EXECUTIVE SUMMARY:

FARMERS´ VULNERABILITY TO CLIMATE RISK IN THE ANDEAN REGION OF BOLIVIA: CHARACTERISATION STUDY

The regional project Resilient Andes to Climate Change is implemented in Bolivia, Ecuador and Peru. It is facilitated by the consortium HELVETAS Swiss Intercooperation - AVINA Foundation and financed by the Swiss Agency for Development and Cooperation (SDC). Its overall objective is "to contribute to the resilience and capacity to adapt to climate change of men and women in poor and vulnerable rural Andean communities in Ecuador, Bolivia and Peru, and focus on improving their food and water security.

Likewise, the specific objective of its first phase is **"to strengthen and bring together public and private stakeholders' capacities to provide services that enhance the resilience and capacity to adapt to climate change of poor and vulnerable Andean rural communities, aiming to improve their food and water security".**

The project considers the development of country studies in Bolivia, Ecuador and Peru, which are focused on characterizing the vulnerability and climate risk in producers[1] of Andean Family Farming (AFF), as well as the implications for policies that strengthen their resilience. In Bolivia, this study is

1. The analysis in this document considers the situation of both women and men, but the male gender is used for ease of reading.

carried out by PROSUCO and its scope involves the analysis of indicators and social, environmental and economic variables that characterize Andean family farming in a particular way, under the hypothesis that it requires differentiated policies and actions to strengthen its overall resilience, mainly in the face of climate threats aggravated by climate change.

The delimitation of the Bolivian Andean region is based on the classification by biogeographical provinces of Navarro and Ferreira (2012), which is adjusted for biodiversity studies and ecological floors. However, for the purposes of analysing the AFF in terms of its social, productive, economic and political dimensions, another type of complementary classification is required, based on the MDRyT's classification of large regions and agro-productive zones and political-administrative (municipalities and communities) areas.

According to the studies reviewed from Fundación Tierra (2015) and CIPCA (2021), the identification of Family Farming (FF) based on Agricultural Production Units (APUs) and three key criteria (size of cultivated land, number of heads of cattle and employment of family labour), for the study area of 259 municipalities and 15. 213 communities, three FF typologies have been identified: subsistence (SFF: 6,857 communities), medium (MFF: 5,948 communities) and consolidated (CFF: 2,408 communities).

In relation to recurrent climatic events, between 2010 and the first half of 2021, the Rural Contingency Unit (UCR, by its acronyms in Spanish) recorded events related to impacts on the agricultural sector. Of the events recorded, 88% are mainly represented by four types of recurrent events/ threats: flooding (34%), hailstorms (25%), frost (15%), drought (14%), other events (12%), including forest fires which represent 2% and snowfall (1%).

A review of various methodologies to analyse vulnerability and readiness at the territorial level based on available information was carried out, and the comprehensive ND-GAIN methodology of Notre Dame was identified and adapted to analyse and characterise the Municipal Adaptive Capacity of Andean Family Farming.

The Notre Dame-Global Adaptation Index (ND-GAIN) is a methodology that assesses the current state of vulnerability of six key sectors exposed to climate disruptions, as well as a country´s readiness to cope with the effects of climate change. It is an analysis that identifies the conditions of risk and adaptation to climate change at the territorial level based on representative and available indicators, with the purpose of identifying countries

and/or territories that need to reduce vulnerabilities and enhance their readiness by leveraging public and private sector investments for adaptative actions.

Following the ND-GAIN methodology, a comprehensive municipal vulnerability analysis was carried out based on the analysis of vulnerabilities (by exposure, sensitivity and adaptive capacity) of six strategic sectors: food, water, health, ecosystem service, human habitat and infrastructure, identifying which municipalities are at low or high levels of vulnerability to climate change. Readiness is defined as the ability to make effective use of investments for adaptive actions through a safe and efficient business environment[2]. To measure readiness, three components were considered: economic readiness, governance readiness and social readiness.

The results of the MVI for the 259 municipalities show a high variability of the MVI, from very low vulnerability (0.00) to very high vulnerability (1.00). The following categories were obtained: Low vulnerability: 34 municipalities (13%), Medium vulnerability: 84 municipalities (32%), High vulnerability: 123 municipalities (48%), Very high vulnerability: 18 municipalities (7%), these being the municipalities of Poroma and Azurduy in Chuquisaca; Calacoto, Caquiaviri, Callapa, San Andrés de Machaca, Jesús de Machaca, San Pedro de Curahuara, Chacarilla, Papel Pampa in La Paz; Colomi and Alalay in Cochabamba; El Choro, Choquecota, Escara, Toledo, San Pedro de Totora and Carangas in Oruro and; Gutiérrez in Santa Cruz.

After analysing the three sub-components of economic readiness, governance readiness and social readiness, the Municipal Readiness Index was calculated to identify those municipalities with higher and lower readiness capacity. Figure 13 shows the results of the analysis, observing a trend of a higher concentration of municipalities (88%) in the medium to high municipal readiness range, while 7% of municipalities have low readiness and 5% have very high readiness.

2. Technical Document: https://gain.nd.edu/our-work/country-index/

Once the results of the municipal vulnerability and municipal readiness indexes have been obtained, the existing gaps in both indexes are analysed by municipality, identifying those with a very high risk due to their high vulnerability and low readiness and vice versa, as well as those with a medium risk.

The results allow the 259 municipalities of the Bolivian Andean region to be classified into four quadrants of risk and adaptation to climate change, based on the two indexes calculated: the Vulnerability Index and the Readiness Index. These results have the potential to prioritise the geographical targeting of municipalities in order to design comprehensive programmes and projects focused on sustainable and resilient management of family farming, management of risks and adaptation to climate change of agricultural production systems and socially inclusive food systems.

Based on the study and the methodology adapted and used, the 259 municipalities were placed in the quadrants of the Municipal Climate Change Adaptive Capacity Matrix, identifying 34% of the municipalities in quadrant I of high vulnerability and low readiness; 15% of municipalities are in quadrant II of high vulnerability and high readiness; 17% of municipalities are in quadrant III of low vulnerability and low readiness; and 34% of municipalities are in quadrant IV of low vulnerability and high readiness.

Finally, the results will be systematised in a web application, with the capacity to provide information at the municipal level, in order to advise on the sectors and capacities that need to be strengthened in order to build comprehensive resilience capacities to support Andean family farming.

Andes Resilientes al Cambio Climático

Funded by: Schweizerische Eidgenossenschaft, Confédération suisse, Confederazione Svizzera, Confederaziun svizra; Embajada de Suiza; Cooperación Suiza en Bolivia

Facilitating consortium: HELVETAS BOLIVIA; Fundación Avina

Partner: IISD International Institute for Sustainable Development

Strategic ally: FIDA Invertir en la población rural

Consultant: PROSUCO