentralized territorial entities are the following:

1. To guarantee food security and, sovereignty, prioritizing the production and consumption of agricultural foods produced in the territory of Bolivia.

2. To establish mechanisms for protection of Bolivian agricultural production.

3. To promote the production and sale of agro-ecological products.

4. To protect agricultural and agro-industrial production from natural disasters and inclement weather, and geological catastrophes. The law shall provide for the creation of agricultural insurance.

5. To implement and develop technical, productive, and ecological education at all levels and in all modalities.

6.To establish policies and sustainable projects, obtaining the conservation and recovery of the soils.

7. To foster irrigation systems, for the purpose of guaranteeing agricultural and livestock output.

8. To guarantee technical assistance and to establish mechanisms of innovation and transfer of technology in the entire agricultural productive chain.

9. To establish the creation of the seed bank and centers of genetic research.

10. To establish policies to encourage and support the productive agricultural sectors that have natural structural weakness.

Law No. 300 - Framework of Mother Earth and Integral Development for Living Well

Regarding Law 300, which aims to establish the vision and fundamentals of integral development in harmony and balance with Mother Earth to live well. Guidelines are set to recover and strengthen local knowledge and ancestral knowledge; as well as integral development objectives. In this sense, relevant articles on soil, water, agriculture and biodiversity, as well as those related to traditional knowledge and climate change will be mentioned, which in some way guided the objectives and actions of the EVA project.

Point 10 of Article 4 notes: "Water for Life. The Plurinational State of Bolivia and society assume that the use and indispensable and priority access to water, must satisfy in an integral and indistinct way the conservation of the components, zones and life systems of Mother Earth, the satisfaction of water needs for human consumption and productive processes that guarantee the sovereignty with food security."

Article 13**.** Knowing to Feed for Living Well. The Plurinational State of Bolivia shall promote the right to food and health with sovereignty and food security, considering in addition to knowing how to feed all the objectives of Living Well, through the following main aspects:

2. Development of integral processes and actions within the framework of respect and gratitude to Mother Earth, prioritizing: access to land and territory with water and good production; the management and control of environmental, climatic and pollution risks; the output, transformation and marketing of a variety of ecologic and organic products; access to food and health in the family and in the community, increasing the value and strengthening local knowledge and ancestral and collective knowledge and education for food; healthy growth of people; and more and better employment and income for the Bolivian people.

6. "Prioritization of domestic supply with national output, promotion of fair trade and solidarity of agricultural and forest products, as well as the formulation of trade policies that benefit the small producer and the community economy."

Item 6 of Article 15 (Establish non-contaminating production processes that respect the regeneration capacity of the Mother Earth in relation to public interest) indicates "Development of agricultural productive processes that guarantee greater productivity, the regeneration capacity of Mother Earth, respect for the zones and life systems of the different regions and the priority of guaranteeing food sovereignty and security. "

Article 19. (Facilitate equitable access to the components of Mother Earth). This way, the Plurinational State of Bolivia shall facilitate the reduction of the differences regarding the access of the Bolivian people to the land, water, forests, biodiversity and other components of Mother Earth, through the following main aspects:

3. Establishing equitable conditions in access to water for consumption, irrigation and industrial use within the framework of integral management of river basins and water resources.

Article 23. (Conservation of biological and cultural diversity). The foundations and guidelines of Living Well through the integral development in conservation of biological and cultural diversity, including Protected Areas, are:

1. Develop policies, strategies, plans, programs and projects for the use, exploitation, protection and conservation of biodiversity in a participatory manner, according to the characteristics of each life system.

2. Encourage the development of capacities for risk assessment for the biodiversity, human health and life systems, inherent to the introduction of invasive alien species, agricultural products and others.

3. Establish and implement policies, plans, programs and projects for the maintenance of the genetic heritage and the diversity of genetic resources existing in the country and the associate ancestral knowledge.

4. Promote the conservation and protection of ´hydric reloading zones, basin headwaters, national security zones of the country and areas with high conservation value, within the framework of integrated water basin management.

5. Respect for the classification of zones and life systems and strict compliance with the aptitude of land use by the central level of the State, autonomous territorial entities and agrarian and community owners.

Article 24**.** Agriculture, fisheries and livestock. The foundations and guidelines of Living Well, through Integral development in agriculture and livestock are:

1. Facing the productive agricultural community revolution, establishing as a fundamental objective the achievement of sovereignty with food security.

2. Maximize productive and energy efficiency to minimize the advance of the agricultural frontier, the irreversible damage to life zones, and the use and exploitation of other components of Mother Earth.

3. Establish the maximum limits of use and use of the components of Mother Earth according to each zone and life system.

4. Develop policies of harmonious, adequate, responsible and participatory management of agricultural output according to the characteristics and regional vocation of each life system.

5. Prioritize and encourage agriculture, fishing, community family livestock and agro-ecology, according to the world view of each native indigenous village and intercultural and Afro-Bolivian community, with a diversified, rotating and ecological character, for the sovereignty with food security, seeking the dialogue of knowledge

16. Identify, update, classify and delimit the total agricultural area based on the vocation of use of land to promote greater productivity of agricultural activities, avoiding the expansion of the agricultural frontier within the framework of sovereignty with food security.

Article 27. (Water) The foundations and guidelines of Living Well through integral development in water are:

1. Guarantee the right to water for life, prioritizing its use, access and use as strategic resource in sufficient quantity and quality to satisfy in an integral and indistinct way the conservation of life systems, the satisfaction of the domestic needs of people and productive processes to guarantee food sovereignty and security.

2. All industrial and extractive activity, which involve the use of water as appropriate, must implement, among others, extractive and transformation dynamics that include plants and / or treatment processes that minimize the effects of pollution, as well as the regulation of discharge of toxic waste to water sources. Small-scale mining producers, mining cooperatives and community enterprises shall develop these actions jointly with the Plurinational State of Bolivia.

4. Regulate, protect and plan the use, access and adequate, rational and sustainable use of water components, with social participation, establishing priorities for the use of drinking water for human consumption.

5. Regulate, monitor and monitor the parameters and levels of water quality.

6. Promote the use and sustainable use of water for food production according to the priorities and productive potential of the different zones.

7. Guarantee the conservation, protection, preservation, restoration, sustainable use and integral management of fossil, glacial, wetland, underground, mineral, medicinal and other waters, prioritizing the use of water for life.

8. Promote the use of rivers, lakes and lagoons water resources that make up the hydrographic basins, which are considered strategic resources due to their potential, to the variety
of natural resources they contain, and to a fundamental part of the ecosystems, for Bolivian development and sovereignty

9. Regulate and develop inter-institutional plans for the conservation and sustainable management of water basins, under parameters and guidelines issued by the central level of the Plurinational State of Bolivia, in accordance with the provisions of the Political Constitution of the State, aimed at guaranteeing sovereignty with food security and the basic services and the conservation of life systems, within the framework of the norms and procedures of the native indigenous peoples, intercultural and Afro-Bolivian communities according to the Law.

10. Develop comprehensive water management plans for the benefit of the people and permanently protect border and transboundary waters, for the conservation of water wealth that will contribute to the integration and health of the people.

11. Adopt, innovate and develop practices and technologies for the efficient use, collection, storage, recycling and water treatment.

12. Develop policies for the care and protection of the basin headwaters, water sources, reservoirs and others, which are affected by climate change, the expansion of the agricultural frontier or unplanned human settlements and others

Article 54. (Joint mitigation and adaptation mechanism for integral and sustainable management
of forests and Mother Earth).

I. The Joint Mitigation and Adaptation Mechanism for Integral Management and Sustainable of Forests and Mother Earth, operated by the Plurinational Authority of Mother Earth is established.

1. The mechanism has the objective of promoting the integral management and sustainability use of forests and life systems of Mother Earth, the conservation, protection and restoration of life

systems, biodiversity and environmental functions, facilitating optimal soil uses through the development of sustainable production systems, including agriculture and forestry, to address the causes and reduce deforestation and forest degradation, in a context of mitigation and adaptation to climate change.

Article 56. (Mechanism of Adaptation to live well). The Adaptation Mechanism to Live Well is established by the Plurinational Authority of Mother Earth, with the following main functions:

1. Coordination, administration, management and development of interventions with the Executive Branch, autonomous territorial entities, public and private, social organizations and productive actors, within the framework of the plural economy, focused on adaptation processes to climate change for Living Well.

2. Development of an operational and methodological framework to promote adaptation processes to climate change, fostering the building of climate resilience actions of life systems in different areas, including sovereignty processes with food security, integrated water management, and management for the prevention and reduction of risk to the impacts of climate change.

2025 Agenda of the Plurinational State of Bolivia

The 2025 Patriotic Agenda projects our country for the year 2025, in this regard thirteen pillars were proposed, of which the EVA project is directly related to three. Pillars 6, 8 and 9 lead to specific actions to promote the productive sovereignty with diversification, food sovereignty and environmental sovereignty with integral development respectively. The main goals are farming production with emphasis on family farming, ideal and efficient production systems, diversified local production based on native and sustainable diversity, as well as the reduction of malnutrition and universal access to food. These are goals directly related to the encouragement of sustainable and inclusive development.

Law No. 144 on Productive, Communal and Agricultural Revolution

This law aims to "regulate the process of the Agricultural Productive Community Revolution for food sovereignty", for which it establishes the institutional bases, policies and technical, technological and financial mechanisms for production, transformation and trading of agricultural and forestry products, prioritizing the organic output in harmony and balance with the bounties of Mother Earth.

Law No. 1333 on Environment

The law of the Environment No. 1333, enacted on March 23, 1992, in its
chapter VIII, article 60 indicates that protected areas constitute natural areas with or without human intervention, which were declared under the protection of the State through legal provisions, with the purpose of protecting and conserving the flora and wildlife, genetic resources, natural ecosystems, hydrographic basins and values of scientific, aesthetic, historical, economic and social interest, in order to conserve and preserve the natural and cultural heritage of the country. In this sense, the borderline of "reserve areas" in the different Ayllus and Markas of the EVA project is consistent with the objectives of protected areas in the sense of preserving genetic material of flora and indirectly in the protection and conservation of fauna and unique natural landscapes that exist within these "reserve areas.

State Planning System (SPIE) Law 777

The opportunities to achieve the goals of the 2025 Agenda have been made more concrete in the new planning scenario with territorial approach and life systems management offered by the SPIE. For peasant and indigenous organizations around agriculture, this context is conducive to a greater incidence in public policies and decision-making spaces on the use and destination of public resources.

And in the area of climate change and risk management, guidelines and methodologies will be developed to deal with them through the ordering of zones and life systems, and the incorporation of life systems management into planning processes in coordination with the competent entities.

Irrigation Agenda 2025 of the Ministry of Environment and Water

The Vice Ministry of Water Resources and Irrigation, under the Ministry of Environment and Water, proposes a collective construction of the irrigation sector as a contribution to the Patriotic Agenda 2025

In this sense, it proposes three axes to contribute to pillar 6: "Productive sovereignty with diversification and integral development and Water policy for Agricultural Production". These axes are: 1) More water for irrigation, 2) Social and institutional empowerment, and 3) Further production with irrigation.

Likewise, the project is related to pillars 1, 7, 8 and 9 of the Patriotic Agenda, which respectively are:

- Eradication of extreme poverty.
- Sovereignty over natural resources with nationalization, industrialization and marketing in harmony and balance with Mother Earth.
- Food sovereignty through the construction of knowing how to feat
.
- Environmental sovereignty with comprehensive development; respecting the rights of Mother Earth

The Irrigation 2025 Agenda proposes the consolidation of a policy of greater water availability for agricultural production, greater awareness of demand through the use of irrigation technology and greater water sustainability in irrigation systems, to supply sustainable irrigation systems for future generations in time and harmony with Mother Earth.

5. ÁREA OF INTERVENTION

Geographically the region mainly consists of the Eastern mountain range, with an altitudinal ranging from 2,500 to 5,200 m, and in smaller proportion by the highlands, that is towards the west of Poopó Lake to an average altitude of 3700 m. This considerable altitudinal variation goes from the high mountains, (Toro sector - Challapata 5,150 m, southeast region of Challapata municipality) to valleys and plains (Mustafay sector - Pocoata, about 2,500 m, Municipality of the same name) resulting in the existence of different climates and helping to differentiate three altitudinal levels or ethno-ecological strata:

- SUNI O PUNA (high mountains and pasture lands above 3900 meters above sea level)
- CHAWPIRANA (mountains and valley heads between 3,900 and 3,000 meters above sea level)
- LIKINA (dry valleys below 3,000 meters above the sea level)

The EVA project developed its activities in Challapata, Chayanta, Llallagua, Chuquihuta, Pocoata and Uncía municipalities, which covers a total area of 6,020 km^2. However, it worked more properly in 13 Ayllus, ten in the north of Potosí: Chullpa, Sikuya, Chayantaka, Panakachi, Amaya, Kharacha, Layme, Puraka, Jukumani and Pocota; and three in the southeast of Oruro: Qaqachaca, Norte Condo and K'ulta (table 2, figure 1), corresponding to an area of 3,457.7 km^2, and a population of more than 6,600 families. However, the actual area of intervention covered 2,753 km^2, which sums up and includes all reforestation activities, construction of terraces, PDMIs, etc. It is necessary to clarify that of eleven Ayllus that make up the Jatun Ayllu Pocoata only two participated in the EVA project, these were: Chakaya and Qhampaya (pers. Ing. Soliz, EVA project coordinator).

Table 2. Ayllus where the activities of the EVA project and total surface by ethno-ecological level were developed.

			Area (km^2)		
Department	Municipality	Ayllu	Suni	Chawpirana	Likina
Potosí	Chayanta	Aymaya *	3,21	8,11	0
	Uncía		178,98	20,37	0
	Chayanta	Chayantaka	97,58	204,58	0
	Chuquihuta		0	0,12	0
	Llallagua		1,96	28,23	0
	Uncía		5,96	2,71	0
	Llallagua	Chullpa	259,37	57,45	0
	Uncía		19,38	1,41	0
	Challapata	Jukumani	0,23	0,08	0
	Chayanta		0,05	7,67	0
	Chuquihuta		95,77	164,51	0
	Pocoata		0	0,33	0
	Uncía		0,24	0,13	0
	Chayanta	Karacha	2,12	15,12	0
	Chayanta	Layme - Puraca	5,39	15,10	0
	Chuquihuta		0,03	0,01	0
	Uncía		249,82	126,47	0
	Chayanta	Panacachi	77,26	148,00	0,6
	Chayanta	Pocoata *	0	1,18	0,1
	Chuquihuta		0	2,92	0,87
	Pocoata		318,09	708,77	60,96
	Chuquihuta	Qaqachaca	0,07	0,04	0
	Uncía		4,22	2,46	0
	Chayanta	Sikuya	0	0,8	0
	Llallagua		13,29	109,04	0
Oruro	Challapata	Jukumani	0,23	0,04	0
	Challapata	K'ulta *	609,31	23,36	0
	Challapata	Layme - Puraca	7,6	0	0
	Challapata	Norte Condo	48,41	1,24	0
	Challapata	Pocoata *	48,84	7,69	0
	Challapata	Qaqachaca	378,59	39,96	0
(km^2)		total área	2.426,00	1.697,90	62,53
		Total Area (%)	57,9	40,6	1,5

Note: Of the 13 Ayllus studied in the Project three do not have official polygons titled by INRA to 2016, being these: Aymaya, K'ulta and Pocoata. To fill this gap, 2015 PROINPA data was used as a reference

Many times an Ayllu has its limits that exceed the municipal limits and even sometimes the departmental limits (Table 2). Note that only the Ayllus Pocoata and Panacachi have three ethno-ecological levels and that the intermediate level (Chawpirana) had the greater number of localities.

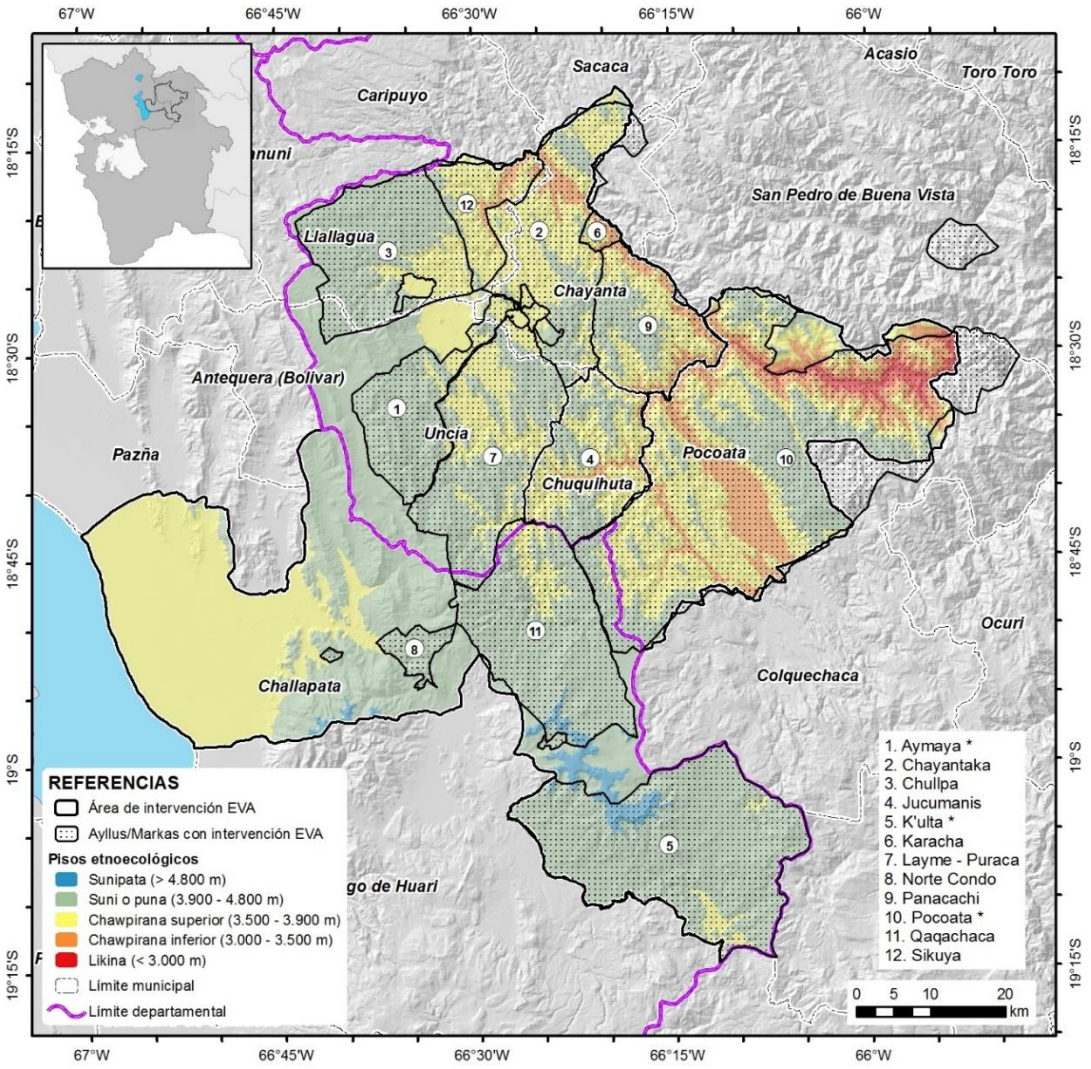


Figure 1 Map of ethno-ecological levels, Ayllus and intervention area main access roads of the EVA project.

Access roads

The area is accessible by road, from the highlands (to the east) throughout the whole year. From the city of Oruro, there are two main access roads; the first one at the northwest, following the fundamental road network, (route 1), until the junction with the town of Machacamarquita (before Machacamarca), the same one that leads to the city of Huanuni (route 6), to connect with the main urban conglomerate of the study area (Llallagua, Siglo XX and Catavi). This route crosses the Llallagua, Uncía, Chuquihuta and Pocoata municipalities, connecting their main towns; towards the northeast, even with Chuquisaca department (Figure 1).

The second route of road connection continues along route 1, following the road to the city of Potosí, passing through the city of Challapata, taking the left detour, heading East, towards the towns of Japo and Qaqachaca (central region of the study area).

There is a road that connects Qaqachaca with Chuquihuta and the main road network, but it is not in good condition.

The main route "1" has another route of access, crossing Challapata municipality and connecting with the town of Cruce Culta (to the southeast), with northeast direction, until near the town of Macha, to merge with Pocoata, capital of the municipality of the same name.

Weather

The territory of the EVA project is located in the southern hemisphere of the planet, between latitude 18,2 ° and 19,2 °, in the intertropical zone near the Tropic of Capricorn. Its climate is mainly determined by the seasonal movement of the ITCZ intertropical convergence zone and by its higher elevation between 2,480 meters above sea level and 5,130 meters above sea level.

The ITCZ, by its acronym in Español, ZCIT) is the region of the Earth where the trade winds of the northern hemisphere converge, bringing humid air, with the dry winds of the southern hemisphere. The movement of the ITCZ affects the precipitation producing marked rainy and dry seasons. During the winter the ITCZ moves to the north and the winds originating from the South Pacific Ocean blow deeper into the continent, resulting in the dry season. At the end of winter, the winds coming from the Pacific Ocean begin their retreat to the South, while the ITCZ advances towards the center of the continent taking with it humid and hot air thus causing the rainy season in the summer.

The rainfall in the area of the EVAs occurs mainly between the months of October to March. The average annual rainfall in the area of the EVAs varies between 384 mm and 557 mm, making an average of 440 mm. Figure 2 shows the distribution of rainfall in the area of the EVAs (Gonzáles 2016a).

With some regularity, an average of 4 to 7 years, the phenomenon of *El Niño* takes place, which is accompanied by strong and dry winds coming from the West, which temporarily block the descent of the ITCZ towards the northern latitudes causing a delay in the arrival of the rainy season and causing droughts in the *mountain range* and Altiplano. The phenomenon of *the Niña,* on the other hand, leads to heavy rains in the mountain range area.

The strong elevation of the area of the EVAs with respect to the level of the sea causes that the temperatures are low, in spite of being in the tropical region, and it results in high levels of solar radiation as a consequence of a reduced thickness and lower density of the atmosphere in the region.

The study area is characterized by a seasonal variation of temperature, with the highest temperatures during summer and the lowest temperatures during winter. The average annual temperature in the area of the EVAs varies depending on the height from 0 ° C in the high parts to 17.9 ° C in the lower parts, with an altitudinal gradient of 6.7 ° C / km. The average annual minimum temperature in the study area varies between -9.1 ° C to 9.7 ° C, and the average annual maximum temperature varies between 9.2 ° C and 26.1 ° C.

According to Köppen´s climatic classification, the area of the EVAs presents temperate-dry to cold climates.

According to Rivas-Martínez´s bioclimatic classification (1999), the area presents temperate and dry climates

(mesotropical and subtropical) in the valleys and their headwaters and cold to very cold weather above the 3,900 meters (Gonzales 2016a)

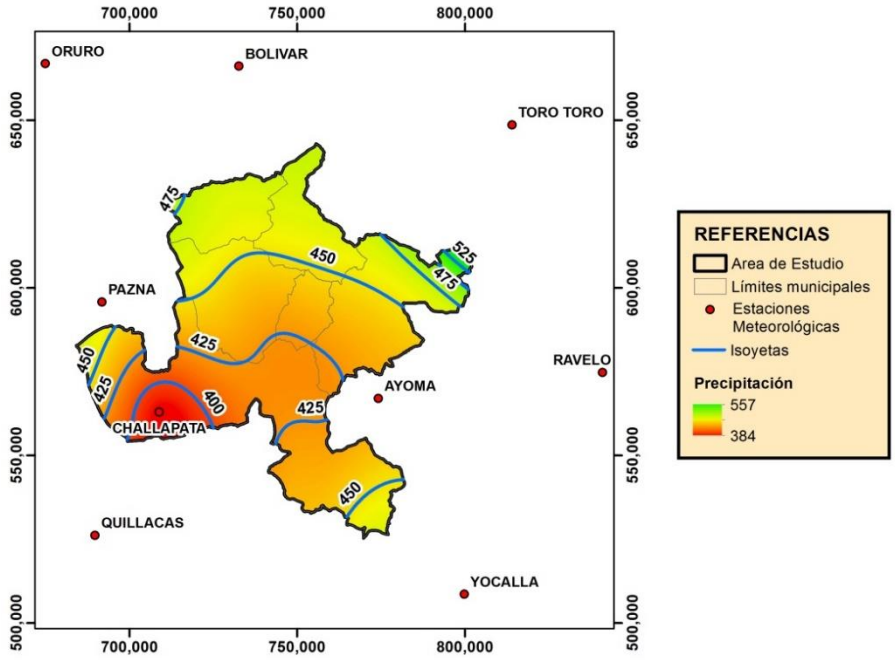


Figure 2. Average annual rainfall throughout the study area.
Source: (Gonzáles 2016a)

Hydrography

The area of the EVAs is characterized by its location on the boundary of three macro-basins of Bolivia: the Amazon basin, the Plata basin and the endorheic basin of the Altiplano (Figure 3). The northeast part of the study area drains into the Amazon basin, and covers most of the territory under study, approximately 75%. The western part drains towards the Poopó lake basin, on the slope of the Altiplano, and covers approximately 20% of the study area; and finally, the southern part drains towards the slope of La Plata river, covering approximately 5% of the study area (Gonzales 2016b).

The area of the EVAs corresponds to a political delimitation of municipalities, and as a result, it does not correspond with a delimitation of basins, as can be seen in figure 3. The area of influence of the EVAs, from the hydrological point of view, covers a larger territory which includes the area of the basins that flow into the territory of the study area (Gonzales 2016b).

The area of the sub-basins that contributes towards the Amazonian slope (green color) is located within the sub-basin of the Chayanta river, level 5 according to the official delimitation of the MMAyA, and includes 5 basins of level 6 that are shown in figure 3. These sub-basins cover a total area of 7,255 km². (Gonzáles 2016b).

The area of the basin that contributes towards the endorheic basin of the Altiplano (yellow color) comprises 5 basins of level 6 according to the official delimitation of the MMAyA, and covers a total area of 2,837 km². These basins are part of Lake Poopó sub-basin (Gonzales 2016b).

The watershed area that contributes towards del Plata slopes (Pilcomayo) (red color) comprises 3 basins of level 5 according to the official delimitation of the MMAyA and covers a total area of 1,159 km2.

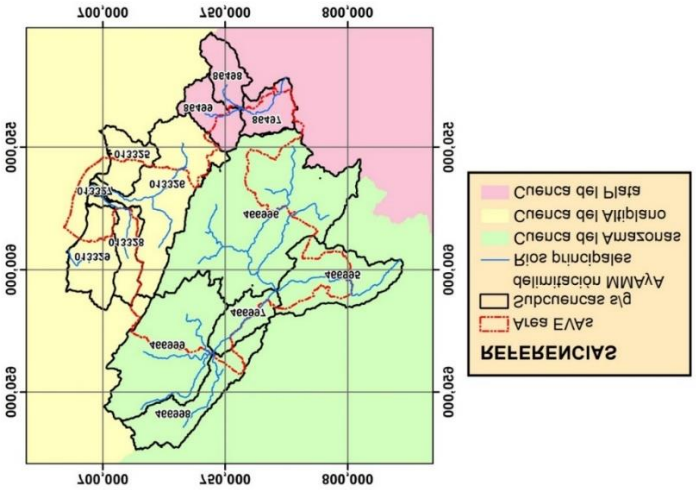


Figure 3. Sub-basins according to the official delimitation of MMAyA. The basin enumeration corresponds to the MMAyA .official codification

Source: Prepared from MMAyA, 2010.

Characterization of indigenous communities

The indigenous population located in the area of influence of the EVA project is mainly of Aymara and Quechua origin, whose main characteristic was the vertical control of ecological levels, which allowed them to provide themselves with many kinds of products. These cultures have their organizational core in the Ayllu, a word of Aymara origin meaning community, lineage or family so it includes a set of descendants of a common ancestor (actual or presumed) that coexist in a collectively territorial space (Mink 'a) and in a spirit of reciprocity such as the Ayni (GAM Llallagua 2008).

The spatial occupation of the Ayllus is characterized by the access to discontinuous lands and ecological diversity, that is to say to the valleys or ethnoecological level called Likina, to the Puna or Suni and to the headwaters of valley or Chawpirana. In each one an intensive, particular and differentiated use of soils is made, with a rotation system of crops and soils called "mantas" that is still handled until the present. This strategy allows a family to have access to different ecological levels with a diversity of microclimates. It also has the possibility of exchanging products through bartering that even come from other places, such as the Yungas; this fact somehow promotes a varied diet.

The cultural organization of the space in the north of Potosí is determined by the convergence of three organizational patterns, which represent the structure of the same space at three levels and at the same time are complementary. The first corresponds to the "economic space", defined from the puna / valley ecological duality, of the agrarian activities and the criteria of access to the land, where the legal parameters of the state and traditional land tenure systems are partially merged. The second is delimited by the "political space", whose constituent elements originating from the

Ayllus system were partially altered at the time of the colony, being redefined again in the republican era. The third type of organizational pattern is designated the "ritual and sacred space", symbolically condensed in the Pachamama and ultimately determinable from the sacred places, domain and abode of positive and negative forces, which define the appropriate behaviors to each spatial context (Patzi s / f).

The "bartering" was a system that is now being gradually set aside, which until about a decade ago was very widely used, as a traditional way of marketing. It takes place at the Mikani Tomato Fair (Charcas Province), where many farmers arrive from their villages with local products to be exchanged with other typical products of the region and especially products from the cities such as noodles, rice, sugar, oil, among others. A phenomenon that almost disappears referring to the local peasants exchanging their products with peasants from other remote regions such as Lipez, Uyuni and others from the Altiplano, (who arrive in the province in the dry season, transporting products such as salt, quinoa, yareta (ISALP s / f).

The farmers in this area have developed various ways to ensure the availability of food, one of the most important is the control of ecological levels. In this one the farmers access to different ecological levels: Suni, Chawpirana and Likina where they have farms through direct access to the land (owner´s right by inheritance or marriage) and other forms (ayni, company, pledge). The control of the ecological levels is a way to cope with the climatic risks, since, if there is not good harvest in some places, there will be good harvests in others. For example, the hailstorms are more frequent in the valleys and the middle part and frosts in the high part (Medicus Mundi & German Technical Cooperation 2003).

Other very important traditional aspects in the Ayllus are the strategies of reciprocity existing especially in agricultural work. The "choqo" or "ayni" in collective work, is the rendering of collective work in agricultural tasks in order to supply the shortage of labor. The "Tarpuqa" consists of giving aid in the agricultural tasks, in return the owner of the crop offers a few furrows so that the person who helped can harvest. The "Ayni" of work by products where the single women or widows (that do not have land) are generally those who go to work helping in the tasks of harvest, hilling and weeding of the crops. In return, the owners of the land pay them in furrows, in this way they guarantee food security for their family. The "manka," or ayni of seeds, is a word used to describe the process of "seed loaning" in Bolivia. When a peasant loses his harvest and seeds, members of his community as well as neighboring communities may offer to loan the farmer some of their own seeds. Once the harvest is over, the farmer will give thanks and return the seeds to its original owner. (Medicus Mundi & German Technical Cooperation 2003). The "pijunada" is when a person helps in the harvest, for example, digging the potato, at the end of the working day the owner of the plot pays with a basket of potatoes, "according to production and his will. The "Chapara" is a form of reciprocity of work for agricultural products. It is a measure of payment in products for a labor wage, that is, working a day and receiving as payment a basket of corn or potatoes for a wage (Medicus Mundi & German Technical Cooperation 2003).

Historical and ethnographic context

~~After the collapse of Tiwanaku (A.D. 1,100), new hierarchical structures followed, such as the regional~~ manors or Aymaras formed from pre-existing ethnic entities in the region. Among these, in the north of Potosí the Charka manor was consolidated, which was divided into two halves or *moieties* the one above, aransaya-alaxsaya, with the great Ayllu Sukaka; and the one below, Urinsaya or Manqhasaya, with the

great Chayanta Ayllu. The last in turn was divided into six greater Ayllus: Chayantaka, Sikuya, Layme, Puraka, Karacha and Chullpa (GAM Llallagua 2008), whose territories are still maintained today.

The Ayllus of northern Potosí are historically composed of the Chayanta and Puquwat strips. The Chayanta strip corresponds to the Urinsaya half of the Charca Nation. This manor occupied a very large territory in what would now be the Bustillos, Ibáñez, Bilbao and Charcas provinces of the department of Potosí, and some places in Cochabamba (Jilamita & Soto 2005). The Chayanta strip is divided into two moieties, there are four greater Ayllus: Layme, Puraka, Chullpa and Jukumani in the Puna or upper part (Alaxsaya) and there are five greater Allllus: Chayantaka, Sikuya, Aymaya, Kharacha and Panacachi in the lower part (Manqhasaya) (Jilamita & Soto 2005). In the Chayanta strip there are three important towns, Chayanta, San Pedro de Buena Vista and Toro Toro, of which Chayanta is located in the Puna and the other two are in the valley. Chayanta was the most important ceremonial center of the strip because there was performed (and still is) the tinku de la Cruz and Christmas, Three Wise Men, Carnival and Easter ceremonies, which are associated with the rites of the productive cycles for the group of the greater Ayllus (Mendoza & Patzi 1997).

The Pocoata strip or Puquwata is located between the Chayanta and Macha strips and extends from the Puna (Chayanta province) to the valley (Charcas province). It is made up of six lesser Ayllus in the Alaxsaya: Quillana, Chakaya, Khariwa, Pilsaqa, Phari and Uma; the lesser Ayllus in the Manqhasaya are located: Sullkhawi, Jilawi, Jillata, Sullkhata, Chankha and Qiapaxa (Mendoza & Patzi 1997).

The Ayllus of northern Potosí share a series of features that make them unique in culture and knowledge (Harris 1997). Among them, the political organization along with its system of traditional authorities, possession and administration of territories both in the Puna and in the valleys, the economy through the combination and use of high altitude and valley ecological levels, where they develop livestock, crafts and mining activities; the language, traditionally Aymara, although Quechua has expanded due to the arrival of Quechua-speakers in haciendas and mines; music and their festivals, where the tinkus (ritual battles) were and are an important part and textiles reflect a long historical tradition and technical skill.
The mother tongue of the Ayllus is Aymara, as is the territory of the Ayllus.

The Ayllus' mother tongue is Aymara, as the territory of the old Charka manor. The northern provinces of Potosí are of Aymara origin; it is not a Quechua region, as it is generally considered (Patzi, nd). The daily use of Quechua, very widespread in the communities, is the result of the influence of urban population centers and mining linked to the migration of workers from Quechua-speaking areas (Patzi,s.f.). It is very common to find that the inhabitants of the communities communicate themselves in three languages: Quechua, Aymara and Spanish. In the markas of the southeast of Oruro Aymara speech is more frequent, while in the Ayllus of northern Potosí, Quechua is used more frequently.

The music expresses the relationship with nature ancestors, God and saints seasons and times. The musical melody consists sometimes of two halves and balance is sought between them. The same applies to fabrics, which are usually made in symmetrical halves over ponchos, awayos, costales and ch'uspas (Harris 1997).

The idea of opposite halves seeking balance finds its expression in the tinku, a battle that takes place in some festivals where the Ayllus are grouped to face men (sometimes women) who fight "hand to hand", only protected by monteras and armors of leather and fabrics wrapped in the chest and hands. Tinku is the way the Ayllus

express their differences. Generally, those in the lower half (Manqhasaya) fight with those in the upper half (Alaxsaya) but there are variations. The blood that falls on the tinku is considered a sacrifice and an offering to the land to produce good crops and it is a way to demonstrate the strength to cultivate and defend the territory. It is also believed that young people should not marry before fighting at least once in the tinku (Harris 1997).

Holidays are an important way in which the Ayllus are related, keeping the cultural language in common. Sometimes violent conflicts arise over the land between different Ayllus, which are often difficult to resolve and last for years (Harris 1997). Currently, major conflicts are not occurring because of the policies and projects present in the region.

Gender relationship is based on the principle of complementarity between men and women, a principle that has persisted in the Ayllus tradition. Women always accompany the authority of the Ayllu, collaborate in activities and religious practices. In addition, they establish the kinship networks that exist in an Ayllu or between different Ayllus because when they get married they usually move to the husband's house. The Allllus maintain that vision of a balanced cosmos between masculine and feminine forces (Harris 1997).

On the other hand, the Markas of the southeast of Oruro were formerly occupied by the Quillacas, currently organized as JAKISA. They come from a long history and culture that goes back even to the pre-Inca period, known as the Puquina, which was established with its own cultural identity, social, economic and territorial organization (Arnold *et al*. 2005).

Jatun Suyu Killaka is located to the southwest of the department of Oruro, covering the provinces Avaroa, Sebastián Pagador and Ladislao Cabrera. The Quillaca Federation was made up of the Quillacas, Azanaques, Sevaruyos-Haracapis and Aullaga-Uruquillas manors, with their political and administrative center based in Killakas (Arnold et al. 2005). It was a fairly prestigious population.
prestige, in addition to its members being warrior and expansionist, since it is known that the Quillacas participated in the last confrontation between the Inkas and the Spaniards, in Cajamarca. Despite the establishment of colonial reductions and distributions, the extended territory of the Quillacas managed to maintain its territorial structure in *parcialidades* (colonial subdivisions). Even with the establishment of the Republic of Bolivia, the Quillaca identity has remained intact, mainly in the department of Oruro. (Arnold *et al*. 2005).

At present, the Suyu Jatun Quillaca is being restored in 13 "*marka"s* and more than 60 Ayllus,
thus recovering the original territorial structure. Most of these lesser Ayllus have been part of the Aymara confederation of Qhara Qhara, an aspect that is reflected in their culture, customs, music and especially in textile art. For example, Qaqachaka was located between two colonial subdivisions of the greater confederation of Charkas-Qharaqhara, between Layme (Chayanta *partialidad* in the federation of Charkas) and Pukuwata, of the federation of Qharaqhara (Arnold *et al*. 2005).

Qaqachaka became part of the Asanaqi *parcialidad* (colonial subdivision) of the Killaka-Asanaqi nation. Each bias was divided into Anansaya and Urinsaya (up and down), in a dual organizational form, governed by Mallku and his second person. The entire confederation of Killakas-Asanaqi is now equivalent to the provinces of Eduardo Avaroa, Sebastián Pagador and Ladislao Cabrera in the south of the department of Oruro, which includes the city of Challapata, the village of Salinas de Garci Mendoza and the cantons of Qaqachaka, Huancané, Ancacato, Huari, Condocondo, Kulta, Quillacas, Soraya de Quillacas, Sivaruyo and Urumiri de Quillacas, together with the cantons of Pampa Aullagas, Challacota, Aroma, El Tambillo and Jirira (Arnold *et al*. 2005).

The Qaqachaka, Sullkayana and Qullana lesser Ayllus were considered to be native to Qaqachaka. In another body image, Sullkayana was considered the Condo's "head" (p'iqi) it is said that Qaqachaka's main body (kurpu) (especially of the Ayllus of Sullkayana and Qallapa) is in Condo. For demographic reasons, Qullana gradually disappeared; another lesser Ayllu, Qallapa, continues with the same name until now and another lesser Ayllu, Qawalli, was transformed and gradually divided over the centuries to form other lesser Ayllus (Arnold *et al*. 2005).

Economic activities

The most outstanding commercial activity is the realization of weekly fairs, where the exchange of agricultural products takes place with higher intensity. The places are generally in the most important towns (Uncia, Llallagua, Chayanta, Pocoata, Cala Cala, among others) and the days also vary, but they mainly take place on Saturdays and Sundays (ISALP s / f).

The artisanal sector has a certain importance in the process of marketing of products, the communities of the Ayllus commercialize in the local market of Uncia and Llallagua and in the interior in national fairs. The handicrafted products they produce the most are the chulus, agüayos, jackets, aymillas, chumpis, chuspas, scarves. The artisan sector has a certain importance in the product marketing process, the communities of the Ayllus trade in the local market of Uncia and Llallagua and in the interior in national fairs. The handicrafted products they produce the most are the chulus, agüayos, jackets, aymillas, chumpis, chuspas, Production technology is traditional where the "level loom" (ISALP s / f) is used

According to the survey conducted by FUNDECO in 2016, agriculture is the main occupation in the Ayllus, followed by livestock and other activities such as mining and construction (table3).

Table3. Main economic activities in the Ayllus of the EVA project.

Ayllu	Agricultural **(%)**	Trade **(%)**	Livestock **(%)**	Other **(%)**	Independent Work %
Aymaya	50,00	1,83	31,10	8,54	8,54
Chayantaka	41,24	1,82	36,86	18,61	1,46
Chullpa	46,60	0,97	39,81.	10,68	1,94
Jukumani	42,69	4,09	28,95	21,35	2,92
K'ulta	39,50	4,20	32,77	16,81.	6,72
Layme	46,85	2,70	39,64	8,11	2,70
Panacachi	43,80	1,85	37,20	16,89	0.,26
Pocoata	44,90	3,06	32,14	19,39	0,51
Pukara	38,24	2,94	32,00	20,59	5,88
Sikuya	46,36	0,00	31,79	14,57	7,28
Total	44,10	2,39	34,11	16,42	2,98

6. ACTOR MAPPING

The use of actor mapping will help to represent the social context in which the project will intervene, in order to design intervention strategies with more elements than just common sense or the sole opinion of a qualified informant.

This document addresses the following classification of social actors:

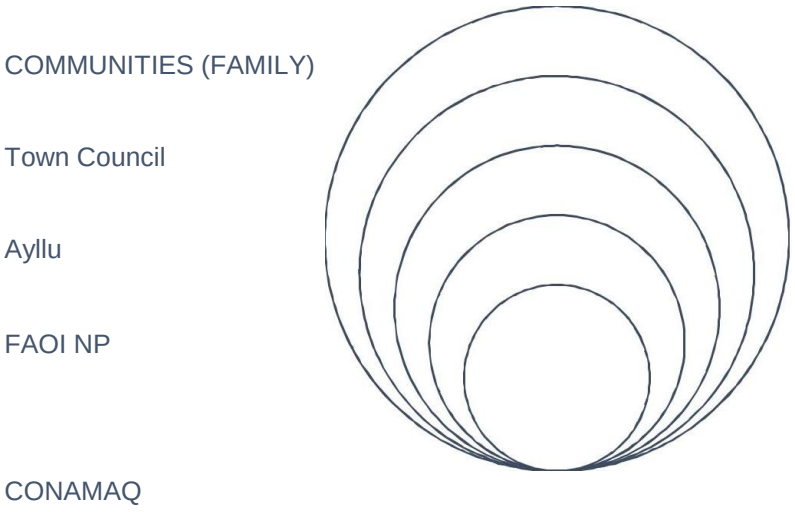
- Indigenous organizations: Conformed by Ayllus and Markas from the intervention area.
- Public-governmental institutions: Conformed by Municipal Autonomous Governments.
- Private Institutions, NGOs Non-Profit Organizations**:** Conformed by development NGOs that work in the area.
- Higher Education Institutions

Indigenous organizations

The Ayllus organizational instance at the national level is the Supreme Council of Ayllus and Markas del Qollasuyo (CONAMAQ) which consists of:

- The Federation of Native and Indigenous Ayllus of North Potosí (FAOI-NP)
- Jatun Killakas Azanajaque, Oruro (JAKISA)

These entities group the Ayllus of the North of Potosí and the South of Oruro, the graphic intends to show the coordinating role that CONAMAQ has at a national level.



The EVA project worked directly with thirteen Ayllus, however, the interaction with Ayllus and markas went beyond the Ayllus involved, due to the fact that the project worked in constant coordination with FAOI NP and JAKISA. Some of the activities of component 2 of the EVA project were aimed at strengthening the interaction between FAOI NP, JAKISA, Ayllus en Paz and municipal authorities; and at the same time empowering the leaders of the Ayllus in terms of natural resource management.

Public institutions - Governmental

In the area of the EVA project, the following municipalities are included:

- Llallagua Municipal Autonomous Government
- Uncía Municipal Autonomous Government
- Chuquihuta Municipal Autonomous Government
- Chayanta Municipal Autonomous Government
- Pocoata Municipal Autonomous Government

- Challapata Municipal Autonomous Government

Until 2016, with the support of the EVA project, these municipalities made efforts to prepare their Municipal Plans of Territorial Organization (PMOT) and Municipal Development Plans (PDM); However, in 2017, Law 777 was enacted in which it is specified that the previous planning instruments are replaced by Territorial Integral Development Plans (PTDI), so that, currently, these instruments are used for municipal management in these autonomous governments.

Private institutions

- In 2016 PRODII conducted workshops on climate change issues and on local perceptions of the 13 Ayllus.
- 2015PROINPA, conducted an ethno-botanical study of the agro-biodiversity of 13 Ayllus of northern Potosí and southeastern Oruro with emphasis on potato, corn, bean and quinoa crops, together with the Ministry of Environment and Water (MMAyA).

The Management of Natural Resources and Climate Change project was conducted by HELVETAS Swis Intercooperation

- In 2016, Veterinarios sin fronteras (Veterinarians without borders), prepared a report on local perceptions of climate change and a book "Our knowledge, our future" for the EVA project.
- Social Research and Potosí Legal Advice (ISALP), works in the Indigenous Territorial Management

component, facilitating participatory processes for socioeconomic development. It carries out training to native authorities, legal support to Community Land of Origin and soil conservation.

- PADEP / GTZ, supported the decentralized public management and fight against poverty.
- The International Cooperation Program (PCI), supported the improvement of Camelids.
- Center for Development Support (CAD), Ricerca Cooperazione (RC) supports food security, natural resources, environment, biodiversity and interculturality, organizational strengthening.
- Center for Research and Economic Promotion (CIPE), benefits the Chayantaka Ayllu and the elderly, conducts training sessions with the themes of the project it develops.
- Kallpa team supports the production, marketing of agricultural products and formation of productive associations.
- Evess Kallpa, supported production, construction of micro irrigation systems and soil conservation.
- UNICEF worked with women, children and adolescents on the subject of basic sanitation.
- Visión Mundial *(World Vision)* works with women, children and agricultural producers, in the areas of: child sponsorship, agroecology, health, production support and Christian witness.
- The media (Radio Pio XII, FIDES, Panamericana and others) broadcast messages, spots and educational programs on related topics.

There are also economic organizations such as:

Cooperativa San Jose which is engaged in the communities of Quinta Pampa, Qollpa, Jacha, Pichata, and Compi. They are dedicated to the agricultural, livestock, transformation, savings and credit

- Association of potato seed producers, is engaged in the communities of Irupata, Llallaguita, Chayanta, in the agricultural sector.
- Producers of stone slabs, in the community of Lozareta, in the mining sector

Higher Educational Institutions

- Universidad Siglo XX (UNSXX).
- Instituto Normal Superior Mariscal Andrés de Santa Cruz de Chayanta.

Actions of concurrence and connection with other projects

In the study area there are plans, programs and projects such as:

- National Watershed Plan and its Multi-Year Program for Integrated Water Resources Management (MMAyA, 2014).
- Climate Resilience Pilot Program
- My Water and My Irrigation *(Mi Agua y Mi Riego)* Investment programs
- Watershed Projects (Comprehensive Management Plan for the Pocoata Basin Phase I. Comprehensive Management of the Calojsa Coataca Micro-basin, etc.)
- Intersectoral programs of cooperation such as the PROAGRO of the German Cooperation GIZ. Comprehensive Management of the Water and Resilient Agriculture Projects of the Swiss cooperation HELVETAS.
- Natural Resources and Climate Change Management project of the Swiss Cooperation in Bolivia, implemented by HELVETAS Swiss Intercooperation.
- Agroecological Zoning Project in the Potosí department of ZONISIG.
- The program to foster and develop agricultural output in Chayanta Municipality supports agricultural output and increases the economic resources of families.
- ICCO Cooperación Sudamericana works with PRODII under a cooperation agreement and with fundings from the European Union, promoting infrastructure and machinery for the production of *mates* and food products, as well as training and marketing in fairs to more than 1,500 families that were in the of Pocoata, Chayanta and San Pedro de Buena Vista municipalities in the province of north of Potosí. Two associations and a community company called Ecomalva were established where women are the majority members.

The 2017 survey reveals the presence of at least 20 institutions that worked in some area related to the EVA project in the last five years (table 4). It shows that the Ayllus with the highest number of actions by other institutions were Pocoata (9), followed by Chayantaka and Panacachi (7 each) and Jucumanis (4). And that this aid was mainly in agricultural work (seed provision, certification) or activities to improve the management and supply of water (provision of water storage tanks or reservoirs for irrigation, and micro irrigation).

Table4. Institutions and / or projects that work in the area of intervention on issues related to the EVA project.

Institution	AREA OF ACTION	Pocoata	Chayantaka	Panacachi	Jucumanis	Sikuya	Layme	Aymaya	Puraca	Grand Tota
APASA	Agro-diversity				1					1
CAPIS	Drinking Water					1				1
GAM	Artisanal house							1		1
	Irrigation		1							1
GTZ	Micro irrigation			1						1
INIAF	Seed Certification	1								1
INSA	Agricultural insurance								1	1
IPTK	Provision of tank Water storage	1								1
	Seed provision	1								1
	Forestry	1								1
	Micro irrigation	1								1
ISALTI	Solar tents			1						1
	Irrigation		1							1
My water 1	Drinking Water			1						1
My Water 2	Irrigation		1							1
PDA Chayantaka	Seed provision		1							1
Suma Mojo PDA	Micro irrigation	1								1
	Irrigation						1			1
PDA Zuicea	Education	1								1
Life Plan	Camelid				1					1
	Provision of Dairy cow		1							1
Housing Plan	Housing reconstruction					1				1
PRODII	Training			2						2
	Micro irrigation			1						1
	Terraces			1						1
RC International	Vegetable production					1				1
SEPSA	Drinking Water				1					1
UNICEF	Drinking Water						1			1
	Reservoir for irrigation				1					1
World Vision	Seed provision	1	1							2
	Reservoir for irrigation	1								1
	Irrigation		1							1
Grand Total		9	7	7	4	3	2	1	1	34

Source: own preparation based on data from the Survey, 2017.

Mining activity has resulted in in water resources and soil contamination of the intervention area of the EVA project, both environmental liabilities and current mining activities, create problems for small farmers of the Ayllus. Therefore, the mining sector, is an identified social actor, conflict generator which has a negative effect on the achievement of the objectives posed by the EVA project. it is recommended for this reason that the EVA project, may address this issue and generate spaces for dialogue and actions to solve the aforementioned conflict in the future. In one of the workshops carried out by FUNDECO, producers of peaches from the Ayllus of the EVA project intervention area, expressed their concern because the river waters they use for the production of peaches arrive contaminated due to the mining activity.

The rest of the relationships identified among social actors in the area of action of the EVA project can be considered as positive for the achievement of EVA project objectives and potential strategic partners.

7 RESULTS

SWOT Analysis

To accomplish a thorough analysis of the project, it has been resolved to group them in four aspects:

1) The physical-natural aspect, which tackles issues such as water resources, soils, ecosystems, landscape, native vegetation and wildlife.
2) The productive economic aspect, which tackles issues such as agricultural, livestock and mining output
3) The socio-cultural aspect, which includes the following components: population, culture and beliefs, transport and communication, health and education
4) The institutional organizational aspect, which develops aspects such as the form of organization, gender issues, and the presence of public and/or private institutions in the area.

The process of SWOT preparation has demanded a series of meetings and group workshops from the consultant team, where each professional has contributed valuable information from the area of his specialty, complementing it with bibliographic review.

	INTERNAL PERSPECTIVE		EXTERNAL PERSPEC	
	NATURAL PHYSICAL ASPECT			
VARIABLES	STRENGTH	WEAKNESSES	OPORTUNITIES	THREATS
Water Resources	Until 2016, the existing irrigation infrastructure has been improved with 19 implemented micro-irrigation systems. The management has been improved for 2,608 families that apply technologies for a more optimal and equitable use. There are 8 stations for the meteorological registry, all located around the intervention area of the EVA project. There is a complete cartographic base, in terms of hydrographic units (basins), hydrographic network, water balance, wetlands *(bofedales and vegas*) high land Marshes and high Andean wetlands The local population is informed about measures to adapt to climate change.	There is a limited understanding of the processes of recharge and transmission of subsurface and groundwater systems. Poverty of historical meteorological records. There is no systematization of the local perception of the effects of climate change. There is technical and institutional weakness in the regulation and monitoring of activities which are harmful to the environment, e.g. mining sites. Lack of management plans.	There is local interest for a better use of water. There is political will for the management of water resources, which will allow channeling resources to implement IWRM GIRH and MIC projects. There are water resources available in different forms of natural storage, including lagoons and groundwater systems. Approach of a quality and water quantity monitoring system.	Climate change will increase water stress due mainly to the increase in temperature by 1.7 to 3.3 ° C. Increase in climate risks due to the intensification of extreme events: floods and droughts. Water resources are scarce in the area, there are no glaciers. The low rainfall contributes little to water recharge. The annual precipitation regime will reduce the regulatory capacity of groundwater systems. Insufficient economic and technological resources for the implementation of optimal infrastructure for the use of water resources. Persisting prevalence in the contamination of water sources with heavy metals due to mining activity.

Soils	There is information on ancestral technologies and soil conservation practices. A monitoring system was proposed for a rational use of soil resource. There are experiences on training and technical assistance in management, control and prevention of soil erosion. There is a systematized cartographic base, in terms of soil pits (107 points) and surface soils (22 samples), with their respective results of laboratory analysis.	High prices for sampling activities and laboratory soil analysis.	There is interest in improving soil conditions in the project area, where erosion is mostly strong to very strong and poor and thin soils predominate.	Abandonment of soil conservation practices. Imbalance of traditional local knowledge due to the effects of climate change.
Ecosystems (pastures, bofedales) (high Andean wetlands)	Several ecosystems are mapped in the project's intervention area. Presence of Native grazing fields (CaNaPas) which increase the infiltration capacity of the water and protect the soil from wind and water erosion. They are also habitat for native wildlife and preserve native flora and fauna.	Lack of knowledge about the management and conservation of wetlands, such as water recharges through different surface and underground sources	Wetlands are becoming of greater interest due to their role in mitigating the effects of climate change.	Climate change threatens the functioning and persistence of ecosystems such as wetlands. Several ecosystems, but mainly the wetlands, are susceptible to overgrazing, fragmentation and drying. Reduction and degradation of Ecosystems due to anthropic and natural action.

	Several training events have been conducted on integrated management and valuation of biodiversity.			
Native Vegetation	There is an extensive inventory of native vegetation. There are 41 reserve areas that contribute to the conservation of native species. A vegetation map was drawn up to, year 2016, on a semi-detailed scale.	Absence of information in several intervention areas of the EVA project.	The availability of native vegetation is a potential for the development of camelid livestock. Opportunity to enrich reserve areas with native species that are not protected in these areas. Perform floristic evaluations in areas with high potential for diversity that have not yet been evaluated	Changes are foreseen in the composition, distribution and abundance of species; decreasing those with greater water requirements, palatable species for livestock and those that are key elements. of ecosystems. High pressure on some plant species (e.g. Achacana) that may threaten its conservation status.
Wildlife	There is an inventory of wild fauna The utilizations for wild fauna have been identified The conflicts that exist with wild fauna are known.	Little interest on the part of local people about the conservation of wild fauna Many beliefs about animals that can affect their conservation. There are no appropriate methods for alleviating, preventing or resolving wildlife conflicts.	There is base information that can be used for local businesses. There is interest on the part of communities to know how to resolve conflicts with wildlife in a more appropriate manner.	As a result of climate change, the habitats of the species will be modified, which can lead to a reduction in the population, increasing the risk of extinction. Conflicts with wildlife that affect the main crops.

ECONOMIC PRODUCTIVE ASPECT

VARIABLE	STRENGTHS	WEAKNESSES	OPPORTUNITIES	THREATS
Agricultural Output	It is a high agro-biodiversity area, mainly	Insufficient technical advice in communities.	There is interest in communities to Improve conditions of the soil and thus improving	The situation of high climatic risk in which Ayllus agriculture develops decreases the

	Potatoes Community production prevails through manthas, which involve crop rotation Actions have been performed to improve the production conditions of indigenous and native crops (construction of terraces, implementation or improvement of micro-irrigation systems, etc	Low crop productivity prevails	productivity There is interest on the part of the authorities and the community to rescue the genetic diversity of their products. There is interest in promoting family farming as a source of nutrition and food security. There is interest from the authorities and community members in producing organic food. There is interest in using natural resources (such as medicinal plants) in productive initiatives for utilization and trading.	Biodiversity. The perception of the community member indicates that droughts and frosts are more frequent, which constitute a threat to the agricultural production. This is ratified by studies. Appearance of pests and diseases that affect crops. Reduction of crop surfaces due to severe erosion and loss of agricultural land due to natural and anthropic effects. Consumption patterns change in rural and urban areas towards less diverse diets. The increasing import and smuggling of external food discourages local production.
Livestock production	There is a traditional management of camelid cattle that involves rotation (in dry and humid periods) and the use of communal land for grazing.	It is an area that has not been tackled by the project and therefore, it lacks a management plan for cattle and native grasslands. There are communal conflicts over the grazing area and undefined limits The livestock food sources are being reduced due to overgrazing.	Camelid cattle produces fertilizer That is used to improve soil conditions. Camelid cattle feeds on native plants, so there is no need to introduce forage and demands little forage per head. Camelids are adapted to extreme climatic conditions of the upper zone.	The increase in animal load will require a greater provision of food, causing overgrazing and deterioration of the ecosystem. Drastic water reduction due to the effect of climate change would affect native vegetation, wetlands, grasslands, which are food for livestock in the area.

Mining Activity	Local population knowledge about the effects (negative and positive) of the environment. Mining activity areas have been identified in terms of concessions of mine entrances and others	Mining activity negatively impacts water resources and soil when not operated properly. Mining activity processes lacking environmental control	Occasional increase in mineral prices	Volatility in mineral prices Generation of externalities Water pollution for human consumption and agricultural production
		Socio-cultural Aspect		
VARIABLE	STRENGTHS	WEAKNESSES	OPPORTUNITIES	THREATS
Population		Reduced population number communities that are exposed to extreme poverty, do not have access to a technical financial assistance	The government tries to support local employment initiatives	Increase of conflicts over territorial boundaries Scarce labor opportunities lead to young people migration
Cultural Base	Strong traditions and customs prevail in the Quechua and Aymara population. There are positive communal values of mutual cooperation (Aynii, Minka)	Drastic reduction in the transmission of ancestral knowledge. Modification of customs due to the adoption of foreign resources replacing the native ones.	There is support for the revaluation and systematization of ancestral knowledge of natural resources management based on the Andean cosmo-vision	Adoption of conventional production practices due to loss of local ancestral knowledge.
Transportation and Communication	Better practices of resource management were broadcasted by radio programs and spots in Pio XII radio station	There are sectors of the population that do not have enough economic income to allow them to make use of means of communication and transportation	There are roads to the main population centers	Poor conditions of many roads make them Impassable during the rainy season

Health	There is published information on the use of medicinal plants. There is vast knowledge in traditional medicine that takes advantage of the natural resources of the region. Traditional doctors are available in many health centers.	Limited Access to health centers. in remote rural areas	There is interest in appreciating and maintaining knowledge in traditional care	The effect of climate change is expected to reduce agricultural production, which will endanger the food security of families and their health. Biodiversity loss also threatens species used in natural medicine**.**
Education	There are educational centers in all communities.	Educational differences prevail at the expense of women.	There are programs that could assist remote and dispersed areas.	Migration reduces the number of students per school, causing school closures.
INSTITUTIONAL ORGANIZATIONAL ASPECT				
VARIABLE	**STRENGHTS**	**WEAKNESSES**	**OPORTUNITIES**	**THREATS**
Forms of organization	There is a strong participatory community organization.	There is no technical knowledge to manage projects.	It represents an opportunity to revalue the form of organization based on Ayllu, Mink'a and Ayni.	Due to the socio-environmental effect, greater migration is expected, which would weaken family structures, organizations and institutions.
Gender	Women play a fundamental role in productive and community activities. There are women's organizations in some communities.	The work and family overload falls mainly on women. Low participation of women in places of authority and decision-making.	Support for the empowerment of women in various scopes.	That a growing empowerment of women generates sexist and discriminatory behaviors.

Public and private institutions	There is a broad willingness and predisposition to community work to access and offer counterparts in the event that public institutions or NGOs want to work in their territory, as long as it is for the benefit of the communities. There have been positive experiences of relations with various institutions (HELVETAS, PRODII).	Lack of follow-up to project management due to insufficient financial resources and time.	There is an institutional intention (public and external cooperation) to promote projects that benefit the population.	Political change generates petty interests and makes it difficult to manage projects with cooperating institutions.
Territorial management	All political-administrative limits and other instruments of territorial management have been mapped and are in digital format, with GIS support.	The official cartography of the political-administrative municipal boundaries updated to April 2015 do not coincide with the original boundaries of the six municipalities with which the previous studies began. It was decided to maintain the official ones for the year 2012. The official delimitation of the Ayllus is not complete (until 2016). Of the 13 Ayllus that make up the study area, only 10 have been mapped by INRA, the remaining 3 have "unofficial" cartography, based on the work of PROINPA (2015).	It is possible to update the geographical database in order to have official cartography..	Emergence of new or old territorial conflicts and land tenure, product of the incomplete mapping of Ayllus by INRA, as well as municipal boundaries.

Analysis of indicators in the monitoring system

In order to perform this analysis, the monitoring matrix (Appendix A) was updated with the information provided by the EVA project, which consisted of semi-annual reports prepared by the project technicians for the Inter-American Development Bank (BID), as well as some reports. of consultancies and publications carried out by the project until the second semester of 2017.

Using the information obtained in the suggested monitoring system, it was possible to establish the degree of compliance with the agreements and the goals established in the project's Operations Manual. A previous matrix was elaborated (Appendix B) from which the scope of the project could be established by component:

Component 1: *Systematization of information and monitoring of soil, water, agro-biodiversity resources and impact of climatic variation.*

Purpose of the component

Compile information in order to establish the baseline in which the project starts and to approve alternative agricultural technologies and derive technical-scientific tools for decision-making regarding policies, programs and projects in the community (Ayllus), municipality, departmental and / or national levels.

General goals

The general goals identified for this component were related to determining the Conservation State of soil, water and biodiversity in the project area and progress obtained throughout its execution through the application of the Ayllus adaptive management system.

On the other hand, the implementation of traditional agricultural and livestock practices carried out under the model used by the Ayllus were also considered. Current agricultural and livestock practices for water management and agro-biodiversity. An evaluation of the discernible current impacts of climate change on the Andean Vertical Ecosystems.

In addition, it was suggested to generate proposals for mitigation and adaptation through improved agricultural practices. Compilation and systematization of traditional knowledge and uses through several relevant case studies on traditional knowledge and uses related to experiences and lessons of the project, systematized, published and disseminated among agro-biodiversity conservation actors.

Level of compliance with the goals identified for component 1

In the intervention zone, it has been possible to develop studies on biodiversity and soil, water and biodiversity conservation through the application of the adaptive management of the Ayllus. At least two studies have been conducted up to date within the framework of the EVA project. The first one was carried out by PROINPA in 2015, which generated information on the agro-biodiversity from 13 Ayllus of northern Potosí and southeast of Oruro with an emphasis on traditional crops such as potatoes, corn, beans and quinoa

was published and disseminated in December 2017.

The second study was performed by FUNDECO in which it has been possible to carry out a thorough evaluation of the biodiversity present in the area, its threats, the conservation status of the different ecosystems, the use of wild plants and animals and the perception of the people respect their environment. On the other hand, this study also managed to identify environmental functions related to water balance and control, habitat for wild species and storage of organic matter. A geodatabase has been generated with built-in databases, thematic layers and at least 63 thematic maps proposed using the information gathered in the field.

All this information is systematized in a manuscript that was published and disseminated in December 2017, entitled "The biodiversity of the Ayllus of the North of Potosí and Southeast of Oruro, Bolivia" and presents a description of the vegetation and flora registered in Ayllus / Markas of the EVA project, indicating the wealth of families, genders and species per level and ethno-ecological sub-stratum. In annex 7 there is a list of all the species of plants and other organisms that were found in the study area, by levels and sub-strata. In addition to a complete list of vertebrates and invertebrates found in the area. Finally, there are 4 relevant studies for the development of a monitoring and evaluation system for agro-biodiversity, soil, water and effects of climate change; that can be implemented and integrated into a Geographic Information System (GIS). In addition to community workshops conducted by the project and surveys that were raised for the evaluation of the proposed indicators.

There is also a document entitled "PRODUCT 2: PRESENTATION OF THE SOIL AND WATER DATABASE - ADJUSTED", which systematizes the water and soil quality information in relation to the demonstration plots and their water sources for irrigation. With regard to water, there are 16 points sampled and analyzed, and with an interpretation of the results and conclusions regarding the suitability of water mainly for agricultural use. Regarding the soil, the document presents the results of the physical-chemical analysis of soils in 3 demonstration plots with their respective control plots (non-intervened areas) in order to be able to appreciate the improvements achieved with the practices introduced by the project, but it does not present an interpretation of the results.

Within the framework of the general purpose of the project, 93 PDMIs have been established, which to date are being managed by local residents of the area. This equates to at least 710 ha of land under the management system. According to studies accomplished, a variation has been established in the amount of organic matter present in the PDMIs (2.5%) with respect to the organic matter found in control plots (1.8% organic matter). The work developed by the project has managed to influence the management tools of the Municipal Governments, such as those that included in their Municipal Plans for Land Use Planning (PMOT) actions to reduce vulnerability and adapt to climate change by integrating scientific knowledge and traditional practices.

Actions have been developed that have made it possible to establish a diagnosis on the local perception of climate change and ecological and social vulnerability, in addition to having a database platform that will systematize the information obtained in the field. Currently, the precipitation and temperature patterns are known in the study region and a document has been

published on the systematization of the exchange of experiences, conservation and sustainable use of natural resources.

Actions have been taken to spread out measures to adapt to climate change, agricultural practices and local regulations that favor the comprehensive management of EVAs through radio spots (4) and publications. It has been possible to establish a systematization of experiences of management, conservation and sustainable use of natural resources coordinated with the Interdisciplinary Integral Development Program (PRODII). It has also been possible to generate publications of dissemination, such as the triptych "Implementation of organizational platforms, exchanges of experiences and organizational strengthening of the Ayllus and Markas (FAOI-NP, JAKISA and Ayllus in Peace)". Finally, at least 11 training events have been developed only in the 2016 management, having achieved that during the execution of the project at least 4,083 people have participated in a training workshop organized by EVA or by some other organization on the topics that are the responsibility of the project.

Component 2: *Policies for strengthening, regulatory framework and local capacities for management of Andean Vertical Systems.*

Purpose of the component

Establish mechanisms for the improvement of the local governance system for the conservation of the Andean Vertical Ecosystems (EVAs) in the area of project implementation.

General Goals

The review processes and / or reform of the regulatory framework of public policies that incorporate the conservation / preservation and integral management of EVAs natural resources in the regulatory framework, policies and plans at Central, Sub National and territorial organizations level and to be implemented in the 12 Ayllus of the project. The strengthening of the instruments of planning and management capacities of the Ayllus, especially the capacity for dialogue among the representatives of the 12 Ayllus and the national and subnational authorities; support for participatory local development processes; strengthen the normative and public policy framework in the 12 Ayllus incorporating in their statutes, regulations or regulatory provisions, attributions and functions on conservation and sustainable management of EVAs natural resources; proposals for municipal and departmental regulations for the management of EVAs should be submitted to local and national authorities for consideration. Training, technical assistance and consolidation of organizations for implementation of Component 3; an environmental education program for children.

Level of Compliance

The project has managed to influence the management of Municipal Governments by supporting in the first instance in the development of 6 Municipal Plans of Territorial Ordering (PMOTs), two of which were already approved (Chuquihuta and Chayanta) that by law 777 would be migrated to Integral Development Territories Plans (PTDI). It has not been possible to generate processes for the implementation of these long-term management tools, but it has been possible to leave trained technicians who could implement them in the following years.

A platform for institutional cooperation has been established, through agreements with the private sector and meetings held during the development of the project. Within the framework of these agreements it has been possible to work the Bylaws of regional organization that were delivered to Four Parent Organizations Original Authorities (Ayllus Federation, Indigenous peoples from the North of Potosí - FAOI NP, Jatun Killakas Asanajaki Ayllu - JAKISA, Ayllus in Paz, Jatun Ayllu Pocoata). These bylaws were reviewed and worked on in meetings and workshops held within the regional platforms.

A total of six municipalities have incorporated tools models of traditional adaptive management in the Ayllus in their norms and planning. Training processes have been carried out for leaders and technicians on issues of agro-biodiversity, soil, water and climate change. Documents related to training sessions have been prepared in addition to four booklets that are being distributed in the project area. Regional and national fairs have been held to promote the exchange of products and knowledge.

Component 3: *Rescue and promotion of best practices and technologies for the conservation of agro-biodiversity and for the restoration of the productive capacity of the Andean vertical ecosystems.*

Purpose of the component

Developing experimental agricultural plots in which the traditional agricultural calendar based on the Ayllus will be implemented, under the organizational structure and division of labor that characterizes and sustains that system.

General goals

It is intended to develop Ayllus traditional adaptive management model in Demonstrative Plots of Integral Management (PDMI) in lands of the Ayllus to be identified and selected for the implementation of this component. Support afforestation and reforestation with native species.

Demonstrative Plots of Integral Management Accompaniment Committee will be formed, by local authorities where the PDMIs will be located. This committee will support the execution and implementation of the PDMIs in the selected places and will help resolve conflicts that may occur, as well as monitoring the commitment of the actors -beneficiaries of each PDMI to ensure the success of the same. Investments will be made in: Training programs in areas such as:

- management of forest and shrub nurseries; conservation of native forests; management of native grasslands and pastures; family gardens and greenhouse
- maintenance and operation of irrigation systems; water harvest; terrace management;
- afforestation, reforestation and conservation of native forests; construction of nurseries, delimitation of forest plots; seedling maintenance production; compensation for planted and grown trees (incentive system coordinated by the Management Committee);
- recovery of degraded and eroded soils.
- Management of native grasslands and pastures.
- Water Resource Management
- Agro-productive diversification.

- Livestock management and animal health.
- Participation agreements in the Ayllus. Project. Formation of the accompaniment committee to the PDMI. Conformation or Inter-Institutional Coordination Committee.

Level of Compliance

710 hectares have been established with traditional soil management and conservation practices and the establishment of 430 hectares of land under sustainable agro-ecological management practices has now been promoted 41 hectares of land have been recovered from riverbeds through the construction of retaining walls with gabion dams in 5 PDMIs of Chayantaka, Sicuya and Puraca Ayllus. 2,740 families participated in the PDMIs, in which the cultivation of Andean varieties of Andean crops preserved *in situ* are promoted (a total of 7 crops) among them: native potatoes, native and criollo maize, peas, beans, amaranth, wheat and t*arwi*

An annual increase of 152,822 kg of traded or exchanged products has been detected (in 2016 management) in addition to an increase in the production of crops, being wheat -among the criollos- the one that presented an increase of 903 kg / year, while among the native crops, quinoa begun to climb with 852 kg more of production compared to other years

Five forest species (molle, queñua and kiswara, and predominantly cypress and radiata pine) have been revalued and introduced and 91 hectares have been reforested in aquifer recharge zones. 34 micro irrigation systems implemented in the cultivation plots have been established, 25 technified irrigation systems under construction and 30 family irrigation systems with water harvesting using water reservoir covered with geo-membrane. At least 4 agronomic practices have been implemented to control erosion, soil conservation, water and biodiversity. Among them we have the implementation of water harvests through water reservoirs system and waterproofing geo-membrane, crop management and diversification, seed management, implementation of agroforestry systems with the use of native shrubs and arboreal species.

Regarding biological practices for erosion control, soil conservation, water and biodiversity, at least 4 biological practices have been promoted: 116 have been closed for the implementation of family forests, construction of 500 ecological kitchens to reduce consumption of fuel and improvement in human health, ecological management of pests and diseases in crops, and preparation of organic fertilizers. The sowing of 400 hectares of forage crops, 605 hectares of native pastures has been promoted.
Eighteen training session on the subject have been conducted on the subject, adding a total of 5,264 participants, and a total of 119 municipal authorities and/or skilled technicians (between 6 and 38 per event). Sixty-three percent of families perceive real benefits from the application of traditional practices and technologies in the conservation of agro-biodiversity in EVAs. Agreements have been reached for the generation of regional organization bylaws which were reviewed and worked out in meetings and workshops held within the regional platforms. There is an institutional platform in operation in the project area between the Ayllus and institutions in the area.

Finally, a book has been published: "Nuestros sabers, nuestro future: Prácticas y saberes de Ayllus y Markas del Norte de Potosi y Sudeste de Oruro[*("Our knowledge, our future: practices and knowledges of Ayllus and Markas , North of Potosi and Southeast of Oruro",)* which presents the results of the consultancy carried out by *Veterinarios Sin Fronteras* for the EVA project.

Subsequently, an analysis was carried out for the impact they had according to identified categories:

i) Integral management of natural resources

Within this category are indicators that attempt to measure the implementation of integrated management of natural resources. In this sense, it includes information on the number of people who are implementing the resource management model proposed by the project, the area that would follow this model and the replication of these actions throughout the Ayllus region. It also includes the recovery of traditional practices to improve production and promote the conservation of soils and agro-biodiversity, the evaluation of the recovery of soils in terms of fertility, moisture and organic matter as a result of having managed resources in an adequate way, in addition to being able to achieve an increase in local production that influences the resources they perceive and the quality of the products that people obtain, resulting in an improvement in food and quality of life.

Thus, at the end of the intervention of the project the impact of the project on the management of natural resources was determined**,** obtaining a model of adaptive management of agro-biodiversity reaching 2,740 families that adopted this model and are replicating practices on communal lands, as well as 93 PDMIs developed and implemented throughout the project´s intervention area. In the same way, thanks to the implementation of the project, a total of 710 ha has been estimated with traditional soil management and conservation practices, 430 ha with sustainable agroecological management practices, 41 hectares of recovered lands in riverbeds through the construction of retaining walls with gabions.

Five forest species were revalued between native and introduced (molle, queñua and kiswara, and predominantly cypress and pino radiata). Afforestation activities were achieved in a total of 91 hectares in aquifer recharge zones using native and introduced plants.

19 micro irrigation systems were implemented in the cultivation plots and 34 micro-irrigation systems were consolidated and implemented, in addition to 25 technical irrigation systems

Technical and economic evaluation of the EVA Project

under construction and 30 family irrigation systems with water harvesting using water reservoirs coated with geo-membrane.

The implementation of 3 agronomic practices, 5 mechanical practices and at least 2 biological practices (reforestation and introduction of forage plants) for the control of erosion, soil conservation, water and biodiversity were achieved. At least 4 agronomic practices have been implemented to control erosion, soil conservation, water and biodiversity. Among them we have the implementation of water harvests through the system of water reservoirs and waterproofing with geo-membrane, crop management and diversification, seed management, implementation of agroforestry systems with the use of native shrubs and arboreal species. Regarding biological practices for the control of erosion, soil conservation, water and biodiversity, we have at least 4 biological practices identified: 116 have been closed for the implementation of family forests,

construction of 500 ecological kitchens for the reduction of fuel consumption and improvement of human health, ecological management of pests and diseases in crops, and preparation of organic fertilizers. On the other hand, the planting of 400 ha of forage crops and 605 ha of native pastures has been promoted.

Technologies that promote integrated resource management have been incorporated and 63 training sessions have been carried out on the recovery and assessment of biodiversity, as well as training for municipal authorities and / or technicians (between 6 to 38 per event) and a total of 4,083 people have attended a training event in the framework of the project. But among the activities that caused the most impact was the organization of 4 fairs (2 regional and 2 national) with the aim of promoting the exchange system not only of products, but also of experiences. Thanks to these activities, there is currently the intention of other communities and Ayllus to be part of the project in the case of having a second phase.

Regarding the implementation of the Demonstration Management Parcels, 2,740 families have participated.

Although it has not been possible to generate a germplasm bank *ex situ*, it was possible to promote conservation areas *in situ*, in which seven species of native and criollo crops are preserved: native potatoes, native and criollo maize, peas, beans, amaranth, wheat and tarwi. Regarding the number of varieties per crop within these areas of preservation we have:

Crops	***Nº de varietiess***		
	Suni	**Chawpirana**	**Likina**
Potatoes	123	170	34
beans	31	54	21
Quinoa	10	17	6
maize	19	37	21

Source: Own preparation based on the work of PROINPA, 2016.

On the other hand, an increase in terms of organic matter was determined (OM) when comparing the soil of the plots (2.5% of MO) with the soil of control plots, where PDMIs were not implemented (1.8% of MO). On the other hand, in terms of fertility analyzed inside and outside the PDMI's, a similar tendency could be identified by observing a percentage of total Nitrogen of 0.1%, Phosphorus within the PDMI's of 19.6 ppm while in control plots 15.6 ppm were obtained and finally the amount of K in PDMI's was 1.3 meq / g while in control plots it was 1.2 meq / g. These results allow us to conclude that, at least with respect to the variables considered, an increase in the fertility of the soils is appreciated when applying the resource management model proposed by the EVA project.

Finally, it should be noted that 5,253 ha of manthas have been implemented according to the agricultural calendar, and to date 2,608 families have registered applying technologies that are part of the adaptive management model of the Ayllus within the Demonstration Plots of Integrated Managements, as well as 4,803 families in the general intervention area that apply technologies that are part of the adaptive management model of the Ayllus in their respective lots.

ii) Biodiversity conservation

Regarding the conservation of biodiversity, the generation of information on biodiversity with an emphasis on agro-biodiversity, and the generation and implementation of information systems and databases is included, with the aim of having information that allows to generate actions in conservation. In this sense, the indicators would allow us to assess whether the adequate management of natural resources, the generation and implementation of adequate policies regarding the management of resources and the recovery of ecosystems, as well as having more and more skilled people will allow the conservation and preservation of native species in the extension of its diversity in the region of the Allllus.

The project, through its work, was able to identify at least six environmental functions (four in the biodiversity study, three in the SPIE platform, a common function in both sources), specifically, the environmental functions identified were: 1) control of erosion, 2) storage of organic carbon in the soil, 3) storage of carbon in biomass, 4) habitat for species, 5) water balance (water regulation) and 6) biodiversity (potential richness of species).

The most relevant work in terms of biodiversity conservation was carried out by FUNDECO, published in the book "La biodiversidad de los Ayllus del Norte de Potosi y sudeste de Oruro, Bolivis: conocimiento actual, usos y potencialidades" *("The biodiversity of the Ayllus of northern Potosí and southeast of Oruro, Bolivia: current knowledge, uses and potentials").* This book represents a significant contribution to the knowledge of the diversity of flora and fauna in the area. It presents information that contributes with the knowledge about the biodiversity of the region, evaluates the environmental functions differentiated by ethno-ecological levels, provides a differentiation of the levels from the floristic point of view and highlights the species that characterize a good state of conservation, also It presents information on the use of fauna and flora and the conflicts that people have with wildlife.

On the other hand, 41 reserve areas with an average surface area of 20.5 ha were determined, where there are at least 22 species per reserve area.
Additionally, 4 relevant studies have been developed for the implementation of a monitoring and evaluation system for agro-biodiversity, soil, water and effects of climate change; that can be integrated into a Geographical Information System with 101 thematic layers and 63 useful thematic maps for the geo-database.

iii) Impact on local policies

Within this category are those activities designed to incorporate, within the main planning and management instruments, aspects related to the model of natural resource management proposed by the project, the incorporation of strategies for the use of the territory, the revaluation of agricultural biodiversity and the recovery of traditional practices.

In this sense, it was supported in the preparation of 6 Municipal Plans of Territorial Organization (PMOTS), which incorporate in their planning tools, criteria for the recovery and revaluation of agro-biodiversity. Of these 6 PMOTS, 2 are approved (Chuquihuta and Chayanta) and currently being implemented. 13 bylaws and regulations for the Ayllus in the area of intervention of the project have also been prepared, as well as an Organic Charter of the Indigenous Chuquihuta Municipality. Additionally, there is a published document that

systematizes experiences in the management, conservation and sustainable use of natural resources.

iv) Dissemination and access to information

Similarly, the activities related to being able to measure the dissemination and access to information are related to generating published information and ensuring that people living within the Ayllus and surrounding areas can have access to all the information related to the project, allowing in the long term, replicate and have joint actions.

Three books have been published: "Our knowledge, our future: Practices and knowledge of Ayllus and Markas of the North of Potosí and Southeast of Oruro", where they revalue the rich traditional knowledge of the region, "The biodiversity of the Ayllus of northern Potosí and southeast of Oruro, Bolivia: current knowledge, uses and potentials "and" Agrobiodiversity in Andean Vertical Ecosystems, (Suni, Chaupiraña and Likina) of 13 Ayllus of the North Potosí and Southeast of Oruro: Production systems, management techniques and agricultural indicators " .

Finally, several radio programs and spots have been produced and broadcasted periodically on Pio XII radio.

v) Capacity building

This category summarizes training activities in natural resource management that may have been carried out, as well as the strengthening of inter-institutional coordination platforms that allow to build local capacities.

There have been 67 training sessions on integrated management and the assessment of biodiversity in which a total of 4,083 people participated (with an attendance of 14 to 406 people per event). In addition, municipal authorities and / or technicians attended training events (between 6 to 38 authorities or technicians per event) and fairs were held in the Ayllus of Oruro and Potosí (2 regional and 2 national).

There have been 202 training session on traditional practices of EVA integral management and conservation of agro-biodiversity, reaching a total of 5,954 people who attended the training events.

vi) Threats to agro-biodiversity

This category includes activities aimed at working on general threats, including those arising from climate change.

In this sense, activities have been carried out so that a total of 2,740 families adopted the management and are replicating practices in communal lands during the years of project implementation. It has been possible to carry out a study on the precipitation and temperature patterns in the study region.

Thanks to these activities, the population of the intervention area of the EVA project has been informed about measures to adapt to climate change, agricultural practices and local regulations that favor the integrated management of the territory through different mechanisms such as, the participatory preparation of Municipal Plans of Territorial Ordering (PMOTs), participatory drafting of the Ayllus Bylaws

Although there has been intense work in the dissemination and awareness with knowledge related to climate change, there has been no systematization of the local perception of the effects of climate change. It will be important to be able to resume this work in a new stage of the project.

Perception on implemented activities

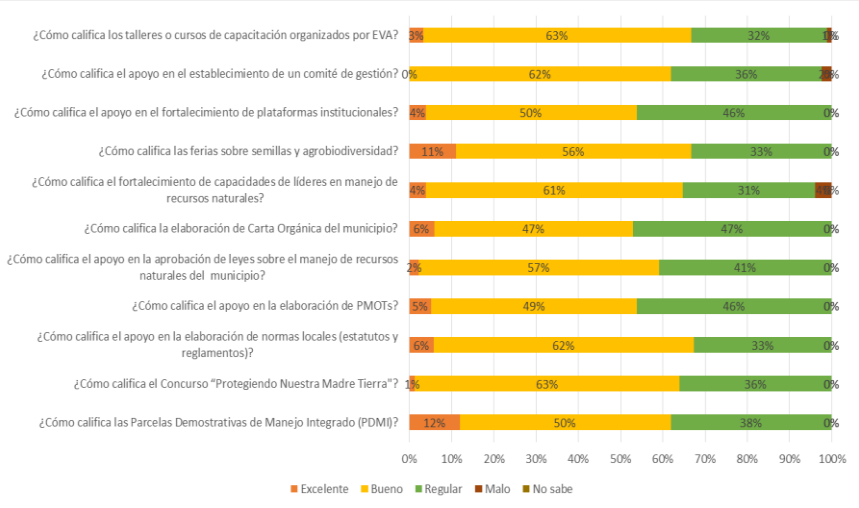
In order to know the perception of the beneficiaries about the activities carried out by the EVA Project, 240 family surveys and 25 community surveys were taken in 32 communities of 6 municipalities and 10 Ayllus in October 2017 (Table 5).

Table 5. Communities surveyed for the final evaluation of the EVA Project.

No.	Community	municipality	Ayllu	Participation	Latitude	Longitude
1	Micani	Chuquihuta	Jucumani	PDMI	18 ° 32'48 "	66 ° 20 '01 "
2	Chirihuana	Uncia	Puraca	PDMI	18 ° 31 '06 "	66 ° 27 '44 "
3	Inca Chalviri	Llallagua	Sicuya	Contest	18 ° 17 '39 "	66 ° 32 '12 "
4	Condor Kuyo	Llallagua	Sicuya	PDMI	18 ° 21 '29 "	66 ° 29 '40 "
5	Jachojo	Llallagua	Chullpa	PDMI	18 ° 20 '53 "	66 ° 39 '42 "
6	Walkeri	Llallagua	Chullpa	PDMI	18 ° 20 '17 "	66 ° 38 '01 "
7	Copana	Chayanta	Panacachi	PDMI	18 ° 28 '41 "	66 ° 14 '21 "
8	Quinta Pampa	Chayanta	Chayantaka	PDMI	18 ° 14 '16 "	66 ° 21 '07 "
9	Pichata	Chayanta	Chayantaka	Contest	18 ° 14 '06 "	66 ° 19 '36 "
10	Compi	Chayanta	Chayantaka	PDMI	18 ° 13 '54 "	66 ° 23 '16 "
11	Popusiri Ii	Uncia	Aymaya	Contest	18 ° 30 '16 "	66 ° 31 '31 "
12	Changarani	Uncia	Aymaya	PDMI	Response:	66 ° 32 '20 "
13	Chullunkiani	Uncia	Aymaya	PDMI	18 ° 34 '37 "	66 ° 33 '21 "
14	Condoriri	Uncia	Aymaya	Contest	17:38:15	66 ° 35 '05 "
15	Palcota Ii	Uncia	Layme	PDMI	18 ° 39 '37 "	66 ° 32 '51 "
16	Tocoria	Chuquihuta	Jucumani	PDMI	18 ° 38 '51 "	66 ° 20 '32 "
17	Chaqueni	Uncia	Layme	Contest	18 ° 37 '43 "	66 ° 27 '39 "
18	Luluni	Chuquihuta	Jucumani	PDMI	18 ° 41 '05 "	66 ° 25 '34 "
19	Irpa Irpa Baja	Chuquihuta	Jucumani	Contest	18 ° 33 '08 "	66 ° 21 '53 "
20	Irupata	Chayanta	Chayantaka	PDMI	18 ° 14 '28 "	66 ° 23 '56 "
21	Panacachi	Chayanta	Panacachi	PDMI	18 ° 25 '26 "	66 ° 16 '59 "
22	Caloxa	Chayanta	Panacachi	PDMI	18 ° 28 '25 "	66 ° 19 '41 "
23	Kisi Kisi	Chayanta	Panacachi	Contest	18 ° 31 '14 "	66 ° 14 '44 "
24	Chucarasi	Chayanta	Chayantaka	PDMI	18 ° 29 '54 "	66 ° 14 '47 "
24	Chaqueni I	Llallagua	Sicuya	PDMI	18 ° 17 '05 "	66 ° 26 '14 "
26	Utavi	Pocoata	Pocoata	Contest	18:55:39	66 ° 14 '44 "
27	Vila Vila	Pocoata	Pocoata	PDMI	18 ° 49 '35 "	66 ° 15 '32 "
28	Pacotanca	Pocoata	Pocoata	PDMI	18:45:27	66 ° 15 '41 "
29	Villa Alcarapi	Pocoata	Pocoata	PDMI	18 ° 49 '18 "	66 ° 17 '17 "
30	Jachatajo	Pocoata	Pocoata	did not participate	18 ° 32 '21 "	66 ° 58 '40 "
31	Chayala	Pocoata	Pocoata	did not participate	18 ° 33 '28 "	66 ° 58 '25 "
32	Janko Jaque	Challapata	Educated	PDMI	18 ° 4 '40 "	66 ° 12 '55 "
Total		6 Municipalities	10 Ayllus			

a) Main activities developed by the EVA project

Among the activities carried out by the EVA project that had greater participation by the beneficiary families are the training workshops, the implementation of the PDMIs, the "Protecting Mother Earth" contest, the support in the preparation of bylaws and regulations, and the strengthening of the capacities of leaders in natural resource management. For the purpose of evaluating the project, an assessment of these activities was requested to the people who participated in them (Figure 4). These activities were rated as good in a percentage greater than 50%, the regular rating is in second place with percentages ranging from 31 to 47 percent and there are appreciations that qualify them as excellent in third place. On very few occasions and with percentages that do not exceed 4% there is a bad rating.



Excellent Good Regular Bad Does not know

b) Appreciation on the "Protecting Mother Earth" contest

Undoubtedly, one of the most successful actions carried out by the EVA project was the "Protecting Mother Earth" contest, of which two versions were made, in the 2016 and 2017 administrations. In general terms it had a positive impact because it was possible to reach a greater number of beneficiary communities and families. In the first contest (2016), 1,900 families participated in activities to replicate the management of PDMIs in their lands. Of the 32 evaluated communities in 2017, 8 communities participated in this activity, with the participation of 75 families, who carried out activities at the community level. They rate from good to regular and some are excellent (Figure 5). However, problems were detected in some communities due to disagreement regarding the awards received. They even pointed out that this caused internal conflicts and expressed their dissatisfaction with the project since they carried out few activities in several communities.

However, in general terms, the beneficiaries' perceptions state that this event was mostly a good initiative and 63% rate it this way. This trend is general in the interviewees, with some variations in the Ayllus where they had a better rating. The Chullpa, Amaya, Sikuya, Layme and Panacachi Ayllus rated it as good in more than 70%, while the Pocoata and Chayantaka Ayllus, although they have no disapproval, they show perceptions that rate them predominantly as regular (Figure 5) although 14% rate it as excellent and good in Chayantaka.

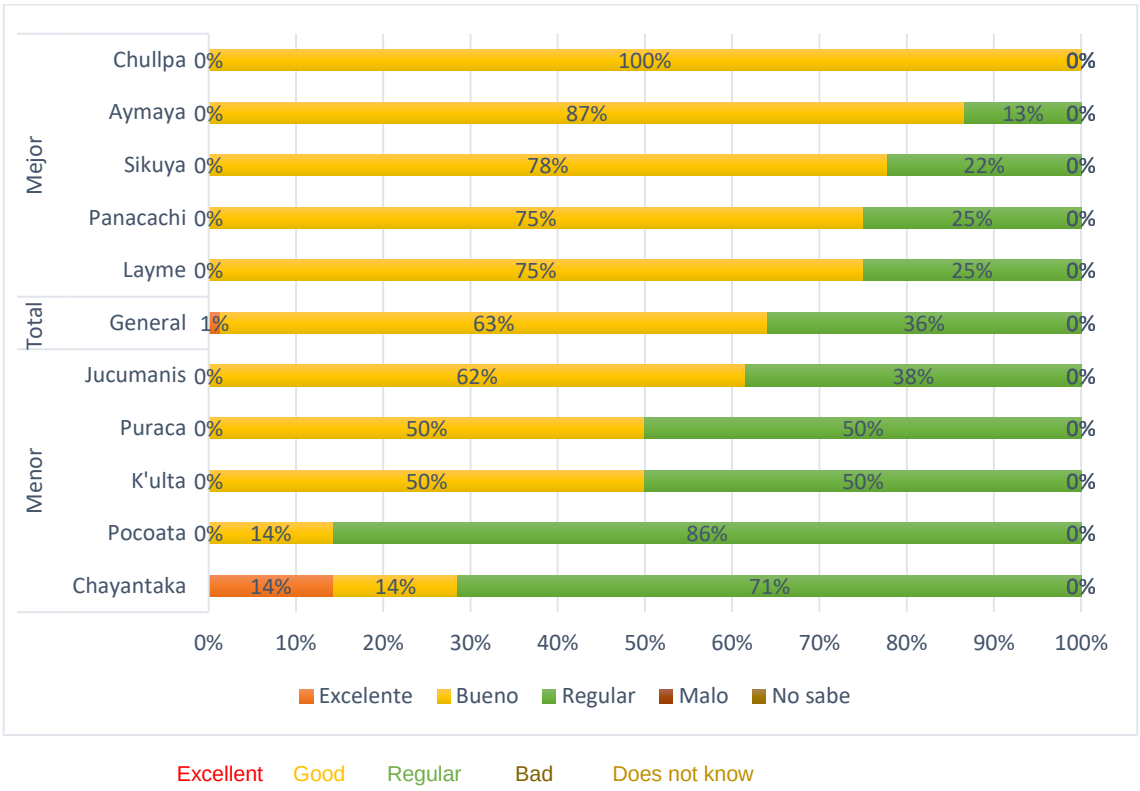


Figure 5. Opinions on the "Protecting Mother Earth" contest

This initiative, rather than structurally changing the conditions sought by the project, is a way of conducting awareness and motivation campaigns for the beneficiaries, in the next initiatives this should be the starting point of the project in order to reach the desired impacts.

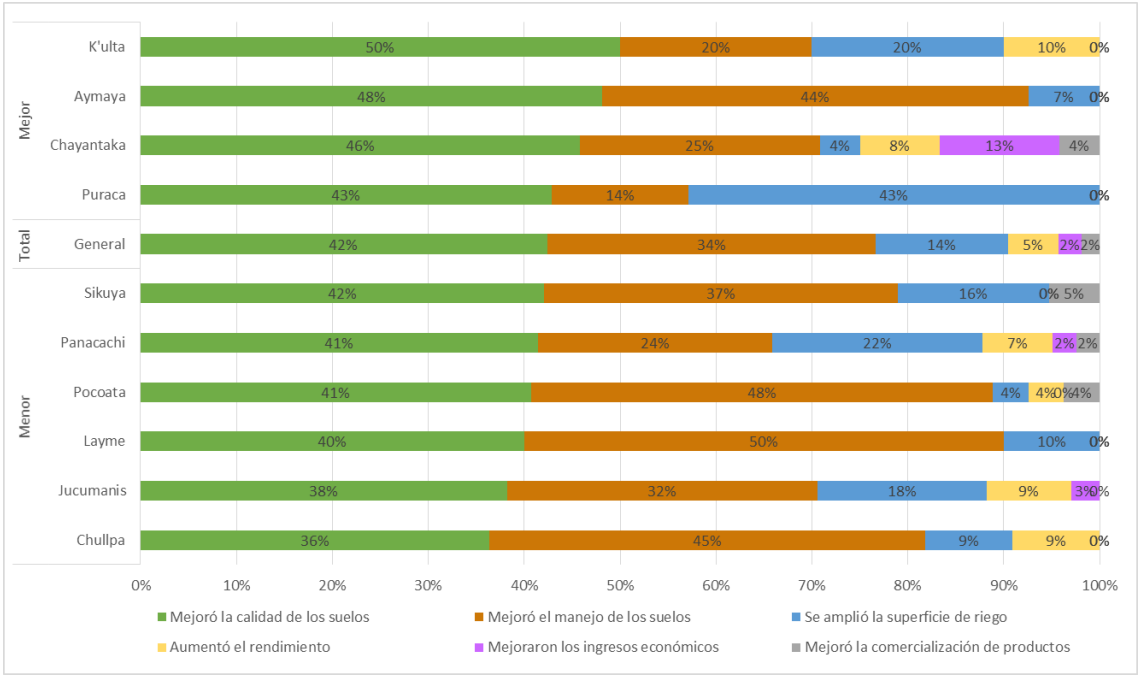
c) Project main benefits

Taking into account 6 of the main actions aimed at achieving the objectives and goals of the project, it can be clearly established that one of the practices that has had the best perception has been "the improvement of soil quality". In general, 42 percent of the interviewees said it was the most important benefit that the EVA project has brought. Considering all Ayllus interviewed, it can be evidenced that K'ulta, Aymaya, Chayantaka and Puraca that are above this level had a better perception in this sense while the others Ayllus have a lower perception as seen in Figure 6.

The improvement in the management of soil is associated to the improvement of the quality of the soil, a 34 percent stated this way, these two variables are very related, because an adequate soil management contributes to an improvement in the quality of the soil. It is not surprising to find that the results of several EVA-driven practices are aimed at improving soil quality and management, such as the implementation of living or dead barriers, construction of terraces, preparation and

incorporation of organic fertilizer, infiltration ditches, etc.

On the other hand, only 14 percent detected that the most beneficial action the EVA project accomplished was the expansion of irrigation, a 5 percent considers the improvement in yields, and finally only 2 percent believes that economic income and marketing of products were improved.



Improved soil quality Improved handling of soils Enlarged irrigated area

Yielding increased Improved economic income Improved marketing of products

Figure 6 Perception of the most important benefits the EVA project has brought.

Source: Own preparation based on Survey 2017.

As can be seen in the figure above there is no a single trend since there are different perceptions in the different Ayllus due to the emphasis achieved with each of the actions, we understand that also by the prioritization of the needs identified for example in Puraca Ayllu the expansion of irrigation and soil improvement are seen as an action of equal importance (43 percent).

Although one of the expected results was to boost the marketing of products for the improvement of family economic income, this had a lower impact and it must be understood that this is a longer term process that not only depends on the intervention of the EVA project but there are other determining factors to promote this action, such as road access, protection of domestic market or production of marketable surpluses.

Some of the objectives set for the project program are to demonstrate that the adaptive management model of the Ayllus promotes the conservation of agro-biodiversity and sustainable use of soil and water in PDMI, with these results on the perception of people it is possible to reinforce and incentivize the adequate management of the soil and rescue of ancestral practices to carry out an adaptive management to soil management and conservation in the Ayllus North of Potosí and South East of Oruro.

EVA project has marked the way so that from the management of soil other processes can be continued and influence other factors that can be achieved little by little for the rescue of EVAs,

as long as the policies favorable to peasant economies, family farming and conservation can be implemented in a tangible way for the inhabitants of the region.

d) Knowledge application acquired in technical assistance

Regarding the knowledge given and the technical assistance provided by the project, 64 percent of those interviewed consider that they seldom apply this knowledge, 31 percent consider they apply it a great deal and only 5 percent consider they do not apply this knowledge. As shown in Figure 7, in the K`ulta Ayllu the situation is more favorable since 80 percent of those interviewed consider that they apply the acquired knowledge a great deal and only 20 percent consider they seldom apply it. In contrast, the Ayllu Puraca states that 75 percent consider they seldom apply it and 25 percent consider they apply none.

In general terms the perception is not negative, although there is no an ideal scenario, it can be established the project has had an influence on the application of knowledge, that while now it is low this process is a trend that can grow on all if a specific strategy is applied to influence the application of knowledge that goes along with a monitoring in the application so that the changes can be made visible with respect to the improvement, reinforcement, and adoption of new practices in favor of the rescue and management of the EVAS.

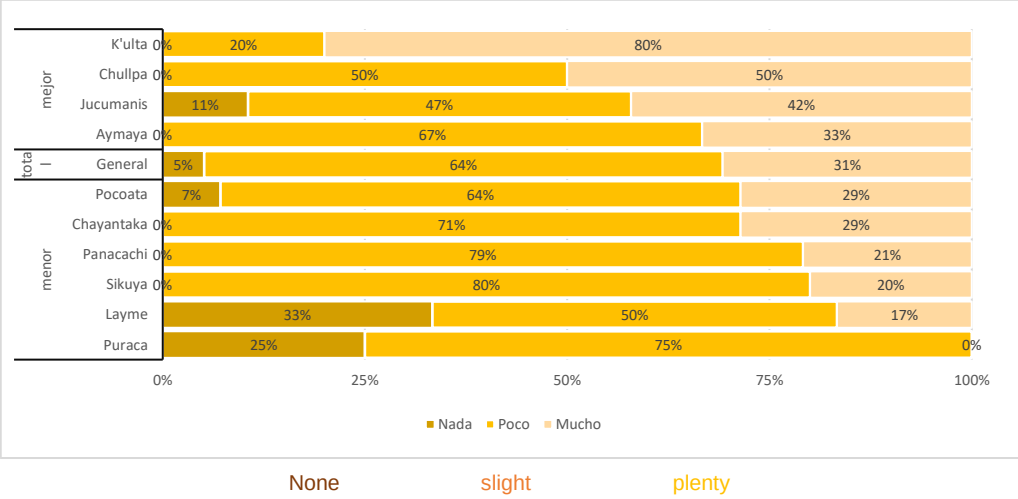


Figure 7. Perception on the application of knowledge obtained in technical assistance.

Source: Own preparation based on Survey 2017

e) Changes in crop management due to EVA technical assistance

In terms of people's perception of changes in crop management due to the technical assistance of the EVA project, 68 per cent of the interviewees believe that the changes in their crop management were scarce, 20 percent consider that the management of their crops changed considerably thanks to technical assistance, and 13 percent do not perceive a change at all. As shown in figure 8, again K`ulta Ayllu exhibits the most favorable situation with 40 percent considering that the changes were significant, (a lot), the other 40 percent detect few changes

in the management of their crops and 20 percent do not detect any change (none). In contrast, in the Puraca Ayllu 100 percent state that the changes are scarce and 83 percent of the Layme Ayllu indicate that the changes were scarce, and 17 percent even indicate that they do not detect any change in the management of their crops.

This perception is somewhat unclear, however the results show that eight of the ten Ayllus evaluated the perception in the change of their crops was considered "a lot" in a range of 10 to 40 percent, and that most perceive little change in the management of their crops. This evaluation is not bad because it perceives the changes in the management and improvement of the crops thanks to the technical assistance of the EVA project. For this reason, it should be considered that the improvement and management of different crops go beyond the implementation of techniques and manual labor that are intended to improve the quality of the soil and thus increase the yielding of crops, but it is influenced by several other factors that cannot be controlled by the project such as drought, hail and frost.

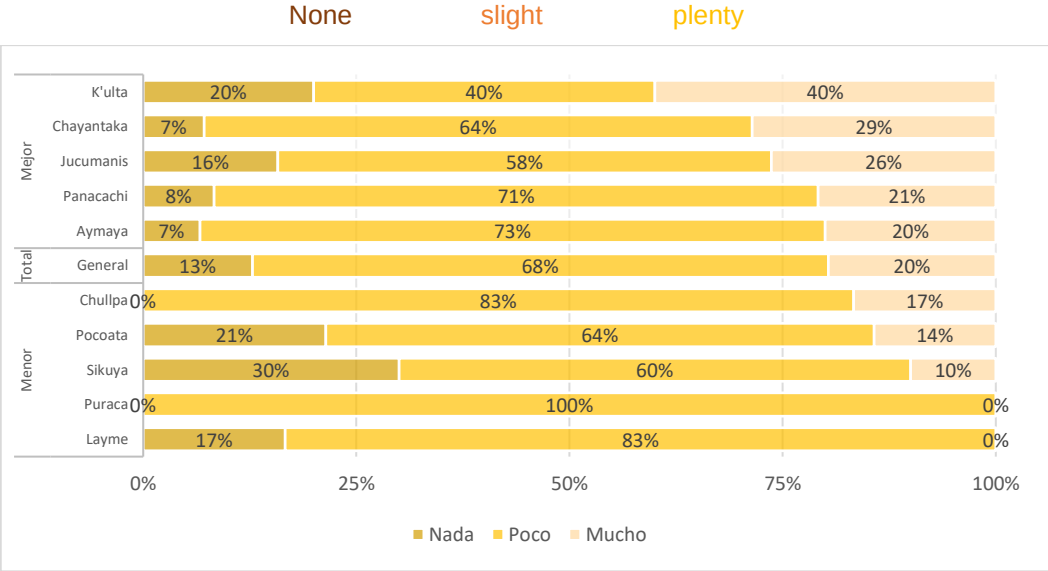
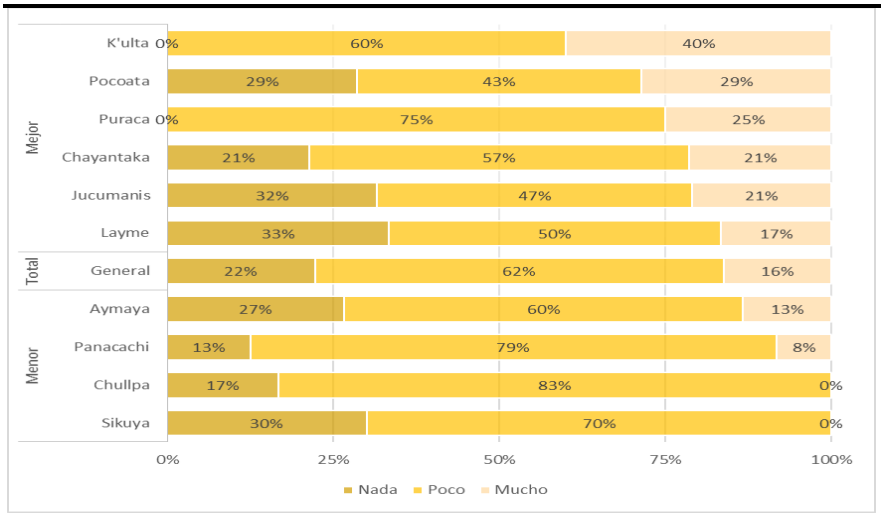


Figure 8 Perception on the improvement in crop management due to EVA technical assistance.

f) Improvement in crop yielding

The perception of the families indicates that in general terms the yielding of the crops improved "little" (62%), only 16% indicate that the yielding improved "a lot" and a 22% indicates that it did not improve "at all" (Figure 9) Although it is not a totally negative perception, it must be understood that the productive conditions in the area have structural problems such as access to land or adverse weather conditions, aspects that are beyond the control of the project, so the improvement in crop yielding in the area is a longer-term task.

Within this general scenario it can be evidenced that the K'ulta Ayllu has had the best perception regarding the improvement in crop yielding, and on the other extreme Chullpa and Sikuya Ayllus the worst valuations. If the result has varied nuances, it is likely that the effect
on performance has also contributed to the interest of the beneficiary families.



None slight plenty

Figure 9. Perception on the improvement in crop yielding.

On the other hand, if we make a comparison of the productivity of different native and criollo crops between 2016 and 2017 (data from 2016 and 2017 surveys), there is a slight decrease in the yielding of pea, wheat, corn, potato and quinoa (Table 6), this could be the effect of adverse environmental factors -such as hail and drought- that had a high incidence in crops in 2017. However, the crops of broad beans, onions and prickly pear cactus, had a slight increase in yielding, and this might be due to the actions promoted by the EVA project, since it supported the provision of these seeds and also promoted the cultivation of prickly pear cactus in the area.

Table 6. Increase in annual productivity (kg / ha), 2016 and 2017 management.

Crops	2016 Performance Kg / Ha (Average)	2017 Performance Kg / Ha (Average)
	Criollos	
1. Peas	1,253	1.084
2. barley grain	733	786
3. Onion	4.939	5,567
4. Bean	1.111	1,463
5. Wheat	903	798
6. Prickly pear	1,769	2,245
7. Carrot	9,951	8,188
	Indigenous peoples	
8. corn grain	1.765	1,264
9. Wood sorrel	3,133	1,956
10. Potato	(5,435)	4,079
11. Papaliza	3.044	1,909
12. Quinoa	852	805
13. Tarwi	3.138	1,012

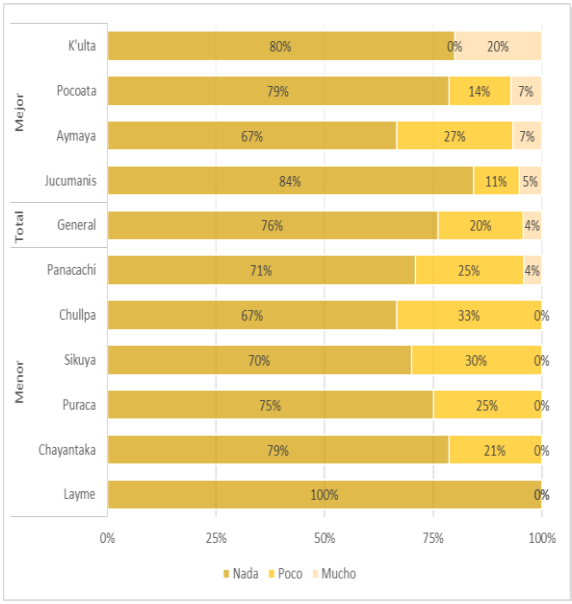
Source: Own preparation based on Surveys 2016 and 2017.

g) Increase in the marketing and bartering of products

Another result that the EVA project aimed to achieve was to increasing the marketing and bartering of agricultural products to boost the economy of the beneficiary families. The perceptions of the beneficiaries are not uniform but in a general it can be inferred that these results have not generated significant changes in the situation preceding the project. Only 4 percent consider that there was much increase in bartering and only 6 percent indicate a high increase in marketing (Figure 10).

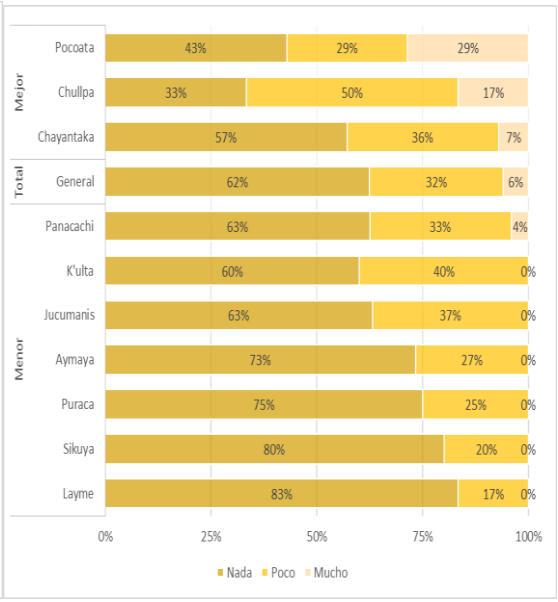
A better perception of the increase in marketing is shown in Pocoata, Chullpa and Chayantaka Ayllus and the lower perception in the other Ayllus as shown in Figure 10b. As for bartering, a lot of increase is observed in K'ulta, Pocoata, Aymaya and Jucumanis Ayllus , it should be noted that in all the Ayllus - with the exception of Layme Ayllu – it was said that part of the families (above 20) percent) maintain this form of bartering, a situation that has slightly changed with the project.

a) Bartering



None slight plenty

b) Marketing



None slight plenty

Figure 10 Increase in the marketing and bartering of products.

Within the main actions or products promoted by the EVA project are the PDMIs or Demonstration Plots of Integrated Management that were implemented in several communities within the area of intervention of the project. The scope of this activity reached 2,740 families until year 2017.

Although the PDMIs were mapped, it is necessary to clarify that of the 93 PDMIs in total, two have erroneous coordinates, therefore they are outside the limits of the area of influence of the project (see figure 11 and table 7), one does not have coordinates and eight are not located within the territory of an Ayllu according to the coordinates they have.

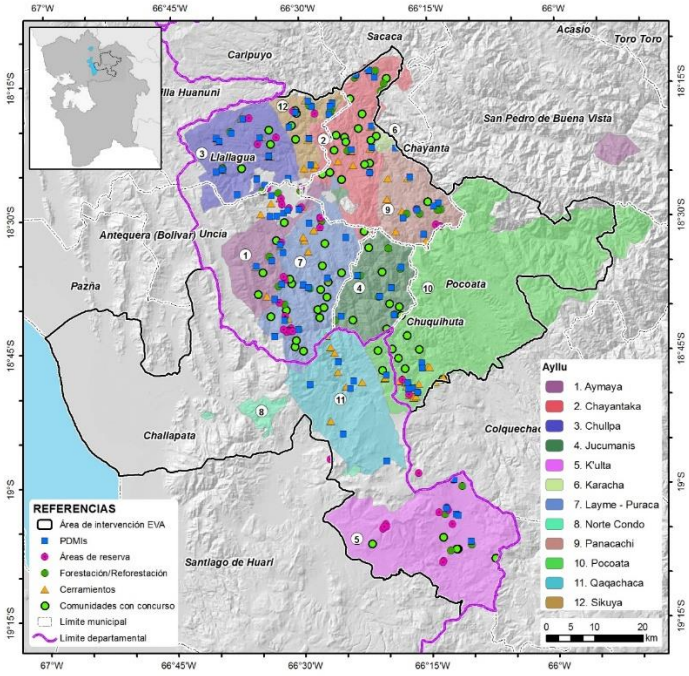


FIG. 11. Location of the main activities carried out by the EVA project.

Table 7. Summary of the main activities developed in component 3, differentiating Ayllu and ethno-ecological level.

		Ayllus:												
ethno-ecological level:	**Activities performed by the EVA project:**	**1 Aymaya**	**2 Chayantaca**	**3 Chullpa**	**4 Jucumanis**	**5 K'ulta**	**6 Karacha**	**7-8 Layme – Puraca**	**9 Norte Condo**	**10 Panacachi**	**11 Pocoata**	**12 Qaqachaca**	**13 Sikuya**	**TOTALS**
Suni	No. of PDMIs	3	1	9	2	5	0	5	0	1	3	4	0	31
	No. of enclosures	3	1	7	0	0	0	5	0	5	10	3	0	34
	No. of reservation areas	3	1	3	0	5	0	11	1	1	1	0	0	26
	No. of afforestation-reforestation areas	2	2	4	2	5	0	2	0	3	0	0	0	20
	No. of communities with contest	3	3	3	2	5	0	11	0	1	3	0	0	31

Ethno-ecological level:	Activities performed by the EVA Project:	1 Aymaya	2 Chayantaca	3 Chullpa	4 Jucumanis	5 K'ulta	6 Karacha	7-8 Layme – Puraca	9 Norte Condo	10 Panacachi	11 Pocoata	12 Qaqachaca	13 Sikuya	TOTALS
	No. of communities surveyed	2	1	2	1	1	0	2	0	1	3	0	0	13
	No. of water sampling points	2	0	0	0	0	0	5	0	0	2	0	0	9
	No. of soil sampling points	3	2	2	0	0	0	13	0	0	3	3	0	26
	No. of soil sampling points (soil pits)	4	4	3	0	10	0	0	0	0	4	0	0	25
Chawpirana	No. of PDMIs	2	6	2	10	0	1	5	0	8	4	2	9	48
	No. of enclosures	1	4	3	0	0	0	4	0	1	5	4	6	28
	No. of reservation areas	1	1	0	0	0	5	2	0	2	2	0	2	15
	No. of afforestation-reforestation areas	0	3	0	5	0	0	2	0	2	0	0	6	18
	No. of communities with contest	1	12	0	5	0	1	6	0	0	6	0	4	35
	No. of communities surveyed	2	5	0	3	0	0	1	0	4	4	0	3	22
	No. of water sampling points	0	0	0	0	0	0	1	0	0	1	0	3	5
	No. of soil sampling points	2	2	4	3	2	0	2	0	3	16	0	11	45
	No. of points of (soil pits)	2	6	0	0	0	1	6	0	0	16	0	0	31
Likina	No. of PDMIs	0	0	0	0	0	0	0	0	0	0	0	0	0
	No. of enclosures	0	0	0	0	0	0	0	0	0	0	0	0	0
	No. of reservation areas	0	0	0	0	0	0	0	0	0	0	0	0	0
	No. of afforestation - reforestation areas	0	0	0	0	0	0	0	0	0	0	0	0	0
	Nro. de comunidades con concurso	0	0	0	0	0	0	0	0	0	0	0	0	0
	No. of communities surveyed	0	0	0	0	0	0	0	0	0	6	0	0	6
	No. of water sampling points	0	0	0	0	0	0	0	0	0	0	0	0	0
	No. of soil sampling points	0	0	0	0	0	0	4	0	0	4	0	0	8
	No. of points of (soil pits)	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	No. of PDMIs	5	7	11	12	5	1	10	0	9	7	6	9	82 *
	No. of enclosures	4	5	10	0	0	0	9	0	6	15	7	6	62
	No. of reservation areas	4	2	3	0	5	5	13	1	3	3	0	2	41

Ethno-ecological level:	Activities carried out by the EVA project:	Ayllus: 1 Aymaya	2 Chayantaca	3 Chullpa	4 Jucumanis	5 K'ulta	6 Karacha	7-8 Layme – Puraca	9 Norte Condo	10 Panacachi	11 Pocoata	12 Qaqachaca	13 Sikuya	TOTALS
	No. of afforestation - reforestation areas	2	5	4	7	5	0	4	0	5	0	0	6	38
	No. of communities with contest	4	15	3	7	5	1	17	0	1	9	0	4	66
	No. of communities surveyed	4	6	2	4	1	0	3	0	5	13	0	4	41
	No. of water sampling points	2	0	0	0	0	0	6	0	0	3	0	3	14
	No. of soil sampling points	5	4	6	3	2	0	19	0	3	23	3	11	79
	No. of points of (soil pits)	6	10	3	0	10	1	6	0	0	20	0	0	56

Verification of actions and infrastructure driven by the project

This activity was carried out in 18 communities of the 32 communities surveyed in total.

It was decided to carry out this activity in these 18 since it was possible to arrange a meeting with authorities and community members. Among the beneficiary communities where the verifications were carried out, there are those that participated in the PDMI and others that participated in the "Protecting the Mother Earth" contest. In these communities, the construction of bench terraces and terraces with dead and / or live barriers was found (depending on the availability of material in the community). Each family carried out the construction of terraces in their own plots (as a counterpart) and EVA project support was in training or providing materials (picks, shovels and wheelbarrows) (Table 7).

In most of the communities where terraces were built, families indicate that they are kept in a good state of conservation. People perceive that the terraces help a good management and care of the soil and that thanks to this they obtained an increase in the yielding of their crops. The seeds supplied to the beneficiaries by the project were sown and harvested for their own consumption.

In all the communities where afforestation activities were carried out, it was observedthat fences were placed to protect the forested area, the materials for the construction ofthe fences were donated by the EVA project and the people of the community carried outhe construction as a counterpart.

In Panacachi community, they indicate that the EVA project has an agreement with PRODII for the training and preparation of organic fertilizers. The following table summarizes the actions carried out in the communities visited and interviewed.

Table 8. The actions promoted by the EVA project, the infrastructure built with its support or the supplies delivered in 18 communities visited in the north of Potosí and southeast of Oruro are indicated.

Community	Participation type	Activities performed			
		Irrigation	Supplies (materials and seeds)	Terraces and gabions	Forestry
Vila Vila	PDMI	New construction of a water reservoir.	Sprinklers, hoses.	Bench terraces in good condition	Construction of fence
Villa Alcarapi		Construction of a water reservoir (*Q'otaña*) that benefits 16 families.	Delivery of hoses, picks, shovels and seeds.	Bench terraces	Kiswara and pine plants. Death of all plants.
Quinta Pampa			They delivered alpha seeds.	Construction of gabions.	
Copana	PDMI	Installation of micro irrigation chambers	Vegetable seeds, alpha, onion, hoses	Bench terraces	5 ha delivered pine and queñua plants.
Chiriguana	PDMI	Installation of micro irrigation chambers	Vegetable seeds, alpha, onion, hoses		2 ha delivered pine and queñua plants
Chaqueni I	PDMI Contest	Infiltration ditches	Tanks, hoses, sprinklers, vegetable, alpha seeds	Terraces with dead and alive barrier (prickly pear and siwillanco), each beneficiary family built 100 to 150m terraces	2.5 Ha of plants with kiswara and pine with fence.
Chucarasi	PDMI and Contest	Improvement of irrigation system. Change of pipes. Installation of chambers for micro irrigation. Communal and family water reservoir.	Chambers to regulate the use of water. Vegetables, alpha and fodder barley seeds.	Terraces with dead and alive barrier (prickly pear and siwillanco, phalaris grass)	3 Ha, 20% of the plants died.
Irupata	PDMI	Extend the irrigation by 200m still to be completed. Infiltration Trenches	Vegetable, alpha seeds.	Terraces with phalaris grass	50% dead pine and elm plants
Luluni	PDMI	Installation of micro irrigation chambers.	Hoses, wheelbarrows, prickly pear stalks	Bench terraces, 30 to 50 per family	

Community	Type of participation	Activities performed			
Palcota II	PDMI	Installation of micro irrigation chambers, infiltration ditches.	Vegetable seeds Hoses, sprinklers	Bench terraces from 30 to 50 m per beneficiary family	2 Ha with pine and elm.
Micani	PDMI and Contest	New installation of 4 water reservoirs (Q'otañas) with geo-membranes.	Delivery of poly-tubes. Vegetable, alpha alpha seeds.	A good condition of the terraces was verified.	Delivered pine and cypress plants in 2 ha of land.
Utavi	Contest		Vegetable seeds	10 to 50 m of terraces per family. .	
Janko Jaque	PDMI	Infiltration ditches	Forage barley and potato seeds.	Bench terraces in good condition.	In 1 hectare of pine, kiswara and elm plantation, 50% died from drought.
Condoriri	Contest		Hoses, sprinklers	Built terraces from 30 to 100 m per family.	
Panacachi	PDMI		Vegetable, onion, alpha, fodder barley seeds.	Terraces and communal PDMI	
Kisi kisi	Contest		Alpha Alpha Seed	Bench terraces in good condition.	
Pichata	Contest		Wheelbarrows, picks, shovels.	Terraces built by each family on their land, in good condition.	
Walkeri	PDMI	Construction of 18x6 m. communal water reservoir. Materials delivered by project..	Sprinklers, hoses. Installation of chambers to regulate irrigation, vegetable, onion seeds,.	Terraces. living barriers phalaris grass.	Communal and individual afforestation. 30 plants of kiswara and queñua per family. 1 communal Ha. with pine, Kiswara and Queñua plants..

Below are brief assessments of the various actions in the visited communities.

Vila Vila

According to the authorities and interviewees, they indicate that a micro irrigation water reservoir was installed and that it is currently in operation (Figure 12), irrigation only supplies the lower part (Chawpirana) and does not reach the upper part.

Figure 12. Expansion for micro irrigation in the community of Vila Vila. Water reservoir and sprinkler irrigation.

For afforestation, they placed a fence to delimit the area, but until October 2017 they had not delivered the seedlings for afforestation.

Villa Alcarapi

People indicate that they had internal problems in the community and little coordination with the EVA project technician, these difficulties and problems affected the good development of the project.

Some people expressed their discomfort since the promised material was not delivered and indicate that for this reason internal conflicts arose since not all

the beneficiaries received the materials (hoses, wheelbarrows, picks, etc.) committed by the project.

Quinta Pampa

Community authorities indicate that the activities carried out were delivery of alpha seed and construction of gabions (Figure 13).

Figure 13. Gabions built by the EVA project in the Quinta Pampa community

Copana

The project supported its micro-irrigation system and people indicate that it is in good condition and currently functioning. However, they point out that the delivered inputs arrived incomplete and that it was missing for four beneficiaries.

Chiriguana

People indicate that the project delivered pine and kiswara plants for afforestation. They indicate that approximately 20% of the plants died, and pine was the species with the highest mortality. The Kiswara, on the other hand, managed to survive the inclement weather (drought and frost). A testimony of the authority of the community is: "Sure is the land of the Kiswara on that hill" (Jilanco de Chiriguana).

Chaqueni I

The community members testify that they were given kiswara and pine plants and that they are in good condition. The forested area has a fence that was made by the community, and whose materials were provided by the EVA project (Figure 14).

Figure 14. Chaqueni I community forestation area, Municipality Llallagua, Ayllu Sikuya.

It was possible to verify the PDMI, where terraces were made (Patachas) with dead and alive barriers, infiltration ditches and the installation of a water storage tank (Figure 15).

Figure 15. IMMP in the Chaqueni I community, with terraces with living and dead barriers. Irrigation tanks and infiltration ditches.

Chucarasi

People estimate that about 20% of the plants delivered for reforestation by the project died (Figure 16).

Figure 16. Afforestation área in Chucarasi Community

The family water reservoirs that the project implemented benefits three families. The construction of a nursery with the support of the project was observed (Figure 17), it is not yet completed.

Figure 17. Activities carried out by the EVA project in the community of Chucarasi: a) Family water reservoirs b) Teofilo Colque and his wife together with their PDMI, c) Emigdio Santander together with their alpha crop (seed delivered by the project), d) Nursery under construction.

Irupata

In this community there is an organization of women who also participate in the EVA project, managed to sow and harvest the seeds given to them by the project, and together with some vegetables prepare cakes, bread and biscuits that they give for school breakfast, and when the educational units are on vacation they take the vegetables to the markets to commercialize them.

Luluni

The authorities and people in this community indicate that the chambers they installed for the micro irrigation do not work well, that they have water leaks, and that the valve to regulate the flow of water that was delivered is of poor quality. Some beneficiaries were not given valves and also stated that some inputs were incomplete (Figure 18). However, they emphasize that this was due to the oversight of the previous authority, that the inputs were given to all those who participated in the project, but that some materials were lost.

They also built terraces (Figure 18), which they perceive as helping the soil. They also delivered prickly pear stalks that had already been planted (Figure 18).

Figure 18. Bench terraces, incomplete irrigation system chamber is not functioning, Prickly pear stalks delivered by the project.

Palcota II

In this community there are 27 beneficiary families and each one built from 30 to 50 m of terraces. They recognize the support of the project in the micro irrigation system (Figure 19), however they clarify that these inputs were only given to 15 families and not to the total number of beneficiaries of the project.

Infiltration ditches were also built that work during the rainy season. Approximately 2 hectares of pine and elm species were also afforested.

Figure 19. Micro irrigation system, micro irrigation chambers, keyway, bean crop with sprinkler irrigation, forestation area. Palcota II Community.

Micani

There are 40 beneficiary families on the official lists and 15 families who worked voluntarily or as indirect beneficiaries.

They express their interest in the continuation of the project and in continuing to participate. This last year was the year in which they received the most activity and support from the project.

Utavi

Twenty-five beneficiary families participated and each built from 10 to 50 m of terraces (Patachas). The people of the community indicate that they received consolation prizes (wheelbarrows,

some picks), and for that reason they are not satisfied with the project and indicate that "they did nothing", since the prizes were not for all the families that participated.

Janko Jaque

The small rectangular Q'otañas (infiltration ditches) "only work when it rains, but since it didn't rain this year it's all dry" (Jilanco, Janko Jaque).

On afforestation they indicate that they drip irrigated with the help of PET bottles, but because of the drought, approximately 50% of the seedlings died.

Condoriri

The people who participated in the contest are enthusiastic, indicating that they made the construction of terraces. It was possible to talk with the people who won the first places in their community in 2016 and 2017, they express their satisfaction with the prizes and perceive that the terraces they built in 2016 increased the yield of their crops (Figure 20)

(Figure 20). Bench terraces made within the contest "Protecting Mother Earth" Condoriri community. Above terraces built in 2017, person who won first place in his community, left person winner of the 2016 contest, right lady who participated in the contest in 2017.

Panacachi

This community has a singular particularity, the PDMI was installed communally in the Educational Unit (Figure 21). Based on this, some families carried out PDMI at an individual level, where each beneficiary was able to apply the knowledge and practices acquired in the communal PDMI.

This community worked together with teachers, parents and students to build terraces with living and dead barriers. The project delivered vegetable seeds to the educational unit and the teachers and their students were in charge of sowing, caring for and harvesting the crops.

Figure 21. Demonstration Plot of Integrated Management (PDMI) in the Educational Unit, Panacachi community.

Educational Unit teachers also shared the experiences they had with the PDMI, and they rate it very well since they managed to rescue the ancestral knowledge and combine it with the curriculum, the students were encouraged to take responsibility and combined the different activities (planting, harvesting, and caring for different crops) with the different subjects of the school curriculum such as Mathematics, Biology, etc. The teachers together with the students sold the harvest and the remainder was destined for their own consumption as each student took part of the production to share with his family.

The teachers prepared an area to build a water reservoir in the communal PDMI (Figure 22) and expect the EVA project to give them a geo-membrane. They indicate that irrigation is too difficult for them since each student brings a bottle of water from home and many times it is not enough and sometimes they have to bring water from the river that is near the plots and the students put themselves in danger with these tasks.

With the experience that the teachers have accumulated to date, they suggest: to have more practical training in order to be able to replicate later that acquired knowledge, they observed that some of the trainings were only theoretical and they did not manage to put it into practice later, they also suggest that didactic material can be delivered to the Educational Units and to the community, with technical information that they can replicate. Also, there is a concern with the soil of their communal PDMI, they observed that the yield was good during the first years of its installation, however now this yield is decreasing because they are sowing every year and do not let the soil rest. They are asking for training to solve this problem and thus keep the soil in good condition and have a good yield in their crops.

Figure 22. PDMI Panacachi community. Onion seedlings, lettuce cultivation. Preparation of land to install a water reservoirs in the PDMI of the Educational Unit. Meeting with teachers and community authorities.

Hichuta

The survey was not carried out in this community, but a meeting was held with the authorities and technical promoters of the EVA project. They indicate that the entire community participated in the contest "Protecting Mother Earth" by carrying out terraces and activities for good soil management, but that they had many problems because the prizes (shovels, picks, wheelbarrows) were not for everyone who participated and this created conflicts between people.

They suggest that the prize-giving should be for all those who participate and that it be given in a meeting with all the people who participated, in order to avoid misunderstandings and internal problems.

Kisi Kisi

Kisi Kisi participates in the project with two communities, Kisi Kisi participated in the contest and Layuri of the PDMI. In Kisi Kisi only a few people participated - not the whole community, as it used to be - with the building of terraces that, according to them, are in good condition.

Jachatajo and Chayala

These communities are located in the municipality of Pocoata, although they are located within the intervention area of the project, both belong to the LIKINA ethno-ecological floor, where the EVA project failed to carry out activities. However, six people were interviewed who were not beneficiaries of the project in order to have production data and information on needs and demands.

In the Jachatajo community an agroforestry system was observed (Figure 23) despite the lack of water for irrigation. Both the Jachatajo community and the Chayala community indicate that the greatest need is for water. The Chayala community does not have potable water, so they have to walk one hour to get water. They indicate that no institution supports the community, they think that they do not receive support because they are few in the community, only 6 families live in total.

Figure 23. Jachatajo Community Agroforestry System.

Case Studies

Around 2,740 families participated in the PDMI and 93 communities participated in the EVA project. In this document we will present the experiences of two families who related their experiences.

One of the interviewees was Cristóbal Mitma, a young farmer from the Inka Challviri community of Ayllu Sicuya, in the municipality of LLallagua. This community participated in the Contest "Protecting Mother Earth". Don Samuel Conde from the Chucarasi community, Ayllu Panacachi, municipality of Chayantaka, was another person interviewed. He participated in the Demonstration Plots of Integrated Management (Figure 24).

Figure 24. People interviewed for the case studies. Left: Cristóbal Mitma. Right: Don Samuel Conde.

CRISTÓBAL MITMA GARCÍA, is identified as a community member of Ayllu Sikuya, lives in the community of Inca Challviri (latitude 18°17' 39" S and longitude 66°32' 12" W), located in the municipality of Llallagua. To enter his community there is a dirt road and it is an hour away from Llallagua.

Don Cristóbal is single, lives with his father (Walberto Mitma Condori) and dedicates himself mainly to the cultivation (potato, onion, bean, alpha, forage barley, vegetables) and breeding of bovine and ovine animals. He has cultivable plots in Chawpirana floor (3900 masl) with an area of 0.38 ha with various crops such as potato, bean, onion, prickly pear, fodder barley and alpha, he also has 0.12 ha of fallow land (Figure 25) and 0.1625 ha of fields left to rest (with more than 3 years without crops). Of these lands 0.38 ha are irrigated and 0.1625 ha are dry land (that is, no irrigation).

Figure 25. Various crops of Cristobal Mitma. Inca Chalviri Community.

The community of Inca Challviri participated in the contest "Protecting Mother Earth" which was promoted by the EVA project in the 2016 management. For Don Cristóbal it was an opportunity in the perspective of finding knowledge, practices and techniques to increase crop yields and improve soil management. He participated in training courses for community leaders where he explained the importance of natural resource management, soil conservation and how to improve productivity with irrigation. These topics were of enormous importance for his own production, this training was complemented with workshops on integrated management of natural resources.

> The interest to improve and learn new technologies is the engine for change. "I was always a very curious person and I was interested in participating in the project so on my own initiative I started asking how I could participate and because of the interest I showed, the project decided to support me. I applied what we were told by the project and some things we already did before but now we improve them, I made infiltration ditches to bring water to my crops, that helps me in rainy weather, I used organic fertilizers, I built "Patachas" (bench terraces) and the project gave me seeds, I sowed bean, forage barley, alpha and vegetables lettuce, cabbage, onion, radish. That I cultivated and we already ate it, all this I think is good for us and improved the performance of my crops a little "(Cristóbal Mitma, 2017).

Don Cristobal was able to apply the knowledge acquired from the technical assistance he received from the EVA project and put into practice the recommendations suggested by the technicians. The project encouraged activities in soil management, construction of terraces, incorporation of organic fertilizers, implementation and improvement of micro irrigation systems and also included the diversification of new crop varieties (Figure 26). He built terraces to participate in the contest "Protecting Mother Earth", where he made approximately 150 linear meters of terraces with stones.

This year the project gave him a geo-membrane to build a " water reservoir " close to his crops, with an approximate size of 8 x 4 m (Figure 27), the project also gave him some materials and inputs for the irrigation system, such as water valves, hose and sprinklers. With all these materials Cristóbal built a water reservoir to expand irrigation for his crops.

Figure 26. Crops of: A) Onion and B) alpha alpha (seeds delivered by the project). C) construction of "Patachas" or bench terraces made to participate in the contest "Protecting Mother Earth". D) water reservoir built with the support of the project.

Figure 27. Micro irrigation system built with the support of the EVA project. A) water reservoir B) Chamber C) Water valve and D) Sprinkler delivered by the project.

It is observed that the new terraces that he implemented in his plots are higher and better elaborated, and it is also observed that the terraces are combined with living (Phalaris grass) and dead (stones) barriers (Figure 28).

Figure 28. Bench terraces, on the left are made only with stone and on the right combine stones and Phalaris grass.

All the agricultural production of the family is mainly destined for their own food, the most frequent crops of the place have been potato, bean, onion. They also carry out the transformation of some products such as chuño, which is taken to the Llallagua fair for marketing. Don Cristóbal is very happy with the new crops that the EVA project supported him with, such as vegetables, which helped him diversify his diet, in addition to selling a small surplus in his community. This is a significant step in productive diversification and a way to reduce food vulnerability. While the current trend among farmers is that due to cost and competition issues they stop producing and prefer to buy products such as vegetables, Don Cristóbal gradually incorporates them into his family diet and production.

He also increased the cultivation of alpha alpha, which he will use to feed his cattle. His enthusiasm and willingness to continue applying the acquired knowledge is evident as he observed positive changes in his land management and also an improvement in the yield of his crops.

> The perceived changes are important to continue applying the adaptive technologies encouraged by the EVA project. *"I can see that with the irrigation, with the sprinklers, the water does not wash the earth and lasts a little longer than when I used irrigation by flood and with the terraces I take care of my plots because the water does not wash my land, the soil es retained therel, and with the new seeds that they gave us I was able to verify that I can plant more types of crops than before "*. (Cristóbal Mitma).

SAMUEL CONDE lives in the community of Chucarasi, which belongs to the Ayllu Panacachi (Latitude 18°29' 54" S, longitude 66°14' 47" W), the community is located in the municipality of Chayanta and is approximately 3 hours away from Llallagua. To get to this community from Llallagua you must go towards Chayanta, by an asphalted and wide road, from there you must go towards the Irupata junction, on a secondary dirt road, until you reach the Chucarasi community.

Samuel Conde lives with his wife Gregoria Flores and two children Elmer Conde and Edwin Conde the latter collaborates with the family for planting and harvesting, afterwards he is dedicated to construction. Don Samuel is a farmer with plots in the ethno-ecological floors of Suni and Chawpirana (3.749 masl). His cultivated plots have an approximate area of 2.9 ha, he also has 2.15 ha of fallow land, and an area with natural pastures of 0.3 ha, has an irrigated area of 2.19 ha and a dry area of 0.94 ha, he also has lots with an area of species cultivated for fodder of 0.91 ha (Figure 29) and within his crops are observed some peach plants. He also has a few animals (three cattle, ten sheep, two chickens and a donkey). In other words, it is a typical family farming production with diverse and dispersed crops as a mechanism to face climatic risks.

Figure 29. Left, alpha and right, fallow plot of Samuel Conde, Chucarasi community.

The community of Chucarasi was one of the beneficiaries of the EVA project where Demonstration Plot of Integrated Management (IMMP) was implemented. Don Samuel indicates that the demonstrative practices were in his own plots, he also participated in the contest "Protecting Mother Earth" and in the "Seed and Agrobiodiversity" fair organized by the project. According to his appreciation, all the activities in which he participated were good for him and for his community, because he improved the yield of his crops and at the Seeds Fair he was able to market some of his products.

He also participated in other activities that the project organized and encouraged, such as the establishment of the management committee, and also attended workshops and training courses, where integrated resource management was discussed.

The perception and appreciation of the EVA project is important to continue and encourage the participation of people in the communities. "I'm very grateful with the project, it helped us a lot and I hope it continues, I'm going to tell you how I asked the project to help me and they told me some only talk but don't do the work, I want to see your work and we'll see if you really need help, so I worked the land and built these terraces on this land (Fig. 5 left). 5 left), if you had seen before it was all with straw thorns you couldn't walk, just as this land here was like that (Fig. 5 right), then they saw my work and that I was complying, so the one from the project the project told me, you really need it and that's why you work your land. So they helped me, they showed me how to do and what to do and I applied everything they told me" (Samuel Conde).

Figure 30. Plots with bench terraces (left) built by project incentive, land with natural grass (right) by Samuel Conde.

Don Samuel applied the knowledge acquired in the workshops and in the technical assistance for the project, installed Demonstration Plot of Integrated Management, made "patachas" or bench terraces (approximately more than 150 linear meters) (Figure 31a) and slow forming terraces with live barriers with prickly pear (about 80 linear meters) and 80 linear meters with "Siwillanko" a native grass of the place (Figure 31d) with which he had some problems for its establishment due to lack of rain. Don Samuel will try again to make terraces of slow formation with Siwillanko because he is a very persistent person. At the recommendation of the project technicians he combined the stone bench terraces with Phalaris grass.

Figure 31. Different adaptive technologies for soil management. a) Bench terraces, b) and c) slow forming terraces with live barriers (prickly pear plants), d) native grass "Siwillanko".

It also diversified its crops, as the project provided it with carrot, cauliflower, radish and cabbage seeds (Figure 32a). It also expanded the area planted with forage species (alpha and fodder oats), all of which have already been harvested (Figure 32b). In addition, the application of organic fertilizer was further encouraged with the support of PRODII (Interdisciplinary Integral Development Program), which supported the EVA project with a consultancy. In the community, water reservoir were implemented at the family level and each one benefits three families and thanks to this water reservoir (Figure 32c) don Samuel was able to improve and expand the irrigation area by approximately 1 Ha, with a sprinkler irrigation system (Figure 32d).

Figure 32. Different crops a) vegetables (cauliflower, carrot, radish and cabbage). b) alpha crop. c) " water reservoir of " 8x6 m and d) alpha crop with sprinkler irrigation.

Don Samuel appreciates several benefits of the EVA project for him and his community. "The project helped us a lot, especially in irrigation. Before there used to be irrigation, but in turns, and since we were several in the community, when it was my to irrigate my crops dried up, I tried to bring water but that was not enough. Now with my family water reservoir I can irrigate and I can save water with the sprinklers. With vegetables I can eat greens and my family feeds better, as I sowed alpha that helps me for my cattle, now I'm digging and preparing because I was told that I would get some apple plants (Fig. 8). What the project helped me the most was to improve the yield in my crops and expand irrigation for my crops" (Samuel Conde).

Figure 33. Demonstration Plot of Integrated Management, land prepared to plant apple seedlings.

The project improved its irrigation system by changing pipes to provide water for family irrigation and the dams, It also implemented water reservoir at the community level and delivered sprinklers, hoses and water valves chambers for the micro-irrigation system. Finally, it forested an area of approximately 3 hectares at the communal level, with pine, kiswara and queñua plants.

> “The changes perceived encourage to improve more their productive units, this thanks to the adaptive technologies encouraged by the project. "I want the project to continue, I have an idea, we already have the water reservoir by family, I want to place permanent irrigation bury the hoses in the ground and place like pipes with shut off valves and just open the key and have irrigation with sprinkler, because now hoses and sprinklers helps us a lot but I have to carry from one side to another the hose and sometimes destroy the alpha and crops but if my irrigation is permanent everything installed would be much better and I would have time to prepare my land and take care of my crops" (Samuel Conde).

8. FINANCIAL ASSESSMENT

Initial budget

Initially, the total cost of the project was programmed at US$ 14,050,000, of which US$ 6,000,000 were to be financed with resources from the Global Environmental Facility (GEF). The contribution of the Government of Bolivia would be a total of US$ 8,050,000, made up of financing in kind estimated at US$ 479,525 and resources from loan 2223/BL-BO-CRIAR, for an amount equivalent to US$ 7,570,475. The distribution of this

14,050,000, corresponding to 5.5% for administration, 6.3% for component 1, 7.4% for component 2 and 80.8% for component 3 (Table 9).

Table 9. Total project budget by funding source and components.

Components	GEF / IDB		MMAyA		22223 / BL-BO		TOTAL	
	US $	%	US $	%	US $	%	US $	%
Administration	389,660	6.49	386,160	80.53		0	775,820	5,52
Component 1.	862,645	14.38	24,060	5.02		0	886,705	6.31
Component 2.	1,006,180	16.99%	30,000	6.26		0	1,036,180	7,37
Component 3	3,741,515	62.36	39,305	8.20	7570475	100	11,351,295	80.79
TOTAL	6,000,000	100	479,525	100	7,570,475	100	14,050,000	100

Source: Document of the Inter-American Development Bank. Conservation and Sustainable Use of Andean Land and Vertical Ecosystems. (BO-X1001) Non-reimbursable financing proposal. 31/08/2010

Initially, the counterpart of loan 2223/BL-BO was programmed, which would correspond to the CRIAR program of the Ministry of Rural Development and Lands (MDRyT), financed by the Inter-American Development Bank, whose objective should contribute to food production within the framework of the national security policy with food sovereignty, malnutrition and communities in action. Although it is similar to the general objectives of the EVA project, its coverage did not necessarily coincide, since it gives general priority to municipalities in extreme poverty and supports family farming throughout the national territory.

With an integrating vision, the project had to establish close complementarity and coordination between the two initiatives since the results obtained from CRIAR would feed back into the EVA project in order to derive good practices and lessons learned aimed to broadening the experience in the future. The executors of the two operations had to establish coordination mechanisms to facilitate the relationship and exchange during the execution, but fundamentally during the evaluation events that would make it possible to reinforce the actions of component 3, where financing was integrated.

However, these intended complements and synergies did not occur. On the contrary, the technical-operational information of the EVA project and the counterpart corresponding to the CRIAR Project were independent, which was not recorded technically or financially in the execution of the project. In this sense, the resources assigned to component 3 did not have the total programmed investment, which implied a 66% reduction of the initial proposed budget. The levels of intervention have not been clearly established, nor at what time and in what circumstances there was such separation. Being the project of two ministries, each one of the institutions had established its own objectives and beneficiary population, on the other hand, the intervention methodologies in the communities were different and in the reports there are no reports that CRIAR had carried out interventions in the area covered by the EVA project.

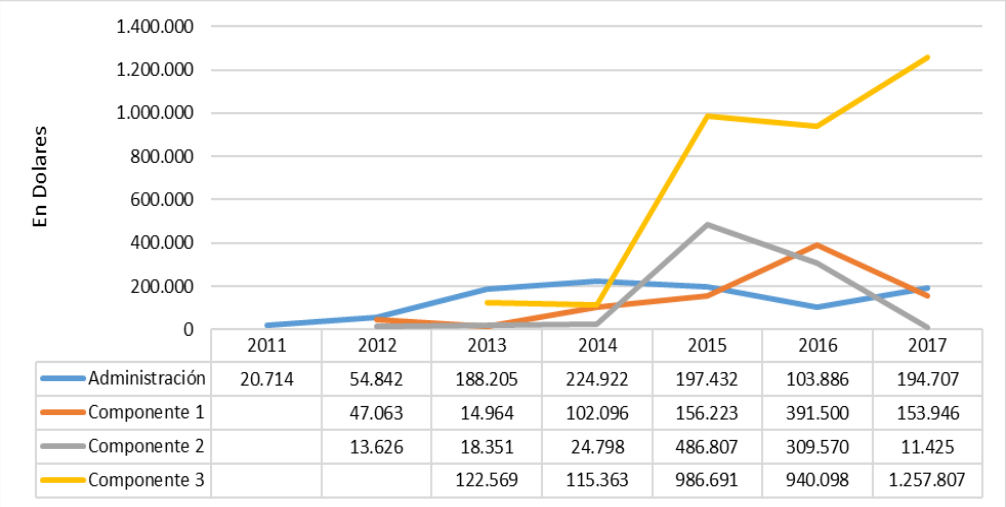
With these structural considerations, if we compare the initial budget of the EVA project and the final level of financial execution, it would only have reached 40% of financial execution (approximately 6 million compared to 14 million dollars). This scenario certainly does not show the desired economic efficiency.

Financial Efficiency GEF / IDB and MMAYA

Although the analysis of the programmed investment and the final financial execution show an unencouraging scenario, the evaluation cannot demarcate this comparison, this was the information available and facilitated by the EVA project. Undoubtedly, failure to comply with financial and technical commitments should attract attention and be taken as a "lesson learned" to face new challenges that involve the coordination and integration of concurrent counterparts, because otherwise there is a risk of making isolated investments for the rural development, which are inefficient and disintegrated, far from the spirit of the national development plans proposed for example in the 2025 agenda.

For the purposes of analysis from the perspective of the coordination of the EVA project, which had to overcome - in addition to the lack of inter-ministerial integration - conflicts with social organizations, although it does not escape its responsibility, we understand that the scenario was not favorable for the optimal progress of the initiative's activities. In this sense, we will carry out the analysis considering the economic resources over which the coordinating unit of the project (6.4 million dollars) had control, corresponding only to the GEF / IDB financing and a small counterpart of MMAyA.

As shown in Figure 34, the trend of expenditures, the project began its most significant execution in the 2013 management, that is 3 years later than scheduled, losing 2 years (2011 and 2012) where the project practically did not have progress, beyond administrative expenses.



	2011	2012	2013	2014	2015	2016	2017
Administración	20.714	54.842	188.205	224.922	197.432	103.886	194.707
Componente 1		47.063	14.964	102.096	156.223	391.500	153.946
Componente 2		13.626	18.351	24.798	486.807	309.570	11.425
Componente 3			122.569	115.363	986.691	940.098	1.257.807

In Dollars
Administration
Component 1
Component 2
Component 3

*Figure34. Budget execution by management (2011-2017).*Source: Accounting Department of the EVA project (2017)

From 2013 to 2016 there was an increase in investment, whose highest points were the year 2015 and 2016 respectively (Figure 34).

Budget execution to 2017

Regarding the final budget, the Project Executing Unit (PEU) on December 8, 2016 and on March 30, 2017, with a note CAR / EVAS / UCG No. 047/2017, requests the transfer of component 3 "rescue and promotion of best practices and technologies for the conservation of agro-biodiversity and for the restoration of the productive capacity of vertical ecosystems" to the Administration component (Table 9), with this budget amendment the project execution is developed and reported.

The cumulative execution amounts to US $ 6,137,605, from GEF / IDB and national counterpart (Table 10). Regarding the financial execution by component between the programmed and executed budget until 2017, the component with the highest execution is the administration, reaching 126% followed by component 1 that has achieved 97.6%, component 3 shows 90.5% and the component 2 is the lowest execution obtaining 83.4%. In general, the budget execution up to the year 2017 reaches 94.7%, this figure corresponds to 28/12/2017 of the present year.

Table10. Budget by counterpart and by component.

Components	GEF / IDB	MMAyA	TOTAL	EXECUTED BUDGET							Execution	Percentage
				2011	2012	2013	2014	2015	2016	2017	accumulated	executed
Administration	389,600	386160	775,760	20,714	54,842	188.205	224,922	197,432	103,886	194.707	984,708	126.9
Component 1.	862,645	24060	886,705		47,063	14.964	102,096	156.223	391,500	153,946	865,792	97.6
Component 2.	1,006,180	30000	1,036,180		13,626	18.351	24,798	486,807	309,570	11,425	864,577	83.4
Component 3	3,741,575	39305	3,780,880			122,569	115,363	986,691	940,098	1,257,807	3,422,528	90.5
Total	**6,000,000**	**479,525**	**6,479,525**	**20,714**	**115,531**	**344.089**	**467.179**	**1,827,153**	**1,745,054**	**1,617,885**	**6,137,605**	**94.7**

Source: Accounting Department of the EVA project, 2017

The highest cost was allocated to online consultancies and consultancies per product, followed by the purchase of vehicles and office and computer equipment. Administration expenses were 100% executed (Figure 35).

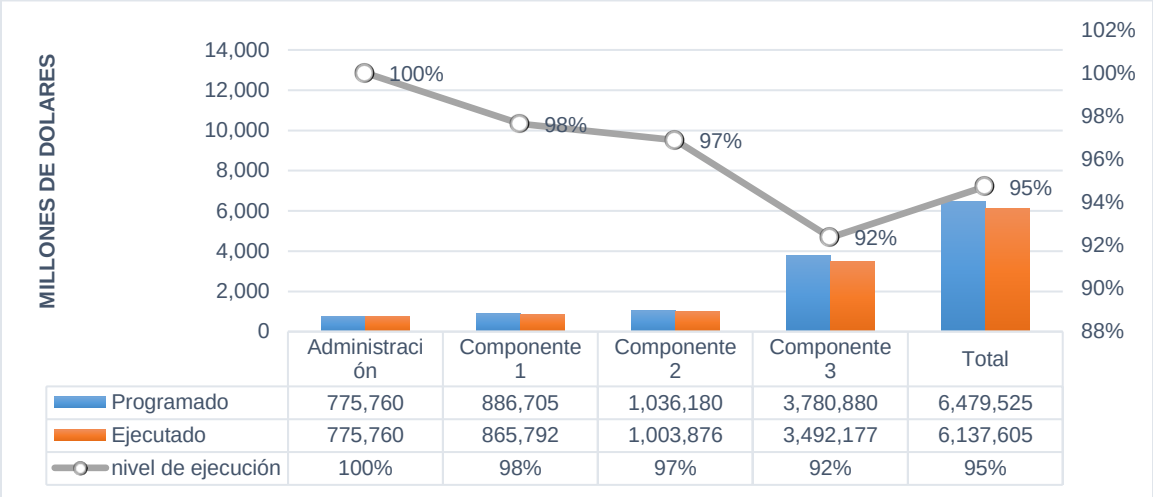
It can be inferred, according to the information reviewed, that component 3 "rescue and promotion of best practices and technologies for the conservation of agrobiodiversity and for the restoration

of the productive capacity of vertical ecosystems", reached an execution of the 92%, eight percentage points less budgeted (GEF / IDB -MMAyA), explained -as mentioned- by the delay in the real start-up of the project and the conflicts with local social organizations.

Component 2 "Strengthening policies, regulatory framework and local capacities for the management of vertical ecosystems", reached an execution of 97%, reaching the second place in the execution in relation to the other components.

The component 1 of "Systematization of information and monitoring of soil, water and agrobiodiversity resources, and the impact of climatic variation" reached an execution of 98%, that is to say, it reached almost 100% of execution between the programmed and the executed in the life of the project.

In general terms, it can be established that, although the project technically has had an advance in the execution with respect to the commitment with the GEF / IDB, the best efficiency in spending was in administrative aspects and the least efficient in component 3.



	Administración	Componente 1	Componente 2	Componente 3	Total
Programado	775,760	886,705	1,036,180	3,780,880	6,479,525
Ejecutado	775,760	865,792	1,003,876	3,492,177	6,137,605
nivel de ejecución	100%	98%	97%	92%	95%

MILLION OF DOLARS Administration Component 1 Component 2 Component 3 Total
Programmed
Executed
Level of execution level.

Figure35. *Percentage of the budget programmed and executed according to component (*IDB / *GEF and MMAyA).*

Source: Own elaboration based on information provided by the project accounting department EVA, 2017

Distribution of the global execution and per capita with respect to the initial financial programming

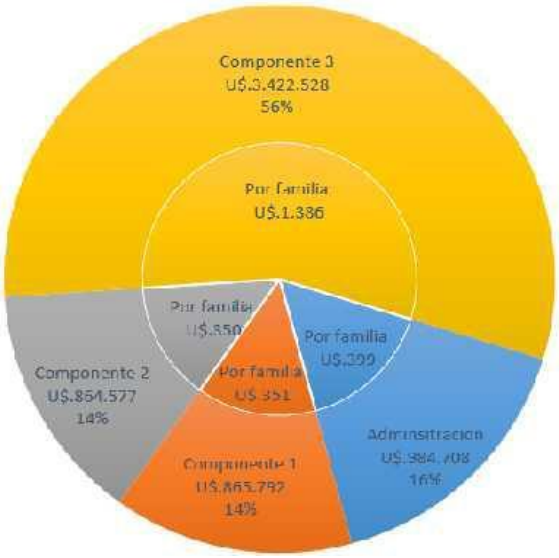
As established in the initial paragraphs, the financing structure provided that the largest part of the budget was allocated to component 3 (81%) and the remaining 19% -in administration 5.52% in component 1, 6.31% and in component 2, 7.37% -. The clear intention was to privilege direct investment for the implementation of actions aimed at the rescue and promotion of best practices and technologies for the conservation of agrobiodiversity and for the restoration of the productive capacity of EVAs in communities and beneficiary families.

However, in the overall final execution there were great differences with respect to this intention. The project allocated 56% to component 3, that is, much less than the expected proportion, again this is explained because the budget committed by the CRIAR program has not been incorporated in the final execution. As can be seen in figure 36, the distribution in the final execution shows that 16 percent was allocated in administrative expenses above the components 1 and 2, to which 14 percent were allocated, respectively.

If we analyze the execution by beneficiary family according to the initial projections, an investment of $ 2,128 / family was envisaged, in practice $ 2,486 / family was executed. Direct investment in component 3 provided $ 1,719 / family, execution reached 1,386

dollars / family, 19 percent less than expected. Although it can be shown as a favorable financial index, it must also be crossed with the information on the number of beneficiary families that reached 2,740 families with respect to the 6,600 planned.

It can be understood that the coordination of the project took the necessary steps to achieve an efficiency in the investment in the shortest time, however the weakest factor was the coverage to the direct beneficiaries. For future actions, more precision must be given to direct and indirect beneficiaries, and the funding sources committed to achieve the desired impact.



Component 3 Per family Component 2 Component 1 Administration

Figure36. Distribution of total financial execution, by family and by component of the project.

Source: Own elaboration based on the information provided by the accounting department of the EVA project, 2017.

9. COMMENTS ON THE CARTOGRAPHIC INFORMATION

- No useful information was found related to the environmental quality that could be migrated to a geographical information system, the one found was very general and only served as an isolated reference.
- The information obtained through the workshops carried out by FUNDECO in 2016 was systematized and migrated to a geographic database, however, there are gaps that due to their importance should be corrrected to future events.
- A validation process is required to correct the locations of the mapped traits, this due to the scale with which they were digitized.
- It is necessary to mention that the information collected about the PDMIs must be corrected and complemented, both in the relation of the PDMIs and their coordinates (for the mapping) as well as in the

the attributes that are shown in the matrices, in order to standardize the collected data.

- There is a basis for the easy elaboration of thematic cartography.
- The location of the meteorological stations is convenient and sufficient, in terms of their spatial distribution, and will allow the generation of climatic cartography from interpolation processes in a GIS environment.
- When of using the thematic layers it is recommended to review the cited documents to correlate the data of the coordinates of the points, values of some attribute, units, etc., in order to avoid errors or identify those that could arise in the process of migration to a GIS. This is due to the poor quality of the data coming mainly from the ISALP studies (2007). As for example: concentrations of heavy metals in water. For the mentioned study, the information referring to chemical analysis of water in the Kutimarca and Cantón Queñuani Town Halls is the same, for this reason it is presumed that the data is not correct. Also, it is suggested to review and standardize in detail the writing of the names of the communities, due to the large number of sources.

10. Lessons learned

Some aspects to highlight as lessons learned are:

- Community participation in the development of PMOTs promoted the integration of the community, this meeting space has made it possible to better structure the conservation of agro-biodiversity and have a good level of management in the management of their natural resources.
- The organizational system of indigenous peoples provides an optimal setting for the realization and coordination of activities, because they have institutionalized meeting spaces, which facilitates coordination with authorities and beneficiaries.
- The extensive knowledge of indigenous peoples about ancestral practices and technologies is an important opportunity for the management and conservation of natural resources in response to resilient measures to the effect of climate change. This knowledge and instruments should be analyzed and, if possible, replicated in all intervention areas of the project and in other regions with similar characteristics north of Potosí and Southeast of Oruro, as tools for governance of natural resources.
- Participatory planning with the beneficiaries enables the activities that are implemented with the project (such as PDMIs) to become empowered, which benefits a better territorial management.
- The rescue and strengthening of forms of mutual work organization in the Ayllus (such as the *Choco,* he *Ayni* and the *Minka*) allows the achievement of goals set, mainly in activities that require more labour force, such as soil conservation and recovery practices.
- Strengthening the capacities of human resources in the peasant communities, allows to guarantee the sustainability of the actions carried out by any institutional intervention.
- The joint work among institutions (municipalities, other state institutions, original organizations), allows to coordinate actions around common objectives, facilitates the taking of

decisions and the leveraging of economic and human resources for the achievement of objectives and goals.

- The work in advocacy of public policies is conducive to the sensitization of Municipal Authorities and residents for the articulation and definition of municipal policies aimed at food security, strengthening the production system, mitigation and adaptation to climate change, and risk management.
- The joint work with the Indigenous Authorities of the Federation of Indigenous Ayllus of North Potosí (FAOI-NP), Jatun Ayllu Killaqas Asanajaqi (JAKISA) of the Southeast of Oruro, Second Majors and Major Mayors of the intervention zone, allowed a work in trust between the EVA Project and the beneficiaries.
- The participation of the indigenous authorities of each Ayllu and Marka in the Project Management Committee would benefit the effectiveness of the actions to be carried out.
- The application of adaptive technologies were better assimilated at a family level than at a communal level because the benefit is dispersed at the communal level, on the family level the benefit is more tangible, this is reflected in the construction of terraces, water reservoirs, etc. . that had a better result at family level for its good elaboration for its own use.
- It was significant to make botanical inventories despite the fact that the study area belongs to relatively well known regions in relation to its flora, such as the Andean highland zone, Puneña and inter-Andean valleys. However, it emphasizes the presence of several species that on the one hand represent new records that expand the range of distribution, generating new reports at the departmental, national and regional levels, and on the other hand they are new species for science, which shows the importance to continue evaluating these regions of the country.
- The implementation of irrigation systems at the family level was better accepted by the communities because it obtained better results, however it is important that this use be regulated since water is a communal right and not an individual one.
- Afforestation with native and introduced species should be analyzed to reflect on the long-term advantages and disadvantages, considering also the benefits towards biodiversity, adaptation to the environment and the mortality rate, in order to consider their relevance in future actions.
- The collaboration of community members (particularly elderly people) is important, for example in the work of inventorying biodiversity since it allowed the transmission of local knowledge (uses and names), which would otherwise hardly be known.
- Coordination with local authorities and technicians of the EVA project allowed in many cases access to areas representative of vegetation rich in species.
- The participation of local guides (men and women) and the respective technicians in the biodiversity assessments greatly enriched the information recorded in the evaluated zones, since it allowed us to go, in most cases, to well-conserved and representative areas of the region. This cooperation should be maintained and strengthened in the next phase of the project.

11. Conclusions and Recommendations

The EVA project has made it possible to visualize that the traditional use of vertical ecosystems provides food products to the populations of the Ayllus and also income from the sale of them, which is why it is important to conserve and make a sustainable use of the ecosystems, revaluing and perfecting the local wisdoms, knowledge, practices and technologies of the Ayllus.

A great effort has been devoted to the preparation of 6 PMOTs, of which two have been approved (Chuquihuta and Chayanta) and regional organization statutes were worked on. Future actions are recommended for its implementation.

Given that the EVA project is one of the benchmarks in terms of projects that include cultural, agricultural and biodiversity dimension (including agro-biodiversity) it becomes valuable experience to be replicated, which is why it is recommended to transfer the information obtained in the project to pertinent instances in order to conserve and take advantage of the information in public management, for example articulating with SUNIT (Single National Land Information System) by the Vice Ministry of Lands of the Ministry of Rural Development and Land and with the MTCC System (Plurinational System of Information and Integral Monitoring of the Mother Earth and Climate Change) in charge of the Plurinational Authority of Mother Earth, both systems, both SUNIT and MTCC, are in the structuring process.

The area of intervention of the EVA project includes populations that vividly conserve the Ayllus and Markas organizational structures, through workshops it was identified that this organization is positively important for the development of any project, for which it is recommended to respect its structure, strengthen them and highlight the role of the EVA project that has made visible these organizational structures, using as a strategy the alliance with them, which was possibly one of the success factors of the project, for example with the hiring of local technicians and guides from the Aylllus.

The EVA project through research studies has demonstrated the validity of a high level of traditional knowledge associated with the use of biodiversity, the registration of information can be expanded to socialize it to avoid its loss or modification.

The mapping of actors will allow the authorized spokespersons to be recognized, identifying the appropriate social actors and institutions, outline possible alliances, manage conflicts and, therefore, allow a better way of interacting to optimize the results desired by the project.

With the formal creation of 41 "reserve areas", it has been made visible "protection or conservation sites" that communities have long been designated to conserve, above all forage plants but which have intrinsically promoted the conservation of flora and fauna residing in these protected habitats. The creation and biological evaluation of future "reserve areas" compromises the conservation / protection and knowledge of rare or vulnerable species, wild relatives of native crops, economically important plants, etc.

The knowledge about the rich agrobiodiversity is still partial, only four crops of the wide variety that exists in the area has been documented. In the second phase of the EVA project, it is recommended to expand the spectrum of crops to study and carry out actions to ensure their conservation, especially those that are typical of the region. Also, include an evaluation of

potential "alternative" crops (fruit trees, vegetables, medicinal and / or aromatic herbs) that can be developed around the cultivation areas and / or houses of the peasants.

It is important to carry out periodic monitoring of the beneficiaries in order to establish the degree of application of the knowledge acquired, this may have an impact on greater success in the management and conservation of their resources.

With respect to component 3, the PDMIs had a sustainable integral management approach, considering the demands and needs of the Ayllus' inhabitants, also traditional technologies and new technologies for the area were implemented. It can be said that this component is the best known of the EVA project, due to the active participation of the beneficiaries; however, it is also recommended to monitor the impacts of irrigation and other applied technologies.

Among the actions carried out by the EVA project are the construction of bench terraces, slow-forming terraces with live barriers (prickly pear, Siwillanco and pasture *Phalaris*) and with dead barriers (stones). In the terraces it was possible to see improvements in its construction and increase of arable land. Likewise, people perceive that the terraces help to good management and care of the soil and observed that they had an increase in the yield of their crops thanks to these improvements and the construction of terraces (Patachas).

Most of the communities carry out the incorporation of organic matter in their plots as a traditional practice, however the project encouraged this activity by carrying out some training to improve and encourage the use of organic fertilizers.

An activity rescued but not yet of significant impact or scope was "barter". In a second phase of the project this activity should continue to be fostered, gradually increasing the territorial space of exchange, even reaching the exchange of products that formerly interrelated the western region (Altiplano) and eastern (Yungas) of the Andes.

In the communities visited, it was possible to verify the presence of 10 micro-irrigation systems improved or implemented by the project, these systems are in operation and help to manage the water resource, saving water and stopping water erosion thanks to irrigation spray applied. The implementation of communal and family water reservoirs should also be highlighted, however the infiltration ditches must be improved according to the perception of the people because it is only viable and useful in the rainy season, and it is not effective in prolonged droughts.

Regarding afforestation actions, 10 areas of afforestation were visited in the communities interviewed, the areas vary from 1 to 5 hectares. The use of native species (such as queñua and kiswara) that better adapt to the environmental conditions of the place and have better survival rates is highlighted. However, the project also promoted the use of introduced species such as cypress and pine, but the delay in the delivery of seedlings (even in a community the delivered was not made) produced a high mortality (between 20 and 50%).

Future afforestation and restoration actions should consider the advantages and disadvantages of the use of native and introduced species and analyze the relevance of use of both native and introduced species, considering the benefits to the ecosystem, biodiversity, adaptation to the environment and mortality rates.

It is recommended to have a monitoring team or personnel to verify the status of the activities, and thus be able to detect problems or internal conflicts in the communities to be able to solve these problems at the time.

It is also suggested to create a Regulation to rule the activities to be carried out, both by the project staff and by the people of the communities that will participate in the project.

To improve the management and conservation of soil and water resources, it is recommended to carry out trainings (workshops and practical courses) on the improvement of their terraces, use and improve organic fertilizers and techniques according to the characteristics of each place. These trainings must be done to the technicians and community members, with the commitment to replicate them to other people and futures generations.

There is a weakness or deficiency in the capacities and technical and institutional conditions of the actors involved, mainly at the local level. These limited management capacities result in a substantial loss of the possibility of efficiency and continuity of biodiversity management initiatives. Therefore, it is important to strengthen the various management capacities to achieve compliance with the objectives and goals to promote learning with the accumulated experience and build more solid biodiversity management processes, efficiency and sustainability. In that sense, the experiences of biodiversity management have not reached the desired continuity and impact, due mainly to the dispersion of the training.

Climate change poses two important challenges for the inhabitants of the region:

- On the one hand, climatic conditions different from existing ones are envisaged, with higher temperatures and perhaps slightly more precipitation, but at the same time a greater demand for water for the vegetation; opportunities will be presented for new types of crops, provided when good water management is done.

- On the other hand, extreme events are expected to be more intense or more recurrent than before, increasing the rate of erosion and floods, among others, which will require that the population be more constant in the implementation of soil conservation practices and the efficient use of water

One of the activities of greater scope was the contest "Protecting Mother Earth", in its two versions, which managed to reach a greater number of communities and beneficiaries than the PDMIs. However, in some communities there were difficulties when carrying out the evaluation and awarding, mainly due to the disagreement of the participants, since they considered that the awards received were very few and did not reach all the participants, this created some internal conflicts between community members and dissatisfaction with the project.

In general terms, most of the objectives proposed by the project have been met; however, the participation of the Ayllus in the EVA project has been uneven, and in some cases, caused disagreements within the communities.

In terms of budget execution, although the project has managed to surmount the activities committed to the GEF / IDB, a 100% execution has not been achieved, with expenditure on administrative and cabinet aspects being the best efficiency and component 3 the least.

Based on the results of this evaluation, it will be analyzed if it is pertinent to expand the area of influence of the project to specific places, justifying the reasons why this change should be made and planning future interventions in a coordinated manner.

Finally, it is to be mention that indigenous communities hold important expectations for a next phase of the EVA project, this highlights a sufficient level of trust between the EVA project and the directly benefited communities and neighboring communities, which have aspirations and needs similar to the Ayllus and Markas participants in the EVA project.

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APPENDIX A

Matrix of analysis on the fulfillment of objectives, goals and activities.

Background

The project "Conservation and Sustainable Use of the Land in Andean Vertical Ecosystems developed in the Ayllus of North Potosí and Southeast of Oruro" has the objective of promoting the conservation of agricultural biodiversity and the sustainable use of soil and water in the Vertical Ecosystems Andean (EVA), through the organizational structures of the Ayllus, in order to strengthen food security and the long-term sustainability of the Ayllus of northern Potosi and Southeast of Oruro. Thus, it has been proposed to demonstrate that the adaptive management model promotes the conservation of agro-biodiversity and sustainable use of soil and water in Demonstration Plot of Integral Monitoring (PDMI) located in the Andean Vertical Ecosystems (EVA) and that said model will be used in municipal territorial planning and family farming in the area. Therefore, the project contributes to the awareness and dissemination of local traditional practices of soil and water conservation among the beneficiaries of other agricultural development projects.

In this sense, in order to to develop said project, Bolivia signed with the Inter-American Development Bank (IDB) the Non-Reimbursable Financing Agreement for investments Nº GRT / FM 12228-BO with funds from the Global Environment Facility (GEF / GEF). The strategy of the Project is to strengthen and use the mechanisms and structure of the territorial organizations (Ayllus), so that the communities recover and show the ancestral practices of management of natural resources, water, soil and agrobiodiversity, and be strengthened in the medium term. Thus, the project aims to reduce the economic vulnerability of communities, improve local food security and strengthen the integrated management of EVA. The overall expected result of the project is to demonstrate that the adaptive management model of the Ayllus promotes the conservation of agrobiodiversity and sustainable use of soil and water in PDMIs (Demonstration Plot of Integral Management) located in the Andean Vertical Ecosystems (EVA), and that said model be used in municipal territorial planning and family farming in the area.

In accordance with the provisions of the project, and stipulated in the framework of the agreement signed on December 2, 2010, in clause **2.02**: Special conditions prior to the first disbursement, it was agreed that before the first disbursement of financing from the Inter-American Development Bank (IDB), the Executing Agency or Executing Agency, in this case the MMAyA, must submit and approve the "Operations Manual", with the no-objection of the IDB. Said Operations Manual has the objective of being able to identify the activities and goals of the project in order to be able to operationalize its development. In the same way that the project was proposed, the Operations Manual is established according to the three identified components: **Component 1:** Systematization of Information and Monitoring of Soil, Water Resources, Agro-Biodiversity Impact of Climate Variation, whose main objective is to collect information to establish the baseline in which the project is initiated and to approve alternative agricultural technologies and derive technical-scientific tools for decision making regarding policies, programs and projects in the community (Ayllus), municipality, departmental and / or national levels. **Component 2:** Policies for strengthening, regulatory framework and local capacities for the management of Andean vertical ecosystems,

whose objective is to establish mechanisms for the improvement of the local governance system for the conservation of the Andean Vertical Ecosystems (EVAs) in the area of project implementation. Finally, **Component 3:** Rescue and promotion of best practices and technologies for the conservation of agro-biodiversity and for the restoration of the productive capacity of the Andean vertical ecosystems with the objective of developing experimental agricultural parcels where the traditional agricultural calendar based on the Ayllus will be implemented, under the organizational structure and division of labor that characterizes and sustains that system.

In this sense and to be able to adequately monitor the project and evaluate in this way if the goals identified in the Operations Manual are being achieved, especially in relation to the importance of using different ecological strata and the resources they generate for the communities, is that indicators have been proposed to verify improvements in agricultural practices affecting positively the local income, as well as the capacity of ecosystems to resist the effects of climate change. One of the most important aspects for the area is to reduce the processes of soil erosion by increasing the vegetation cover and improving the soil aptitude for indigenous, Andean and traditional agriculture, which is expected, will mitigate the effects of climate change on food security. Finally, indicators have been identified to measure the contribution of the project in local and national policies, incorporating the agrobiodiversity associated with traditional knowledge of the agricultural sector policies

To determine compliance with the goals identified in the Operations Manual, we worked based on the identified indicators. In this regard, to date there is a monitoring system that allows us to adequately monitor the scope and compliance of the same. In this system, a baseline has been identified for each indicator and two annual measurements of the degree of compliance.

Component 1 Systematization of Information and Monitoring of Resources Soil, Water, Agrobiodiversity and Impact of Climate Variation

Objective of the component

Collect information to establish the baseline in which the project starts and to approve alternative agricultural technologies and derive technical-scientific tools for decision making regarding policies, programs and projects in the community (Ayllus), municipality, departmental and / or national levels

Overall targets

- State of Soil, Water and Biodiversity Conservation in the project area and progress achieved
- throughout its execution through the application of the Adallus adaptive management system.
-Traditional agricultural and livestock practices carried out under the model used by the Ayllus.
- Current agricultural and livestock practices for water management and agro-biodiversity.
- Current discernible impacts of climate change on the Andean Vertical Ecosystems.
- Mitigation and adaptation proposals through improved agricultural practices.
- Compilation and systematization of knowledge and

Indicators

GEF-1 A model of adaptive management of agrobiodiversity (including lessons learned and operational instruments) applied, systematized, evaluated and disseminated to the fifth year of the project in at least 70% of the Ayllus of the project area.

GEF-2 A study on perception of local communities in the project area regarding climate change, and its effects.

GEF-3 At least 2 Exploratory studies conducted on the ecological, social (institutional) vulnerability to climate change involving direct or

Goals by indicator

Model of adaptive management of agro-biodiversity in the EVA (including lessons learned and operational instruments) evaluated, systematized, applied and disseminated.

Learning network on climate change indicators, and the National Climate Change Program strengthened by having access to systematized, documented and disseminated information on the perception of communities regarding climate change, and their results included in the project's climate change indicator

Study on ecological, social (and institutional) vulnerability to climate change in the most vulnerable areas spread among communities and other important actors

Indicator compliance

2730 families adopted the management and are replicating practices in communal lands during the years of implementation of the project (25 more than in past management)

93 PDMIs prepared and implemented

1 Workshop and / or study on local perception of climate change.

An identified study that directly or indirectly assesses the ecological and social (institutional) vulnerability to climate change during the period 2011-2016 (5 years), together with a database platform

Component

Objective of the component

Overall targets
traditional uses by means of several relevant case studies about traditional knowledge and uses related with
experiences and project lessons, systematized, published and disseminated among conservation actors of agro-biodiversity.

Indicators
indirectly the zones prioritized from the project area during at least five years of its management

GEF - 4 Instruments of local planning.: PMOTs and PDMs include actions to reduce vulnerability and to adapt to climate change integrating traditional knowledge and practices with scientific studies aimed at vertical ecosystem management.

GEF -5 At least one study that identifies the main threats on agrobiodiversity with emphasis in the variables.

Goals by indicator

Plan agreed with the communities and with the main actors that identifies adaptive priority initiatives, emphasizing the most vulnerable communities.
Changes of patterns of behavior of climatic variables (precipitation and temperature) estimated for a time horizon of at least 50 years.

Indicator compliance

Two municipal governments (Chuquihuta and Uncía) included in its Municipal Plans of Territorial Planning,
Actions to reduce vulnerability and to adapt to climate change integrating scientific knowledge and traditional practices; 2 Municipal governments (Challapata and Pocoata) included in their Municipal Plans of Territorial Planning, studies on vulnerability to climate change. Regarding the Organic Statutes and internal regulations: 13 Internal statutes and regulations, mention the importance of an adequate water management and agrobiodiversity to face the climate change

1 study on the patterns of precipitation and temperature in the studied region.

Component

Objective of the component

Overall targets

Indicators
climatic (precipitation and temperature) estimated for a time horizon greater than 10 years.

GEF-6 Study on threats to agrobiodiversity for traditional crops of potatoes, beans, quinoa and corn in the ethno-ecological levels of the EVA project.

GEF-7 Main environmental functions identified and mapped in the EVA project area.

Goals by indicator

Results of the study on threats and identified indicators and baseline calculated for traditional tuber crops and varieties of corn in the zones of Chawpirana and Likina

Inventory of flora and fauna in the PDMI performed, registered in the National Herbarium, published, diffused among the main actors involved in the conservation of biodiversity. Main identified indicators for agrobiodiversity and conservation. 2 studies carried out and disseminated about environmental services that derived from conservation of soils, water and agrobiodiversity.

Indicator compliance

2 studies on threats to agro-biodiversity associated with traditional potato, bean, Quinoa and corn in the ethno-ecological levels of the EVA project.
2 New studies were conducted in 2016

Six environmental functions (four in the study on biodiversity, three on the SPIE platform, one common function in both sources), specifically, the functions strong identified were: 1) erosion control, 2) organic carbon storage in the ground, 3) carbon storage in biomass, 4) habitat for species, 5) water balance (water regulation) and 6) biodiversity (rich potential of species).

Component

Objective of the component

Overall targets

Indicators
9D-GEF Generation of information and technical bases for elaboration of a monitoring and evaluation system of agrobiodiversity, floors, water and effects of climate change; that can be implemented and integrated within a geographical information system

GEF-9 A geodatabase generated from the systematization of existing data of soil, water and agro-biodiversity resources in the demonstration plots and communal lands.

11 D-GEF At least 2 publications that summarize and systematize the experiences and lessons learned from project at the end of 5 years.

Goals by indicator

Information generated about conservation strategies soils, water and agro-biodiversity in vertical ecosystems Andean

Geo-referenced information
Monitoring and Evaluation and of studies under component 1 and 2, disseminated among the main local, departmental actors and nationals resulting from the system of

1 national event to present 4 documents of experiences and lessons learned, with participation of principals agro-biodiversity actors and conservation

Indicator compliance

4 STUDIES relevant for development of a system of monitoring and evaluation of agrobiodiversity, Soils, water and effects of climate change; what can be implemented integrated into a System of geographic information • 1 Publication • 1 Product of Community Workshops EVAs (2016) • 2 documents with information collected by EVA technicians.

101 Thematic layers and 63 maps thematic topics for a geodatabase. A document published on systematization of the exchange of experiences in handling, conservation and sustainable use of natural resources

Component

Objective of the component

Overall targets

Indicators
1R-GEF The 13 Ayllus in the coverage area of project access information about adaptation measures to climate change, agricultural practices and local regulations that they favor the handling integrated EVAs.

IDB-1 Floor surface under PDMI that have improved its content of organic matter, humidity and fertility, Through the application of practices and traditional technologies of the Ayllus, compared with plots not intervened.

IDB-2 At least 10% of increase in output annual tubers and prickly pears that improves the food consumption Traditional family and allow grater …….

Goals by indicator
• 12 Ayllus • 6 Municipalities

Indicator compliance

10 Bylaws 6 PMOTs 4 Radial spots 2 Publications

1) 710 ha of land under PDMI 2) 2.5% organic matter (MO) in PDMIs and 1.8% in control plots 3) There is no data on the percentage (%) of humidity gravimetric or volumetric 4) Fertility: Total N 0.1%, P available in PDMI 19.6 ppm and in control plots 15.6 ppm; K in PDMI 1.3 meq / g and in control plots 1.2 meq / g

Marketing percentage:
Prickly pear = 16.44%
Wood sorrel = 0.59%
Potato = 3.98%
Papaliza = 0.88%
Izaño = 0.07%
TOTAL = 4.53%

Component

Objective of the component

Overall targets

Indicators

Trading margins (%)

IDB -3 The production of agrobiodiversity has been increased allowing greater volumes of marketing and its availability at fairs local and other markets.

IDB -4 Number of native species preserved as genetic material in "reservation areas" established by the communities of 11 Ayllus

Goals by indicator

Indicator compliance

Change in Marketing Value = 0%

Exchange percentage: Crops Native = 9.43% Creole Crops = 9.55% Change Marketing volume = 0%

INDICATOR VALUE 2016 = 41 reserve area, average area 20.5 Ha, between 1 to 22 species per reservation area *.

* The variation in the number of species by reservation areas is due, on the one hand, to the fact that they are found in different altitudinal levels with different climate and therefore different kind of vegetation and on the other hand, only the main species of the reserve areas in sources revised are mentioned.

Component

Objective of the component

Overall targets

Indicators

IDB -5 Ha of grasslands under rotation and fallow land system with use guaranteed by the traditional practices and the agricultural calendar of the Ayllus.

IDB -6 Trained communities of the 12 Ayllus about the ecological value of biodiversity to finalize the project.

Goals by indicator

Indicator compliance

5253 ha of blankets according to the agricultural calendar, scattered data registered in 9 studies.

1. At least 11 training events were held in 2016 management
2. In total 4083 people have passed a training workshop organized by EVAS or by some other organization.

Component

Component 2: Strengthening policies, regulatory framework and local capacities for the management of Andean vertical ecosystems

Objective of the component

Establish mechanisms for the improvement of local governance system for the conservation of Andean Vertical Ecosystems (EVAs) in the area of implementation of the project.

Overall targets

The process of revision and / or reform of the regulatory framework of public policies that incorporate EVAs conservation / preservation and integral management of natural resources in the regulatory framework, policies and plans at the Central level, Sub National and territorial organizations level to be implemented in the 12 Ayllus of the project. strengthening the planning tools and management capabilities of the Ayllus, especially

Indicators

GEF-11 At least 6 PMOTs implemented for the recovery and revaluation of agrobiodiversity, which take part of the regulatory framework and public policies at the community, local, departmental and ministerial levels for EVAs integral management

Goals by indicator

The local authorities of the 12 Ayllus, 6 municipalities and prefectures have reached an agreement on a regulatory framework for native conservation and sustainable use of soil, water, forests and agro-biodiversity in the EVAs in their respective areas, which will reflect that agreement in 12 PGTI and 6 PMOT

Indicator compliance

6 Municipal Plans of Territorial Planning prepared, of which 2 are approved.

Component

Objective of the component

Overall targets

The negotiating capacity between the representatives of the 12 Ayllus with the national and sub-national authorities, supporting participatory local development processes; strengthening normative and public policy framework in the 12 Ayllus by incorporating in their statutes, regulations or normative dispositions attributions and functions on conservation and sustainable management of natural resources of EVAsProposals for municipal and departmental EVA management regulation should be submitted to local and national authorities for consideration. Training, technical assistance and consolidation of organizations for the implementation of Component 3; a

Indicators

GEF-12 Institutional coordination platforms have been strengthened and local capacities have been generated on the management of natural resources in North Potosí and southeast of Oruro.

Goals by indicator

Two consolidated inter-institutional coordination platforms (1 NO Potosí, 1 SE Oruro), 70 local technicians and facilitators / coordinators and 12 municipal technicians trained in management and execution of projects under the modality of "learning by doing". 3 fairs for Oruro Ayllus and 9 fairs for Potosí Ayllus carried out during the execution of the project, in order to promote the EVA product exchange.

Indicator compliance

1) 3 documents and 4 institutional agreements related to the strengthening of the institutional coordination platform.2) 26 technicians, facilitators, local coordinators and / or municipal technicians trained in natural resource management. 80 leaders and technicians trained in issues of agro-biodiversity, soil, water and climate change, through modular processes. In addition to generating capacities in topics of personal empowerment, the themes of: Confidence Recovery, Teamwork and Conflict Resolution, Leadership and Construction of Life Project will be developed.3) 6 documents related to training (2 documents and 4 booklets).4) 4 fairs held for Oruro and Potosí Ayllus (2 local and 2 national), in order to promote products and knowledge exchange.

Component

Objective of the component

Overall targets

Environmental educational program for children

Indicators
GEF-16 At least 4 Municipalities incorporate in their policies and planning tools, the traditional adaptive management models of the Ayllus for the conservation of agrobiodiversity at the end of the project.
GEF-17 At least 4 Municipalities prepare and approve their municipal plans of territorial planning that incorporate soils, water and agrobiodiversity conservation measures at the end of the project.
BDI-7 At least 4 Municipality Plans of Territorial Planning (PMOTs) that incorporate strategies of use of territory derived from the management model

Goals by indicator
The local authorities of the 6 municipalities have reached an agreement on a regulatory framework for conservation and sustainable use of EVA native soil, water, forests and agro-biodiversity in their respective zones

• 12 Ayllus introduce criteria for the sustainable management of natural resources in EVAs, and at least 4 of them start implementing these measures as part of their Indigenous Territorial Management Plans (PGTI).
• 6 PMOTs have been prepared by incorporating the 12 PGTIs with the corresponding criteria for biodiversity conservation

Indicator compliance
6 municipalities incorporate traditional adaptive management models in the Ayllus into their norms and tools planning, for the conservation of agrobiodiversity.
6 PMOTs prepared and 2 PMOTs (municipalities of Chuquihuta and Chayanta approved), which incorporate measures of soil, water and agro-biodiversity conservation in its policies and / or strategies (the municipality of Chayanta has 3 policies and the municipality of Chuquihuta has 13 strategic lines related to conservation measures
6 PMOTs prepared and 2 PMOTs approved (municipalities of Chuquihuta and Chayanta approved), which incorporate the strategy of EVAs project territorial management

Component

Component 3: Rescue and Promotion of Practical Improvements and Technologies for the conservation of agro-biodiversity and for the restoration of capacity production of Andean vertical ecosystems

Objective of the component

Develop experimental agricultural plots where the traditional agricultural calendar will be implemented based on the Ayllus, under the organizational structure and division of the work that characterizes and sustains that system.

Overall targets

The aim is to develop a traditional adaptive management model for Ayllus in Management Demonstration Plots.

(PDMI) in the Ayllus lands to be identified and

selected for the execution of this component. Support for afforestation and reforestation with native species. It will form an Accompaniment Committee for the Integral Management Demonstration Plots, formed by local authorities where the PDMI will be located. This committee will accompany the execution and implementation of the PDMI in the chosen locations and will support in resolving conflicts that may occur, as well as monitoring the commitment.

Indicators

Ayllus' adjustment at the end of the project.

GEF-13 At least 70 Ha of communal or private land are under 3 main technologies and traditional practices for EVA management, for the control of erosion and soil, water and biodiversity conservation.

Goals by indicator

At least 70 Ha of communal and/or private land in 70 new PDMI (1 PDMI tied to at least 10 families), determined in conjunction with the Ayllus, under soils and water management traditional technologies and under agrobiodiversity conservation practices in an EVA integral operating logic. At least 25% of eroded soils have been recovered through the use of traditional technologies used by the Ayllus. At least three EVA traditional management technologies and/or practices and conservation of its agrobiodiversity have been rescued and applied in each pilot prioritized zone and replicated at family level during the 4 years of intervention execution in the selected pilot areas

Indicator compliance

1) 710 ha with traditional management practices and conservation of soils .430 hectares with sustainable agroecological management practices 41 Ha of land recovered in river bed through the construction of retaining walls with gabions, in 5 PDMIs of Chayantaka, Sicoya and Puraca Ayllus. 2) 5 forest species revalued and introduced (molle, Quewiña and quiswara, and predominantly cypress and radiata pine) Afforestation of 91 hectares in recharge areas of aquifers using revalued native introduced plants. .3) 19 micro irrigation systems implemented in the cultivation plots. 34 Well-established and implemented micro-irrigation systems. 25 tech irrigation systems under construction. 30 family irrigation systems with water harvesting using water reservoirs covered with geo-membrane under construction. 4) 3 practices have been implemented

Component

Objective of the component

Overall targets

of the beneficiaries of each PDMI to ensure the success of PDMI. Investments will be done in: Training programs in areas like: forestry and shrubs nursery management; native forest conservation; native pasture and grassland management; native family gardens and greenhouses; maintenance and operation of irrigation systems; water harvest; terraces managements. Afforestation, reforestation and conservation native forests; construction of nurseries; delimitation of forest plots; production maintenance of seedlings; compensation for planted and grown trees (incentive system coordinated by the Management Committee) recovery of

Indicators

Goals by indicator

Indicator compliance

agronomic, 5 mechanical practices and at least 2 biological practices (reforestation and introduction of forage plants) for erosion control, soil conservation, water and biodiversity. At least 4 agronomic for erosion control, soil conservation, water and biodiversity. Among them we have the implementation of water harvests through the water reservoir system and waterproofed with geo-membrane, management and diversification of crops, seed management, implementation of agroforestry systems with use of native shrub and tree species. In terms of biological practices for erosion control, soil conservation, water and biodiversity we have at least 4 identified biological practices: 116 Has closed for the implementation of family groves, construction of 500 ecological kitchens for reducing fuel consumption and improving human health, pest and disease management

Component

Objective of the component

Overall targets

degraded and eroded soils Management of native grasslands and pastures water resource management agro-production diversification livestock and animal health management participation agreements participation in the project for the Ayllus. Conformation of the accompaniment Committee to the PDMI. Conformation or Interinstitutional Coordination Committee

Indicators

Goals by indicator

Indicator compliance

in crops, and preparation of organic fertilizers. The sowing of 400 ha of forage crops has been promoted, 605 ha of native pastures

Component

Objective of the component

Overall targets

Indicators
GEF-14 Families of the 13 Ayllus receive training and training in traditional practices of integral management of EVA and conservation of agrobiodiversity

Goals by indicator
70% of families and corporate actors in the pilot areas that perceive the benefits and dedicate their time and resources to carry out training and dynamic events for the for the implementation of strategies for sustainable management of natural resources and conservation of agro-biodiversity. At least three species of tree shrubs, varieties of pastures and animal species recognized as key for the conservation of EVA by intervened zone and with consensual plans for its conservation. At least 8 Events (2 in each geographical area) of awareness and education on the relevance of soil conservation, water and agro-biodiversity for the food security of the population.

Indicator compliance

1) 18 training carried out on the subject.
2) In total 5264 people attended the training events.

Component

Objective of the component

Overall targets

Indicators

GEF-18 At least 70 municipal technicians and 70% of the participating families of the PDMIs of the 13 Ayllus of the EVAs project incorporate technologies that drive integrated management and receive training for the recovery and valuation of biodiversity.

GEF-19 At least 30% of families with PDMI replicate the the traditional management strategies of the EVA, preserving 5 varieties of Andean crops in situ, with an average annual increase in productivity and volumes of exchange and marketing according to ecological floor; preserving surfaces from critical sites of

Goals by indicator
70 local technicians and facilitators receive training, as well as 12 municipal technicians; • 3 fairs for the Ayllus of Oruro and 9 fairs for the Ayllus from the North of Potosí have been carried out during the execution, in order to promote the exchange of products of Vertical ecosystems • 70% of the participating families receive training on the conservation value of the integrated management systems of the Ayllus

• At least 30% of the number of farmer's families in the application areas of the models and 10% of the total intervention zone revalorize, apply and replicate the technologies and practices applied in the demonstration plots for the sustainable management of the natural resources in the EVA during the implementation period of the project. • At least 5 varieties of preserved Andean crops (in situ and in local seed banks). • Average increase

Indicator compliance
4 training carried out on the integrated management and the valuation of biodiversity (together with the 63 of the last management make a total of 67 events counted between January 2015 and July 2016)

119 competent municipal authorities and / or technicians (between 6 and 38 per event) 3. 4083 people trained 4. 4 fairs carried out in the Ayllus of Oruro and Potosí (2 regional and 2 national)

1. 2730 families participating in the PDMI2. Number of varieties of Andean crops preserved in situ = Seven species of native and creole crops preserved in situ: native potatoes, native and criollo maize, peas, beans, amaranth, wheat, tarwi
2. Crops No. of varieties: Potato = 123 (Suni); 170 (Chawpirana); 34 (Likina) Bean 31 (Suni); 54 (Chawpirana); 21 (Likina) Quinua 10 (Suni); 17 (Chawpirana); 6 (Likina) Maize 19 (Suni); 37

(Chawpirana); twenty-one

Component

Objective of the component

Overall targets

Indicators

native arboreal and shrub species, and of pastures and grasslands
6R-GEF At least 3 traditional practices aimed at the good management and conservation of soils, established in the PDMIs, applying traditional agricultural technologies and calendars

Goals by indicator
of at least 10% per year in the productivity and average increase of at least 15% per year in the production of native and / or introduced species food safety base and surpluses for the market) in each plot, per ecological and harvesting floor according to calendar traditional agricultural • Increase by 20% in the volume of exchange products in fairs (or marketed in markets) by harvest of the representative products on each ecological floor by zone of intervention • 1400 Ha of native shrub and tree species in critical site.

• The Ayllus have dedicated 15% of the communal land and farms to the operation of the PDMI, and in these plots the traditional systems of adaptive management of the Ayllus have been implemented. Re-established for at least 25% of eroded soils, through application of technologies

Indicator compliance

(Likina) 3. kg / ha of Increase in annual productivity : CRIOLLOS: 1. Pea = 1.2532. Barley grain = 7333. Onion = 4.9394. Bean = 1.1115. Wheat = 9036. Prickly pear = 1.7697.
Carrot = 9.951 NATIVE 8. Corn grain = 1.7659. Oca = 3.13310. Potato = 5.43511. Papaliza = 3.04412. Quinoa = 85213. Tarwi = 3.1384. 152,822.64 kg increase of products marketed or exchanged

8 traditional practices implemented according to agricultural calendar in the PDMIs for the management and conservation of soils.

Component

Objective of the component

Overall targets

Indicators

7R-GEF 70% of the families with PDMI and a 10% of the total area of intervention, know the benefits of conservation of agrobiodiversity through the use of technologies and management practices traditional integrated the EVA.

IDB-8 Number of families of farmers in the area of the Demonstration Plot of Integral Management) that apply the technologies that are part of the model adaptive management of Ayllus

Goals by indicator

traditionally organized through the Ayllus, such as building terraces, rest and rotation of crops, agricultural diversification and others.

• 70% of the number of agricultural families in the areas where the models are appalied, and 10% of the total areas of intervention, revalorize, apply and replicate the tchnnologies and practices applied in the demonstration lots for the sustainable management of resources in the EVA during the execution period.

Indicator compliance

63% of families perceive real benefits for the application of traditional practices and technologies in the conservation of agro-biodiversity in EVAs.

2608 families apply technologies that are part of the adaptive management model of the Ayllus. No changes were identified in relation to the base year 2015.

Component

Objective of the component

Overall targets

Indicators

IDB-9 Number of families in the general area of intervention applying the technologies that are part of the adaptive management model of the Ayllus in their respective lots

Goals by indicator
• 4803 families applying technologies • 8 disseminated technologies

Indicator compliance

APPENDIX B
Monitoring Matrix of the identified indicators
(Matrix in Excel - CD attached)