

# MID-TERM REVIEW

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## ENHANCING RESILIENCE TO CLIMATE CHANGE OF THE SMALL AGRICULTURE IN THE CHILEAN REGION OF O'HIGGINS

**FOR:**



ADAPTATION FUND

**FINAL REPORT**

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## ACRONYMS

<b>AGCID</b>	Agencia de Cooperación Internacional de Chile. Agencia pública dependiente del Ministerio de Relaciones Exteriores que capta o entrega y administra recursos de cooperación internacional, tanto entrantes al país como entregados por Chile a países de igual o menor desarrollo.	Chilean International Cooperation Agency. Public agency under the Ministry of Foreign Affairs that channels, delivers and administers international cooperation resources, both incoming and outbound.
<b>ATP</b>	Asesor Técnico Principal.	Primary Technical Advisor.
<b>CMUNCC</b>	Convención Marco de las Naciones Unidas sobre Cambio Climático.	United Nations Framework Convention on Climate Change.
<b>CIREN</b>	Centro de Información de Recursos Naturales. Institución de apoyo al Ministerio de Agricultura que proporciona información de recursos naturales renovables.	Natural Resources Information Center. Support institution under the Ministry of Agriculture that produces information on renewable natural resources.
<b>CONAF</b>	Corporación Nacional Forestal. Entidad de derecho privado dependiente del Ministerio de Agricultura, cuya tarea es administrar la política forestal de Chile y fomentar el desarrollo del sector.	National Forestry Corporation. Private institution under the Ministry of Agriculture that administers Chile's forestry policy and promotes sectorial development.
<b>DGA</b>	Dirección General de Aguas. Organismo del Estado dependiente del Ministerio de Obras Públicas que se encarga de promover la gestión y administración del recurso hídrico.	General Directorate of Water. State office under the Ministry of Public Works in charge of management and administration of water.
<b>DOH</b>	Dirección de Obras Hidráulicas. Agencia dependiente del Ministerio de Obras Públicas cuya misión es brindar servicios de infraestructura hidráulica que permitan el uso óptimo del agua y la protección del territorio y las personas, con la participación de los ciudadanos en las diferentes etapas de los proyectos para contribuir al desarrollo sostenible del país.	Directorate for Hydraulic Works. Agency under the Ministry of Public Works whose mission is to provide services hydraulic infrastructure that allow the use optimal water and protection of the territory and people, with the participation of citizens in the different stages of projects to contribute to the development sustainable of the country.
<b>EMA</b>	Estación Meteorológica Automática.	Automatic Meteorological Station.
<b>FACC</b>	Fondo de Adaptación, financia proyectos y programas para ayudar a países en desarrollo a adaptarse a los efectos nocivos del calentamiento mundial.	Adaptation Fund, whose role is to finance concrete adaptation projects and programs in developing countries that are part of the Kyoto Protocol and are particularly

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vulnerable to the adverse effects of climate change.

<b>FAO</b>	Organización de las Naciones Unidas para la Alimentación y la Agricultura.	Food and Agriculture Organisation of the United Nations.
<b>FIA</b>	Fundación para la Innovación Agraria.	Foundation for Agricultural Innovation.
<b>INDAP</b>	Instituto de Desarrollo Agropecuario. Servicio descentralizado dependiente del Ministerio de Agricultura que tiene por objeto promover el desarrollo económico, social y tecnológico de los pequeños productores agrícolas y campesinos.	Institute for Agriculture Development. Decentralized service under the Ministry of Agriculture that aims at promoting the economic, social and technological development of small farmers.
<b>INE</b>	Instituto Nacional de Estadísticas.	National Statistics Institute.
<b>INIA</b>	Instituto de Investigaciones Agropecuarias. Corporación de derecho privado sin fines de lucro y dependiente del Ministerio de Agricultura. Es la principal institución de investigación del ramo de Chile.	Agricultural Research Institute. A private not-for-profit corporation that depends upon the Ministry of Agriculture and is the Chilean main research institution in the field.
<b>MINAGRI</b>	Ministerio de Agricultura. Institución del Estado encargada de fomentar, orientar y coordinar la actividad silvoagropecuaria del país.	Ministry of Agriculture. State department in charge of promoting, orienting and coordinating the agricultural and forestry activity in the country.
<b>MMA</b>	Ministerio del Medio Ambiente. Órgano del Estado encargado del diseño y aplicación de políticas, planes y programas en materia ambiental y la protección y conservación de la diversidad biológica y de los recursos naturales renovables e hídricos.	Ministry of Environment. State organ in charge of the design and implementation of policies, plans and programmes in matters environmental and of protection of biological diversity and renewable natural and hydric resources.
<b>MOP</b>	El Ministerio de Obras Públicas es la Secretaría de Estado encargada de planificar, estudiar, construir, expandir, reparar, mantener y operar la infraestructura pública fiscal, que está bajo su custodia en todo el país.	The Ministry of Public Works is the Secretariat of State in charge of planning, study, build, expand, repair, maintain and operate public infrastructure fiscal, which is under their custody throughout the country.
<b>NIE</b>	Agencia Nacional de Implementación.	National Implementing Agency.
<b>ODEPA</b>	Oficina de Estudios y Políticas Agrarias. Servicio público centralizado, dependiente del Ministerio de	Agricultural Policies and Studies Office. Centralised service under

	Agricultura, que presta servicios especializados de asesoría e información.	the Ministry of Agriculture that provides specialised advisory and information services.
<b>UGP</b>	Unidad de Gestión del Proyecto.	Project Management Unit.
<b>PGC</b>	Programa de Generación de Competencias.	Plan Generation Skills.
<b>POA</b>	Plan Operativo y Presupuesto Anual.	Annual Operating Plan and Budget.
<b>PRODESAL</b>	Programa de Desarrollo Local (INDAP). Su finalidad es apoyar a los pequeños productores agrícolas y sus familias que desarrollan actividades silvoagropecuarias.	Local Development Programme (INDAP). Its aim is to support small farmers and their families in developing agricultural, forestry and livestock-breeding activities.
<b>SAG</b>	Servicio Agrícola y Ganadero. Servicio descentralizado dependiente del Ministerio de Agricultura cuyo objeto es contribuir al desarrollo agropecuario del país mediante la protección, mantención e incremento de la salud animal y vegetal; la protección y conservación de los recursos naturales renovables y el control de insumos y productos agropecuarios sujetos a regulación en normas legales y reglamentarias.	Agriculture and Livestock Service. Decentralised service under the Ministry of Agriculture that aims at contributing to the agricultural development of the country through the protection, maintenance and enhancement of animal and plant health, the protection of renewable natural resources and the control of agricultural inputs and products that are subject of legal and procedural regulation.
<b>SAT</b>	Servicio de Asesoría Técnica (INDAP). Su objetivo es contribuir a mejorar de forma sostenible el nivel de competitividad del negocio o sistema productivo desarrollando las capacidades de los usuarios.	Technical Assistance Service (INDAP). Its objective is to contribute to the sustainable enhancement in business or productive-system competitiveness through users' capacity development.
<b>SEREMI</b>	Secretaría Regional Ministerial. Es el órgano desconcentrado de los ministerios de Estado de Chile, con la condición de representante del ministerio respectivo en la región.	Regional Ministerial Secretary. It is the subnational organ of State Ministries in Chile, having the condition of representative of the Ministry in a given region.
<b>SERNAGEOMIN</b>	El Servicio Nacional de Geología y Minería es un organismo técnico responsable para generar, mantener y difundir información sobre geología básica y recursos y riesgos geológicos del país para el bienestar de la comunidad y para el servicio del país, y regular y supervisar el cumplimiento de regulaciones sobre seguridad minera, propiedad y planes de cierre para	The National Service of Geology and Mining is responsible technical body to generate, maintain and diffusion information on basic geology and resources and geological hazards of the country for the welfare of the community and to the service of the country, and regulate and supervise the compliance with regulations on mining safety, property and closure

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	<p>contribuir al desarrollo de la minería plans to contribute to the national. development of national mining.</p>
<b>SIRSD-S</b>	<p>Sistema de incentivos para la System Incentive Program for Agro-sostenibilidad agroambiental de los Environmental Sustainability of suelos agrícolas del Ministerio de Agricultural Soils of the Ministry of Agricultura. Asistencia financiera no Agriculture. Non-refundable financial reembolsable para cofinanciar assistance to co-finance activities actividades y prácticas destinadas a and practices aimed at restoring restaurar suelos agrícolas degradados degraded agricultural soils and / or y/o mantener y recuperar suelos maintain and recovered agricultural agrícolas. soils.</p>
<b>SEGRA</b>	<p>Sección de Emergencias y Gestión de Emergency and Agricultural Risk Riesgos Agrícolas. Antigua Unidad Management Section. Former Nacional de Emergencia Agrícola y National Agricultural Emergency Gestión de Riesgos Agroclimáticos. Unit and Risk Management Unidad operativa del MINAGRI que Agroclimatic. MINAGRI operating gestiona el Sistema Nacional de Gestión unit that manages the National de Riesgos Agroclimáticos. System of Risk Management Agroclimatic.</p>

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## TABLE OF CONTENTS

1	SUMMARY OF THE PROJECT	8
1.1	Components and expected results of the project	9
1.2	Implementation mechanisms and governance	10
2	CONTENT OF THE EVALUATION	11
2.1	Scope of the evaluation	11
2.2	Objectives of the evaluation	12
2.3	Methodology of Evaluation	12
3	SUMMARY OF MAIN FINDINGS	15
4	LEARNED LESSONS	21
5	RECOMMENDATIONS	22
5.1	Administrative management recommendations	23
5.2	Technical management recommendations	25
6	RELEVANCE AND SIGNIFICANCE OF THE PROJECT	26
6.1	Relevance of the design and components of the project	27
6.1.1	Vulnerability to climate change in the project area	27
6.1.2	Climatic trends in the project area	32
6.1.3	Social vulnerability of the beneficiaries in the project area	32
6.2	Institutional dynamic phase of the project formulation	36
6.3	Internal consistency of the design	38
6.4	Relevance of the project in the context of development policies	42
6.5	Project Actions according to the FACC strategies	44
6.6	Project dimension gender	44
7	EFFICIENCY IN THE PROJECT IMPLEMENTATION	45
7.1	Budget and time efficiency by component	50
7.2	Budget implementation to December 2019	53
7.3	Collaboration between institutions and management mechanisms	54
7.4	Opportunities to improve the efficiency of the project	55
8	EFFICIENCY IN THE PROJECT IMPLEMENTATION	55
8.1	Progress in achieving the expected results	55
8.2	Control mechanisms and monitoring implementation	86
8.3	Performance indicators and actual performance project	87
8.4	Opportunities to strengthen the project effectiveness	88
9	SUSTAINABILITY OF THE PROJECT RESULTS	88
9.1	Ability of adaptation to climate change	89

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9.2	Appropriate action to ensure sustainability	91
9.3	Opportunities to strengthen the sustainability of the project	91
10	IMPACT OF THE PROJECT	92
10.1	Visibility and communication of project actions	93
10.2	Opportunities to strengthen escalation of the project	96
11	REFERENCES	97
12	ANNEX 1. REVISED DOCUMENTS AND REPORTS	97
13	ANNEX 2. EXECUTED INTERVIEWS	98
14	ANNEX 3. RESULTS FRAMEWORK, MILESTONES, TARGETS AND INDICATORS OF THE PROJECT.	100
15	ANNEX 4. GENDER DEFINITIONS (FACC, 2016).	104

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## 1 SUMMARY OF THE PROJECT

The Adaptation Fund (FACC)<sup>1</sup> was established by the Parties to the United Nations Framework Convention on Climate Change (UNFCCC), to finance projects and programs of adaptation to climate change in countries of the Kyoto Protocol that are particularly vulnerable to its adverse effects. In this context, the Chilean International Cooperation Agency (AGCID) signed an agreement on 13 November 2015 to finance the project, which corresponds to the first project to be approved in Chile by the FACC, and AGCID as the first organization to be accredited at a country level.

The overall objective of the project is to enhance the resilience of agricultural rural communities in the coastal dryland and interior of the O'Higgins Region, regarding variability current climate and future climate change.

The specific objectives are:

- a) To implement a capacity building and training system to increment the resilience capacity on farm vulnerable communities to climate variation and climate change, regarding livestock, crops, water and soil management.
- b) Implementation of measures and technologies to increasing water resources availability for rural communities in coastal and inner drylands of the O'Higgins Region.
- c) To improve the decision supporting agroclimatic information management for the actual climate and future climate changes for local MINAGRI professionals and farmer communities.

The general background of the project goes as follows:

- Project title: Enhancing resilience to climate change of the small agriculture in the Chilean O'Higgins Region.
- Implementing Entity: Chilean International Cooperation Agency (AGCID).
- Executing Agency: Ministry of Agriculture (MINAGRI).
- Implementing Partner: Ministry of Environment (MMA).
- Primary Technical Advisor: Agricultural Research Institute (INIA).
- Launchpad: Libertador General Bernardo O'Higgins Region eight municipalities of the coastal and inner drylands: Paredones, Pichilemu, Marchigüe, La Estrella, Litueche, Navidad, Lolol and Pumanque.
- Start Date: August 2017.
- Amount financed by the Adaptation Fund (FACC): US\$ 9.960.000.-

The Libertador General Bernardo O'Higgins Region has, as several regions of Chile, four longitudinal strips: Andes, Intermediate Depression, Coastal Range and Coastal Plains. The Andes has an altitude ranging from 3,000 to 4,000 m and a width of approximately 50 kilometers in this region, showing a marked volcanism where the greatest heights correspond to the volcanic cones Tinguiririca (4,620 m) and Palomo (4,860). Intermediate Depression occurs with flat shapes generated by carrying materials, mainly source glacial-fluvial-volcanic, crossed by the stream Codegua, Cachapoal and Rengo rivers. The Coastal Mountain presents low and rounded shapes that do not reach the 2,000 meters of altitude.

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<sup>1</sup> [www.adaptation-fund.org](http://www.adaptation-fund.org).



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The Coastal Plains are of great extent on the coast to the south of the Yali estuary, near the Rapel River, where the coast is low and allows the development of dunes and beaches. The same happens in Bucalemu and Pichilemu where there are up to three levels of terraces. The Coastal Mountain is reached through several waterways that penetrate up to 25 kilometers inland ([https://www.bcn.cl/siit/obtieneimagen?id=repositorio/10221/17299/4/Regi%C3%B3n%20Ohiggins\\_fn\\_G.jpg](https://www.bcn.cl/siit/obtieneimagen?id=repositorio/10221/17299/4/Regi%C3%B3n%20Ohiggins_fn_G.jpg)).

Furthermore, according to General Directorate of Water (DGA) (2015), O'Higgins Region has other important features. Regarding land use, it is the fourth region in area designated for agricultural use at a national level and, in relation to its own surface, it is the highest percentage allocated to this land use (26%). It has multiple users of surface and ground waters and important point sources of pollution, such as liquid waste and / or water generated in cities contact, tasks mining or other industries in the region, in addition to agriculture.

There is little efficient irrigation agriculture, where only half of the total area devoted to agriculture is irrigated, where 72% use gravity irrigation (quoted in Original Project 2015, (INE, 2007)).

The hydrographic system is constituted by the system of the Rapel River and its most important tributaries, Cachapoal and Tinguiririca rivers; both at its confluence give rise to the Rapel reservoir. Rapel reservoir has a storage capacity of 433 million cubic meters and the hydroelectric plant has an installed capacity of 350,000 KW. The use of the waters of the Rapel-Cachapoal-Tinguiririca system is based on irrigation, electricity production, industry, mining and consumption by the population (<https://www.bcn.cl/siit/nuestropais/region6/indica.htm>).

In this regional context, by 2040 climate scenario in the project area is 20% to 25% decreases in the average annual rainfall and temperature increase of about 3°C (Original Project, 2015).

However, in recent years, rainfall levels have dropped, creating a problem of water scarcity dated on October 3, 2019, a water shortage in the area of O'Higgins Region, being enacted by MOP decree N°116. This statement is based on the "Report of hydrometeorological conditions" in the region, which was prepared on September 27, 2019 by the Division of Hydrology of the DGA (2019). Furthermore, dated on August 20, 2019, through Exempt Resolution N°400 / MINAGRI, emergency defines the effects of productive agricultural damage resulting from water deficit condition, affecting O'Higgins Region.

## **1.1 Components and expected results of the project**

The project has two main components, which are:

**Component 1:** capacity building in climate variability and climate change related to appropriate farming practices with respect to soil, water, crops and livestock.

**Component 2:** implementation of an information system for agroclimatic risk management and to climate change adaptation.

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Expected results of component 1 are:

**Result 1.1:** implementation of capacity building and training systems, to increase resilience of farming communities vulnerable to changes in climate and climate change, regarding the handling of livestock, crops, water and soil management.

**Result 1.2:** implementation of measures and technologies to increase the water resources availability for rural communities in coastal and inner drylands of the O'Higgins Region.

The expected results of component 2 are the following:

**Result 2.1:** improve the decision supporting agro-climatic information management for actual climate and future climate changes, for local MINAGRI professionals and farmer communities.

## **1.2 Implementation mechanisms and governance**

The implementation mechanisms and governance defined in the project are:

- AGCID acts as "Implementing Entity".
- Ministry of Agriculture (MINAGRI) is the "Executing Entity". They must report monthly to AGCID.
- MINAGRI is also part of the Regional Executive Committee, through its Regional Ministerial Secretary (SEREMI).
- Ministry of Environment (MMA) acts as an "Implementing Partner", participating in the Steering and Advisory Committees.

Moreover, the Under Secretary of Agriculture, in order to carry out its function, has signed an agreement with the Agricultural Research Institute (INIA), which acts as "Primary Technical Advisor" and run component 1 of the project.

MINAGRI, through the Sub Department of Information, to Emergency and Agricultural Risk Management Section (SEGRA), run component 2 of the project. Also, the SEREMI of Agriculture of the O'Higgins Region is in charge of implementing the project at a regional level and benefited communities.

Other important stakeholders are the Agricultural Policies and Studies Office (ODEPA) and the Institute for Agricultural Development (INDAP). ODEPA participated in the initial stage of the project and it's part of the Advisory Committee. Meanwhile, INDAP participates in the Executive Regional Committee, resulting of vital participation at a local level, especially by users of their Local Development Programme (PRODESAL) and Technical Assistance Service (SAT), along with the committed municipalities.

The Regional Ministerial Secretary of Agriculture in the O'Higgins Region is the National Director of the project, which oversees the activities, ensures timely delivery of contributions of resources and is fully accountable to the Government of the products and results. The daily management of the administrative, monitoring and accounting is performed by the Project Management Unit (UGP).

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The other form of governance are the project committees, which meet certain periodicity, which is registered in the 2018-2019 annual report. These are mentioned below.

**Directive Committee:** It is the body on top of the project, involving the Minister of Agriculture, Minister Environment and Executive Director of AGCID. They receive reports from the Project Management Unit and are supported by the Advisory Committee.

**Advisory Committee:** they give expert advice and operationalization of decisions. SEREMI chairs, which in turn is the National Director of the Project. The Secretary acts as coordinator of the UGP. Representatives from AGCID, MMA and MINAGRI (consultants and professionals nationally), INIA, ODEPA, SEGRA, and other guests at every appointment.

**Regional Executive Committee:** it does the specific coordination of the project in the O'Higgins region, advises and supports the National Director of the Project on technical and operational interagency coordination. They meet at least every three months. SEREMI chairs the maximum of Agriculture and regional authorities involved: SEREMI Environment, INIA, INDAP, SAG, plus guests.

**Local committees:** coordinate the actions of the project at the municipality level. There are eight local committees of the project. Mainly involved SEREMI of Agriculture, INIA, SAG, INDAP, PRODESAL, and the representative farmer from the site where the demonstrating unit is located.

Finally, the UGP is the unit of permanent work on the project, dependent on the National Director of the Project and responsible for coordinating the implementation and monitoring of field activities of the project in general and, particular, the actions of component 1 of the project.

## **2 CONTENT OF THE EVALUATION**

### **2.1 Scope of the evaluation**

The Mid-term Review (MTR) is a contribution to the knowledge of the evolution of the project, also social and institutional learning obtained from the practice developed in the average execution period. It is done to show the current status of the relevance, improve the effectiveness, efficiency and sustainability, and significance of the ongoing interventions.

The recommendations hereby presented will allow to have relevant evidence and expert opinion to enhance the implementation of the project, as well as for institutional learning to help improve the performance of institutions implementing and executing future projects.

The evaluation covers the period from 18 August 2017 to August 2019.

According to the Board of the FACC, an MTR is a critical evaluation of products (outputs) and results (outcomes) of the project. The evaluation focuses on the objectives and agreed indicators and the current context of implementation.

Analysis of the current context of the implementation is especially important, since the change in socioeconomic conditions and / or weather may cause the diagnosis and starting

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point of the intervention, be out of focus of the actual situation. So, the results of this evaluation can contribute to changes in the implementation of the intervention and the updating of the assumptions adopted (cited in Original Project (AFB, 2015)).

## 2.2 Objectives of the evaluation

As provided in the Terms of Reference (ToR) of this evaluation, the main objectives of the MTR are:

- Assessment of the relevance and significance of the project.
- Assessment of efficiency in the implementation of the project.
- Assessment of effectiveness in implementing the project.
- Sustainability of the project results.
- Impact of the project.
- Learned lessons.
- Final recommendations.

## 2.3 Methodology of Evaluation

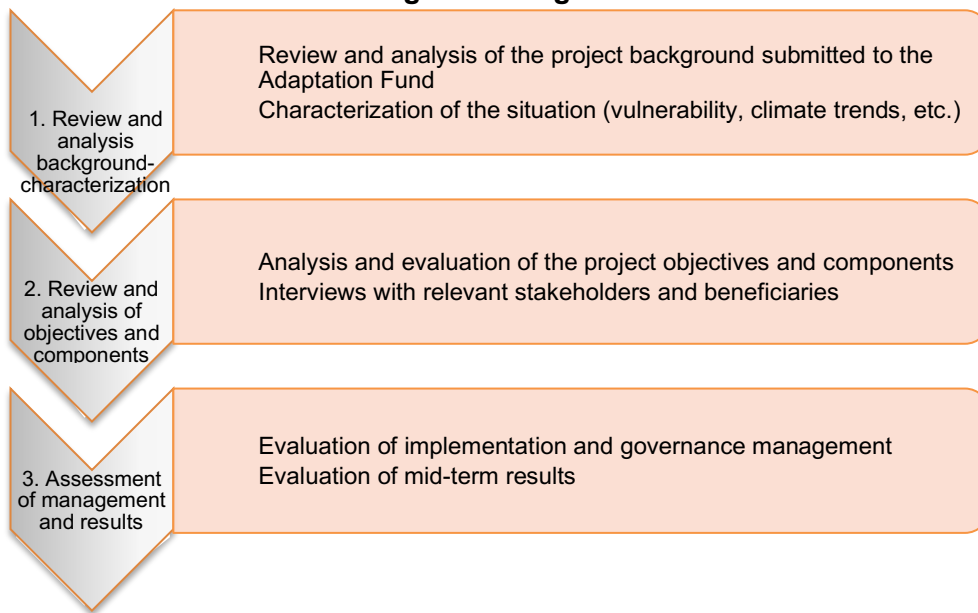
The methodology of MTR was conducted according to international standards set by the Organization for Economic Co-Operation and Development OECD and recognized by the FACC2, and according to ToR recruitment for this evaluation, and was performed in three steps (**Figure 1**). This was done based on a qualitative assessment matrix proposing 5 criteria: relevance, efficiency, effectiveness, sustainability and impact, each of which has the following emphasis:

- The criterion of relevance focuses on the analysis of the validity of the alternative chosen in the current context, consistency of design (including the incorporation of gender analysis, youth and indigenous population) and studies the institutional dynamics in phase formulation.
- The criterion of efficiency focuses on the study of budget and time efficiency and analysis of the dynamics between actors in the implementation and execution.
- The criterion of effectiveness focuses on the analysis of the evolution and progress of the project achieved so far on the positive effects expected and studies the responses and different benefits for each group of recipients.
- The criterion of sustainability studies the unexpected effects and institutional financial and technological sustainability.

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<sup>2</sup>OECD / DAC defines evaluation as "a systematic and objective assessment of an ongoing or completed project, including its design, implementation and results. The objective is to determine its relevance and the achievement of its objectives, efficiency, effectiveness, impact and sustainability. An evaluation should provide evidence-based information that is independent, credible, reliable and useful, enabling the timely incorporation its findings, recommendations and lessons into the decision-making processes. Evaluations are important sources of evidence, achievement of results and institutional performance, and should contribute to knowledge and organizational learning "(OECD / DAC, 2010).

**Figure 1. Stages of evaluation.**



Source: prepared by author.

The methodology of the evaluation included:

- Collection, review and analysis of the background and characterization of the current situation against climate change in the central zone of Chile, in the O'Higgins Region and the eight municipalities that considers the project and other secondary information available, which is specific and related to the purpose of the project. This will be used for the information provided by the AGCID and other sources of information.
- Review and analysis of the specific objectives of the project and the document presented to the FACC.
- Review and analysis of the components of the project.
- Review and analysis of the expected results of the project.
- Semi-structured interviews with key players in the implementation and governance committees.
- Semi-structured interviews with representative beneficiaries of the eight municipalities.
- The information generated both background checks and interviews, served as an input for the evaluation according to the criteria of relevance, efficiency, effectiveness, sustainability and impact of the change being proposed.
- Evaluation of results: a systematization was developed with the results of the evaluation.

It should be noted that this assessment was developed from 12 December 2019 to 29 January 2020, so this final report considers an assessment of about two months of work, a period in which the following activities have taken place.

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- Document Review (**Annex 1**).
  - Field visits to demonstration units of the project: Pichilemu, Paredones, Lolol, Pumanque, Marchihue, La Estrella, Litueche, Navidad and Hidango Experimental Station.
  - Interviews with the beneficiaries of the demonstration units.
  - Interviews with other beneficiaries of the project.
  - Interviews with actors in the implementation and governance committees, and others (**Annex 2**):
    - Project Director
    - Head of the Department of Multilateral Cooperation and the Bilateral AGCID
    - AGCID Coordinator
    - AGCID Financial Analyst
    - MMA Representative
    - SEGRA Head
    - Finance and Accounting of the Under Secretary of Agriculture Head
    - Responsible for Climate Change Specialist, Department of Sustainability and Regulatory ODEPA
    - INIA Rayentué Director
    - Technical Coordinator of the Project - Chief Technical Advisor
    - UGP coordinator
    - Sociologist
    - Responsible for the monitoring and control of the project UGP (2 professional)
    - Communications Officer

Special emphasis regarding the gender component was given, reviewing and analyzing the measures taken and assessing the necessary measures to implement it deemed relevant, considering the Gender Policy and Plan of Action of the FACC (2016).

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### 3 SUMMARY OF MAIN FINDINGS

The summary of the main findings of the mid-term review, arranged for each of the five evaluation criteria, mentioned that an overview of the current status of implementation of the project was allowed.

RELEVANCE OF THE PROJECT: HIGH
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General: Resilience of farming communities through improving the skills and abilities, and water availability is being carried out in the same way in the 8 municipalities covered by the project. However, beneficiaries have high variability of socioeconomic conditions and access to water resources, as some beneficiaries have only drinking water that the municipality provides them through water trucks. Present negative conditions of climate change have accelerated beyond expected during the project design stage, so the project has high relevance. O'Higgins Region is an enacted area and agricultural water shortage emergency.

Vulnerability to climate change in the project area: The relevance of the project in the area of intervention is based on estimating a 44% loss in crop areas by 2040 in the O'Higgins Region, producing negative impacts on the social, productive and economic system. Moreover, rates of vulnerability to climate change have a tendency to high vulnerability and vary considerably between 8 municipalities, so there are special needs in building the skills of producers to address climate change. Since the design of the project until today, transversely beneficiaries believe that the most significant effect they have is the decreasing availability of water in water sources, as situation has worsened. Other aspects of vulnerability are age (over 60 years) and the high level of unmet basic needs. Finally, sustained reduced planting of traditional crops like wheat, corn and beans, and decreasing cattle, prevent the resilience of producers for alternatives having weak productive.

Climatic trends in the area of the project: The dry season in the project area lasts between 6 and 8 months per year, a period which is likely to increase over the coming decades. According to the projections of climate change, this region is in the area that will be most affected by reduced rainfall and rising temperatures and solar radiation. This will affect not only production, but also further degraded soil quality, ecosystem services and biodiversity. The statistics representative of one of the municipalities of the project (Litueche) have been tracing a downward trend in annual rainfall over the past 45 years, a situation that has been escalated in all municipalities in the past year.

Furthermore, given the increased demand for groundwater, and the existence of several areas declared by the DGA as restriction zones to form new groundwater rights, it is necessary to have a better understanding of the current situation of water rights and availability water from each of the beneficiaries, even more so considering that most of the municipalities in the area project are located in coastal watersheds where it is quite likely that groundwater levels are increasingly depressed product of the extraction of groundwater upstream.

Social vulnerability of the beneficiaries of the project area: Beneficiaries shortlisted for the formulation of the project correspond to farmers who were not eligible for conventional support INDAP because of their vulnerability: the land did not meet the minimum size of agricultural unit, do not have machinery for agricultural production, not known state

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programs, they cannot fill out forms or applications. Initially, the potential beneficiaries of the project consisted of women in a 57%, reflecting a positive discrimination in the selection of beneficiaries of the project, but now this figure corresponds to 42%, and the project is making an effort to reach that figure back (57% women). The total number of farms in the area of the project is 5,767, while 62% of them are farms of less than 20 hectares. The main agricultural activities are production of sheep, cereals and vegetable production and most of the land is used for grain production in upland soils ( $\approx 92\%$ ). Chile highlighted by the small average size of agricultural units, where 73.4% of farms being less than 20 hectares, while 19% are between 20 and 100 hectares and 7.6% are larger than 100 hectares.

Institutional dynamic phase of the project formulation: The most important institutional arrangement defined in the project is the inter institutional report, since the intra hierarchical line is due to own relations of the participating institutions. Thus, independent paths are observed between the two components of the project. While the component 1 is technically in charge of the INIA, and is executed by the UGP in all subjects, except training and reports to the director of the project; component 2 has a fairly independent treatment, executed by the SEGRA who receives support from INIA in training and is directly related to the Ministries of Agriculture and Environment and the steering committee, without dependence on the SEREMI. Furthermore, it defined with a communications strategy and independent training of the project as a whole. Regarding the contractual line, an incongruity is seen in the relationship of the INIA and UGP, as contractually relate to the MINAGRI, through the Secretary of Agriculture, not through the region's SEREMI.

Internal consistency of the design: Currently, the beneficiaries are found in a current threat scenario, because rainfall has decreased and temperatures have steadily risen to such a level that are affecting livestock and crop production, which needed intervention in some territories for years, distributing drinking water in tank trucks for consumption of rural residents and recently distributed as drinking water for animals. So that the specific objectives of the project were designed to propose concrete solutions, implementing a system of capacity building and training system to increase the resilience of vulnerable communities to climate variation, regarding livestock, crops, water and soil management, therefore needing trained professionals and farmers in agricultural practices, livestock, soil management, irrigation and water accumulation that allow them to be efficient in the use of natural resources in their production systems. Moreover, implementation of measures and technologies to increase the availability of water resources in rural communities, seeks to provide farmers infrastructure and equipment, which although has proved its effectiveness in the area, currently not found overcrowded, since they are not to the extent of the producers. So, although the internal coherence of the project design is in effect, given current hydrological conditions, it is required to diagnose the availability of water resources of the beneficiaries.

Relevance of the project in the context of development policies: The relevance of the project in the context of national development policies, regional and / or local, as well as the priorities and needs of the productive sectors, national and regional institutions, and the beneficiary population is expressed on its agreement with several of the guiding principles of the National Rural Development Policy 2014-2024 and the Regional Development Strategy for Libertador General Bernardo O'Higgins Region for the period 2011-2020. In addition, "The National Action Plan on Climate Change 2017-2022" (PANCC II).

This plan indicates in the agriculture and forestry sector displacement of crops to the south of Chile is expected, along with reduced availability of water for irrigation, generating



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changes in production and net income remained negative in the northern areas and center, whereas positive in southern areas. Also, negative effects foreseen, not only on the quantity but also the quality of the products. The most vulnerable farmers would be inner and coastal dryland areas, between the regions of Valparaiso and Biobio, farmers of the cross valleys and the dryland farmers, which is consistent with what was stated in the project regarding the vulnerability of small farmers in the coastal and inner dryland of the O'Higgins Region and is consistent with current climate changes being observed. In the review of the project and associate with the specific objectives of the National Action Plan on Climate Change 2017-2022, it was observed that the actions of the project are easily relatable to the 4 axis of the plan, with the specific objectives, action lines and measurements.

Gender: design of the project in 2015 had a positive discrimination to include a larger number of beneficiaries in harvesting systems and accumulation of rainwater and greenhouses. However, it is necessary to incorporate other concepts to the project, in the field of gender equality, which are equality, integration and gender sensitivity and empowerment of women.

Currently, the project is considering gender equality, because it makes no difference to equal rights, responsibilities and opportunities and access for women, men and children with equal consideration of their interests and needs. This has been a difficult aspect to achieve, because of the profile of the rural population in the project area.

However, it is necessary that the project deepens into gender balance, having the same number of women and men in decision-making bodies and between staff at different levels of organizational structures. Likewise, on gender equality and gender mainstreaming, considering the process of assessing the implications for women and men of any planned action, in any area and at all levels of the project so that women and men benefit equally. Should differentiated actions are sought to reduce disadvantages or historical biases associated with gender roles and norms. Currently, out of the total targeted beneficiaries, 42% are women, 51% men and 8% are not selected. The original project proposed 57% of women.

Neither present evidenced sensitive gender, based on consideration of gender norms, roles and relationships to address inequality generated by these elements. Although observed, it has addressed the empowerment of women, especially through participation and decision-making, in the demonstration units in charge of women and other direct beneficiaries of the project.

In particular, an imbalance was evident in the gender balance in governance committees of the project and technical teams with low participation of women in these two areas, noting that administrative tasks are carried out mainly by women and technical work mainly by men.

EFFICIENCY OF THE PROJECT: LOW
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The project began its implementation in August 2017, so in August 2019, 21.3% has of the total budget was executed, leaving a surplus of US\$ 7,837,302. However, according to what was originally planned during the first two years, it is expected to run a total of US\$ 5,878,885. So, the average of the implementation period should have spent 59% of budgetary resources.

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This gap in the budget execution was evident high during the first year, as only US\$ 635.639 were implemented, corresponding to 33.3% of the planned budget for the first year, that was US\$ 1.909.974. Meanwhile, the second year 37.5% of the budget with an amount of US\$ 1,487,059 was executed. This lag in implementation is associated with the initial problems, because of the emergency facing the country by severe fires in 2017 and administrative procedures existing in the state. In addition, changing team of professionals and technicians of the project due to the change of government.

While the pace of spending rose from US\$ 635,638 year 1 to US\$ 2,122,699 in year 2, the performance in execution of the project in the remaining time should be intensified, while the deadline for implementation of the project is recommended to extend in a year. Moreover, 78.7% of the total budget is still pending.

While the project is developed on the basis of 10 products, six out of these products, are associated with the implementation of a capacity building and training to increase the resilience of vulnerable rural communities to changes in climate and climate change, regarding soil management, crops, livestock and water. And two products related to the implementation of measures and technologies to increase the availability of water resources for rural communities in the coastal dryland and interior of the O'Higgins Region. These eight products have a level of budget execution between 9.7% and 28.9% of the proposed budget. Finally, the last two products of component 2, related to improving management of agroclimatic information relevant to decision-making, for present and future changes in climate between local professionals, MINAGRI and farming communities reached levels of budget execution of 11.4% and 16.4%.

Out of these 10 products, 2 meant 57.2% of the original budget that relate mainly to machinery and infrastructure for the 9 demonstration fields and installation of equipment for cleaning water in 558 properties, including training and procurement of materials and equipment and installation of greenhouses.

In the case of the purchase of agricultural machinery, it is one of the products of greatest impact on the current conditions of water stress and has a performance of 28.1%. It should be noted that this activity has presented difficulties during the process of purchasing scarifier plow and manure spreaders, from the excessive time taken for purchase, non-compliance with the technical specifications developed by INIA and the poor quality of some parts of the machinery, which had to be replace for new ones and improvements to be design.

Regarding the installation of equipment for harvesting rainwater, storage systems and greenhouses with irrigation systems for 558 beneficiaries, 9.7% of the initial budget was executed, so it is necessary to improve the current performance to achieve projected target, as for the date for this assessment, 64 units were built in year 1 and 62 units in year 2, plus 109 units that are currently under being approved by background administration.

The information provided by AGCID corresponds to the approved-on 18 August 2019. However, other expenses that are in the process of reception and approval in accordance with the requirements set by the institutions.

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EFFECTIVENESS OF THE PROJECT: LOW
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The effectiveness in increasing the resilience of vulnerable farming communities regarding the management of livestock, crops, water and soil management (outcome 1.1) has been low.

While the soil physics laboratory was implemented and the INIA carried out trials in the demonstration units, it has trained farmers, technicians and professionals, including the generation of promotional material and support for training. Direct training work to date covers approximately 50% of farmers. The training has had a compliance rate of 25%, the diffusion and replication of activities (field days and courses in demonstration units) have a higher percentage of compliance that expected.

Regarding the purchase of machinery, both for demonstration units to meet the target of 5,000 hectares of improving the quality of soil, increased soil moisture and water storage capacity due to better soil management, meets 36% as reported in the annual management report in year 2.

Regarding the implementation of measurements and technologies to increase the water resources availability (outcome 1.2), considering harvesting, storage and use of rainwater, which has had a permanent decrease during the execution of the project, this is why they have built and received 126 rainwater harvesters and built more than 109 units.

The efficiency in the specific objective 3 (outcome 2.1), which is to improve decision-making based on agro-climatic information management focused on professionals and communities, progress was made in the installation of Automatic Meteorological Station (EMA) and developed material diffusion. In addition, 2 trainings for coordinators and territorial technicians were held through e-learning: climate risk management forestry and agriculture sector (22 professionals and technicians) and there are 2 agroclimatic tables implemented by 2 municipalities each, which have been well received by the beneficiaries, sharing information and experience, which has allowed them to assess their knowledge and has given them tools for making planting decisions and production management.

In summary, while there has been progress in the installation of the demonstration units and there have been several training and diffusion activities, there is a gap in the opportunity to train the trainers, being responsible for proposing the predial interventions and guide producers in implementing actions, they should be trained prior in the core subjects to achieve the objectives of the project. In addition, proposals for intervention in the demonstration units are not fully implemented, as greater involvement of attendees is related to not reach proper training.

The second specific objective of the project associated with the result 1.2, refers to implementing measures and technologies to increase the availability of water resources in rural communities. This is one of the actions that directly affects the resilience of farmers and, therefore, has higher value. The strategy proposed was harvesting, storage and use of rainwater, however rainfall in the area of the project have been steadily decreasing during the execution of the project, so the effect expected may not have the magnitude proposed, which was to have 20,000 liters of water per year per beneficiary and increase household incomes in at least US\$ 1,000 / year.

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According to the information provided by the interviewees, the goal of 20,000 liters was not reached in year 2019, but as little as 5,000 liters, due lower rainfall. It should be noted that some storage systems were installed at a later date during the rainy season.

Summarizing the analysis of the effectiveness of the project, which will be given to meet specific priority goals over the indicators is that evidenced low efficiency to date even in the resilience of farming communities vulnerable to changes in climate and climate change, regarding the handling of livestock, crops, water and soil management. It was observed that the main reason was the current performance of the project under drought conditions.

The current performance of the project should be increased from the present mid-term review, especially considering the learned lessons to date and recommendations for technical and administrative management.

It is urgent to proceed in the development of these activities and to define the measuring indicators in the adoption of new technologies. In addition, it should be given particular importance to reduce water supplies for farmers, as well as not to increase the amount of precipitation of the agricultural of season 2020, cumulative effects will be devastating for food safety, and probably an indeterminate number of beneficiaries should migrate or be relocated due to extremely adverse weather or socioeconomic conditions.

SUSTAINABILITY OF THE PROJECT: MODERATE

Referring to the sustainability of the project based on the relevance analysis of the capacity building for adaptation to climate change, it is still early in the stage of the project, because it is ongoing and has several activities that have not been executed. It is also anticipated to make a full assessment of the actions initially designed and / or modified actions being carried out, have been relevant in terms of capacity building resilience of agricultural rural communities and weather sustainable.

Analysis of capacity building for adaptation to climate change based on the actions being carried out in component 1 and 2, is expected to moderate sustainability being achieved, as evidenced in the aspects presented in chapter 9.

It is noteworthy that the main aspects of the 9 technology transfer demonstration fields are operational, but better visibility is required for their location and actions taken or planned, which should also be added to the website of the project <http://cambioclimatico-ohiggins.cl/>, so that more indirect beneficiaries or other people who have moved to the project's areas of interest can access the infrastructure, learn about the actions, operation and maintenance that are proposed.

Regarding maintenance and operational costs of the machinery, there is no instructive of preventive and corrective maintenance yet, or cost estimates for work on these data. Nor it is defined, even preliminarily, how and who will manage the machinery acquired after completion of the project.

Training in crop management (triticale, quinoa, etc.), forage crops (legumes, grasses), fruit trees (olives, walnuts) and livestock (sheep), tolerant to variability of climate and climate change, including the purchase of seeds, plants and animals, have been performed in fewer number (see chapter 8). In addition, the design of the aforementioned project that INIA has

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developed varieties that are resistant to water stress or terms may be available to the project, of which more information is not acquired.

Beneficiaries of the demonstration units and other direct beneficiaries of the project valued intervention and concern as giving them opportunities they did not have before, also generating additional revenue. For example, some women who had never worked in a greenhouse now feel they have their own workspace.

So it is recommended that a system of evaluation and monitoring of the use of practices for soil conservation and sustainable production systems, that promote the improvement of environmental conditions be defined in the final stage of the project, with particular emphasis on increasing the soil organic carbon stock and vegetation in the intervention area. It is recommended that the project promotes diversification of production systems to ensure the adoption of technologies and long-term sustainability.

IMPACT OF THE PROJECT: MODERATE
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The impact of the project, according to the effects that are taking the actions implemented and the assessment of the transformative effect of the project, may demonstrate the completion of the project or later. However, people's interviews of the demonstration units: Lolol, Paredones, Pichilemu, Pumanque, La Estrella, Marchigue, Navidad and Litueche, show a positive impact in some cases, mentioning that the climate changes arrived earlier than expected and productive transformations that had to do with climate variability (decline in cattle population, planting legumes in small areas), and other impacts were the loss of oat production and harvesting of wheat had low productivity last season.

In another sense, it evidenced in production systems visited an emerging resilience to climate change and the implementation of measures and technologies is producing an initial effect. For example, in the use of the electric fences and the scarifier plow to prepare the soil.

It is recommended to define impact indicators in the final stage of the project; for example, number of farmers (including hectares and crops) that have adopted the relevant technologies that allow them to be resilient to climate change; number of farmers adopting soil conservation practices, soil surfaces is prepared with the machinery of the project, productive ventures based on effective conservation of soil and water management.

#### **4 LEARNED LESSONS**

The learned lessons from the project are presented below, that have been identified by the implementing entity and the consultant who conducted the mid-term review:

- The procedures of public administration in Chile and the public procurement law, require times that's not been considered in the implementation of the project, which has delayed the implementation.

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- An important lesson we learned is that the direction of the project be run by professionals who don't have leadership positions in government, so they perform their functions until the end of the project.
  - In the design of the project, although the components defined for it, are relevant to the issue of climate change and the expected results, activities / actions for each component were not defined, if they were done, it would have allowed a better implementation and execution of the project.
  - Elaboration of the baseline as initially defined, it is a stage that had to be postponed because not knowing the current situation to begin intervention actions that were planned or others that should be planned result of climate changes, making it difficult to achieve the expected effectiveness, sustainability and impact of the project. It is essential to know the actual water resources availability and the water rights status of each beneficiary, because all of them referred to the limited amount of water available as the main problem, so that the project should provide solutions in this regard. They also mentioned that groundwater levels had declined gradually.
  - Regarding the replacement of beneficiaries of the original list of 558 beneficiaries, there are 36 new beneficiaries and considering that are highly vulnerable farmers, it is important to diagnose the characteristics to be considered to adopt activities / relevant actions that generate an effect on resilience to the climate change the project aims (example: socioeconomic status, age, health status, vulnerability indicators, etc.).
  - It is important to define a verification mechanism in the UGP to show that the observations made by the implementing entity are being addressed and solved by the executing entity to improve current performance, as well as the efficiency and effectiveness of the project.
  - It is important to consider the contribution of related institutions such as the DGA and the DOH of the MOP in generating information on the groundwater status.
  - Permanent coordination in the work of the different ministries (MINAGRI, MMA, MOP) and MINAGRI institutions (ODEPA, INDAP, SAG, CONAF) is essential for the sustainability and impact of the project.

## **5 RECOMMENDATIONS**

Recommendations to the project have been separated in the field of administrative and technical management. The main recommendations according to findings are presented below. It is worth mentioning that also in the corresponding chapters, improvement opportunities are identified for the efficiency of the project, opportunities to strengthen the effectiveness, sustainability and scaling of the project.

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## 5.1 Administrative management recommendations

The main recommendations are:

- To extend the period of execution of the project by one year due to delay in implementation and current performance. It is recommended to consider a readjustment of the budget, not originally designed, but necessary for the success of the project and to ensure keeping a team of professionals and technicians who will carry out the last phase of the project. This includes analyzing the professional's profiles of the team.
- The direction of the project requires a full-time project manager. It is not possible to consider a professional who has a political and technical authority at a regional level to direct and supervise the project, whereas it is an agricultural area and livestock exports, with current conditions of water scarcity and agricultural emergency.
- The advisory committee must perform functions that were initially considered as an expert advisor and the operationalization of decisions. It is the committee who should make decisions for approval, rejection or redesign of activities / actions defined to meet the projected results, as defined in the project.
- The implementing entity should control and monitor the UGP. It is suggested that it be run through developing technical notes of the issues to be solved. More frequently and smaller reports should be made, in order to facilitate its review.
- While the efficiency and effectiveness of the project are low and the current yield should be increased, it is suggested to review the profiles and job descriptions of the UGP and INIA professionals, considering training, experience, skills and competences for the recruiting coordinator, professionals, technicians and communication team for the project, to ensure that the implementation team of the project have adequate competences and skills. Some beneficiaries referred to the PRODESAL technicians will provide more technical knowledge than the professionals of the project.
- Contracts made to professionals and technicians with short deadlines don't give job security nor an adequate commitment to the project, they need to be longer than a 3 months renewal.
- To focus training and capacity building in professional and technical services of the Ministry of Agriculture and beneficiaries of the project, so as to reduce the risk of losing training efforts and training staff who are not permanent officials at MINAGRI.
- To improve the planning of the activities to be developed in component 1 and 2 to achieve the expected outputs / results, so it is suggested to develop a Gantt chart that covers the entire remaining period of the project, as the opportunity to carry out certain agricultural and agro-climatic activities. Delivering timely information is essential to achieve specific goals. Some beneficiaries mentioned delays in infrastructure construction (greenhouses, harvesting and storage of rainwater) and the soil preparation opportunity.

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- To improve the gender dimension, as defined in the gender policy of the Adaptation Fund.
  - To achieve greater public awareness of the project and its scope. To improve citizen participation to increase the involvement of indirect beneficiaries, which would achieve the proposed indicators and the expected impact of the project.
  - To improve the visibility and communication of the project, for which one of the important activities is to have new strategies in communications, as well as new team that considers a rural communicator as manager, according to the original design of the project.
  - To improve the Website, Facebook, Twitter and Instagram pages, as they are not meeting the goals. Consider to have available on the project's website the training courses, workshops, results of technical tours, field trips, guided tours, etc. Likewise, making available the tests carried out in the demonstration units and proposed technological solutions that the primary technical advisor is delivering. In addition, it was shown that the banner of agroclimatic information is not operational, showing an error message.
  - Social and environmental guarantees considered the project to be available to users in different ways of communication to meet the satisfaction achieved. However, this approach was not successful as expected, so it is recommended to incorporate some aspects into the socio-economic survey, such as: beneficiary satisfaction with the project and adoption of new technologies or to adapt existing technologies to timely correct deviations of the results expected and check whether they are meeting expectations. Some beneficiaries mentioned that their expectations are not being met, and that other farmers who have visited the demonstration units, considered that no significant changes were observed. Others mentioned that infrastructure such as rainwater and surface runoff harvesting have not been timely delivered, and there was no soil preparation work. Crops in some sectors have not been timely sowed.
  - Other subsidies of the beneficiaries should be registered, such as food and water for animals, drinking water for humans, knowledge of other support that the farmers are receiving from the MINAGRI and governmental institutions, which added to the work of the ongoing project, would make an assessment of whether in some cases may affect the expected impact of the project negatively. This way, the project could also be made available to the authorities, information which will be used in the future to discuss the relocation of some farmers, due to climate change or socioeconomic conditions.
  - To estimate the sustainability and impact of the project, information of trained users should be systematized separately (component 1). While trainings are reported to direct the technical team of the project, other trainings, such as field trips, courses and workshops for farmers, technicians and professionals, didn't observe the number of training to farmers considering direct and indirect beneficiaries.
  - To standardize the frequency of management reports carried out by the UGP and INIA. Each separately reported the result of their actions, making it difficult to members of the advisory committee to view the progress, results and compliance



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indicators. More frequent reports are suggested, in order to get a more efficient and faster reading.

## **5.2 Technical management recommendations**

- The primary technical advisor should maximize links with neighboring countries and other Latin American countries, as part of international cooperation that has to propose technological solutions to the drastic change in weather conditions regarding the design stage of the project, proposing new and broad agricultural technologies, intervention and management. In neighboring countries, the recommendation is linking with Brazil, Embrapa Gado de Corte, goats and sheep center, Campo Grande, Mato Grosso (Dr. José Alexandre Agiova da Costa) and Argentina, suggested by the National Agricultural Technology Institute (Dr. Guillermo Sánchez, Institutional Relations Manager, National Coordination Linking Technology and Institutional Relations), among others.
- Readjust the numbers of the INIA team's participants by the required functions and greater time commitment, according to the current needs of the project.
- The implementing entity and the INIA should consider activities / actions of the project to be defined, depending on the socioeconomic, geographic and soil degradation presented in the municipalities of the project, to propose technological solutions, appropriate to the different situation of the project areas.
- Since climatic conditions have changed dramatically since the design stage to the actual implementation of the project, it is recommended to diagnose the water sources availability in the wells and springs of the direct beneficiaries, and their water rights status. The diagnosis should include a technical evaluation and financial possibility to do some actions to improve water security of beneficiaries, such as the start of processing water rights regularization (permanent or temporary), deepening wells or well construction, as required.
- Diagnose the socio-economic and agro-ecological situation of older farmers, allowing them to adopt technologies that will make them resilient to climate change.
- In the construction of greenhouses, it was shown that the quality of the infrastructure is poor and does not have a unique design, so the development of technical specifications are suggested. In addition, it is recommended to ask the contractors that once construction is completed, it is made an official delivery, showing compliance with the technical specifications. Moreover, it is suggested that monitoring of buildings performed by a technical inspector. Consider the technical specifications for building greenhouses.
- Likewise, because of activities / actions purchase of agricultural implements, it became clear that there had been problems in meeting the technical specifications and quality of equipment, so it is recommended to review the procurement process, recommendations and specifications already defined.

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- To implement a geographic information systems (GIS) to spatially visualize the location of direct beneficiaries and their characteristics, knowing about the socioeconomic status of each property (baseline), find out about the activities / actions of the project that have been implemented and that are running, and which training they've participated in.
  - On the demonstration units, it is emphasized to fill the register with the records of the products obtained from the greenhouse and orchard, for consumption and for sale, and other products produced.
  - To define the scope, objectives, activities and foreseen outputs of the proposed Groundwater Monitoring.
  - To define the scope, objectives, activities and expected outputs of physics samples of the soil.
  - Consider installing demonstrative methods of harvesting rainwater collectors and greenhouses in rural schools and other educational institutions in the area project, as done in the town of Pailimo, as well as incorporating training for children and teenagers.
  - Give greater support to the group of beekeepers due to adverse weather conditions, which have threatened their activity, in order to invest in technical implementation and improve feeding bees, through the planting of native trees melliferous, flower garden, etc.
  - Help livestock producers in analyzing the technical and economic feasibility of implementing electric fences and water troughs to improve farm management.
  - Regarding native trees requested to CONAF, if there is no well-defined reforestation or vegetation enrichment plan, the design of interventions should be early considered, in order to take direct action measures that includes the National Climate Change Strategy and Vegetation Resources.

## **6 RELEVANCE AND SIGNIFICANCE OF THE PROJECT**

The relevance and significance of the project aims to assess to what extent the implementation of the project allows adaptation to climate change, and how the original project is aligned with the current environment, verifying whether the intervention planned (components of the project) is the most satisfactory to solve the problems being identified, and if the problem still exists in the same magnitude after four to five years from the formulation of the project.

Because of this, social and climatic changes have been explored, which have occurred in the area project and in Chile in the recent years, to link them with the project, so as to contrast the proposed actions with state of the art and scientific evidence. On the other hand, the design of the project and the coherence of the objectives have been revised, activities undertaken, and results obtained. In the same way, they have reviewed and analyzed the validity of its indicators and targets, which have been compared with the original project,

based on the ordering of the Results Framework, Milestones, Targets and Indicators of the Project (**Annex 3**).

## 6.1 Relevance of the design and components of the project

### 6.1.1 Vulnerability to climate change in the project area

According to the information available in the design of the project, the Second National Communication to the UNFCCC Chile (2011), indicated that the O'Higgins Region would present a loss of 44% in the crops areas by 2040 and a loss of 68% in the area by 2070, assuming an A2 scenario. The results of an extensive study on the socio-economic vulnerability to climate change in the 8 municipalities of the project area showed that the expected effects and the vulnerability exists. As for the expected effects of climate change, negative impacts were estimated and ranging from lower to higher. In terms of vulnerability, indices were calculated, which range from lower to higher vulnerability.

The range of vulnerability indices to climate change ranges from 0 (zero vulnerability) to 1 (high vulnerability) and it is observed to significantly vary between municipalities (**Table 1**), (AGRIMED, 2008, cited in FACC Project 2015). Rates of vulnerability of 0.5 and greater are highlighted.

**Table 1. Indices of vulnerability to climate change.**

Municipality	FT	IDH	IRU	R / S	UCT	VME	VSP	VSS	VSE	Cultivated area (ha)
Pichilemu	0.15	<b>0,68</b>	0.20	<b>0,93</b>	0.07	0.25	<b>.67</b>	0,26	0.16	2,729
La Estrella	0,19	<b>0.70</b>	<b>0.50</b>	<b>0,81</b>	0.38	<b>0.50</b>	<b>0,54</b>	0.40	0,44	2,225
Litueche	0.15	<b>0,64</b>	0.40	<b>0,84</b>	0.20	0.36	<b>0.60</b>	0.38	0.28	2,760
Marchigue	0.16	<b>.67</b>	<b>0.60</b>	0,43	<b>.63</b>	<b>0.75</b>	0.32	0,47	<b>0,69</b>	6,111
Navidad	<b>0.50</b>	<b>0.65</b>	<b>0.70</b>	<b>0.85</b>	0,46	0,47	<b>.63</b>	<b>0,53</b>	0,47	1,341
Paredones	<b>0.50</b>	<b>.63</b>	<b>0.60</b>	<b>0.89</b>	0.17	0.32	<b>0,69</b>	0,49	0.25	1,109
Lolol	0,21	<b>.63</b>	<b>0.50</b>	<b>0,56</b>	<b>0,68</b>	<b>0,76</b>	0.36	0,44	<b>0,72</b>	4,937
Pumanque	0.18	<b>0,64</b>	<b>0.70</b>	<b>0,87</b>	0.40	0,47	<b>0.55</b>	<b>0,53</b>	0,44	1,810

FT = index of land fragmentation; HDI = human development index; IRU index = rural index; Index R / S = R irrigation; UCT index = capital and technology availability; VME index = accessibility to the market; VSP index = agricultural vulnerability; VSS = social vulnerability index; VSE = EVI (Source: project FACC).

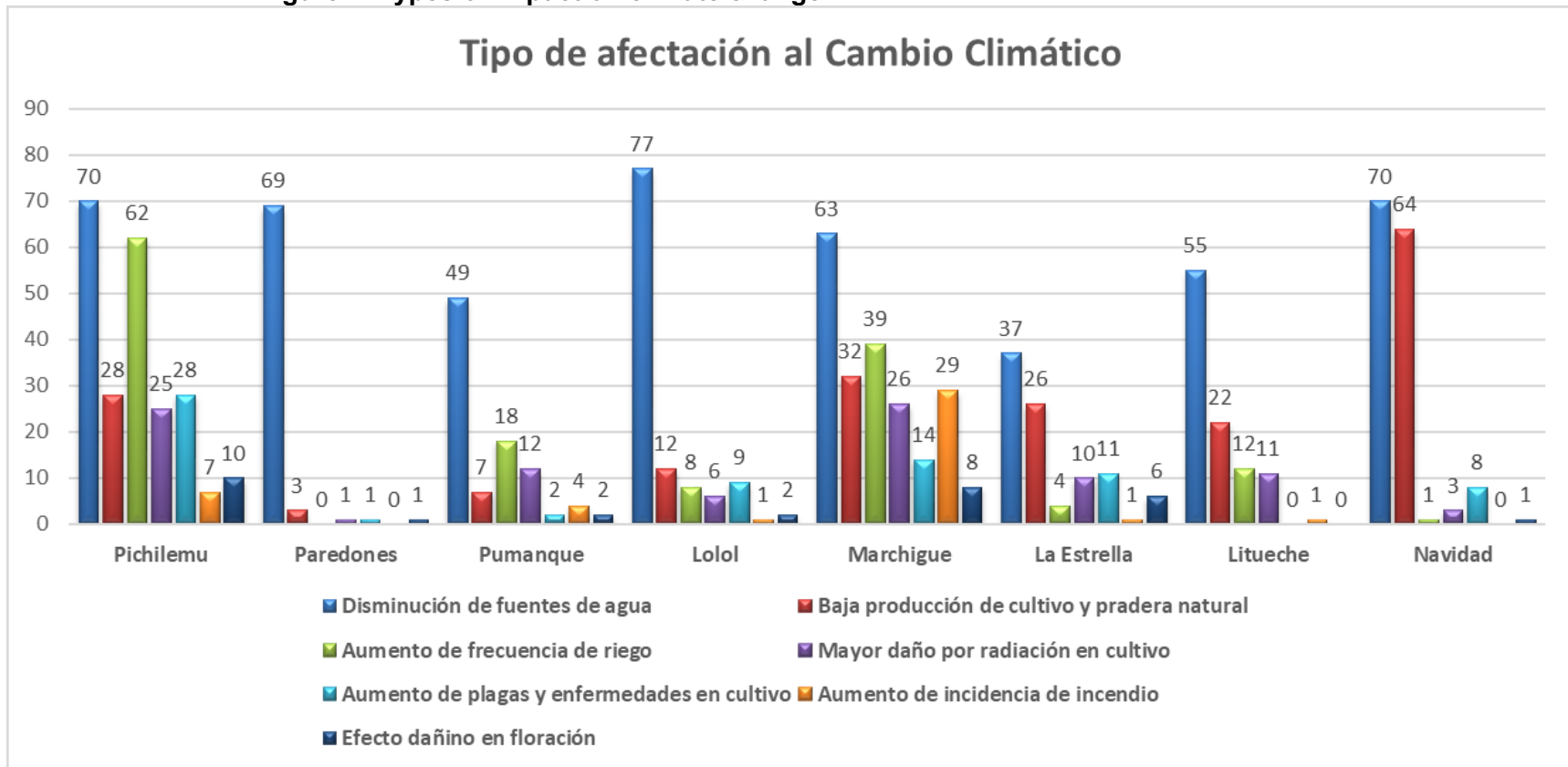
This implies that the municipalities of the project have special needs for building climate resilience, although in terms of the design of the project this was not considered, not defining specific or objective components geographically, based on rate impact on climate change that were investigated in the design of the project, which were: reduced water sources, increase in frequency of irrigation, lower crop yields and pasture (**Figure 2**).

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It should be noted that this variability in municipalities has risen partly during the development of the project, through the socio-economic survey (baseline) that has been applied to a sample of beneficiaries of the project. The beneficiaries mentioned that the most significant effect is the decreasing availability of water in the sources, and low crop production and natural pasture, should defined by specific activities/actions to the problems they report.

Moreover, there are differentiating features in the beneficiaries observed at the level of municipalities, for example Navidad, Pichilemu and Paredones are presented as the territories of highest percentage of people over 60 years, while Pumanque and Lolol present higher percentage of beneficiaries under 59 years. Another indication is the level of satisfaction of basic needs, where we observed that the source of drinking water in households differs between municipalities, where although 56.9% of beneficiaries has a public drinking water supply network. In Navidad there are particular showing that 25% of beneficiaries are supplied by trucks and Pichilemu has 33% of cases used a river, shed, lake or estuary. Other municipalities have a large public supply network. Even in Navidad, 21.4% reported carrying water to their homes.

Figure 2. Types of impact on climate change.



Source: Project FACC, 2015.

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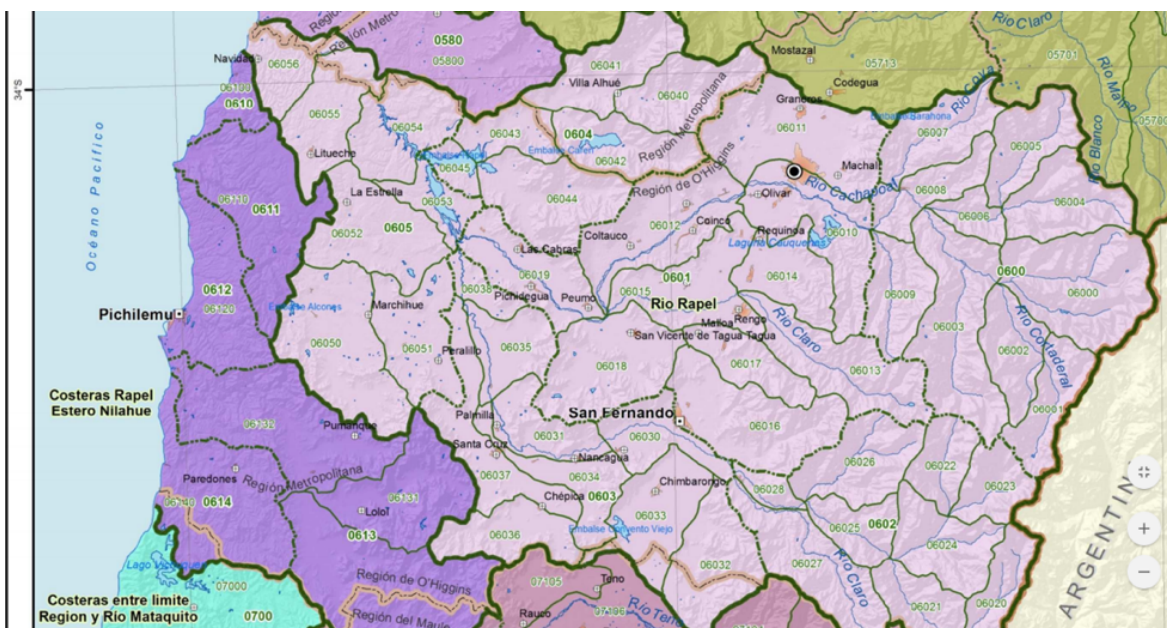
It should be noted that Libertador Bernardo O'Higgins Region has three basins (**Figure 3**), where major aquifers associated with Cachapoal, Tinguiririca and Nilahue rivers are located. These are characterized by their size and hydraulic properties that give interesting perspectives of exploitation, both located in areas with a growing population development (supplied by groundwater catchments by drinking water company ESSBIO), as for industrial advance progressive and agriculture, using the underground resource as a supplement (DGA, 2011).

Probably in the current situation, resulting from the decrease of rainfall in recent years, the use of the underground resource as an add-on is no longer valid, so it is important to consider the current monitoring network levels groundwater in the project which, as indicated by DGA (2015), has good distribution, contemplating the recharge and discharge zones, and where the largest concentration of water rights is granted. This monitoring network could be supplemented by monitoring proposed by INIA.

However, given the increasing demand for groundwater and the existence of several areas declared by the DGA as restriction zones to form new groundwater rights, it is necessary to have a better and updated knowledge the behavior of the groundwater level, and availability of water and the current situation of water rights of each beneficiary, because all the beneficiaries interviewed referred to the limited amount of water available they own to be the main problem. Also, they mentioned that groundwater levels had been in gradual decline, reaching cases where the wells are completely dry.

It is important to consider, as seen in **Figure 3**, that most of the municipalities of the area of the project are located in the coastal sub-Estero Nilahue Rapel (DGA, 2014). These are the municipalities of Navidad, Pichilemu, Paredones, Pumanque and Lolol, located at the exit of the basins where it is quite likely that groundwater levels are increasingly depressed due to withdrawals of upstream groundwater.

Figure 3. Basins and sub basins in the area of the project.



CODIGO CUENCA	CUENCAS NOMBRE	AREA KM2	TIPO	REGION	% por REGION
057	Río Maipo	15274,1	Exorreica	V - XIII - VI	(4 - 91 - 5)%
	0570 Río Maipo Alto	4858,7			
	0571 Río Maipo Medio	2574,1			
	0572 Río Mapocho Alto	1022,4			
	0573 Río Mapocho Bajo	3455,7			
	0574 Río Maipo Bajo (Entre Río Mapocho y Desembocadura)	3363,3			
060	Río Rapel	13766,8	Exorreica	V - XIII - VI - VII	(0,2 - 7 - 92 - 0,8)%
	0600 Río Cachapoal Alto (Hasta bajo junta Río Claro)	2705,0			
	0601 Río Cachapoal Bajo	3593,7			
	0602 Río Tinguirica Alto (Hasta bajo junta Río Claro)	1843,2			
	0603 Río Tinguirica Bajo	2089,3			
	0604 Estero Alhúe	1424,8			
	0605 Río Rapel	2110,8			
061	Costeras Rapel-E. Nilahue	3397,3	Exorreica	VI - VII	(88 - 12)%
	0610 Costeras entre Río Rapel Y Estero Topocalma	106,4			
	0611 Estero Topocalma	545,3			
	0612 Costeras entre Estero Topocalma y Estero Nilahue	407,0			
	0613 Estero Nilahue	1776,4			
	0614 Costeras entre Estero Nilahue y Límite Región	562,3			



Source: DGA, 2014.

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### 6.1.2 Climatic trends in the project area

According to the information presented in the design of the project, the dry season in the area of the project has a length of 6 and 8 months per year, a period which is likely to increase over the coming decades, as being observed in the present. According to the projections of climate change, models show a high degree of certainty in this area. This region will be most affected by reduction of rainfall. This situation will certainly increase the difficulties small farmers faced today, in terms of water scarcity and soil degradation. This will affect not only production, but also further degraded soil quality, ecosystem services and biodiversity.

The statistics presented in the design of the project for the municipality of Litueche are tracing a downward trend in annual precipitation over the last 45 years and highlights the extreme interannual variability in rainfall, ranging from an average of 1,100 mm / year to 500 mm / year, with frequent periods ends, when interannual differences reach 700 mm and more. This succession of extremely dry and relatively wet years, to the apparently related to the phases of El Niño and La Niña, are one of the main threats to sustainable land use and water supply in the area of the project. **Table 2** shows the average annual rainfall of 6 of the 8 municipalities in 2004.

**Table 2. Annual average rainfall in 6 municipalities of the project area.**

Commune	Annual average rainfall (mm)
Pichilemu	708
Marchigue	529
Navidad	708
Paredones	859
Lolol	696
Pumanque	696

Source: Atlas Agroclimatic, Santibanez, 2004, FACC Project.

According to AGRIMED (2008), cited in Project FACC 2015, climate scenario to 2040 in the area of the project shows that there will be a decline from 20% to 25% in the annual average rainfall and temperature rise of about 3°C.

However, there was a further decline in rainfall 2019, which happened in some municipalities where annual precipitation decreased in 50%, so the entire region was declared an area of water scarcity on 3 October, by Decree MOP N°116 (DGA, 2019).

### 6.1.3 Social vulnerability of the beneficiaries in the project area

The total area covering eight districts of the project is 420 thousand hectares, of which 78% of the area is used for agriculture and forestry. The total number of properties in the area of the project is 5,767, where 62% are small farms of less than 20 hectares, totaling 3,549



properties (**Table 3**). The main agricultural activities according to the Agricultural Census (2007), are sheep, cereals and vegetable production (**Tables 4 to 7**).

**Table 3. Land characteristics in the project area.**

Category: farm size (ha)	Number of properties in each category	% of total	Number of hectares in each category	% of total	Number of hectares AF & L *
<20	3,549	62%	23,006.6	5%	18,970.9
<50	4,534	79%	54,554.7	13%	44,291.4
50-100	599	10%	41,583.4	10%	32,479.5
100-500	483	8%	98,468.9	2.3%	75,880.0
> 500	151	3%	225,481.4	54%	174,909.4
<b>sum</b>	<b>5,767</b>	<b>-</b>	<b>420,088.4</b>	<b>-</b>	<b>327,560.4</b>

AF & L \*: agricultural, forestry and livestock.

Source: ODEPA, Agricultural Census 2007 (INE), cited in Project 2015 FACC.

Given the overall size of the area devoted to agriculture, forestry and livestock activities, 11% of this area is devoted to crop production, 38% is used for forest plantations and 2% for cattle fodder. Forty-nine percent of the area contains both, natural and improved rangeland (**Table 4**).

**Table 4. Characteristics of agriculture in the project area.**

Production	Area (ha)	Area (%)
<b>Crops</b>	35,681.4	11%
<b>Grasslands</b>	6,158.0	2%
<b>Natural and improved grasslands</b>	159,681.2	49%
<b>Forest</b>	125,778.2	38%
<b>Total</b>	<b>327,298.8</b>	<b>100%</b>

Source: ODEPA, Agricultural Census 2007 INE, cited in Project FACC, 2015.

The main crops in the area are vegetables (39%). Other economically important crops include grains, fruits, grapes, vines and flowers (**Table 5**).

**Table 5. Composition of crops areas.**

<b>Production</b>	<b>Area (ha)</b>	<b>Area (%)</b>
<b>Grain</b>	4,806.7	13.5%
<b>Vegetables</b>	1,078.9	3.0%
<b>Industrial crops</b>	227.1	0.6%
<b>Seed production</b>	196.2	0.5%
<b>Fruits</b>	4,488.2	12,6%
<b>Grapes and Vineyards</b>	5,663.4	15.9%
<b>Vegetables</b>	13,881.2	38.9%
<b>Flowers</b>	5,339.7	15.0%
<b>Total</b>	35,681.4	100%

Source: ODEPA, Agricultural Census 2007 INE, cited in Project FACC, 2015.

Most of the land is used for grain production in upland soils ( $\approx 92\%$ ). Grain varieties grown are shown in **Table 6**. The most important grain in the dry area is white wheat, while the most important crop in irrigated land is corn.

**Table 6. Production of cereals, species and varieties in the project area.**

<b>Type of Cereal</b>	<b>Hectares under irrigation</b>	<b>Without irrigation hectares</b>	<b>Production [quintals / ha]</b>	<b>Number of farms</b>
<b>White wheat</b>	43.5	3,211.4	66,739	656
<b>Wheatgrass</b>	0.0	55.5	1,491	14
<b>Barley</b>	0.0	2.6	78	3
<b>Barley forrajera</b>	0.7	202.4	3,706	79
<b>Oats</b>	39.6	719.2	14,325	228
<b>Rice</b>	0.0	6.6	43	3
<b>Corn</b>	335.4	130.7	32,807	279
<b>Quinoa</b>	0.0	58.6	581	27
<b>Others</b>	0.0	0.5	*	one
<b>Total</b>	419.2	4,387.5	-	1,290

Source: ODEPA, Agricultural Census 2007 INE, cited in Project FACC, 2015.

According to the INIA report terms of reference for agricultural machinery of the project, the use of the soil in the eight districts of the coastal dryland of O'Higgins Region 2016-2017 season has the following characteristics. In the northern sector (municipalities: La Estrella, Litueche, Marchihue, Navidad) there are 276 producers who cultivate 316 hectares (91.5 ha of wheat, 23.2 of legumes and 201 ha of oats) and have a total area of grassland natural 4,273 hectares. However, in the southern sector (municipalities: Pichilemu, Paredones, Lolol, Pumanque) there are 268 producers who cultivate 452 hectares (134.2 ha of wheat, 9.7 ha legumes, 231.7 ha of oat and 11.6 ha of quinoa), ranging a total area of 1,004 hectares.

Livestock that thrives in the area of the project is mainly sheep, cattle and goats (**Table 7**). The main agricultural activities in the project area are sheep farming, vegetable and grain production. It is noteworthy that in the last agricultural season, the cattle population has decreased, and oat and wheat crops saw their production and quality of the grain decline, when they managed to produce grain.

**Table 7. Number of heads in each category of livestock production.**

<b>Cattle raising</b>	<b>Number of heads</b>	<b>Heads (%)</b>
<b>Cattle</b>	33,910	19.4%
<b>Sheep</b>	129,972	74.5%
<b>Goats</b>	10,689	6.1%
<b>Total</b>	174,571	100%

Source: ODEPA, Agricultural Census 2007 INE, cited in Project FACC, 2015.

In the project design, it was stated that the target population of the project was a group of mainly subsistence farmers with farm size of less than 20 hectares, belonging to the rural population, corresponding to 60% of the total population. This rural population has lower incomes and high poverty levels compared to regional and national averages (average rate = 16.7%). The poorest municipalities were Pichilemu (poverty rate 17.6%) and Lolol (poverty rate 16.7%) (FACC Project, 2015).

In addition, migration to the cities of younger generations, especially women, changed the structure of age and gender of the remaining population and therefore increasing their social vulnerability (UNDP, 2008, cited in Project FACC 2015).

The following table summarizes some of the socioeconomic characteristics of farmers in the project area, which are observed to be poorly linked to export markets, agrobusiness or farmers' organizations. They have received little funding, even if they have obtained some other support.

**Table 8. Social and financing conditions of farmers in the project area.**

Characteristics	Women		Men	
	Number	%	Number	%
<b>Total farmers</b>	1,562	100%	3,426	100%
<b>Linked to export markets</b>	33	2%	97	3%
<b>Linked to agrobusiness</b>	25	2%	74	2%
<b>They received funding (2005-2007)</b>	201	13%	789	2.3%
<b>They received other support</b>	323	21%	938	27%
<b>They belong to an agricultural organization</b>	65	4%	232	7%

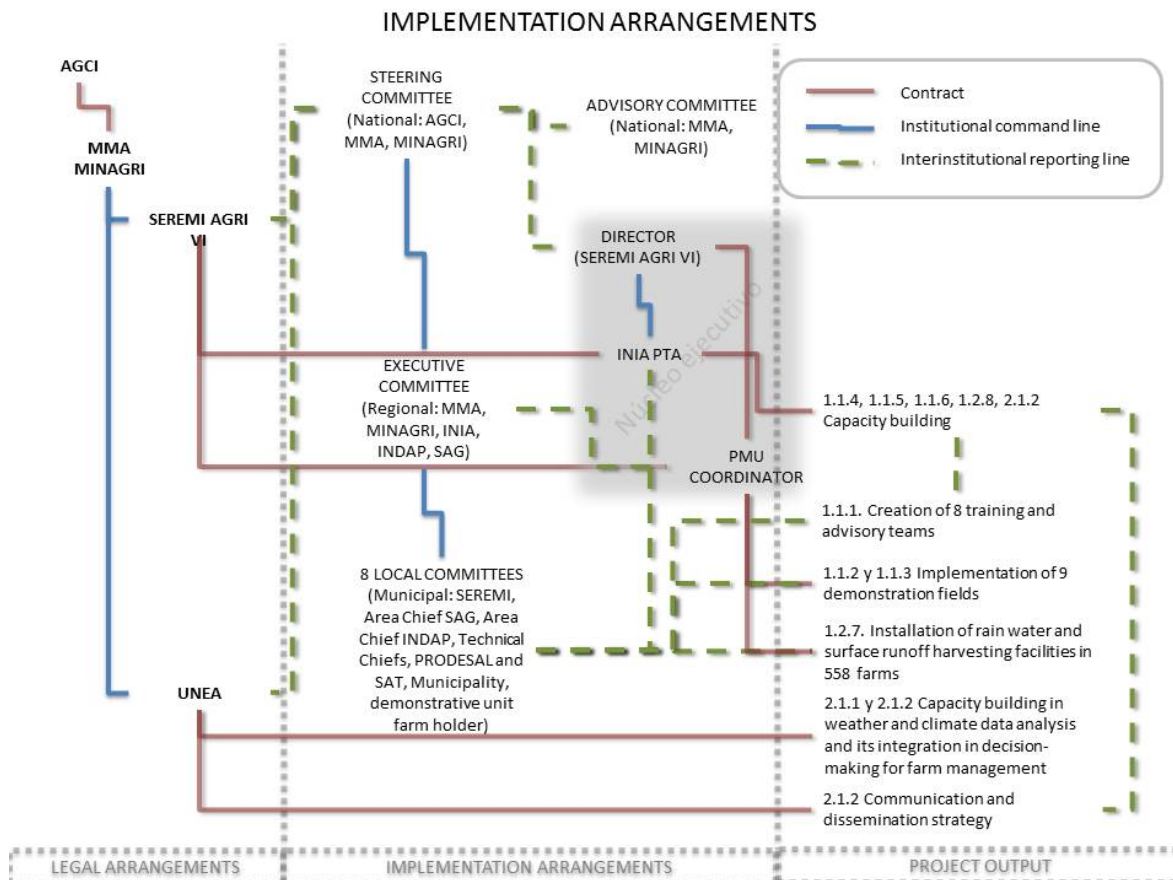
Source: ODEPA, Agricultural Census 2007 (INE), in FACC Project.

The 558 pre-selected beneficiaries are the most vulnerable farmers in their respective municipalities, some of them take part of current MINAGRI programs, but a majority of them are not even eligible for MINAGRI support to poor farmers (The site does not meet the size of the minimum agricultural unit, do not have machines to perform works with, could not fill out forms or requests of unknown programs). The process was explicitly designed to allow for and encourage their participation. The potential beneficiaries of the project were 57% women, reflecting a positive discrimination in the selection of beneficiaries of the project.

## **6.2 Institutional dynamic phase of the project formulation**

Institutional dynamics present in the formulation phase of the project having a relationship scheme for the implementation of the project that reflects some specific comments (**Figure 4**).

Figure 4. Project Implementation arrangements.



Source: Project FACC, 2015.

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The most important institutional arrangement that was defined at the start of the project is the inter-line report, since the intra hierarchy line is due to own relations of the participating institutions. Thus, independent paths are observed between the two components of the project, where component 1 is technically in charge of the INIA and executed by the UGP in all subjects except in training and reports to the project director.

Component 2 has a fairly independent treatment, being executed by the SEGRA who receives support from INIA in training and is directly related to the Ministries of Agriculture and Environment and the Steering Committee, without dependence on the SEREMI. Also, it defined with a communications strategy and independent training of the project as a whole.

Regarding the contractual line, an incongruity is seen in the relationship of the INIA and UGP, as contractually relate to the MINAGRI, through the Under Secretary of Agriculture, not through the SEREMI of the region.

### **6.3 Internal consistency of the design**

An analysis of the relevance of the project and the internal consistency of the design was made, based on the review of the Results Framework, Milestones, Targets and Indicators of the Project with the structure of objectives, components and activities / actions established in the POAs years 2018 - 2019 and 2019 - 2020) together with the results and the validity of its indicators and targets.

It should be noted that during this evaluation, the results framework of the project was complemented from the information available and shown in **Annex 3**. This framework results of the reflecting project "causal hypothesis" that exists and is expressed in components and activities / actions designed and carried out to date, ensuring that the process of the project is developed with the execution of its activities and the implementation of the outcomes / products expected in quantity, quality, timeliness and relevance, so the overall objective and specific objectives are achieved.

Components / products and institutions responsible for the current project shown in the following table along with the review of activities / actions proposed in the POAs, regarding the project in its initial design.

**Table 9. Component / product, responsible institution and review activities.**

<b>Component / Product</b>	<b>Institution / responsible</b>	<b>Review activities / actions</b>
<b>Component 1. Technical support and capacity building in agricultural practices appropriate to climate change (management of soil, water, livestock and crops)</b>		
<b>Result 1.1. Implementation of a capacity building and training to increase the resilience of rural communities vulnerable to changes in climate and climate change regarding soil management, crops, livestock and water</b>		

<b>Component / Product</b>	<b>Institution / responsible</b>	<b>Review activities / actions</b>
<b>Output 1.1.1</b> Team training and technology transfer for agriculture in each of the 8 municipalities in the area coordinated and supervised by local experts INIA project.	INIA, UGP	The first hires were made in February 2018. To date, only 4 out of the initially hired for the technical field team were kept in office. This change in the team influenced the delay in implementing the project because consolidation was required again for the team to conduct additional training.
<b>Output 1.1.2</b> Implementation 9 Demonstration fields to transfer agro-technologies (1.1.4, 1.1.5, 1.1.6 and 1.2.8) including infrastructure and equipment (fences, troughs, energy, etc.): 4.5 hectares each of the eight municipalities plus Hidango (INIA).	INIA, UGP	How to define the demonstration plots did not follow the proposal of the original project but responds to a proposal by professionals INDAP and the PRODESAL. 9 demonstrative fields are implemented. However, La Estrella beneficiary withdrew his participation so a new beneficiary was identified in March 2019.
<b>Product 1.1.3.-</b> Acquisition of agricultural equipment (including maintenance and operating costs) for the 9 demonstration fields.	INIA, UGP	Acquisition of machinery has shown several complexities: <ul style="list-style-type: none"> <li>- change of equipment proposed in the project.</li> <li>- technical specifications in terms of reference that were not met.</li> <li>- problems in the purchasing process, problems in purchasing decisions for efficient use in preparing soil for no consideration of technical specifications.</li> <li>- they are looking for the best alternative of how the management and use of machinery and implements soil preparation will be performed. However, at the time of this evaluation it is not yet resolved.</li> </ul>

Component / Product	Institution / responsible	Review activities / actions
<b>Product.1.4.-</b> Training in sustainable soil management, tillage practices, fertilization, soil fertility, holistic recovery practices and soil management.	INIA	The trainings are delayed. During the year 1 corresponds only to the training of demonstration farms in the management of the system rainwater harvesting. Skills Generation Plan differs from the original proposal for the project, which will be developed in the second year of the project, but in practice only partially fulfilled in year 2.
<b>Product 1.1.5.-</b> Training in use of crops (wheat), fodder (legumes and grasses), fruit trees (olives and walnuts) and livestock (sheep) tolerant to climate variability and climate change, including the purchase of seeds, plants and animals.	INIA	Skills Generation Plan differs from the original proposal for the project but in practice only partially fulfilled in year 2.
<b>Product 1.1.6.-</b> Training in efficient management of water in demonstration fields (including equipment acquisition) through the application of irrigation technologies use renewable energy (solar and wind).	INIA	As described in section 1.2.7.
<b>Output 1.2. Implementation of measures and technologies to increase the availability of water for rural communities in the coastal and inner dryland of the O'Higgins Region</b>		
<b>Product 1.2.7.-</b> Installation of equipment for cleaning water in 558 properties including training and procurement of materials, equipment (roofing materials, plumbing, portable tanks, pumps with renewable energy (solar radiation and wind) and installation of greenhouses.	UGP	Capture units, accumulation and rainwater harvesting 64 in year 1 and 62 in year 2, more than 109 without receiving year 2. 100 photovoltaic panels are intended to incorporate. In addition, wind energy alternatives are sought, although one study that indicated that there is no technical feasibility. Year 2 different courses were conducted in greenhouse management harvesting and rainwater systems, irrigation and bioproducts. Total of 293 trained people of which 141 are women.
1.2.8.- Management product knowledge and exchange of best practices.	INIA	238 people from other municipalities (producers, technicians, journalists, professionals), 95 were women.



Component / Product	Institution / s responsible	Review activities / actions
<b>Component 2. Installation of information system for agroclimatic risk management and adaptation to climate change</b> <b>Result 2.1. Improve the management of agroclimatic relevant information for decision-making for present and future climate changes among local MINAGRI professionals and farming communities</b>		
<b>Output 2.1.1.-</b> Strengthening the existing network of Automatic Meteorological Stations (EMAs).	SEGRA	It implements the project considered four EMAs and this result was changed to implement one EMA, after studies and investment to develop the Foundation for Agrarian Innovation (FIA). Activity to implement a Subterranean Water Monitoring System that has not been executed to date, nor has defined its reach, objectives, activities and expected outputs is incorporated. Progress has been made in implementing the Agroclimatic Observatory Regional (OAR).
<b>Product 2.1.2.-</b> Capacity building for analyze climate data and time and integration into the making agricultural decisions	SEGRA, INIA	The project considered a communications strategy of year 1. Currently, this activity is performed in conjunction with communications equipment Seremi of Agriculture O'Higgins, which was not defined in this way. In addition, the Communications Strategy considered an agroclimatic rural extension Plan and a rural communicator, which has not been implemented yet.

Source: prepared by author with information from the FACC Project, 2015 and POAs years 1 and 2.

Considering that we understand adaptation to climate change as an active response and planned to face the climate change challenges, which can manifest themselves as both threats and opportunities (IPCC (2013/14, cited in the project 2015) and in the case of this project is presented as a threat, so it seeks to improve resilience in a specific segment of the population of the municipalities of the coastal dryland and interior of the O'Higgins Region, such as small farmers, regarding to current climate variability and future climate change.

The definition of resilience is the ability of social, environmental and economic systems to cope with an event, trend or disturbance which is hazardous, responding or reorganizing so as to maintain its essential function, identity and structure, as long as it remains the adaptability, learning and transformation.

Currently the beneficiaries of the project are in a threat scenario, because rainfall has decreased and temperatures have steadily risen to such a level that are affecting livestock and crop production, which has led to the entire region to a severe water deficit. Faced with this deficit, the government has had to intervene through the distribution of water in tank

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trucks for consumption of rural residents in the most critical months and now had to distribute drinking water for animals.

So that the specific objectives of the project were designed to propose concrete solutions to meet this challenge, firstly implement a system of capacity building and training system to increase the resilience of vulnerable communities to climate variation, regarding livestock, crops, water and management of soil, also seeks professionals and trained farmers in agricultural practices, livestock, soil management, irrigation and water accumulation that allow them to be efficient in the use of natural resources in their production systems.

Moreover, implementation of measures and technologies to increase the availability of water resources in rural communities, aims to provide farmers of infrastructure and equipment to achieve so, which has proven its effectiveness in the area, although they are not currently overcrowded, because they are not in the scope of producers because of their cost.

Therefore, although the internal consistency of design of the project is in effect, given current hydrological conditions, it is required to diagnose the availability of water resources of the beneficiaries, evaluating the technical feasibility and verifying whether the modification of the financial items will allow these changes into the original project.

#### **6.4 Relevance of the project in the context of development policies**

The relevance of the project in the context of national development policies, regional and / or local, as well as with the priorities and needs of the productive sectors, national and regional institutions, and the beneficiary population is expressed in its agreement with several of the guiding principles of the National Rural Development Policy 2014-2024 and the Regional Development Strategy for the Libertador General Bernardo O'Higgins Region for the period 2011-2020.

Moreover, it's worth mentioning that Chile expressed its vulnerability to climate change in the First National Communication to the UN Framework Convention on Climate Change (UNFCCC) in 1999. Since then, it has developed the "National Climate Change Strategy "(2006), which began operations through the "National Action Plan on Climate Change: 2008-2012 " (PANCC) two years later, as the articulator of Chilean public policy instrument adaptation to climate change. The National Adaptation Plan had seven sectoral plans for adaptation to Climate Change: Agroforestry, Biodiversity, Fisheries and Aquaculture, Health, Infrastructure, Energy and Water Resources, to which were added cities and tourism sectors in 2014.

This indicates the plan in the agriculture and forestry sector displacement of crops to the south is expected, along with reduced availability of water for irrigation in downtown area, generating changes in production and net income remaining negative in the northern and central areas, and positive in south and austral areas. Also, negative effects are foreseeable, not only on the quantity but also the quality of the products. The most vulnerable farmers would be the ones in inner and coastal drylands, between the regions of Valparaiso and Biobio, farmers of the cross valleys and the dry land farmers.

In the review of the project with the specific objectives of the National Action Plan on Climate Change 2017-2022, it was observed that the actions of the project are easily relatable to the

4 axis of the plan, a number of specific objectives, lines of action and measures, which are identified in **Table 10**.

**Table 10. Axis of the plan, specific objectives, lines of action and measures.**

Axis of action	Specific goal	Lines of action	Measure
Adaptation	3.1.1. Periodical evaluation of the vulnerability of human and natural systems to the impacts of climate change, setting out the risks and opportunities presented by this phenomenon.	LA1. Generation, analysis and update of climate information.	MA2: Improvement the national monitoring network station, meteorological variables for climate monitoring and feeding patterns of climate scenarios.
		LA2. Generation, analysis and updating of information on vulnerability and risks against climate change.	-
Mitigation	3.2.2. Develop and implement mitigation actions and policies.	LA10. Mitigation of the agriculture and forestry sector.	-
	3.3.2. Support technology transfer for the implementation of measures mitigation and adaptation to climate change.	LA18. Development strategy and technology transfer.	-
		LA19. Incorporation of new technologies.	MI11: To facilitate the introduction of technologies for implementing mitigation and / or adaptation in Chile.
Means of implementation	3.3.3. Create and strengthen national capacities to manage climate change and provide technical assistance.	LA21. Education and awareness strategy to address climate change.	MI18: Integrate gender and sociocultural aspects of climate action.
			MI19: Implement of a campaign of awareness of climate change, aimed at the private sector and civil society.
			MI20: Train of officials in different levels of governance in climate change management.
		LA22. International cooperation.	MI22: Sharing the experience of Chile at national and international level in managing climate change.
Management of climate change at regional and community level	3.4.2. Build capacity in regional governments and community.	LA28. Development of training programs and diffusion.	MG8: Awareness program at the community level, which includes seminars, workshops, written materials, and other activities.

Source: prepared by author based on the National Action Plan on Climate Change 2017-2022 (PANCC II) and the POA year 2.

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## 6.5 Project Actions according to the FACC strategies

Chile is a country that meets the current strategic requirements of the FACC described in their document "Policies and operational guidelines" of the Adaptation Fund Annex 1: Strategy, policies and guidelines of the Fund priorities. Chile is part of the Kyoto Protocol, it is an OECD country, and according to the National Action Plan on Climate Change it is highly vulnerable to climate change, fulfilling most vulnerable nine criteria set out by the UNFCCC. These are: low altitude of coastal areas; arid and semiarid areas; forest areas; territory susceptible to natural disasters; areas prone to drought and desertification; urban areas with air pollution problems and mountain ecosystems.

Preparing the project took into consideration the "National Action Plan on Climate Change: 2008-2012" and "Adaptation Plan to Climate Change 2013 the Forestry and Agricultural Sector". Regarding this plan, technical working groups on climate change from the Ministries of Environment and Agriculture identified a number of concrete actions as a "first step" towards the gradual implementation of the whole plan. The project presented to the FACC took over these shares.

## 6.6 Project dimension gender

Different UNFCCC decisions have been incorporating the gender dimension in their statements, from assessing the participation of women in cooperatives long-term actions (2010) to define a gender policy (2016), which promotes efforts to achieve equality and gender equality, as well as empowering women in activities, and thus increase the resilience of human systems, supporting women as agents of positive change, with a deep knowledge of the relevant systems for adaptation such as food, water or energy and actively addressing the disproportionately greater vulnerability of women to the impacts of climate change and natural disasters, because of persistent gender inequalities.

From the project design presented to the FACC 2015, positive discrimination was observed to incorporate a larger number of beneficiaries in harvesting systems and accumulation of rainwater and greenhouses, to achieve gender balance. However, it is necessary to incorporate other concepts in the field of gender equality which are gender equality, integration and gender sensitivity and empowerment of women (**Annex 4**).

Currently, the project is considering gender equality, because it makes no difference to equal rights, responsibilities and opportunities and access for women and men and children with equal consideration of their interests and needs. This has been a difficult aspect to achieve because of the profile of the rural population of the project area. Women are recognizing and valuing the role they have in greenhouses, for example.

However, it is necessary that the project deepens into gender balance, to have the same number of women and men in decision-making entities and between staff at different levels of organizational structures. Likewise, in gender equity (the process of being fair to men and women, boys and girls) in gender mainstreaming, which considered a process of assessing the implications for women and men of any planned action, in any area and at all levels of the project so that women and men benefit equally and inequality is not perpetuated. Differentiated actions to reduce disadvantages or historical biases associated with gender roles and norms should be sought.

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Neither presents evidenced of sensitive gender, based on consideration of gender norms, roles and relationships to address inequality generated by these elements. Although if that was observed that empowerment of women has been addressed and understood as growth over the lives of women, through participation and decision-making, especially in the demonstration units in charge of women and other direct beneficiaries of the project.

In particular, an imbalance was evident in the gender balance in governance committees of the project and technical teams with low participation of women in these two areas, noting that administrative tasks are carried out mainly by women and technical work mainly by men. For this reason, and observations of the Adaptation Fund in its latest report that has been considered hiring a gender specialist, which must have verifiable experience and training respect.

## **7 EFFICIENCY IN THE PROJECT IMPLEMENTATION**

The efficiency of a project, also called "Elements of the triple constraint", time, budget and scope, were considered until sometime a valid measurement element for the success of a project. However, the success of a project cannot be measured solely in relation to the terms which delimit their efficiency, but also to measure the satisfaction of stakeholders (Galván and García, 2015).

Evaluating the efficiency will be discussed at what cost, how much, how relevance and timing have developed actions and the need and reasonableness of the assumptions used to perform them. On the other hand, it involved an analysis of the implementation and execution, considering the dynamic between each of the parties involved and the satisfaction of the direct beneficiaries.

The budget for the project is provided entirely by the FACC, reaching a global total of US\$9,960,000. According to the information, US\$ 500,000 are executed directly by the body of implementation (AGCID) and US\$ 9.46 million by the MINAGRI, who acts as the execution entity. MINAGRI, through the Under Secretary of Agriculture, initially transferred an amount US\$ 4,558,259 to the primary technical advisor (INIA) for the implementation of component 1 of the project.

The total budget has not changed, only a change was identified in the agreement between Under Secretary of Agriculture and INIA in which some activities are redefined and increased the budget, by transferring US\$ 383,468, leaving an INIA budget of US\$ 4,941.727. Thus, INIA is currently responsible for the execution of 52.24% of the total budget, followed by the Under Secretary of Agriculture with 42.76% and AGCID with 5%, for the work of implementation.

During the development of the project, it was considered that the exchange rate CLP / US\$ was kept at about \$ 550, a situation that has occurred and that is in practice, the project has been implemented to date based on an average weighted dollar of \$ 681.5.

During the revision of the initial budget in terms of its contribution to components 1 and 2 (**Table 11**), it was observed that the strongest component of the project is the component 1: appropriate responses to climate change technology support and capacity building in agricultural practices (management of soil, water, livestock and crops), to which 86.4% of

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the total resources of the project was assigned (1.1 and 1.2: two outcomes for this component were designed).

On the one hand, to implement a system of capacity building and training to increase the resilience of vulnerable rural communities to changes in climate and climate change regarding soil management, crops, livestock and water (outcome 1.1), 53.2% of the total budget was assigned, which is primarily focused on obtaining the product 1.1.3, which refers to the acquisition of agricultural machinery for 9 demonstration fields, including maintenance and operating costs, with 24.1% of the total budget.

To result 1.2, implementation of measures and technologies to increase the availability of water for rural communities in the coastal dryland and interior of the O'Higgins Region, 33.2% of the budget was assigned, which corresponds to a contribution to the premises assigned farmers direct beneficiaries of the project.

Regarding component 2: installation of an information system for managing agriculture climate risk and adaptation to climate change, with an allocation of 4.1% of the total budget, with administration costs of 4.5% and costs associated with implementing entity 5%.

The project began its implementation in August 2017, so to August 2019, 21.31% of the total budget was executed, leaving a surplus of US\$ 7,837,302. However, according to the originally planned during the first two years it is expected to run a total of US\$ 5,878,885 of the average of the implementation period should have spent 59% of budgetary resources.

This gap in the budget execution was evident during the first year was big, since only US\$ 635,639, corresponding to 33.3% of the planned budget for the first year that was US\$ 1,909,974. While the second year, 37.5% of the budget with an amount of US\$ 1,487,059 was executed. This lag in implementation is associated to the initial problems because of the emergency the country faced by severe fires in 2017 and administrative procedures existing in the state. In addition, changing team of professionals and technicians of the project product of the change of government.

**Table 11. Initial budget component of the project, results and products, implemented by year and total % of execution and August 2019.**

Component / Result / Product		Initial budget	% Of the initial budget	Executed Year 1	Executed Year 2	Total executed	% of execution
<b>Component 1.</b>	<b>Technology support and capacity building in agricultural practices appropriate to climate change (management of soil, water, livestock and crops)</b>	<b>8,602,851</b>	<b>86.4</b>	<b>382,945</b>	<b>1,231,422</b>	<b>1,614,367</b>	<b>18.8</b>
Output 1.1	Implementation of a capacity building and training to increase the resilience of rural communities vulnerable to changes in climate and climate change regarding soil management, crops, livestock and water	5,297,381	53.2	265,667	1,020,232	1,285,899	24.3
Output 1.1.1	Team building training and technology transfer for agriculture in each of the 8 municipalities of the project area coordinated and supervised by local experts INIA	820,499	8.2	89,044	148,167	237,211	28.9
Output 1.1.2	Implementation 9 Demonstration fields for agro transfer technologies (1.1.4, 1.1.5, 1.1.6 and 1.2.8) including infrastructure and equipment (fences, troughs, energy, etc.): 4-5 hectares in each of 8 municipalities plus one on land INIA Litueche (Hidango)	438,131	4.4	29,149	54,999	84,148	19.2
product 1.1.3	Purchase of agricultural machinery (including maintenance and operating costs) for the 9 demonstration fields	2,396,540	24.1	57,783	616,289	674,072	28.1
product 1.1.4	Training in sustainable soil management, tillage practices, fertilization, soil fertility, holistic recovery practices and soil management	548,504	5.5	30,925	70,331	101,256	18.5

Component / Result / Product		Initial budget	% Of the initial budget	Executed Year 1	Executed Year 2	Total executed	% of execution
product 1.1.5	Training in the use of crop (wheat), forage (grasses and legumes), fruit trees (olives and walnuts) and livestock (sheep) tolerant to climate variability and climate change, including the purchase of seeds, plants and animals	561,982	5.6	29,404	65,854	95,258	17.0
product 1.1.6	Training in efficient management of water in demonstration fields (including equipment acquisition) through the application of irrigation technologies use renewable energy (solar, wind)	531,725	5.3	29,362	64,592	93,954	17.7
Output 1.2	Implementation of measures and technologies to increase the availability of water for rural communities in the coastal dryland and interior of the O'Higgins Region	3,305,470	33.2	117,278	211,190	328,468	9.9
product 1.2.7	Installation of equipment for cleaning water in 558 properties including training and procurement of materials, equipment (roofing materials, plumbing, portable tanks, pumps with renewable energy (solar radiation and wind) and installation of greenhouses	3,167,821	31.8	117,269	188,859	306,128	9.7
product 1.2.8	Knowledge management and exchange of better practices	137,649	1.4	9	22,331	22,340	16.2
<b>Component 2.</b>	<b>Installation of an information system for agroclimatic risk management and adaptation to climate change</b>	<b>406,748</b>	<b>4.1</b>	<b>35,935</b>	<b>16,583</b>	<b>52,518</b>	12.9



Component / Result / Product		Initial budget	% Of the initial budget	Executed Year 1	Executed Year 2	Total executed	% of execution
Result 2.1.	Improve the management of agroclimatic relevant information for decision-making for present and future climate changes among local professionals MINAGRI and farming communities	406,748	4.1	35,935	16,583	52,518	12.9
Output 2.1.1.	Strengthening existing network of automatic meteorological stations	124,269	1.2	9,812	10,607	20,419	16.4
Output 2.1.2.	Capacity building for analyzing climate data and time and integration into the making agricultural decisions	282,479	2.8	26,123	5,967	32,099	11.4
Administration cost		450,000	4.5	131,727	141,169	272,896	60.6
Implementing entity (AGCID)		500,000	5.0	85,031	97,887	182,918	36.6
Total		9,960,000	100.0	635,639	1,487,059	2,122,698	<b>21.3</b>

Source: prepared by author with information from the initial project and Project Performance Report years 1 and 2.

## 7.1 Budget and time efficiency by component

Assessment of budgetary efficiency and temporal component of the project, based on the results and planned indicators, focus and execution of the project shows that component 1 in budgetary terms corresponds to 86.4% of the total project. This component is divided into two key areas of intervention to achieve the objective of the project. The first one is capacity building to enhance resilience through training and demonstrative actions of methods to better cope with water shortage, and the second one, providing infrastructure to capture, accumulate and improve the efficiency of use of water.

As mentioned above, the budget implementation of component 1 is out of step with the budget and is responsible for not reaching 58.6% of the budget expected for the second year.

Regarding component 2, the marginal budgetary scope is global and such terms as indicated in the interview SEGRA corresponds to strengthen and deepen development of MINAGRI coming through SEGRA and other public institutions, whereas action in the field of agricultural drought emergency has been focused on the O'Higgins region in the recent years. While their spending does not reach the budget, this gap is smaller than the one in component 1 and no change of strategy has deferred time spent.

While the spending pace rose from US\$ 635,638 in year 1 to US\$ 2,122,699 in year 2, the execution performance of the project in the time remaining should be intensified and the deadline for implementation of the project is recommended to be extended in a year, especially because 78.7% of the total budget execution is pending.

The project is developed on the basis of 10 products (**Table 11**). Out of the total of these products, six are associated with the implementation of a capacity building and training to increase the resilience of vulnerable rural communities to changes in climate and climate change, regarding soil management, crops, livestock and water. And two products relate to the implementation of measures and technologies to increase the availability of water for rural communities within the coastal and inner drylands of the O'Higgins Region. These eight products have a budget execution level between 9.7% and 28.9% of the proposed budget.

Finally, the last two products of component 2, related to improved management of agroclimatic information relevant to decision-making for present and future changes in climate between local professionals MINAGRI and farming communities, which have a level of budget execution of 11.4% and 16.4%, respectively.

Out of these 10 products, 2 considered 57.2% of the original budget that relate mainly to machinery and infrastructure. 1.1.3 specifically to the product, purchase of agricultural machinery, including maintenance and operating costs for the 9 demonstration fields and the product 1.2.7, installation of equipment for cleaning water in 558 properties including training and procurement of materials, equipment (roofing materials, pipes, portable tanks, pumps with renewable energy (solar radiation and wind) and installation of greenhouses.

In the case of the purchase of agricultural machinery, it is one of the products of greater impact under the current conditions of water deficit and presents an execution of 28.1%. It should be noted that this activity has presented difficulties during the process of purchasing

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harrows and manure spreader, from the excessive time taken for purchase, non-compliance with the technical specifications developed by INIA and poor quality of some parts of machinery, which had to be replaced by new ones and have had to design improvements.

Regarding the installation of equipment to harvest rainwater, storage systems and greenhouses with irrigation systems for 558 beneficiaries, 9.7% of the initial budget was executed, so it is necessary to improve the current performance in order to achieve the projected target. By the date of this assessment, 64 units were built in year 1 and 62 units in year 2, plus 109 units that are currently pending receipt by lack of background administration for approval of spending.

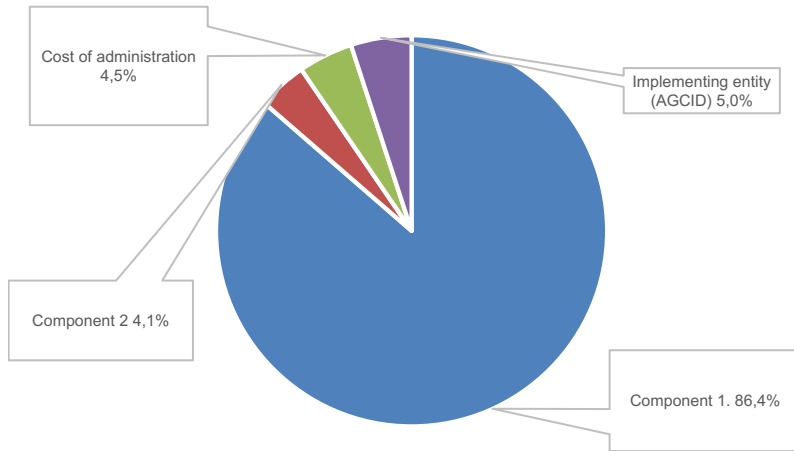
These two outcomes are associated with specific targets to reach the project objective:

- In product 1.1.3, 2,208 farmers benefited directly and at least 691 women with greater access to machinery and technical assistance and 5,000 hectares for a better quality soil, generating an increase in household income in at least US\$ 1,000 / year.
- In product 1.2.7, 558 owners benefited directly and at least 318 women with a lower risk from extreme weather events, hoping to accumulate product capturing rainwater, 20,000 liters of water per year available per holder and an increase in revenue of households in a less US\$ 1,000 / year for this item.

1.1.3 result in trainings related products, each of them has 18.5%, 17.0% and 17.7% progress executed in the initial budget are presented.

In **Figure 5**, the resources allocated to each component, the implementing entity and the cost of administration defined the start of the project are observed.

**Figure 5. Percentage of the total budget allocated by component, management cost and the cost of implementing entity.**



Source: prepared by author with the initial project information and documents Project Performance Report years 1 and 2.

## 7.2 Budget implementation to December 2019

Budget implementation to December 2019 in the different accounts in which the project has been divided is presented in the following table, showing that December 2019's budget execution is 26.4%. Leaving a balance of budget execution of US\$ 7,329,649.

**Table 12. Execution budget to December 2019.**

<b>Account</b>	<b>Budget amount (US \$)</b>	<b>Execution December 2019 (US \$)</b>	<b>Balance (US \$)</b>	<b>% Execution</b>
International consulting	71,979	-	71,979	0.0%
National consultancies	2,733,733	743,047	1,990,686	27.2%
Travels	252,374	71,776	180,598	28.4%
Equipment	3,856,011	1,098,300	2,757,711	28.5%
Contracts	120,2150	289,533	912,617	24.1%
Products and Materials	1,073,946	140,596	933,350	13.1%
Training	269,807	71,830	197,977	26.6%
<b>Total</b>	<b>9,460,000</b>	<b>2,415,082</b>	<b>7,044,918</b>	<b>25.5%</b>
Amount NIE	500,000	215,270	284,730	43.1%
<b>Total</b>	<b>9,960,000</b>	<b>2,630,351</b>	<b>7,329,649</b>	<b>26.4%</b>

Source: prepared by author with financial information presented by AGCID.

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### 7.3 Collaboration between institutions and management mechanisms

The dynamics of collaboration between institutions and management mechanisms that have been implemented, have helped to partially achieve the expected results of the project, because there are different mechanisms of management in each institution, the mechanisms of the Under Secretary of Agriculture as a public entity. And, in another area, is INIA, which has other mechanisms of management and administration, and must adapt to a productive environment changing product of climate variability facing central Chile, and must propose comprehensive technological solutions that are validated for current status of rainfed areas, because the focus has been on research on agricultural production in irrigated areas in previous years.

Moreover, there are differences in the legal aspects of the institutions that manage the resources of the project. On the one hand, AGCID and the Under Secretary of Agriculture, which wields the internal management of the project within the MINAGRI and are governed by the Public Procurement Act. Instead INIA is a nonprofit private corporation, which does not belong to the organs of public administration and is not ruled by this Law. While this law has a system to ensure transparency and purchase efficiency, preserve equal competition and ensure the rights of participants, it also has procedures, deadlines and defined steps to be followed and for which an adequate planning is required.

The institutional arrangement for implementation of the project (chapter 6.2) makes a difference between interagency reporting lines, intra institutional and hierarchy contractual link line between the institutions, committees and products of the components project. These independent paths do not state a difficulty for each other, allowing the development of components with dissimilar specificities. Moreover, the component 2 corresponds to the deepening of the work started in 2008 due to agricultural drought emergency, so they have their own dynamics and ways of relating. However, it requires improved coordination mechanisms, particularly in the area of training and communications.

Initial design of the project's steering committee which punishes annual operating plans and management reports. This is a high-level political institution that supports their decisions on the contributions that gives you the advisory committee and having a periodicity of meetings that allows only to discuss global issues.

Therefore, from the perspective of this evaluation, the advisory committee is considered as an intermediate body, to which he reports both to the UGP, and SEGRA, and where changes are proposed to the project. These changes, depending on their magnitude, are approved directly or should be approved by the steering committee. It was noted that this institutional arrangement operates properly in some areas, as indicated by the minutes of the meetings of the advisory committee.

However, one aspect to note is the mix of roles and responsibilities between INIA and UGP. Even though the project clearly defines the INIA as the institution technically in charge of the component 1 and the UGP as its executor in all matters except in training, activities / actions, these functions overlap both from the INIA to be in charge of administration of 59.6% of the budget, and from the UGP to the INIA, considered only as advisory in some technical definitions, which should not happen because INIA is the primary technical advisor.

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## **7.4 Opportunities to improve the project efficiency**

Opportunities for improvement in the efficiency of the project are:

- Develop a Gantt chart that covers the entire period of the remaining project, defining which activities are critical to meet the specific objectives of the project.
- Modify the POA of year 3, since the POAs of years 2 and 3 have not caught existing delays in implementing the project and establish an operational planning of the work of soil preparation.
- Agricultural repurchase machinery do not meet the technical specifications for timely perform the tasks of soil preparation before the start of the rainy season in a timely manner.
- Restructuring of the team and refocusing the characteristics of each team in charge of the functions that correspond to them, so such activities are not duplicated functions and responsibility and authority of each position are met.
- Temporarily hiring and preparing a team of sociologist support in surveys. It is estimated that a team of at least 4 surveyors with experience in this type of activity is required, considering that the baseline information is essential for progress in fulfilling the universe of 558 beneficiaries of the project.
- Review the technical specifications for tenders pending greenhouses, considering that the project estimated the lifetime of this infrastructure in 15 years.

## **8 EFFICIENCY IN THE PROJECT IMPLEMENTATION**

Effectiveness in the implementation of the project is given by the degree of compliance which objectives have been achieved through the activities / actions proposed, taking the relevance and significance of these into account, and regardless of the budget used, so the evaluation of the effectiveness analysis is carried out considering the positive effects that were anticipated in the design of the project, its overall objective, specific objectives and components.

### **8.1 Progress in achieving the expected results**

Increase the resilience of vulnerable farming communities to changes in climate, regarding the handling of livestock, crops, water and management of the soil through trainings, to professionals, technicians and beneficiaries, is one of the specific objectives priority. The proposed strategy is based on different training courses, workshops, visits to demonstration units, knowledge of international experiences, technology transfer on the grounds themselves, etc.

In order to ensure the effectiveness of the project, it is opportune to keep developing these activities. For example, it is necessary that the demonstration units are properly implemented to present it to farmers in terms of technology, management, etc., relevant to address the effects of climate change. While all the demonstration units are operational today, this process was developed in approximately two years and some of this infrastructure still requires repairs, such as La Estrella. Additionally, it is required to run preparation soil and sowing crops in a timely manner.

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Moreover, defining actions not originally designed is needed, that there are necessary changes to the success of the project, which is ensuring water sources.

Considering the above, progress in meeting the results for the year 1 according to the indicated in the first annual monitoring report (2017-2018) in the output 1.1, it is as follows:

- Rising information baseline: a diagnosis was made of the technical, social, and economic status to a sample of 600 small farmers (75 per municipality), which gave us more information about their areas of production: annual and perennial pastures, sheep farming, annual crops (wheat, oat, chickpea, quinoa, etc.), vegetables and poultry.
- Selection, design and implementation of land, for the establishment of demonstration units in the eight municipalities of the project. Additionally, the demonstration unit of Pichilemu, was considered an evaluation of alternative soil management in walnut and almond plantations.
- Training of professionals from the contracted project February 2018 and the team of the UGP: induction to the project (February 2018, 12 participants), training about risk prevention (July 2018, 22 participants including building contractors units harvest rainwater), training about capacity of wells (August 2018, 13 participants), training farmers in the use and operation of harvest units and rainwater harvesting, training about component 2, new technologies and methodologies for the use of agroclimatic information in agriculture.

Activities in demonstration units are being implemented and intended to demonstrate and validate appropriate adaptation to climate change, oriented to farm units techniques. In addition, the purpose is to use them as training and technical units for farmers, students, professionals and others.

It is worth mentioning, due to administrative processes agreements, that implement the project began to be executed in February 2018, giving priority to collect baseline information through a survey of the beneficiaries and the establishment of demonstration units, which delayed the execution of the training that had been scheduled for year 1.

The demonstration units are georeferenced to enter them later to a geographic information system, which to date has not been made.

Regarding the progress in achieving results for the year 2 as indicated in the annual report 2018-2019, the outcome 1.1, it is as follows:

- Information gathering baseline: a diagnosis of the technical, social, and economic status of a sample of 600 small farmers in a number of 75 by municipality was made. This diagnosis allowed to establish the areas of greater importance of productive rainfed systems, including annual and permanent pastures, breeding and production of sheep farming, management of annual crops (wheat, oat, chickpea, quinoa), vegetables and poultry meat.
- Generation of promotional and support material for training through five booklets and video tutorials.
- Training to farmers, technicians and professionals.



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- Construction and equipment of 171 rainwater harvesters, 62 of which were built by contractors and 109 through a public tender awarded to a bidder.
  - Assessment of the evolution of the soil moisture content in different treatments of handling, including scarification with subsoiler plow and traditional management of the farmer with disc plows. It is expected that soil management alternatives are compared with each other, measuring the water content product of rainfall that infiltrates in the soil profile.
  - Mr. Hector Manuel Araya Ramirez was selected for the installation of Automatic Meteorological Station (EMA), located in Licancheu, Navidad municipality (UTM coordinates: 6240362.2 - 241941.2).
  - Company acquisition Engineering and Projects Ltda. Competitive bids for equipment for EMA, which considers the installation and on-site commissioning.
  - Installation and commissioning of the EMA, this activity was completed in the first quarter of the year 3 of the project.
  - Development of promotional material: promotional video and booklet of the component 2.
  - Hiring Agronomist / Computer specializing in management of agro-meteorological information, knowledge modeling and construction of agro-climatic indicators, responsible for developing the technical activities of component 2.
  - Regarding the underground water monitoring system, a technical visit in the 8 municipalities, in which 14 wells were characterized to determine the feasibility of being part of the monitoring system it was made. In addition, expanding the design of this system was decided, by involving the DGA and the National Service of Geology and Mining (SERNAGEOMIN).

To analyze the effectiveness in implementing the two-year project, information was summarized in the tables below. This was done based on the information on the activities of the POAs year 1 and 2, and the compliance degree was derived from the annual management reports.

**Table 13** shows the compliance degree of the activities planned in the annual operational programs for the result 1.1. It should be noted that different types of activities, including training shown, although **Tables 14** through **17** training activities are also presented.

**Table 18** shows the compliance degree of the activities scheduled outcome 1.2, and **Table 19** shows the compliance degree of the result of planned activities 2.1.

**Table 13. Implementation status of the activities planned in years 1 and 2 POAs for the outcome 1.1.**

Activities	Indicator	Compliance degree	Year 1 compliance report	Year 2 compliance report
<b>Result 1.1. Implementation of a capacity building and training systems, to increase the resilience of vulnerable farming communities to changes in climate and climate change, regarding the handling of livestock, crops, water and management of the soil</b>	13 institutions (5 services of Ministry of Agriculture and 8 municipalities) with greater capacity to minimize exposure to the risks of climate variability	-		
<b>Output 1.1.1. Training of advisory teams for the transfer of agro-technology for each of the 8 municipalities in the area of the project, coordinated and supervised by experts INIA</b>				
Activity 1.1.1.1. Hiring professionals (4), technical (9) and truck drivers (8) and professional support UGP	Number of professionals and technicians hired	Tractor drivers and professional support to the UGP are incorporated into the POA year 2. Truck drivers hires and an outside company for the work (modification agreement INIA)	100%	100%
Activity 1.1.1.2. Acquisition of laboratory measuring equipment to set up a laboratory soil	Equipment and instruments acquired	Accomplished	50%	100%
Activity 1.1.1.3. Equipment procurement field measurement of soil characterization of the town of rainfed	Equipment and instruments acquired	Accomplished	40%	100%
Activity 1.1.1.4 characterization and classification of water and vegetation sources from aerial photographs and other	Number of farms analyzed	Advisory Committee No. 14 crosses this activity for year 3	0% POA 2	0% POA 3

Activities	Indicator	Compliance degree	Year 1 compliance report	Year 2 compliance report
Activity 1.1.1.5 Soil classification for rainfed area. Agronomic Studies and Pedological	Field sampling transferred to GIS	The result of samples is ready, but it does not indicate whether is entered in GIS	0% POA 2	100%
Activity 1.1.1.6. Micro study of soil morphology and soil profile cultivation	Documents and data transferred to GIS	deleted from the report 2 made to be done in Year 3	0% POA 2	0% POA 3
Activity 1.1.1.7. Certified in design harvesting systems and water storage. Coordinated and supervised by experts of INIA	Number of trained staff (2)	Advisory Committee No. 15 indicated that no tours are held to others countries	0% POA 2	0%
<b>Output 1.1.2. Implementation 9 demonstration fields for transferring agrotechnology (1.1.4, 1.1.5, 1.1.6 and 1.2.8), including infrastructure and equipment (fences, gutters, power supply, etc.): 4- 5 hectares in each of the eight municipalities plus one on land INIA. POE 2 adds "selection of demonstration units by the technical team"</b>				
Activity 1.1.2.1. Diagnostic field demonstration fields and their final selection (includes agreement / contract with the owners)	Demonstrative number of selected properties	Proposed by INDAP and PRODESAL. Signed contracts	100%	100%
Activity 1.1.2.2. Procurement of materials for the implementation and operation of the demonstration units	Materials purchased for each unit	The delay in approving the designs of the demonstration units of the eight municipalities generated a delay in implementing	100%	100%
Activity 1.1.2.3. Installation of demonstration units capture, storage and rainwater harvesting demonstration unit in each of the municipalities of the project	Uptake units implemented: includes uptake, accumulation tank and greenhouse	At the time of the report year 2 it lacked reception of 2 demonstration units	100%	75%

Activities	Indicator	Compliance degree	Year 1 compliance report	Year 2 compliance report
Activity 1.1.2.4. Analysis of soil fertility on the 8 demonstration units of the project (analysis 32 total)	Number of soil analysis conducted	Year 2 only 4 demonstration units	100%	50%
Activity 1.1.2.5. Physical analysis of soils, on the 8 demonstration units of the project (96 analysis)	Number of soil analysis conducted	Accomplished	0% POA 2	100%
Activity 1.1.2.6. Scarifying or subsoiling soil in the 8 demonstration units of the project	Number of units with scarifying work and / or subsoiling performed	Accomplished	100%	100%
Activity 1.1.2.7. Buying agricultural inputs for the demonstration units. Chicken manure, fertilizers, pesticides, seeds, plants, flowerpots, bags and sacks, sheep, rams, others	Materials purchased for each unit	Accomplished	100%	100%
Activity 1.1.2.8. Purchase materials for soil laboratory	Materials purchased for each unit	Accomplished	0% POA 2	100%
<b>Product 1.1.3. Acquisition (including maintenance and operating costs) of agricultural machinery for the 9 demonstration fields: Tractors, regenerating pastures machine, zero tillage seed drill machine, harrow plow, chisel plow, subsoiler plow. POE 2 incorporates the "Implementation of demonstration plot" concept</b>				
Activity 1.1.3.1. Background collection of agricultural machinery dealers according the project needs	Number of companies analyzed	-	0% POA 2	100%
Activity 1.1.3.2. Public bidding for agricultural machinery and equipment. Award a bidder with better economic technical proposal	Bidding documents with Terms of Reference published	-	0% POA 2	100%

Activities	Indicator	Compliance degree	Year 1 compliance report	Year 2 compliance report
Activity 1.1.3.3. Purchase of tractors (8) for the INIA and backhoe (1). Agricultural machinery and equipment (work to be done by INIA-UGP and external consultant. The latter supported the work of defining terms of reference machinery and equipment	Number of parks of machinery enabled	All machinery and equipment purchased are duly received, although scarifier plow and manure spreader have been problems of design and craftsmanship and did not meet the technical specifications	0% POA 2	36%
Activity 1.1.3.3. Acquisition of a van and a truck for the INIA	Truck / pick-up truck	Three pick-up trucks and one truck were bought	100%	100%
Activity 1.1.3.4. Purchase 1 container with built-in furniture, as well as electricity and water. 2 of them for enabling soil laboratory, and one for storage of materials	Number of containers implemented as laboratories and cellar	Acquisition of a container module for enabling a soil laboratory was also an office module for laboratory personnel and module storage container to hold soil samples and field equipment. This was installed at the Regional Center for the INIA Rayentué. In addition to the above, 2 containers were purchased for enabled as wineries to allow storage materials and supplies in Hidango Central Experimental	75%	100%
Activity 1.1.3.5. Purchase 8 containers, for enabling offices in the municipalities of the project	Number of offices implemented	-	0% POA 2	100%

Activities	Indicator	Compliance degree	Year 1 compliance report	Year 2 compliance report
Activity 1.1.3.6. Construction of warehouses of 8 m x 4 m for the storage of equipment in INIA and demonstration units	Number of cellars built	Not received	0% POA 2	0%
<b>Product 1.1.4. Training in the sustainable management of soil: tillage practices, fertilization practices, recovery practices in soil fertility and holistic soil management</b>				
Activity 1.1.4.1 Training techniques conservation of soil and water	Number of trained farmers to respond and mitigate impacts of climate events	8 courses 284 participants (149 women)	0% POA 2	100%
Activity 1.1.4.2 Technical visit abroad soil and water in arid conditions	Number of farmers known foreign experience	The project envisaged implementation of 6 beneficiaries and 2 technicians. Institution and focus change of the visit. They are not beneficiaries but technical team participants	0% POA 2	100%
Activity 1.1.4.3. Development 8 days on field used subsoiler plow, to reduce erosion processes and facilitate water infiltration into the soil profile in pastures	Number of field days conducted	Eight field days had 283 participants (106 women)	0% POA 2	100%
Activity 1.1.4.4.	-	No information of item appears	-	
Activity 1.1.4.5.	-	No information of item appears	-	
Activity 1.1.4.6.	-	No information of item appears	-	

Activities	Indicator	Compliance degree	Year 1 compliance report	Year 2 compliance report
Activity 1.1.4.7. Service scarifying grassland soil in 12 farms of producers of the municipalities of the project. Technical disclosure work	Number of farms intervened with practice	-	0% POA 2	0%
Activity 1.1.4.8. Radial publishing service of the project in the 8 municipalities. 8 interviews with technical recommendations to producers and technicians, under the terms of the project	Contracted and issued publications	No information appears in year 2	100%	-
Activity 1.1.4.9. Development of 8 workshops soil management, to establish coastal dryland crops. INIA done by professionals and aimed at producers and technicians (1 municipality)	Number of trained farmers	Five workshops with 168 people (71 women)	0% POA 2	69%
1.1.4.10 Development 4 workshops beekeeping production under coastal dryland conditions. Aimed at producers and technicians 4 municipalities of the project (INIA professional and external consultant)	Number of trained farmers	4 workshops with 149 people (50 women)	0% POA 2	100%
<b>Product 1.1.5. Training in crop management (wheat, quinoa), forage crops (legumes, grasses), fruit trees (olives, nuts) and livestock (sheep), tolerant to variability of climate and climate change, including the acquisition seeds, plants and animals. Chickpea appears buckwheat and POE 2.</b>				
Activity 1.1.5.1. Development of three courses on the production of Quinoa and buckwheat in coastal dryland areas. For producers and technicians, 4 municipalities of the project area	Number of courses taken	5 sessions with 131 people (60 women)	0% POA 2	100%
Activity 1.1.5.2. Development of three courses on establishment and management of grassland for rainfed areas. For producers and technicians, 4 municipalities of the project area	Number of courses taken	4 courses with 81 people (40 women)	0% POA 2	100%

<b>Activities</b>	<b>Indicator</b>	<b>Compliance degree</b>	<b>Year 1 compliance report</b>	<b>Year 2 compliance report</b>
Activity 1.1.5.3. Development of three courses on production of green fodder hydroponics. For producers and technicians, 4 municipalities of the project area	Number of courses taken	3 courses with 113 people (46 women)	0% POA 2	100%
Activity 1.1.5.4. Development of three courses on sheep management under rainfed conditions. For producers and technicians, 4 municipalities of the project area	Number of courses taken	2 courses to 1 technical team and another to staff of PRODESAL and INDAP. 38 participants, 4 women	0% POA 2	100%
Activity 1.1.5.5. Development of 8 workshops soil management, for establishing coastal dryland crops. INIA done by professionals and aimed at producers and technicians (1 municipality)	Number of workshops	1.1.4.9 duplicated	0% POA 2	100%
Activity 1.1.5.6. Development of 4 workshops beekeeping production under rainfed conditions. Aimed at producers and technicians 4 municipalities of the project (INIA professional and external consultant)	Number of workshops	1.1.4.10 duplicated	0% POA 2	100%
Activity 1.1.5.7. Comic launch day on climate change, to make for students in rural schools in the project area. Working together with AGCID, Ministry of Education, Ministry of Environment and Ministry of Agriculture	Number of students participating in 8 districts	Without information	0% POA 2	100%
Activity 1.1.5.8. Development of 8 workshops or seminars on concepts of climate change and its effect on rain-fed agriculture. For teachers and students in rural schools or colleges agricultural municipalities of the project	Number of students and teachers involved	9 activities in different local entities 569 (253 women)	0% POA 2	100%



Activities	Indicator	Compliance degree	Year 1 compliance report	Year 2 compliance report
<b>Product 1.1.6. Training in the efficient management of water in the demonstration fields (including the acquisition of equipment) through the application of irrigation technology powered by renewable energy (solar radiation and wind)</b>				
Activity 1.1.6.1. Meeting with PRODESAL teams work - SAT, north and south rainfed upland	Number of Attendees	-	122%	100%
Activity 1.1.6.2. Identify photovoltaic panels required for 15 properties to availability and depth extraction water (external consultants) and preparation of technical basis bidding photovoltaic panels and award proposer	Number of farms diagnosed	15 plots feasible identified (target 25 units)	0% POA 2	100%
Activity 1.1.6.3. Purchase of photovoltaic panels and installing them on each farm benefited (target 25 units)	Number of farms with photovoltaic systems implemented	In quoting process	0% POA 2	50%
Activity 1.1.6.4. 8 courses in conducting harvesting systems rainwater professionals and technicians of the project team	Number of courses taken	2 courses and 33 technical project PRODESAL and INDAP. Advisory committee No.14 requested decrease activity courses 8 to 2	0% POA 2	100%
Activity 1.1.6.5. Embodiment 8 training producers on the use of photovoltaic panels in agriculture (1 municipality).	Number of courses taken	Course 1, 25 people attend. The transfer of this activity for year 3 was authorized by Act No. 14 of the advisory committee	0% POA 2	11%
Activity 1.1.6.6. Consulting, purchasing, and installing wind energy systems, for the production of electricity in 8 demonstration units	Number of demonstration units diagnosed	The transfer of this activity for year 3 was authorized, as stated in the Act No. 14 of the advisory committee. However, the result of the consultancy showed no technical feasibility	0% POA 2	1%

Source: prepared by author with POAs year 1 and 2, annual management reports year 1 and 2.

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Regarding training and implementation degree of Skills Generation Plan (PGC) incorporated in the annual reports 2017-2018 and 2018-2019, which considered training from the second year of the project for component 1, **Tables 14, 15, 16 and 17** the training that have been made and reported to execution in November 2019 by the UGP (quarterly status report No. 9) is presented.

It is noteworthy that the way to inform the training executed, didn't always have the same systematization, so there were cases where it was not possible to identify the total participants of attendees, if applicable to men or women, or whether they correspond to direct and indirect beneficiaries, technical and / or professional. In addition, information on duration and content of courses, workshops, visits or field days, are not shown evenly.

**Table 14. Compliance degree of the training to beneficiaries.**

<b>Training directly to beneficiaries and name of the activity</b>	<b>Participants expected</b>	<b>Executed to December 2019</b>	<b>Attendees total</b>	<b>Women assistants</b>	<b>Compliance degree</b>
Soil conservation techniques and water	480	8	284	135	For farmers and technicians, taught by professionals from INIA. It is projected to 16 editions.
Technical visit: soil and water management under semiarid conditions of the Brazilian Northeast to EMBRAPA	8	1	8	0	The project envisaged implementation of 6 beneficiaries and 2 technicians in year 1. The focus and institution of the visit, attending the Ecological Center of Puerto Alegre is changed. Extends the visit from 5 to 9 days participating the Director of the Project Coordinator of the UGP, regional coordinators (professional) and two people from the PRODESAL.
3 capture workshops on techniques, storage, and utilization of rainwater in greenhouses and crop production associated	540	19	293	141	<ul style="list-style-type: none"> <li>• There have been 19 training activities in the areas of water harvesting, handling greenhouse and irrigation bio inputs preparation for beneficiaries, professionals and technicians. However, in Skills Generation Plan they were projected 3 per municipality / year, giving a total of 72 workshops.</li> <li>• Quarter 1 of year 3 (2019) - 1 course was conducted.</li> </ul>
Production adapted upland crops (quinoa, wheat, legumes, etc.)	160	5	131	60	8 courses-oriented farmers and technicians and taught by professionals from INIA. 5 production courses quinoa and buckwheat production are developed. 2019 POA indicates three courses.
Systems adapted for modern irrigation	10	4	47	-	1st Quarter year 3 place 4 courses. They are not only irrigation but there are 2 greenhouse and irrigation issue.
Visit vegetable production systems, recirculating water under semiarid conditions (Spain)	4	0	-	-	Scheduled visit to University of Cordoba, Almeria, Spain for 4 people for 7 days. It is suspended by the Advisory Committee No. 15 minutes.

<b>Training directly to beneficiaries and name of the activity</b>	<b>Participants expected</b>	<b>Executed to December 2019</b>	<b>Attendees total</b>	<b>Women assistants</b>	<b>Compliance degree</b>
Sheep production systems adapted	240	two	38 + Technical team of the project	4	2 sheep management courses taught by professional INIA for professionals and technicians INDAP and PRODESAL project. Not attending producers corresponding to training of trainers.
Handling adapted grassland	240	4	81	40	4 courses on establishment and management of grassland for rainfed areas conducted by INIA professionals producers and technicians. 2019 POA indicates three courses and PGC considered 8.
<b>Student training</b>	150	-	-	-	Indicates that INIA professionals and trained national consultant.
<b>Subtotal direct training to beneficiaries</b>	1,832	43	919	380	-

Source: prepared by author with information of the Skills Generation Plan, annual reports 1 and 2.

**Table 15. Compliance degree of the training of trainers.**

Course name or activity	Expected participants	Executed	Attendees total	Women	Compliance degree
Characterization of vegetation and water sources, according to interpretation drones flying course	15	0	-	-	View 1 oriented professionals and technicians (15) and conducted by a national consultant.
Study micro morphology and cultural soil profile course	15	0	-	-	View 1 oriented professionals and technicians (15) and conducted by an international consultant.
Certified design, build, and rainwater harvesting system	2	0	-	-	It was scheduled to perform this service in the School of postgraduates. Chapingo University of Mexico, with 12 days. It is suspended by the Advisory Committee No. 15.
Regulation and maintenance of agricultural machinery Course	21	1	21	-	View 1 - 1 quarter year ran 3. Indicate assistance. Programmed for 21 people. It was aimed at holders of professional technical demonstration units, and 2 editions.
Management and maintenance of agricultural tractors course	15	0			View 1 oriented holders of professional technical demonstration units, and (15) and taught by a professional INIA.
Topography course	15	0			2 courses to holders of professional technical demonstration units, and (15) and taught by a professional consultant INIA and national and 2 editions.
<b>Subtotal training of trainers</b>	83	1	21	0	-

Source: prepared by author with information of the Skills Generation Plan, annual reports 1 and 2.

**Table 16. Compliance degree replication and diffusion activities.**

Replication and diffusion	Expected participants	Executed	Attendees total	Women	Compliance degree
Field days and demonstration units courses	500	8  4 5 2 9	<ul style="list-style-type: none"> <li>• 283</li> <li>• 107</li> <li>• 131</li> <li>• 616</li> <li>• 729</li> </ul>	<ul style="list-style-type: none"> <li>• 106</li> <li>• 46</li> <li>• 49</li> <li>• 263</li> <li>• 832</li> </ul>	<ul style="list-style-type: none"> <li>• 8 field day use of subsoiler plow, to reduce erosion processes and facilitate water infiltration into the soil profile in pastures.</li> <li>• 4 visits demonstration units of beneficiaries.</li> <li>• 5 visiting the Demonstrative Unit INIA.</li> <li>• 2 field days in INIA.</li> <li>• 1st Quarter year 3. In some cases, only described in general profile of attendees, for example. PRODESAL Lanco.</li> </ul> <p>Participating beneficiaries, local producers and neighboring regions. High schools and agricultural schools. 4 editions were scheduled.</p>
Replication course conservationist techniques soil, water and crops	13	-	-	-	-
<b>Total diffusion and replication</b>	<b>513</b>	<b>28</b>	<b>1,866</b>	<b>1,296</b>	-

Source: prepared by author with information of the Skills Generation Plan, annual reports 1 and 2.

**Table 17. Training activities not included in the Skills Generation Plan (PGC).**

<b>Courses not included in the generating competitions plan</b>	<b>Expected participants</b>	<b>Executed</b>	<b>Attendees total</b>	<b>Women</b>	<b>Progress degree</b>
Soil management workshops for the establishment of rainfed crops	80	5	168	71	5 workshops conducted by professionals from INIA producers and technicians. It is not found in the PGC, but in the POA 2019 and indicates 8 workshops
Apiculture production under rainfed conditions. For producers and technical	40	4	149	50	3 workshops conducted by professionals in the project and one external talk by consultant to producers and technicians. It is not found in the plan, but if the POA 2019 and indicates 4 workshops
Hydroponic forage production Course	-	3	113	46	3 courses conducted by professionals from INIA producers and technicians. It is not found in the plan, but if the POA 2019 and indicates three courses.
Workshops or seminars on concepts of climate change and its effect on rain-fed agriculture	-	7	-	-	No data assistants. Presented as awareness days aimed at teachers and students in rural schools or colleges agricultural municipalities of the project
Presentation effects of climate change on agriculture	-	9	569	316	9 presentations are made to different local organizations
Rainwater harvesting course	-	2	66	-	2 courses of the project technical team, professional and technical PRODESAL and INDAP given by INIA
Soil classification course	13	-	10	1	1st Quarter year 3 INIA course dictates territorial coordinators, technicians and coordinator territorial INIA. 3 people justify nonattendance
Regulation and maintenance of tractors course	16	-	-	-	Scheduled for September 2019. They have not finished, need tractors have 50 hours of work. Oriented regional coordinators, technicians and territorial units and holders of demonstration given by the company
Harvest accumulation and water use efficiency	-	-	10	8	1st half of year 3 courses in the year were done
Management and development of hives in dry	-	-	12	1	For the territorial technical team. It runs Q1 year 3

conditions adapted to climate change course					
Spring and autumn course management considering aspects of adaptation to climate change	-	-	11	6	For beneficiaries of the project. It runs Q1 year 3
<b>TOTAL</b>	149	30	1,108	499	-

Source: prepared by author with information of the Annual Management Reports 1 and 2.



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In short, the trainings of component 1 have changed regarding what had been proposed in the PGC developed in year 1 of the project, where no technical explanation of the change was found in the documents reviewed. New skills that are included in the POAs are considered but there are not technical or conceptual foundations that generate their incorporation. However, it was considered that reflect the flexibility that has existed for incorporating new themes required.

At the time of evaluation, it is observed that only one of the specific trainings scheduled for trainers has been conducted and it was earlier in year 3. Other specific trainings for this segment have been made in year 2, such as the visit to Brazil, sheep management and rainwater harvesting course. In the first quarter of year 3, hive management, soil and regulation tractors courses were conducted. This situation is relevant, because as responsible for field interventions were proposed to guide producers into implementing actions, which should be trained early in the core subjects to achieve the objectives of the project.

Although there has been progress in the installation of demonstration units and there have been several training and diffusion activities, there is a gap in the opportunity to train the trainers. In addition, proposals for intervention in the demonstration units are not fully implemented, thus greater involvement of attendees is related to outreach improper training.

The second specific objective of the project, associated with result 1.2, refers to implementing measures and technologies to increase the water resources availability in rural communities in coastal and inner dryland within the O'Higgins Region. This is one of the actions that directly affects the resilience of farmers and, therefore, has a high valuation. The proposed strategy is harvesting, storage and use of rainwater, which has been steadily decreasing during the execution of the project, so the expected effect may not have the magnitude proposed and which was to have 20,000 liters of water per holder a year and increase household incomes in at least US \$ 1,000 / year, through the use of water resources.

As seen in **Table 18**, proposed activities in POAs have been executed in a high proportion. However, the construction and installation of capture units, accumulation and utilization of rainwater is delayed. The goal of the project was to have the implementation of these systems in 558 fields of beneficiaries.

It was observed too, that due to farmers personal problems, the list of beneficiaries has been modified since November 2019 to define missing 44 beneficiaries (7.8%). However, this information should be reviewed as soon as possible.

Out of the total farmers that were incorporated into the project, 20.3% belong to the community of Paredones, which is the most representative; being Navidad and Litueche the smallest share (7% and 7.2%, respectively). From a gender perspective, out of the total targeted beneficiaries, 42% are women; 51% men and 8% are not selected because of the need for replacement of the original listing. The original project proposed 57% of women.

**Table 18. Compliance degree with the activities in the POAs years 1 and 2 to the result 1.2.**

Activities	Indicator	Compliance degree	Year 1 compliance report	Year 2 compliance report
<b>Output 1.2 The implementation of measures and technologies to increase the water resources availability for rural communities in coastal and inner dryland of the O'Higgins region</b>	<b>Number of people affected by climate variability</b>	-		
<b>Product 1.2.7. Installing rainwater pickers and surface runoff facilities use 558 properties including training and procurement of equipment and materials (roofing materials, rain pipes, cisterns mobile water pumps powered by renewable energy sources (sun, wind), the installation greenhouse)</b>				
Activity 1.2.7.1. Diagnosis property for building rainwater harvesting systems (558 properties)	Farmer beneficiaries visited and surveyed	2018 survey to a sample of 577 farmers. Survey year 2, 233 beneficiaries of rainwater collectors.	108%	100%
Activity 1.2.7.2 Preparation of technical terms of reference and purchase construction materials of water harvesting systems	Purchases made	-	100%	100%
Activity 1.2.7.3. Hiring contractors for the construction and installation of units of accumulation and rainwater harvesting (greenhouses)	Number of equipment installers hired	-	100%	100%

Activities	Indicator	Compliance degree	Year 1 compliance report	Year 2 compliance report
Activity 1.2.7.4. Construction and installation of unit of accumulation, and rainwater harvesting	Number of harvesting systems built and operating waters on grounds of beneficiaries	64 year 1, 62 year 2 and without receiving 109 year 2.	100%	36%
Activity 1.2.7.5. Purchase of materials for the construction of greenhouses (wood, plastic, polycarbonate, and others)	Number of constructed and operating greenhouses on land beneficiaries	64 greenhouses constructed year 1, 61 year 2	100%	100%
Activity 1.2.7.6. Purchase materials irrigation technology for enabling irrigation in greenhouses (tape irrigation, irrigation controller, pumps, droppers, and others)	Number of systems built and operating irrigation	64 irrigation systems-built year 1, 61 year 2	100%	100%
Activity 1.2.7.7 Training on the rainwater harvesting system	Number of trained farmers	239, 142 women in different courses	13%	100%
<b>Product 1.2.8. Capacity building through knowledge sharing and demonstrations of good practice:</b>				
Activity 1.2.8.1 Visits of foreign experts and visits by members of the training team and advisory services (1.1.1) to these countries	Number of visits and / or proxies received	The Advisory Committee No. 15 indicated that these visits will not be made overseas, distributing funds to allocate to other training and seminars	0% POA 2	0%

<b>Activities</b>	<b>Indicator</b>	<b>Compliance degree</b>	<b>Year 1 compliance report</b>	<b>Year 2 compliance report</b>
Activity 1.2.8.2 Guided tours to farmers in the region and neighboring regions of O'Higgins to fields demonstration of the project (expected number 3,000 farmers)	Number of visits and / or consultancies and number of participating farmers	4 visits to demonstration units, 107 participants of whom are women 46. In Hidango 5 views, 131 participants, 49 women.	0% POA 2	100%
Activity 1.2.9 Implementation communications unit working on: Media Plan, design and other	Audiovisual material / documents / media and other	The team is hired year 2, define communicational strategy but is not media plan.	Not implemented	100%

Source: prepared by author with POAs Year 1 and 2, annual reports year 1 and 2.

To achieve the specific objective 3 (output 2.1) to improve decision-making based on management agroclimatic information for the current variability of climate and future changes in climate, focused on local professionals MINAGRI and communities, seeks to generate adequate information to be diffusion through appropriate means to improve training for decision-making. **Table 19** shows a summary of the compliance grade of the activities planned in years 1 and 2 POAs for the outcome 2.1.

As the progress of the result 2.1, the report indicated that year 1 executed the following activities:

- Analysis of the location of EMA in the demonstrative unit of Navidad.
- Acquisition of a repository server for automated processing regional database (January 2018).
- Diffusion of the Regional Agroclimatic Observatory (OAR) broadcast meetings with farmers.
- Agroclimatic risk management training for local committees: Pichilemu, Marchigue and La Estrella. Similar activity with the Mayors of the 8 municipalities of the territory project.
- Finished the training on climate risk management in the agriculture and forestry sector (e-learning) to field technical teams and other officials and institutions related to the project: INIA, INDAP, SEREMI (May 2018).
- 2 implementations of the OAR meetings with specialists in the area of hydrology. Scope: analysis and discussion features of the territory, alternative measuring instruments, concepts of hydrological drought, synergies and lessons learned from similar projects in the territory of the dryland of other municipalities (May 2018).
- Realization of the seminar "Risk Management: new technologies and methodologies for Agro-climatic information used in agriculture" (Pichilemu, July 2018, 107 participants).

Advances presented in year 2 are as follows:

- Mr. Hector Manuel Araya Ramirez was selected for the installation of Automatic Meteorological Station (EMA), located in Licancheu, Navidad municipality (UTM coordinates: 6240362.2 - 241941.2).
- Company acquisition: Engineering and Projects Ltda. Competitive bids for equipment for EMA, which considers the installation and commissioning on site.
- Installation and commissioning of the EMA: this activity was carried out between days 09 and 11 September 2019 (year 3 of the project).
- Development of promotional material: video and booklet of component 2.
- Hiring Agronomist / Computer specializing in management of agro-meteorological information, knowledge modeling and construction of agro-climatic indicators, responsible for developing the technical activities of component 2.
- Underground Water Monitoring System: a technical visit in the 8 municipalities of the project, in which 14 wells were characterized to determine the feasibility of being part

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of the monitoring system. In addition, it was decided to expand the design of this system, by involving the General Water Directorate (DGA) and the National Geology and Mining (SERNAGEOMIN).

Regarding the generation of agro-meteorological information, it was found that the coordinated work with FIA, decided to leave only one EMA as part of the project, which allowed the release of resources and proposed a groundwater monitoring.

Although the installing of the EMA was delayed, meanwhile acquiring sensors for hydrological monitoring was postponed for year 3, as through coordination with the DGA and SERNAGEOMIN have identified areas where work is required in advance, which is positive.

Where substantive progress is observed is on the implementation and use of the OAR and diffusion for this.

Further advances partially observed in the consulting services required for the project and the postponement of activities and recruiting service flight drones (topography, soils, water sources and characterization of vegetation). Other activities are lagging behind in their implementation, like radial diffusion.

Trainings component 2 have been handled independent of the component 1. Two training for territorial and regional technical coordinators were conducted through the e-learning course management of climate risks linked to the agriculture and forestry sector, 15 professionals and technicians of the project in 2018, and 7 training in 2019. In addition, this component defined to provide training through communal agroclimatic tables.

In summary, 3 trainings within the framework of the local committee meetings and 5 meetings through agro-climatic tables have been developed to December 2019.

Currently, there are two agroclimatic tables implemented, which have been welcomed by the beneficiaries, and have shared information and experience, that permitted to value their knowledge and to deliver tools for making planting decisions and production management.

Regarding the communications unit, it is already implemented, the manager of communications was interviewed, and strategy was reviewed (not the media plan, which has not been drawn up yet).

It is worth mentioning that the project considered hiring a rural communication specialist (see detailed budget, Part III -G, National Consultants), which would be part of the UGP, in order to define, coordinate and implement a coherent communications strategy and diffusion to include news about training and opportunities, demonstration of learned lessons when they are delivered by the activities of the project and information of the agro-climatic system risk management (drought alerts, alerts for frost alerts for water stress, a result 2.1).

However, the communication unit currently consists of three people: a public administrator (team manager), an audiovisual communicator and a graphic designer, which implies that it is best to go back to the original design proposed for the project. While it was clear that the project requires communication equipment, this must be led by a rural communicator.

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The role of the new communications team must stay oriented towards both components of the work project, unlike what was mentioned in the original project primarily which was associated with component 2.

Communications strategy of the project also considered a website of the project, a consultancy on defining appropriate communication strategies, information in diffusion and training for system of agro-climatic risk management, professional communication services to adequately prepare messages for audiences and budgeting for advertising services radios, as they are the most widely used among the target population means.

The project proposed this way of communications strategy, because it considered the difficulty of getting information to a segment of producers with particular characteristics, so that it should address this need from all actions of the project. From preparing materials and methodologies for the training, technology transfer, etc., to define and use the most appropriate means for producers to have the information in the form and timing to define actions on their properties.

While the strategy considers communications, direct beneficiaries are the first channel for communication and defines the work field as fundamental, so professionals reach them, this evaluation did not observe that there is a special training professional in the communication unit in this area.

Because of the innovative nature of this component, it was assumed that the successful implementation of component 2 serves as a model for improved agricultural management aimed at adaptation to climate change.

**Table 19. Compliance degree of the activities planned in years 1 and 2 POAs for the outcome 2.1.**

Activities	Indicator	Compliance degree	Year 1 compliance report	Year 2 compliance report
<b>Result 2. Improve management decision support agro-climatic information for the current climate and future climate change for local professionals MINAGRI and rural communities.</b>	<b>Percentage of population covered by adequate systems for risk reduction</b>			
Output 2.1.1. Strengthening the existing network of automatic meteorological station (EMA) in the project area:				
2.1.1.1 Activity 4 · Acquisition and installation EMA for monitoring climate on relevant sites in the project area	Report preselection of land, ToR, EMA installed and operating	On the recommendation of a study of the FIA decide to install just 1 EMA	100%	50%



Activities	Indicator	Compliance degree	Year 1 compliance report	Year 2 compliance report
Activity 2.1.1.2. Acquisition of other measuring equipment: sensors / stations, based on specifications of existing networks	Reports national / international table hydrological reports, TORs advisers	This activity was postponed for year 3. During the development of new background activity, they rose that made it necessary to rethink the original proposal. Meetings have been developed with SERNAGEOMIN in regions VI and VII, as well as the DGA (Hydrology Division) to develop a monitoring design more robust and useful for rain-fed groundwater	100%	0%
Activity 2.1.1.3 National Agronomist Consulting / Computer specializing in management of agro-meteorological information, knowledge modeling and construction of agro-climatic indicators	ToR and Contract	-	100%	100%
Activity 2.1.1.4 Expert Consulting agroclimatic information, modeling and construction services / setting indicators according to requirements of the region	ToR and Contract	1 consultant with support from the CAZALAC). Installing software for data processing and repair platform Regional Observatory, which had technical problems after their migration to the Ministry of Agriculture	100%	63%

Activities	Indicator	Compliance degree	Year 1 compliance report	Year 2 compliance report
Activity 2.1.1.5 Contracting services for integration, automation of real-time data (existing networks) and building monitoring indicators	ToR and Contract	Currently it is developing the model for the OHR	Does not appear	0%
Activity 2.1.1.6 Server repository for processing automatic regional database	Server installed and operating	-	100%	100%
<b>Output 2.1.2. Capacity building for data analysis and integration in making significant decisions for agricultural management climate and weather and their incorporation into decision-making in land management.</b>				
2.1.2.1 Consulting expert for design, architecture and implementation of the OHR formation of regional special abilities	Number of advisories made by subject	International consultant and CAZALAC	100%	100%
2.1.2.2 Consulting application performance prediction model	ToR and Contract	This activity is not performed, being replaced by a classification study crop area using satellite imagery	Does not appear	0%
2.1.2.3 Recruitment international consultant for agroclimatic monitoring flows and groundwater, Holistic Management, Science citizen.	Number of advisories made by subject	Year 1 was not hired. Year 2 Monitoring hired Flows and Groundwater Science and Citizen are pending for the next stage thematic Monitoring and Holistic Agroclimatic Management	100%	40%

<b>Activities</b>	<b>Indicator</b>	<b>Compliance degree</b>	<b>Year 1 compliance report</b>	<b>Year 2 compliance report</b>
2.1.2.4. Drones Flying Service (topography, soils, water sources and characterization of vegetation)	ToR and Contract	Advisory committee on August 12 agreed that this point will be addressed in year 3	0% POA 2	0%
2.1.2.5 consultancy in the development of a Plan for Rural Communication	ToR and Contract	By decision of the director of the project this advice was not hired, indicating that the communications equipment would be responsible for the development and implementation of communications of the project, which has not happened to date	0%	0%
2.1.2.6. Rural activity extension and advisory	ToR and Contract. Model of rural extension	Rural extension is addressed in the Tables Agroclimatic Participative	0%	0%
2.1.2.7 Services Professional communication for the project activities (production of documentaries, videos, freedom, etc.)	ToR and Contract	Working with the communications team hired by the project	100%	100%
2.1.2.8. Development of manuals and tutorials with the products of the project and final documents for diffusion	ToR and Contract	Working with the communications team hired by the project	Does not appear	100%
2.1.2.9. Printing Services promotional material, caps, pencils and other	ToR and Contract	Products were determined to do	Does not appear	100%
2.1.2.10. Radio broadcasting services and other media, products of the project and its applications	ToR and Contract	Still no material is carried on the activities of component 2	Does not appear	0%

<b>Activities</b>	<b>Indicator</b>	<b>Compliance degree</b>	<b>Year 1 compliance report</b>	<b>Year 2 compliance report</b>
2.1.2.11 Training courses for farmers and technicians, and distance (domestic and foreign)	Number of courses taken	In year 2, 3 trainings were conducted within the framework of a local committee, conducted by the consultant SEGRA and 2 members of the agroclimatic table and one course and learning	100%	67%
2.1.2.1.12 installation training units to facilitate the transfer of knowledge to farmers and technicians	Number of units	In year 2, it was decided to do so through participatory agro-climatic tables, where 2 were installed	0%	67%

Source: prepared by author with POAs year 1 and 2, annual management reports year 1 and 2.

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Summarizing, the effectiveness of the project is low, considering the resilience of vulnerable farming communities to variations in climate and climate change, regarding the handling of livestock, crops, water and soil management through training, for professionals, technicians and beneficiaries. Probably the main reason is the low current yield of the project, which should be increased from the present mid-term review, especially considering the learned lessons to date and recommendations for technical and administrative management.

It is noteworthy that it is required to move forward in the development of these activities in an appropriate way, and that the measurement indicators are defined in the adoption of new technologies. In addition, it should be given particular importance to the reduction of available water supplies for farmers, which raised since the design of the project in 2015, as not to increase the amount of precipitation of the agricultural season 2020, cumulative effects will be devastating for food security, and probably an indeterminate number of beneficiaries has been the subject of the project should migrate or be relocated because of extremely adverse weather conditions and / or other socioeconomic variables.

## 8.2 Control mechanisms and monitoring implementation

Mechanisms for monitoring implementations is mainly done through reporting reports made by the UGP and INIA. Moreover, the AGCID presents reports and financial monitoring and minutes of the FACC, analysis and observations of management reports to the UGP. It is noteworthy that the annual work plan (POA) is the document where the work is set to develop during the corresponding year. The POA 3 is the current year to date.

The different types of reports produced are presented below:

- UGP has produced three annual operating plans: POA 2018 (August 2017 to August 2018), POA 2019 (August 2018 to August 2019) and annual operating plan of year 3 (August 2019 to August 2020) is currently active.
- Annual report year 1 and year 2 prepared by the UGP.
- Project performance report year 1 and year 2 prepared by the AGCID.
- UGP quarterly reports, the latest report delivered corresponds to the N°9 which run from August 18 to November 18, 2019.
- INIA quarterly reports, the latest quarterly report corresponds to the No. 6, December 2019.
- Analysis of the quarterly progress report No. 4 prepared by the AGCID.
- Quarterly comparison and analysis permanent POA 2019 report, prepared by the AGCID.
- Draft observations to the execution of the project, prepared by the AGCID.
- Observations machinery draft prepared by the AGCID.
- Monthly reports of activities prepared by the AGCID.
- Technical reports of field visits, which are sent to the Under Secretary of Agriculture.

It should be noted that the control and monitoring of the project has been made in terms of percentage of completion of activities defined in the POAs of each year. For this reason, in **Tables 12, 17 and 18** indicators and the compliance degree with the progress in the proposed activities are shown.

Moreover, the project has addressed the monitoring by gathering of information of beneficiaries through annual surveys conducted by the field team and led by sociologist, which has varied from obtaining general base line of farmers beneficiaries through gathering information from a sample of them, to create impact indicators of the project. However, this mechanism of control and monitoring focused on the direct beneficiary farmers has been successful, the generation of ways of monitoring and measurement of implementation in the institutions and their officials, and indirect beneficiaries are pending.

The Minister of Agriculture, Minister of Environment and Executive Director of the AGCID are participating in monitoring at a national level. Having responsibilities to review / approve the POAs, annual management reports, budgets and annual financial reports. In addition, providing strategic direction and reporting the implementation to the national director.

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While the project began in August 2017 with a kick off workshop with the participation of the Minister of Agriculture, the Director of AGCI and Mayor Regional, the steering committee is constituted a year later (August 2018), occasion the POAs of years 1 and 2 are validated.

On August 12<sup>th</sup> 2019, the second meeting of the steering committee was held, with the participation of the Secretary of Agriculture on behalf of the Minister of Agriculture, the representative of the Minister of Environment; and the National Director of the AGCID, along with the SEREMI of Agriculture of the O'Higgins region and director of the project, as well as professionals of INIA and UGP. At that meeting, the annual operation plan was validated of the year 3 and status corresponding to advancement of annual operating plan for year 2 was approved.

On the other hand, it is the advisory committee that conducts expert advice and operationalization of decisions, chaired by the SEREMI of the Agriculture who is the project director and acts as secretary the coordinator of the UGP. Participating representatives from AGCID, MMA, MINAGRI, INIA, SEGRA, among other guests. Meetings held year 1 and 2: 15 in total, according to the 2018-2019 annual report.

At a regional level, the regional executive committee carries out the specific coordination of the project in the O'Higgins Region, giving advice and support to the project director in technical and operational interagency coordination. In total, 7 meetings in years 1 and 2 were held. Chaired by the SEREMI of the Agriculture and regional authorities involved: SEREMI Environment, INIA, INDAP, SAG, CONAF, SEGRA, and the Agency of Sustainability and Climate Change.

Finally, at a communal level, there are eight municipal committees of the project, one per municipality, according to the original project work, locally coordinating the actions of the project at the municipality level. They are involved in monitoring the demonstration farms, machinery used by farmers and training activities. Joining the committee's the INDAP team through the SAT and PRODESAL and SAG technical teams through the SIRSD-S. However, they have operated partly as initially planned, since the committees have also been training spaces.

### **8.3 Performance indicators and actual project performance**

Analysis of compliance with performance indicators projected is not possible yet, because the information has not been systematically broken down, so as to show the number of indirect beneficiaries who reached with the training activities of the project, so they acquire better skills and training in order to increase their resilience to climate change.

August 2019 performance of component 1 shows the construction of 171 harvesting units and rainwater storing facilities (30.6% complete). However, some systems have not been received yet, due to pending administrative background and lack of spending approval.

Regarding the preparation of soils, no information of performance to January 2020, since the beginning of the work and commissioning of the equipment soil preparation began on the ground on 25 November 2019, with some difficulties in operation that at the time of the field visit could be observed, so were faulty machinery parts and excessive wear of agricultural implements.

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## 8.4 Opportunities to strengthen the project effectiveness

To date, the following opportunities are displayed to strengthen the effectiveness of the project:

- To define the potential beneficiaries to complete the 558 direct beneficiaries that will be part of the project, as soon as possible.
- To conclude the pending construction of the systems of harvesting and storage of rainwater, irrigation systems and construction of greenhouses, as soon as possible.
- To improve the performance of soil preparation.
- In the demonstration units install signage to permit observance of the different components of the unit, actions and goals, so that visitors can make the route of the unit without further explanation by the beneficiary or technicians, and understand how the proposed actions are creating capabilities that will enhance the resilience of agricultural production systems.
- To review and assess the compliance degree of the communications strategy in extraordinary session of the advisory committee. In addition, request the UGP and INIA to consider the visibility of the project in a better way, with the installation of signs on the main access routes to the demonstration units.
- The trainings, courses and workshops should deliver a certificate of participation and / or approval, if it has evaluations.
- To incorporate a conceptual description of the scope considered, perform field trips and guided visits to the demonstration units.
- It is also recommended to make a farm system according to demonstration unit in Pumanque, and to be visible from the path to the site.
- According to information gathered, is to be hired a new manager for the agroclimatic tables. It is important to consider that the professional should have training, experience, skills and competencies in the following areas: climatology, agroclimatic, atmospheric models (mesoscale models and assimilation systems for the study and operational forecasting, agro-climatic risks (threats, vulnerabilities)), monitoring of atmospheric variables and early warning systems.

## 9 SUSTAINABILITY OF THE PROJECT RESULTS

To talk about sustainability of the project based on the analysis of capacity building for adaptation to climate change, it is still anticipated at this stage of the project, since the project is ongoing and has several activities that have not been executed. Likewise, it is anticipated to make a full assessment of the shares initially designed and / or modified actions that are being carried out as relevant in terms of capacity building and training to face the resilience of agricultural rural communities of the coastal and inner dryland, regarding current climate variability and future climate change.

Nevertheless, it is worth mentioning that in the Results Framework, Milestones, Targets and Indicators of the project (letter E, page 58 of the FACC Project 2015), no activities leading to the achievement of the expected results were defined, but these activities were subsequently established in the annual operational programs (POAs).



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Moreover, goals and indicators proposed are the number of direct and indirect beneficiaries to be trained, as well as institutions and staff to be trained. Also, the amount of water available per beneficiary would generate a raise in household incomes. In terms of area with better soil quality. These goals are:

- 558 direct beneficiaries (318 women) with lower risk from extreme weather events.
- 2,208 direct beneficiaries (691 women) with greater access to machinery for soil preparation and technical assistance.
- 4,988 direct beneficiaries (1,562 women) with a lower risk from extreme weather events (early warning system).
- 255 officials from 13 institutions, of which there are five MINAGRI services (INDAP, INIA, ODEPA, SAG) and eight municipalities, trained to minimize exposure to the risks of climate variability.
- 20,000 liters of water per year available per beneficiary which should increase household incomes in at least US \$ 1,000 / year.
- 5,000 ha with better quality of the soil, which means that household income will increase to at least US \$ 1,000 / year.

From the above, it was noted that the indicators / targets defined for the overall objective, specific objectives and results of the project will not allow measuring sustainability and / or impact of the actions, but is able to know coverage of the activities carried out, where it is unclear how many beneficiaries (direct / indirect) and / or official institutions participating in the training or field days.

In addition, indicators / targets (**Annex 3**) do not capture the possible dimensions of resilience to climate change of agricultural rural communities in the coastal and inner drylands once the project or after completion of this, which must take place at the end of the project.

So, it is recommended to define a system of evaluation and monitoring of use of practices for soil conservation and sustainable production systems that promote the improvement of environmental conditions in the final stage of the project, with particular emphasis on increasing the stock of organic carbon in the soil and vegetation in the area of intervention. It is recommended that the project promotes diversification of production systems to ensure the adoption of technologies and long-term sustainability.

The initial estimate of sustainability presented below is based on findings that have been obtained in this evaluation, anticipating that the results achieved involve any permanent achievement or a tendency toward change. Moreover, the analysis considers whether technological, financial and institutional dynamics arrangements contribute to the sustainability of the project.

### **9.1 Ability of adaptation to climate change**

Analysis of capacity building for adaptation to climate change based on the actions being carried out in components 1 and 2. It is important to mention that it is expected to moderate sustainability, which is evidenced in the following aspects of the expected outputs and territorial intervention:

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- The final training advisory teams for the transfer of technology for the 8 municipalities took place during year 2 of the project. However, new courses are scheduled, not considered in other trainings for professionals and technicians, such as greenhouse vegetable production, coordinated and supervised by INIA experts.
  - 9 demonstration fields for technology transfer are operational, but better visibility is required for their location and actions to be taken or planned, which should also be added to the project's website <http://cambioclimatico-ohiggins.cl/>. So that more indirect beneficiaries or other persons who have moved to the areas of influence of the project can access to meet the proposed actions, infrastructure, operation and maintenance.
  - Even though the purchase of agricultural machinery was made, some tools don't meet the technical specifications, which will prevent having a consistent performance at the moment of soil preparation prior to the rains, to meet the expected result.
  - Purchase of regenerating of pastures is pending, which there is no consistent reason for postponing.
  - Regarding maintenance and operational costs of machinery and implements purchased by the project, there is a need of an instructive of preventive and corrective maintenance and cost estimates to work. It is not defined, how and who will manage the machinery acquired after the project is finished.
  - Training in the sustainable management of soil: tillage practices, fertilization, recovery of soil fertility and holistic management of the soil have been implemented in several trainings, but it was not possible to know the level of adoption of the proposed technologies.
  - Training in crop management (triticale, quinoa, etc.), forage crops (legumes, grasses), fruit trees (olives, walnuts) and livestock (sheep), tolerant to variability of climate and climate change, including the purchase of seeds, plants and animals. They have been performed in fewer number (see paragraph effectiveness of the project). In addition, the design of the project mentioned that INIA has developed varieties that are resistant to water or thermal stress that will be available.
  - Training in the efficient management of water in the demonstration units (including the acquisition of equipment), it has been made through the application of irrigation. Irrigation systems powered by renewable energy (solar radiation) have not been made yet. There is no progress in the use of wind power, as the technical feasibility study gave negative results due to the speed and power of the wind.
  - Installing rainwater pickers and surface runoff and installation greenhouse was carried out in 126 properties. 109 reapers are installed, but without being received due to lack of administrative records for approval of spending.
  - Capacity building through exchange of knowledge and good practices, has performed partly as initially was considered. Similarly, a visit to Brazil by members of the training team and counseling took place, but without the participation of farmers and without considering the initial objective of this activity. The activity was changed, making a visit to the Ecological Center of Puerto Alegre.
  - Guided visits to farmers in the region and neighboring regions have been partially executed (expected number 3,000 farmers).

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- The preparation of manuals and workshops for the diffusion of farming practices is ongoing. However, there are available on the page a series of technical documents.
  - OAR will be operational by the end of year 3, so it will be available only one year, to transfer the knowledge of agroclimatic information to local professionals, technicians and beneficiaries, if the project is not extended.

The beneficiaries of the demonstration units and other direct beneficiaries of the project, valued intervention and concern that has given them opportunities they did not have before, also generating additional revenue. For example, some women who had never worked in a greenhouse now feel they have their own workspace. However, the main concern of beneficiaries since 2015 is the reduction of water sources.

### **9.2 Appropriate action to ensure sustainability**

Main action that is relevant to notice is to ensure sustainability of the project, related to the information required from the direct beneficiaries. Essential information for planning actions, refocusing others, or face deviations that are happening.

It should be noted that information is rising the direct beneficiaries through a sample with a survey, which is being led by sociologist belonging to the team of the UGP. However, it is appropriate to remove information from the universe of beneficiaries and transfer it to a database, in a friendly and easy way to use system for which the MINAGRI owns software license. Thus, it will be easier and more efficient to know the situation at all times. Database that can also be available to the many institutions that make up the governance of the project.

On the other hand, there are actions that have not considered about the availability of water from the direct and indirect beneficiaries, which there must be designed and estimated number according to the socioeconomic baseline. They should be prioritized, so that contribute to refocus the project according to the existing diagnostic and status of current water shortage is occurring in the O'Higgins Region. It should be noted, as Libertador General Bernardo O'Higgins Region indicated, that there is a shortage in the area declared by MOP Decree No. 116 of 03 October 2019. In addition, it is in agricultural emergency.

Likewise, it is important to distinguish the need for training professionals and technical teams depending on whether they are part of local institutions or the project team. Professionals and technicians from local institutions play a major role in the sustainability of actions once the project is complete.

### **9.3 Opportunities to strengthen project sustainability**

The main opportunity to strengthen the sustainability of the project is displayed on improving inter-institutional management for synergy of joint actions, ongoing or that must be carried out among the ministries that make up the committee of the authority designated for FACC of UNFCCC, which are: MMA; MINAGRI, MOP and Ministry of Foreign Affairs.

Additionally, it is required to improve the interaction and joint work between INIA and UGP as it was observed that are not entirely integrating all work, which is evident for example in

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the purchase of machinery, which is critical in the success of the project; technicians and professionals have not been trained in the production of greenhouses nor gender focus; etc.

Here are some actions that could strengthen the project sustainability:

- At each demonstration unit, to install visible information by hanging a thermolaminated sheet set with this information or make it available in a folder.
- Planning priority activities of the project, as is the soil preparation before the rains of autumn.
- Tender the construction of greenhouses that have not yet been built, with a prior review of the initial technical specifications, considering that the proposed lifetime of this infrastructure was estimated in 15 years.
- Request information regarding socio ecological restoration projects that are running to the MMA; for example, in the Maule region, Restoration Plan Socio-scale ecological landscape in Huenchullamí Putú Territory. Interventions in these projects together with communities and the learned lessons there is no doubt that will support the development of resilience, because ecosystem services have become an important model that links the functioning of ecosystems with human well-being. Restoration of native vegetation in water provision areas can increase soil organic carbon stocks and improve availability (quality and quantity) of water resources.
- In the demonstration unit of La Estrella it is suggested to provide it with a system of photovoltaic panels to be 100% sustainable energy, since the unit has good location to draw attention to the project and its actions, and the owner has the characteristics of innovative entrepreneurial, shown during the field visit, using the technology they use to produce goat cheese. In addition, it was shown that it is an innate communicator of the actions that are taking on the project. It also has a great willingness to participate in all kinds of activities.
- Finally, in the demonstration unit of Pichilemu, CONAF should be ask to go through the agreement of the project, appropriate implementation of a program regarding preventive management of native forests and plantations, a program of "Prepared Communities," which seeks the implementation of three actions of prevention and reaction to fire, together with the community. This measure seeks to sensitize people to implement forest fire prevention work under National Strategy on Climate Change and Vegetation Resources also has other facilitative measures for implementation.

## **10 IMPACT OF THE PROJECT**

The analysis of the impact of the project through the identification of the effects that are taking the actions implemented and the assessment of the transformative effect of the project at several levels of stakeholders may demonstrate to the completion of the project or afterwards.

However, from interviewes of demonstration units in the project area, being Lolol, Paredones, Pichilemu, Pumanque, La Estrella, Marchigue, Navidad and Litueche, we can observe a positive and permanent impact in some cases, because the answers of the farmers relate to the climate changes they are living, meaning they have more knowledge and sensitized in the topic , mentioning that it happened earlier than expected and productive

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transformations they had to do, due to climate variability, which are: decline in cattle population, legumes production in small and specific sectors, oat production missed in season 2019 and wheat had low productivity.

In another sense, it is evident that incipient resilience to climate variation and the implementation of measures and technology is producing an initial effect, in terms of production systems. For example, in the use of an electric fence, the use of a subsoiler plow to prepare the soil before planting and water when using greenhouses.

It is noteworthy that it was evident in some field visits, that two greenhouses in Navidad didn't have water for irrigation and two more had been irrigated with potable water.

It is worth mentioning that the extreme conditions of current water shortages are extremely relevant to the impact of the project and the actions to be implemented in the remaining time of the project, will be crucial for the impact and expected results.

### **10.1 Visibility and communication of the project actions**

The valuation of shares of visibility and communication of actions of the project which is carrying out the communications unit and has been reflected in the communications strategy, was conducted by reviewing, both this strategy and the website of the project and social networks implemented.

The objective of the project's communication strategy is to create a positive link between the beneficiary and the project, raise awareness, teach about it and spread it, which is not being met through social networks, because communication and outreach is nonexistent across platforms that have been used, like Instagram, Twitter and Facebook.

On the other hand, the website <http://cambioclimatico-ohiggins.cl/> could be fulfilling a part of the relational objective, charming, attracting, raising awareness on the importance of conservation the productive areas and reporting, but it is not creating a link and interaction between the direct and indirect beneficiaries. While the documents of the project are submitted in the following link (Booklets, sowing calendars, etc.): <http://cambioclimatico-ohiggins.cl/index.php/documentos/>, [actions implemented in the demonstration units](#), are no longer available, and the link to information of Agromet shows an error message.

The findings are as follows:

- On Twitter, the last tweet was on December 27, 2019, last retweet is on December 30, and then spam publications from an application. There are no comments, 1 or 2 retweets, there is no interaction with the target group. It has 104 followers, it follows 203 people and has 203 tweets.
- On Instagram, there are 3 posts and the latest was on March 2019, getting 8 likes. The page has 215 followers and follows 7, none of the 3 post has comments, there is no interaction between the public and the page is not communicating to the group the project objectives and scope. The 7 users followed are: Government of Chile, Sebastián Piñera, Intendance of O'Higgins, Mario Vilches Alcaíno, Joaquin Mujica Arriagada, MINAGRI O'Higgins.

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- On Facebook, the latest release was on 8 January, which has neither comments nor likes, but it was shared twice. The previous publication was on 21 December, with 3 likes. It has 330 followers and 314 people liked the page.

Within these three platforms, the content of the information is divided into pictures, videos, news, computer graphics and interviews (**Figure 6**).




Moreover, the website has more content, such as a gallery with pictures, news, activities, current events, among others. The latest publication was on 19 December 2019. It shows the organizations involved, the communication strategy they use and it has buttons that redirect social networks of the project.

Regarding the written media, television and radio, in the category of regional media interest, it needs to specify what the content to be communicated will be, in which programs, in the case of radio and what body, in the case of newspapers, what time and days it will be published.

Moreover, the visibility and communication of the project locally in the territory is low or zero; the demonstration units do not have attachments that easily recognizable by local actors as part of the project done. Moreover, the actions implemented internally in these units are identified, but with little information. More visible information to inform visitors, adaptation measures to climate change that have been implemented in them (work date preparation of soil, seed rate, fertilization, etc. This is highly relevant if we consider that direct and indirect beneficiaries, which are vulnerable farmers in the dry zone, who don't use media like twitter, Facebook or Instagram.

In short, the visibility and project communication which is carrying out the communications unit has significant shortcomings that must be corrected promptly. In addition, the objective of the communication strategy to create a positive link between beneficiaries and the project is not being met.

**Figure 6.** Platforms, content, frequency and engagement announcements.

FACEBOOK													
	Seguidores	Tipo de contenido						Frecuencia de publicación		Engagement (promedio por publicación)			
	Nº seguidores actuales	Texto	Imágenes	Videos	Infografías	Otros	Publicaciones diarias	Publicaciones semanales	Me gusta	Comentarios	Shares	Respuesta a los usuarios (Si / No)	
	330	X	X	X	X			3	5	1	1	No	
TWITTER													
	Seguidores	Tipo de contenido						Frecuencia de publicación		Engagement (promedio por publicación)			
	Nº seguidores actuales	Texto	Imágenes	Videos	Infografías	Otros	Publicaciones diarias	Publicaciones semanales	Favoritos	Retweets	Menciones	Respuesta a los usuarios (Si / No)	
	104	X	X	X	X			2	2	4	0	No	
INSTAGRAM													
	Seguidores	Tipo de contenido						Frecuencia de publicación		Engagement (promedio por publicación)			
	Nº seguidores actuales	Imágenes	Videos	Infografías	Historias		Publicaciones diarias	Publicaciones semanales	Me gusta	Comentarios	Menciones	Respuesta a los usuarios (Si / No)	
	215	X			X			10	0			No	

Source: prepared by author, raised information in January 2020.

## 10.2 Opportunities to strengthen project escalation

The identification of mid-term opportunities to scale or produce a greater impact of the project is given mainly by the actions of visibility and learned lessons from the project, which are: outreach, communication and demonstration of the effects that the actions of the project are producing on the beneficiaries and their production systems, and other beneficiaries who have, for example, rainwater harvesting and greenhouses or have prepared the soil with the available machinery for sowing crops.

For this activity, the project's website is available (<http://cambioclimatico-ohiggins.cl/>), and also social networks to launch some information. However, it should be noted that the web presents errors; for example, on the banner, three titles show the same information. Also, access to the network from the corresponding agroclimatic banner is not possible.

It would also be essential that the features and data of INIA's trials that are executed in the demonstration units were available. Implementation of demonstration units plus soil preparation with visible information and other records that the beneficiaries can provide to visitors, shown by themselves will be essential to improve skills and training to increase the resilience of indirect beneficiaries with this scaling the project to the projected indicators.

Because of this, the opportunities to strengthen the scaling of the project are in the orderly and systematic implementation of demonstration units, with instructions and registration forms, so as to share information with stakeholders and record the number of activities carried out by themselves, with personal history of the visits, being self-employed farmers, salaried farmers, who are permanent or temporary rural dwellers in the areas of the project or outside, productive or social associations, rural schools, colleges, universities, tourists, etc. It is expected that each demonstration unit became a node technology for intelligent and sustainable agriculture, enhancing food security.

It should be noted that the beneficiaries access to healthy food, quality and timeliness is an important part of healthy eating for families. These benefits are extended to a segment of tourists who visits the main inner and coastal areas.

Therefore, it is required to prepare tables with the following information: work cost and production systems proposed and reviewed alongside farmers; for example, in the case of improving a natural meadow enhanced with subterranean clover.

Finally, it is noteworthy that the results generated by the Skills Generating Plan (PGC), should systematize recording separately trained participants who are both direct and indirect beneficiaries, and whether they are technical or professional and to which institutions they belong.



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## 11 REFERENCES

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García E. and Galván J. 2019. The efficiency and its relationship to the success of a project as project managers in research centers. 22 pages.

## 12 ANNEX 1. REVISED DOCUMENTS AND REPORTS

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- Summary of the draft prepared by the coordinator of the Project AGCI.
- 2018 POA end of August 2018.
- 2018 POA and comments.
- 2019 POA end August 2019
- POA 3 Adopted 12.08.2019.
- Annual Report Year 1, UGP.
- Annual Report Year 2, UGP.
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- Year 1 annual survey report.
- Year 2 annual survey report.
- Gender analysis report, December 2019.
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- Resolution 19 (11.14.2016). Approves Convention AGCID - MMA - MINAGRI.
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- Communication channels
  - Steering Committee Act No. 2, August 2019.
  - Terms of Reference agricultural machinery Climate Change project, Jorge Riquelme, INIA.
  - Quarterly Report No. 6, INIA.
  - Quarterly Report No. 5, INIA.
  - Quarterly Report No. 4, INIA.
  - Quarterly Report No. 3, INIA.
  - No.11 advisory committee bill summary, list the project needs, Fernando Baeriswyl Rada, undated.
  - Draft observations on the implementation of the project, Fernando Baeriswyl Rada. March 2019.
  - Monthly report of activities undertaken, Fernando Baeriswyl Rada. June 2019.
  - Draft some observations on the implementation of the project, Fernando Baeriswyl Rada. June 2019.
  - Reports technical team visit the project to the construction of rainwater harvesters, tendered stage, July 2019.
  - Technical site visit report, Fernando Baeriswyl Rada, September 2019.
  - Technical field visit report, Fernando Baeriswyl Rada, October 2019.
  - Monthly report of activities undertaken, Fernando Baeriswyl Rada. November 2019.
  - Draft relevant issues advisory committee No.16, Fernando Baeriswyl Rada, November 2019.
  - Draft observations machinery for the project site visit, Fernando Baeriswyl Rada, in January 2020.
  - Draft important issues discussed at the meeting, Fernando Baeriswyl Rada, undated.
  - Preliminary review of the POA 2019/2020, regarding of the UGP quarterly report in (November 2019), Fernando Baeriswyl Rada, undated.
  - Ivan Mertens notes for FACC.
  - Project performance report "Enhancing Resilience of Climate Change of small agriculture in the Chilean region of O'Higgins (18 octubre2018).
  - Project performance report "Enhancing Resilience of Climate Change of small agriculture in the Chilean region of O'Higgins (2 December 2019).

### **13 ANNEX 2. EXECUTED INTERVIEWS**

- Mr. Joaquin Arriagada, SEREMI of Agriculture Region of O'Higgins, Director of the Project
- Mr. Fernando Baeriswyl, Coordinator AGCID
- Ms. Pamela Garcia, Regional Government, SEREMI O'Higgins Region
- Mr. Enrique O'Farrill - Julien, Head of Cooperation Department Bilateral and multilateral
- Ms. Violeta Leiva, Cooperation Department Bilateral and multilateral
- Mr. Juan Salinas, Chief Finance and Accounting, Under Secretary of Agriculture
- Mr. Antonio Yaksic, Chief SEGRA
- Ms. Priscilla Ulloa, Ministry of Environment
- Ms. Angelina Espinoza, Climate Change Focal Point, Odepa, MINAGRI
- Ms. Sophia Felmer, Director INIA Rayentué
- Mr. Jorge Carrasco, technical advisor, INIA
- Ms. Paloma Gonzalez, a sociologist, UGP team

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- Mr. Nicolas Larenas, Coordinator UGP
  - Ms. Cecilia Araya, UGP team, project control Agriculture Secretary
  - Ms. Bianca Gonzalez, UGP team, project control INIA
  - Ms. Gema Pérez, Demonstrative Unit Pumanque
  - Mr. Domingo Reyes, Demonstrative Unit Manager Paredones and APR of the sector
  - Mr. José Catalán, Demonstrative Unit Pichilemu
  - Ms. Margarita Meza, Demonstrative Unit Lolol
  - Mr. Marco Olguin, Navidad Demonstrative Unit, Sector La Pataguilla
  - Ms. Victoria Pino, La Estrella Demonstrative Unit
  - Ms. Hernán González, Demonstrative Unit Litueche, industry Manquehua
  - Mr. Germán Carvajal, Demonstrative Unit Marchihue
  - Mr. Luis Herrera, La Estrella
  - Ms. Jacqueline Becerra, Marchihue
  - Mrs. Rosa Ramos, Marchihue
  - Ms. Cecilia, Cuzco sector Litueche
  - Ms. Eliana Palma, Litueche
  - Ms. Rosa Orellana, La Estrella
  - Mr. René Acuña, Mayor of Litueche
  - Ms. María Nuñez, Navidad
  - Mr. Alamiro Orellana, Navidad
  - Agro-climatic Marchigue Working Table (01/07/20)

**14 ANNEX 3. RESULTS FRAMEWORK, MILESTONES, TARGETS AND INDICATORS OF THE PROJECT.**

Objective	Indicator	Base line	Goal
<p><b>Main objective of the project:</b> To increase the resilience capacity of rural agricultural communities in the coastal and inner dryland of the O'Higgins Region regarding current climate variability and future climate change.</p>	<p>Number and type of institutions with the best capacity to minimize exposure to the risks of climate variability. Number of people with reduced risk of extreme weather events.</p>	<p>There degradation of agricultural land by malpractices. At times the younger generation of family farms migrate to cities in search of better economic and working conditions and quality of life.</p>	<p>Degradation of the soil is reduced by applying conservation techniques appropriate soil, water and mulch management practices.</p> <ul style="list-style-type: none"> <li>• 13 institutions (5 Services of the Ministry of Agriculture and 8 municipalities) with greater capacity to reduce to the minimum exposure to the risks of climate variability.</li> <li>• At least 255 officials from the 13 institutions (5 Services of the Ministry of Agriculture and 8 municipalities) trained to minimize exposure to the risks of climate variability.</li> <li>• 558 owners (direct beneficiaries, unless 318 women) with a lower risk from extreme weather events. 20,000 liters of water per year available per owner. Income households increases to at least US\$ 1,000 / year.</li> <li>• At least 2,208 farmers (direct beneficiaries, unless 691 women) with greater access to machinery and technical assistance. At least 5,000 hectares with a better quality of soil. Income households increases to at least US\$ 1,000 / year.</li> <li>• At least 4,988 owners (100% of the farmer population, direct</li> </ul>

			beneficiaries, at least 1,562 women) with a lower risk of extreme weather events (EWS 0-> 3). <ul style="list-style-type: none"> <li>• At least 5,343 (direct beneficiaries, less 1,673 women) trained farmers.</li> </ul>
<p><b>Specific objective 1:</b> Implement a capacity building and training system to increase the resilience of vulnerable communities to climate variation, regarding livestock, crops, water and soil management.</p> <p><b>Component 1:</b> Technical assistance and training to improve agricultural practices regarding climate threats to soil, water, crops and livestock.</p>			
<p><b>Output 1.1</b> Implementation of a capacity building and training systems, to increase the resilience of vulnerable farming communities to changes in climate and climate change, regarding the handling of livestock, crops, water and management of the soil.</p>	<p>13 institutions (5 Services of the Ministry of Agriculture and 8 municipalities) with greater capacity to minimize exposure to the risks of climate variability.</p>	<p>Cultivable area O'Higgins region is reduced by 44% and 68%, respectively (stage A2). The most vulnerable group of farmers (under 20 ha) includes 4,988 farmers (1,562 women) and their families.</p>	<p>Greater capacity for soil management, livestock, water and crops. Community access to machines for handling soil.</p> <ul style="list-style-type: none"> <li>• 13 institutions (5 Services of the Ministry of Agriculture and 8 municipalities) with greater capacity to reduce to the minimum the exposure of risks of variability in climate.</li> <li>• At least 255 officials of 13 institutions (5 Services of the Ministry of Agriculture and 8municipios) trained to minimize exposure to the risks of climate variability.</li> <li>• 558 starters (direct beneficiaries, at least 318 women) with a lower risk of extreme weather events. 20,000 liters of water per year available per owner. Household income rose by a less US\$1,000 / year.</li> <li>• At least 2,208 farmers (direct beneficiaries, at least 691 women) with greater access to machinery and technical assistance. At least 5,000 hectares with a better quality of soil. Income households increases to the least US\$1,000 / year.</li> <li>• At least 5,343 (direct beneficiaries, less 1,673 women) trained farmers.</li> </ul>

<b>Output 1.1.1</b> Training of advisory teams for the transfer of agro-technology for each of the 8 municipalities in the area of the project, coordinated and supervised by INIA experts.			
<b>Output 1.1.2.</b> Implementation 9 demonstration fields for transferring agrotechnology (1.1.4, 1.1.5, 1.1.6 and 1.2.8), including infrastructure and equipment (fences, gutters, power supply, etc.): 4- 5 hectares in each of the eight municipalities plus one on land INIA The POA 2 adds "x selection of demonstration units of the ET".			
<b>Product 1.1.3.</b> Acquisition (including maintenance and operating costs) of agricultural machinery for the 9 demonstration fields: Tractors, regenerating grasslands, sowing tillage, plow, chisel plow, plow subsoiler. <b>POA 2019</b> Implementation of demonstration plot and Acquisition (including maintenance and operating costs) of agricultural machinery for the 9 demonstration fields: Tractors, regenerating grasslands, sowing tillage, plow, chisel plow, plow subsoiler and / or others.			
<b>Product 1.1.4.</b> Training in the sustainable management of soil: tillage practices, fertilization practices, practices recovering fertility of the soil and holistic management of the soil.			
<b>Product 1.1.5.</b> Training in the management of crops (wheat, quinoa), forage crops (legumes, grasses), fruit trees (olives, nuts) and livestock (sheep), tolerant to variability of climate and climate change, including the acquisition seeds, plants and animals. <b>POA 2019:</b> Training in handling crops (wheat, quinoa, buckwheat, garbanzo), forage crops (legumes, grasses), fruit trees (olives, nuts) and livestock (sheep), tolerant to variability of climate and change climate, including the purchase of seeds, plants and animals.			
<b>Product 1.1.6.</b> Training in the efficient management of water in the demonstration fields (including the acquisition of equipment) through the application of technology powered irrigation renewable energy (solar and wind radiation).			
<b>Objective specific two:</b> Implement measures and technologies to increase the availability of water resources in rural communities in coastal and upland areas within the region of O'Higgins. <b>Component 1:</b> technical assistance and training to improve agricultural practices regarding climate threats to soil, water, crops and livestock.			
<b>Output 1.2</b> Implementation of measures and technologies to increase the availability of water resources for rural communities in coastal and upland areas within the region of O'Higgins.	Number of people affected by climate variability.	Limited capacity. Small farmers face water shortages from November to April. Receive water in tank trucks municipalities, but in quantity insufficient for maintaining agricultural activity.	<ul style="list-style-type: none"> <li>• At least 4,988 holders (100% of the farmer population, the direct beneficiaries, at least 1,562 women) with a lower risk of extreme weather events (EWS 0-&gt; 3).</li> <li>• 558 starters (direct beneficiaries, unless 318 women) with a lower risk of extreme weather events. 20,000 liters of water per year available per owner. Household income rose by at least US\$ 1,000 / year.</li> <li>• At least 255 officials from the 13 institutions (5 Ministry of Agriculture</li> </ul>

			services and 8 municipalities) trained to minimize exposure to the risks of climate variability.
<b>Product 1.2.7.</b> Installing rainwater pickers and surface runoff facilities use 558 properties including training and procurement of equipment and materials (roofing materials, pipes rain, cisterns, mobile water pumps powered by renewable energy sources (sun, wind), the installation greenhouse)			
<b>Product 1.2.8.</b> Capacity building through knowledge sharing and demonstrations of good practice: · Visits of foreign experts and visits by members of the training team and advisory services (1.1.1) to these countries. · Guided tours to farmers in the region and neighboring regions of O'Higgins fields demonstration area project (planned number: 3,000 farmers). · Development of manuals and workshops for the diffusion of farming practices.			
<b>Objective specific 3:</b> Improve decision-making based on agroclimatic information management for the current climate variability and future climate changes, local professionals focused on the MINAGRI and rural communities. <b>Component 2:</b> Implementation of an information system for risk management and adaptation to climate change.			
<b>Result 2</b> Improve management decision support agroclimatic information for the current climate and future climate change for local professionals MINAGRI and rural communities.	Percentage of population covered by adequate systems for risk reduction.	Small farmers lack agroclimatic information and skills to make decisions on changing agricultural and extreme environments.	Appropriate information diffusion through appropriate means is generated. Along with training, improved decision-making. · At least 4,988 farmers (100% of the farmer population, the direct beneficiaries, at least 1,562 women) with a lower risk of extreme weather phenomena (EWS 0-> 3). · 13 institutions (5 Services of the Ministry of Agriculture and 8 municipalities) with greater capacity to reduce to the minimum exposure to the risks of climate variability.
<b>Output 2.1.1.</b> Strengthening the existing network of automatic meteorological stations (AMS) in the area of the project: · 4 AMS Acquisition and installation for monitoring climate on relevant sites in the area of the project. · Integration of AMS in the network, automatic data processing, continuously and reporting of time and its diffusion to local farming communities.			

Source: prepared by author based on the Project FACC and POAs years 1 and 2.

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## 15 ANNEX 4. GENDER DEFINITIONS (FACC, 2016).

**Gender:** refers to the social attributes and opportunities associated with being male and female and the relationships between women and men and girls and boys, as well as the relations between women and those between men. These attributes, opportunities and relationships are socially constructed and are learned through socialization processes. They are context/ time-specific and changeable. Gender is part of the broader socio-cultural context and intersects with other important criteria for socio-cultural analysis including class, race, poverty level, ethnic group and age.

**Gender balance:** refers to the goal of having the same number of women and men in decision-making bodies and among staff in the different levels of organizational structures.

**Gender equality:** refers to the equal rights, responsibilities and opportunities and access of women and men and boys and girls and the equal consideration of their respective interests, needs and priorities. Gender equality is not a women's issue but should concern and fully engage men as well as women. Equality between women and men is a human rights issue as well as a precondition for, and indicator of, sustainable, people-centered development.

**Gender equity:** refers to the process of being fair to men and women, boys and girls. It recognizes the need for potential differential treatment that is fair and positively addresses a bias or historical or social disadvantage that is due to gender roles or norms. The process of gender equity leads to gender equality as a legal right and obligation.

**Gender mainstreaming:** refers to a globally accepted strategy for promoting gender equality. Mainstreaming involves the process of assessing the implications for women and men of any planned action, including legislation, policies or programmes, in any area and at all levels. It is a strategy for making the experiences and concerns of women as well as men an integral part of the design, implementation, monitoring and evaluation of policies and programmes, so that women and men benefit equally and inequality is not perpetuated, if necessary through targeted actions to ensure that women's voices as important actors are heard.

**Gender sensitive:** refers to the consideration of gender norms, roles and relations but does not necessarily address inequality generated by unequal norms, roles or relations through remedial action beyond creating gender awareness.

**Women's empowerment:** can be best understood as an expansion of agency throughout women's lives, especially via participation and decision-making. It generally refers to differential or pro-active support to increase: i) women's sense of self-worth; ii) women's right to have and determine choices; iii) women's right to have access to opportunities and resources; iv) women's right to have power to control own lives both within and outside the home; and v) women's ability to influence the direction of social change to create a more just social and economic order, nationally and internationally.



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END OF THE MID-TERM REVIEW