

Adaptive Capacity of Rural Communities to Climate Change in the Biocultural System of the Andes - Bolivia

PhD Project:

Marolyn Vidaurre de la Riva MSc.

Supervisor: Dr. Prof. Jürgen Pretzsch



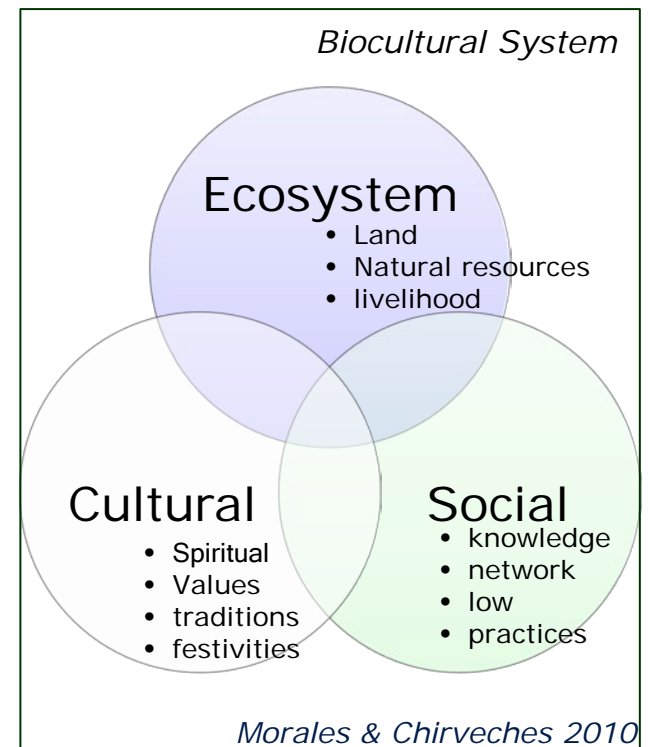
Table of contents

1. Definition
2. Problem Statement
3. Research question
4. Objectives
5. Theoretical framework
6. Study Area
7. Research methodology
8. Expected outcomes

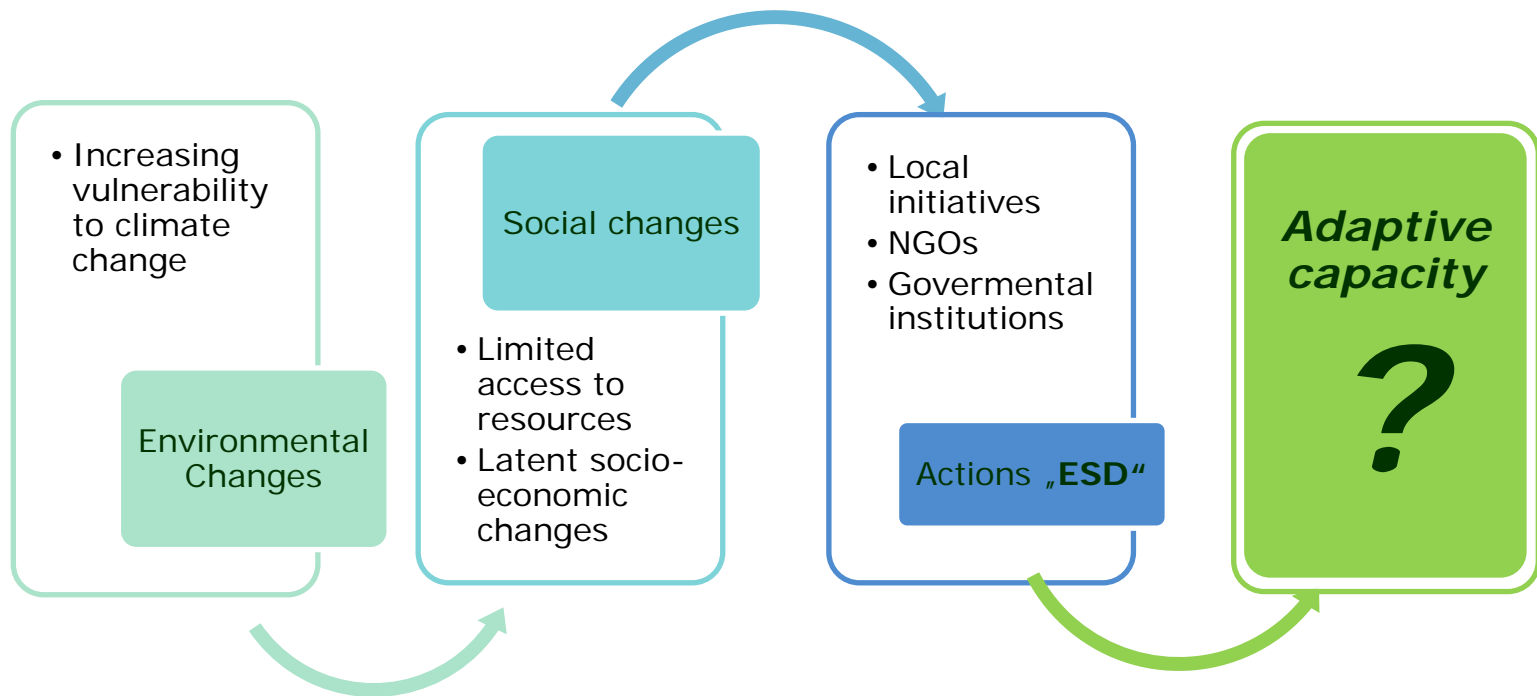
1. Definition

Biocultural System: culture as the intrinsic component of the environment (PNB, 2010).

Endogenous sustainable development ESD: Development from inside; cultural values + external knowledge that contribute to reinforce the “living well” in the communities (Holly & Harry 2012; Tapia, 2008).



2. Problem Statement



How are the communities facing the challenge of climate change?

3. Research questions

- What are the factors that define the vulnerability to climate change in the biocultural systems?
- What is the impact of climate change at the household level?
- What are the adaptive capacities of the communities to face climate change?
- What is the contribution of different scenarios of ***ESD*** in the process of adaptation to climate change?

4. Objectives

Evaluate the contribution of scenarios on endogenous sustainable development process to the adaptive capacities to climate change in rural communities

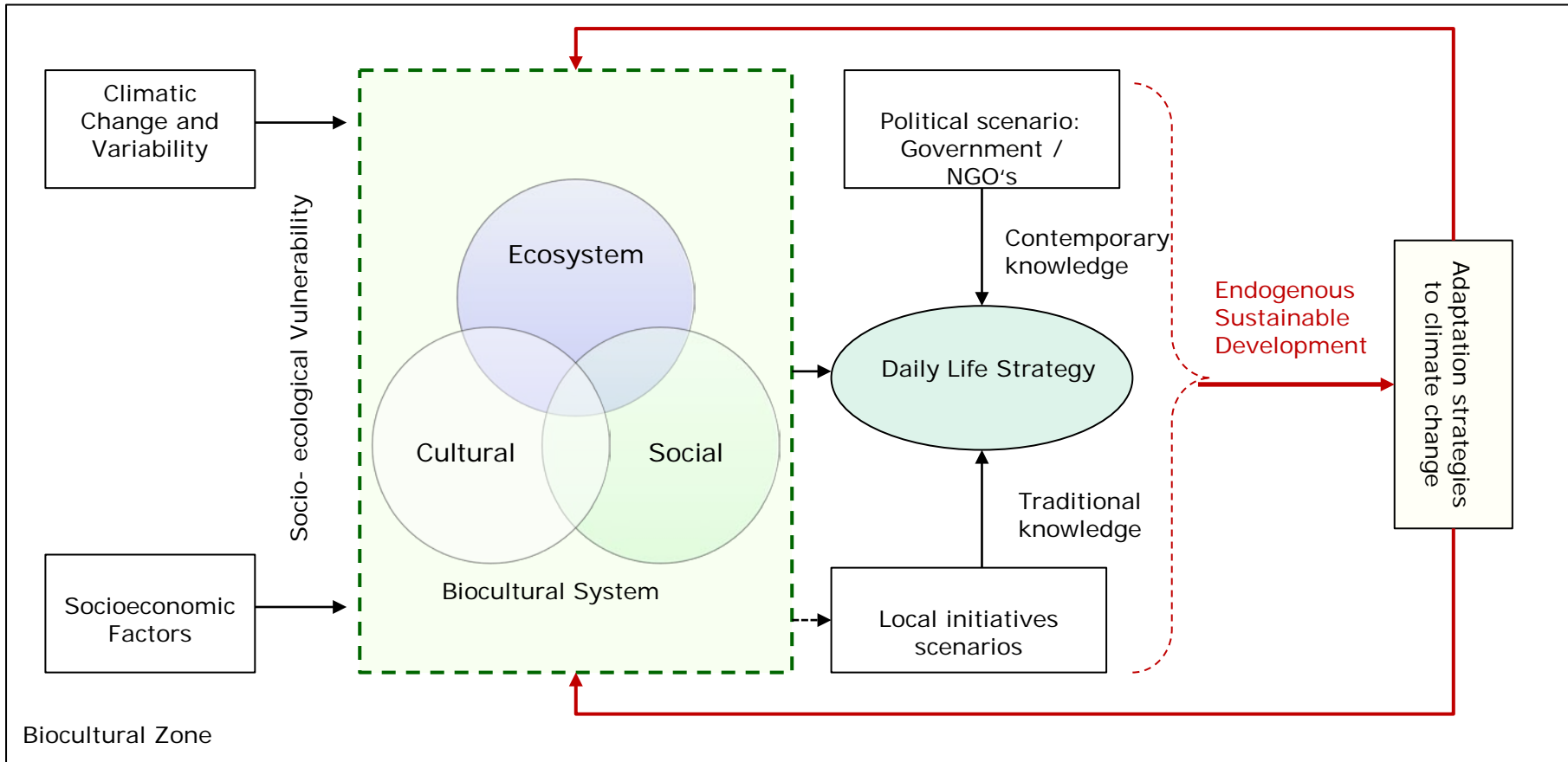
Socio-ecological vulnerability assessment at municipality level

Climate change vulnerability assessment at household level and the influence on the daily life strategy

Identification and categorization of scenarios on ESD^(*), and their role on adaptive capacities

(*) ESD: Endogenous sustainable development

5. Theoretical framework



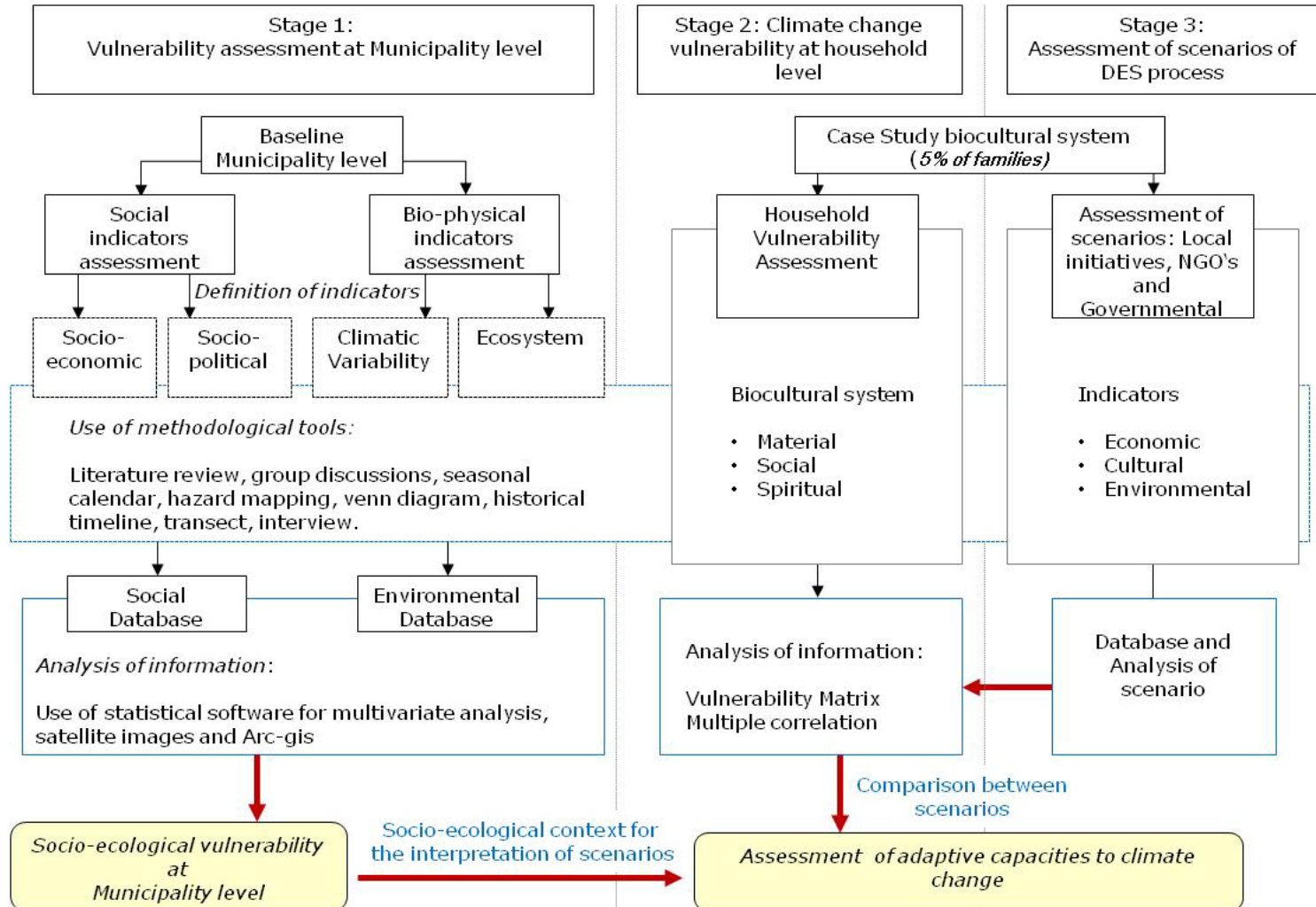
6. Study Area

Yunchara and Charazani

- Different elevation and ecosystems along the Andes
- Farming traditional communities
- Preservation of the culture is high



7. Research methodology



7.1 Identification of social criteria

| a. Assessment of socioeconomic vulnerability | | b. Assessment of political – institutional vulnerability | |
|--|--|--|--|
| Criteria | Indicator | Criteria | Indicator |
| Land Use | Land use change | Development of the culture | Chronology and impact of cultural and social changes |
| Economic resources and wellbeing | Land tenure | Policies | Identification of national - local policies related to conservation, poverty reduction and climate change |
| | Diversification of economic activities | External Cooperation (social capital) | Role of Cooperation in conservation, poverty reduction and climate change |
| | Assess to services | Government Intervention | Role of the governmental organizations in conservation, poverty reduction and climate change |
| | Employment | | Role of the local government (Municipality) in sustainable development, poverty reduction and climate change |
| | Migration | | |
| Availability of technology | Family's accessibility to technology | | |
| Social network | festivals | | |
| | Practice of reciprocity | | |

7.2 Identification of environmental criteria

| c. Assessment of the ecosystem vulnerability | | d. Assessment of climatic Variability | |
|--|--|---------------------------------------|---|
| Criteria | Indicator | Criteria | Indicator |
| Conservation status of ecosystem | Degree of conservation | Weather Pattern | Use of local climatic indicators |
| Water availability | Perception of changes in water availability in the last 30 years | Responses to Extreme events | Measures to cope with extreme events |
| Occurrence of extreme events | Frequency and threats of major weather event and hazards | Temperature | Techniques and technologies to cope with changes in temperature |
| Temperature | Changes in temperature patterns and impact on livelihood | Precipitation | Techniques and technologies to cope with changes in precipitation |
| Precipitation | Changes in temperature patterns and impact on livelihood | | |

7.3 Vulnerability matrix: Climatic variability / ESD scenario

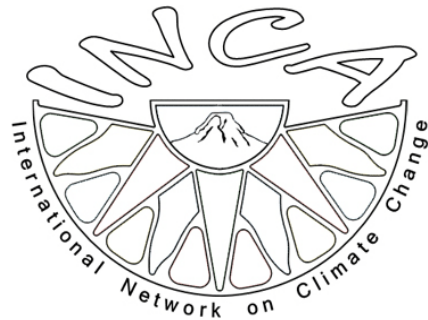
| Indicator of living well | Extreme events | Changes in temperature | Changes in precipitation |
|--|-----------------------|-------------------------------|---------------------------------|
| Access to land | | | |
| Access to water | | | |
| Access to food | | | |
| Education | | | |
| Diversification of economic activities | | | |
| Access to services | | | |
| Employment | | | |
| Migration | | | |
| Social network | | | |

8. *Expected outcomes*

The main contribution of the present research is to take a step ahead on the assessment of the biocultural system and its adaptive capacity to cope with climate change under scenarios of endogenous sustainable development.

- The systematic approach will provide a better understanding about the biocultural system vulnerability; with a comprehensive overview on the integration of the culture within its environment.
- A comprehensive overview will be given by the case study, showing the challenges face by climate change in different ecological zones and the mechanism of respond of the communities according to their environment and the characteristics of their people.

Thank for your attention!!



M.Sc. Marolyn Vidauere de la Riva

Email: marolynvida@gmail.com

TU Dresden

Faculty of Forest-, Geo- and Hydro Sciences

Institute of International Forestry and Forest Products

Annex

a. Assessment of socioeconomic vulnerability

| Criteria | Indicator | Variables | Methods |
|---|---|--|---|
| Land Use | Land use change | Identification of land unites 30 years ago: Number and surface | Satellite Images- historical timeline |
| | | Identification of land unites today: Number and surface | Satellite Images |
| | | Identification of changes : Percentage of increase or reduction of land unites | Satellite Images - Arc-Gis |
| Economic resources and wellbeing | Land tenure | Surface of community land | Literature review : POT's (Territorial Planning Plan - initials in Spanish), PDM (Municipality development plan- initials in Spanish) |
| | | Families with private land | Workshop with communities - interview to families |
| | | Families with rented land | |
| | Diversification of economic activities | Economic activities | Workshop with communities – focus group discussions |
| | | Network market income | |
| | Assess to services | Percentage of families with asses to electricity and drinking water | |
| | Employment | Source of employer | Hazard mapping - Seasonal calendar |
| | | Number of months employed | Interview |
| | | Income | Interview |
| | Migration | Number of months out of the community | Seasonal calendar - interview |
| Place of migration | | | |
| Age | | | |
| Availability of technology | Family's accessibility to technology | Technologies available according to the use | Workshop with communities – focus group discussions |
| | | Percentage of families with access to technologies available | |
| | | Number of months with asses to technologies | |
| Social network | festivals | Percentage of families that believe in rituality | Workshop with communities – focus group discussions - season calendar |
| | | Practice of reciprocity | Workshop with communities - focus group discussions - season calendar |
| | Percentage of families that practice Trueke | | |
| | Percentage of families that practice Minka | | |
| Percentage of families that practice Aimy | | | |

b. Assessment of political vulnerability

| Criteria | Indicator | Variables | Methods |
|---------------------------------------|--|---|---|
| Development of the culture | Chronology and impact of cultural and social changes | Identification and classification of historical event (example: asses to basic services: electricity, fresh water, roads) | Literature review - historical timeline with Community and authorities |
| | | Impact historical events in the communities' lifestyle | |
| Policies | Identification of national - local policies related to conservation, poverty reduction and climate change | Coverage and objectives | Literature review, focus group discussion and interviews with authorities |
| | | Number of plans, programs and projects implemented in the area | |
| | | Percentage of families involve or benefited | |
| External Cooperation (social capital) | Role of Cooperation in conservation, poverty reduction and climate change | Number of NGO operating | Literature review, focus group discussion and interviews with authorities |
| | | Coverage and objectives | |
| | | Network between institutions | |
| Government Intervention | Role of the governmental organizations in conservation, poverty reduction and climate change | Coverage and objectives | Literature review, group discussion and interviews with authorities |
| | | Number of plans and programs | |
| | | Number of years working in the area | |
| | | Number of projects implemented | |
| | | Number of projects finish | |
| | | Percentage of families beneficiates | |
| | | Limitations | |
| | | Budget | |
| | Role of the local government (Municipality) in sustainable development, poverty reduction and climate change | Coverage and objectives | Literature review (POA - PDM) and group discussion with authorities |
| | | Number of plans and programs | |
| | | Number of years working in the area | |
| | | Number of projects implemented | |
| | | Number of projects finish | |
| | | Number of families beneficiates | |
| Limitations | | | |
| Budget | | | |

c. Assessment of ecosystem vulnerability

| Criteria | Indicator | Variables | Methods |
|----------------------------------|--|---|---|
| Conservation status of ecosystem | Degree of conservation | High, Medium, Low | Literature review – participatory mapping |
| | | Soil degradation | |
| | | Deforestation | |
| | | Areas under sustainable management | |
| | | Risk degree/ area | |
| | | Areas under restoration | |
| Water availability | Perception of changes in water availability in the last 30 years | Changes in water level from: rainfall, snowfall, glaciers surface, lake, river etc. | Workshop with communities – focus group discussions |
| | | Changes in water quality | |
| | | Identification of sources of contamination | |
| Occurrence of extreme events | Frequency and threats of major weather event and hazards | Identification of extreme events | Focus group discussion - historical timeline - vulnerability matrix |
| | | Number of extreme events / year / decade | |
| | | Intensity of extreme events | |
| | | Categorization of threats and impacts | |
| | | Identification and categorization of the area according the intensity of impact | Participatory mapping |
| Temperature | Changes in temperature patterns and impact on livelihood | Percentage of families affected | Interview |
| | | Changing patterns | Seasonal calendar - meteorological data |
| | | Categorization of threats and impacts | Focus group discussion - seasonal calendar |
| | | Identification and categorization of the area according the intensity of impact | Participatory mapping |
| Precipitation | Changes in precipitation and its impact on livelihood | Percentage of families affected | Interview |
| | | Changing patterns | Seasonal calendar - meteorological data |
| | | Categorization of impacts | Group discussion - seasonal calendar |
| | | Identification and categorization of the area according the intensity of impact | Participatory mapping |

d. Assessment of climatic variability

| Criteria | Indicator | Variables | Methods |
|-----------------------------|---|--|--|
| Weather Pattern | Use of local climatic indicators | Number and use of local indicators | Workshop and participant observations |
| Responses to Extreme events | Measures to cope with extreme events | Characterization of measures according to the threat | Seasonal calendar - historical timeline - vulnerability matrix |
| | | Ranking of measures/ category of threat | |
| | | Percentage of family with the capacity to cope with threats | |
| | | frequency and magnitude | |
| Temperature | Techniques and technologies to cope with changes in temperature | Classification of techniques and technologies apply in agriculture | Interview – participant observation |
| | | Classification of techniques and technologies apply in livestock | |
| | | Natural resources management | |
| | | Percentage of family with the capacity to cope with threats | |
| | | frequency and magnitude | |
| Precipitation | Techniques and technologies to cope with changes in precipitation | Classification of techniques and technologies apply in agriculture | |
| | | Classification of techniques and technologies apply in livestock | |
| | | Natural resources management | |
| | | Percentage of family with the capacity to cope with threats | |
| | | frequency and magnitude | |

| Indicator of living well | Variables | Extreme events | Changes in temperature | Changes in precipitation |
|--|--|----------------|------------------------|--------------------------|
| Access to land | Access to land in different ecosystems (pasture - pajonar - forest) | | | |
| | Soil quality | | | |
| | Surface for agriculture/livestock | | | |
| Access to water | Area of Rainfed crops | | | |
| | Distance to next river or lake (minutes walking time) | | | |
| | Access to drinking water (minutes walking time) | | | |
| Access to food | Quantity and quality of food/availability -number of months/year with food | | | |
| | Market - self consumption | | | |
| | Diversification | | | |
| Education | Members of the family studying | | | |
| | Years of study | | | |
| Diversification of economic activities | On farm income | | | |
| | Off farm income | | | |
| | Out farm income | | | |
| Access to services | Percentage of families with asses to electricity and drinking water | | | |
| Employment | Source of employer | | | |
| | Number of months employed | | | |
| | Income | | | |
| Migration | Number of months out of the community | | | |
| | Place of migration | | | |
| | Age | | | |
| Social network | Collaboration in the family | | | |
| | Collaboration in the community | | | |
| | Collaboration between communities | | | |