Climate Change in Bolivia:
A scientific background refers to adaption and mitigation process

Instituto de Ecología

UMSA

LA PAZ - BOLIVIA

1. What do we know about the efects of climate change in Bolivia?

2. What methods can we apply to improve our knownledge refering to the climate change?

3. What can we do to adapt and reduce the negative effects of the climate change?

4. ¿What does the Institute of Ecology offer to arrange the project ?

1. What do we know about the efects of climate change in Bolivia?

What do we know?

- Insufficient local data to establish trends of temperature, humidity, rain fall and other data.
- Climate Change topic was only reported in a phylosophical and poltical context, but not with scientific
- Due the topographics of Bolivia, the global data do not allow to establish a conclusive trend.

Qué sabemos

- Indirect evidence suggests that certain changes observed in the country due to global warming, mainly:

  - Retreating glaciers

  - Advancement of plants and animals to higher ground

- Loss of plant and animal species

- Impoverishment of the agricultural and forestry systems, so that food security is at risk

- Little data record in relation to the loss of biodiversity by the effect of climate change

What do we know?

- In terms of projections in the region, there is great uncertainty in scientific data, there is no analysis of long-term climate trends (rainfall, temperature, river discharge, extremes of cold or heat, and intense rain or drought) that allow identify possible variations in climate

The effects of the climate change on the socio-economic and biodiversity are very little scientifically known.

Knowledge of regional climate is still seriously affected by

deficiencies in climate models.

What do we know?

For example:

There are biases in the estimates of rainfall over the Amazon (negative) and Andes (positive), which influences the scientific findings on the above aspects.

2. What methods can be applied to improve our knowledge about climate change in the future?

How can we improve?

Methods and tools applied

The main focus of the project is the human dimension, thus the far reaching integration of farmers in all research steps makes the application of qualitative methods indispensable.

- Round table
- Network mapping
- *Dialogo de saberes*
- Agroclimate calendars
- Participant observation
- Transect walks
- Surveys

Table 2: Methods and tools applied in the four research steps (INCA, 2010)

How can we improve?

Measure and monitoring process

- Changes in distribution of populations and community composition
- Changes over time of biological events (phenology)
- Changes in the morphology, physiology and behavior
- Changes in frequency and intensity of pest and disease outbreaks

How can we improve?

Measure and monitoring process

- Retreat glaciers
- Changes in temperature, precipitation and cloudiness
- Changes in the composition of the biological community
- Effects of climate change on ecosystems (wetlands, cloud forests)

Models and projects

How can we improve?

✓ Regional Climate
- *Temperature and precipitation changes*

Climate

✓ Water Resources
- *drink water supply*
- *hydro-energy*

Water

✓ Distribution of vector-borne diseases (eg dengue, malaria, etc.).

Health

✓ Future predictions
- *areas suitables for crops (agriculture)*
- *Distribution of crops pests*

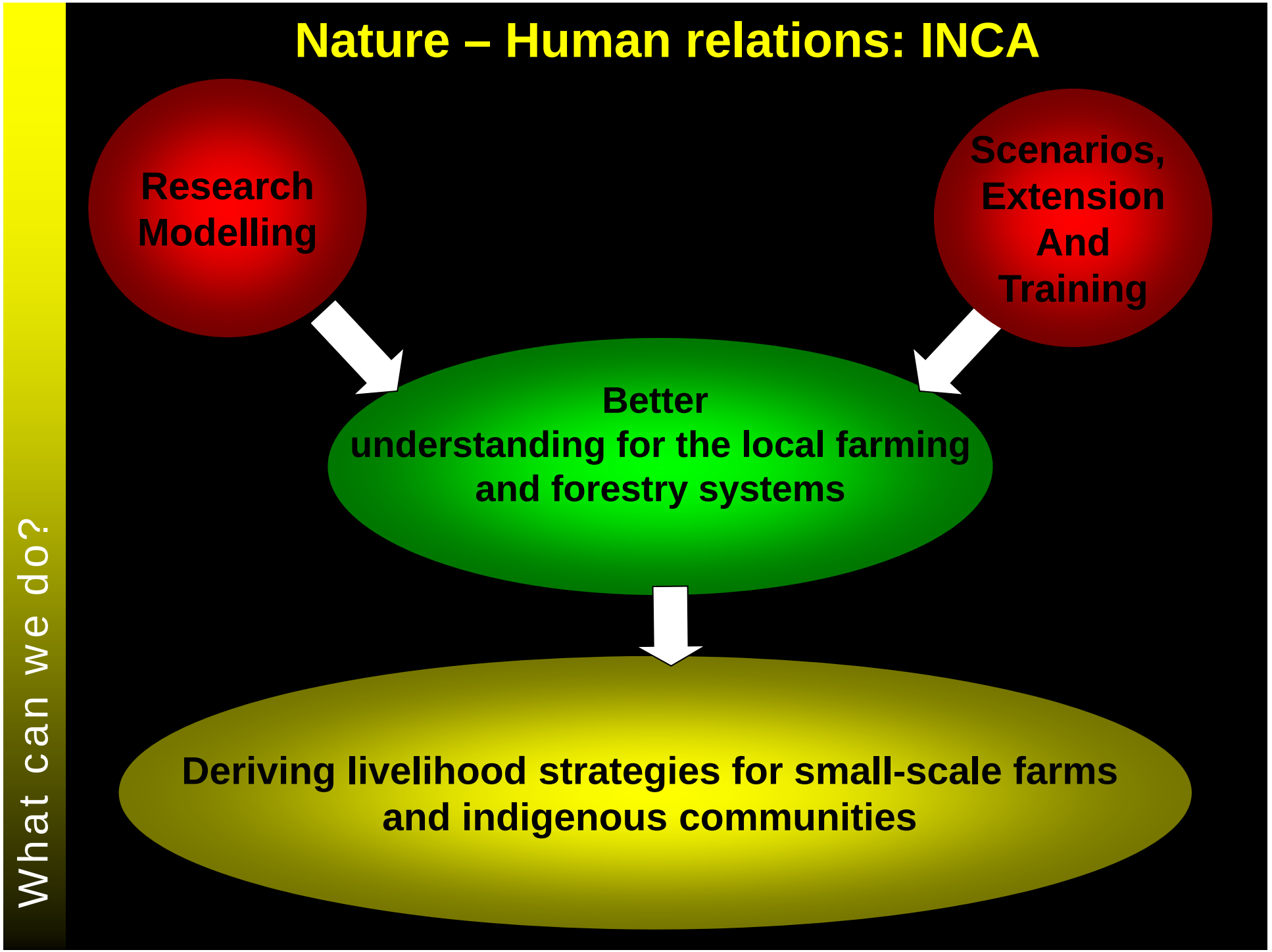
Safety
Food

✓ Change in distribution and probability of extinction of endangered and economically important

Biodiversity

3. ¿What possible lines of research should we do?

Nature – Human relations: INCA



Food safety

- Change in the past and projection into the future:
  - areas suitable for cultivation (agriculture)
  - soil fertility
  - distribution of crop pests
  - understand the situation of local farming and forestry systems in the tropical Andes

What can we do?

What can we do?

Health

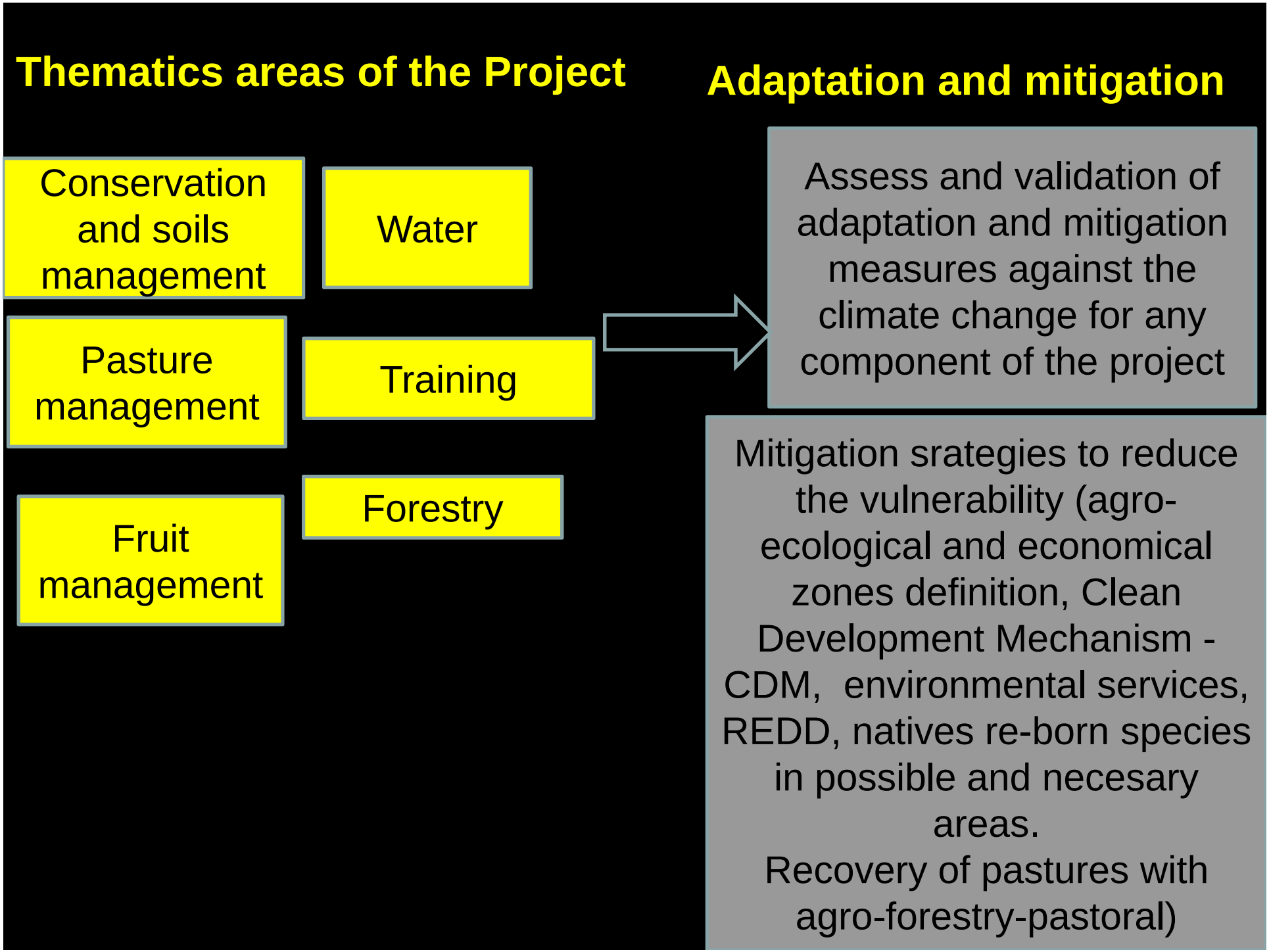
Change in the past and projection into the future:

- area and intensity of diseases transmitted by animals (for example: malaria, dengue)

Biodiversity Conservation

- Impacts of climate change on changing the composition of the biological community
- Projected change in distribution and probability of the extinction of endangered species of economical importance
- Establishment of information for modifying the plan of conservation and protected area systems

What can we do?


Thematics areas of the Project
Conservation and soils management
Water
Pasture management
Training
Forestry
Fruit management
Adaptation and mitigation
Assess and validation of adaptation and mitigation measures against the climate change for any component of the project
Mitigation srategies to reduce the vulnerability (agro-ecological and economical zones definition, Clean Development Mechanism - CDM, environmental services, REDD, natives re-born species in possible and necesary areas.
Recovery of pastures with agro-forestry-pastoral)

4. What does the Institute of Ecology do to accomplish the project?

What does the IE

Watershed Project GiZ IE – UMSA y CBC-Perú

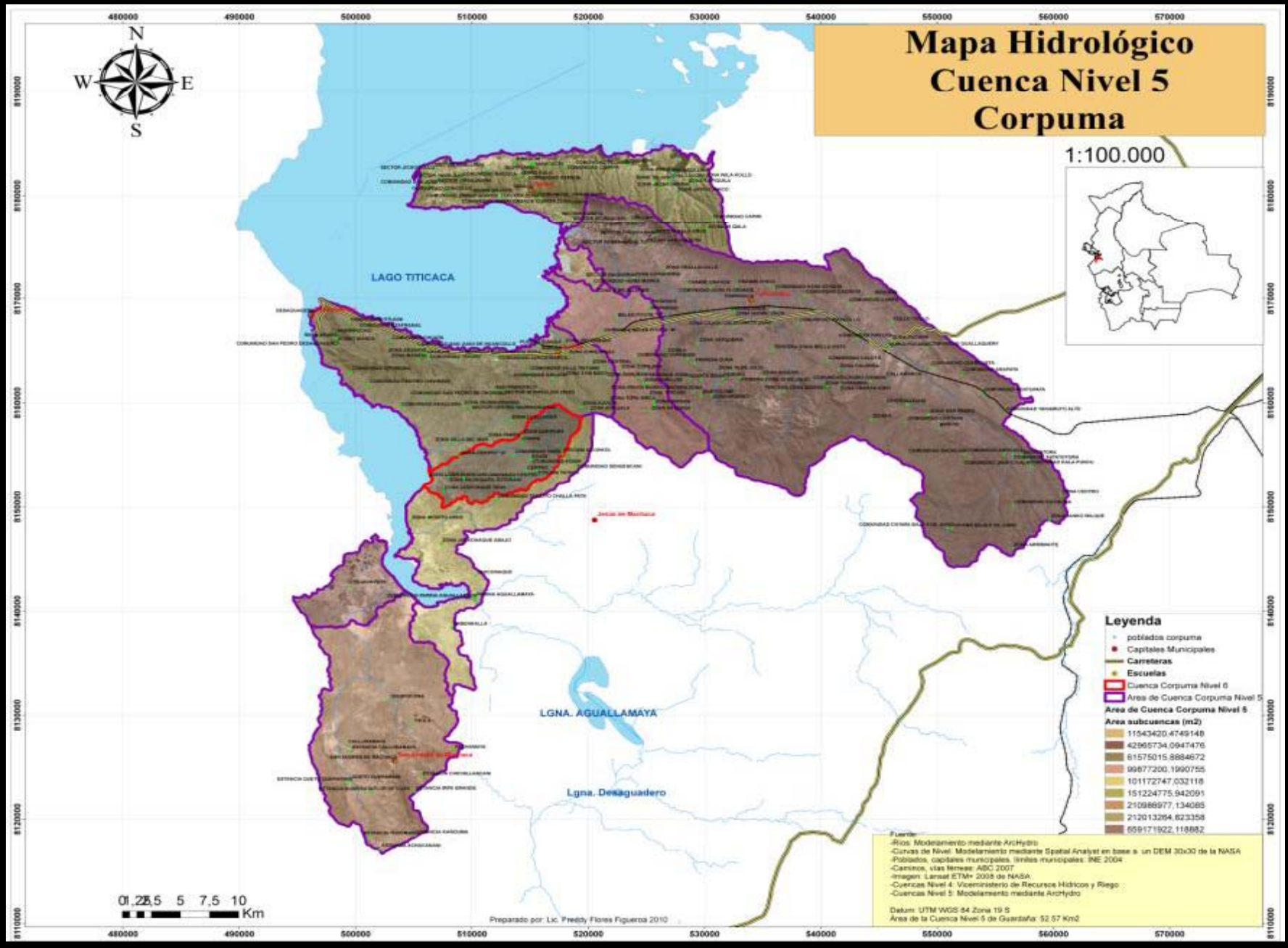
- The project partners are supporting the GiZ and PNC under the Water Resources and Irrigation Vice-ministry. Considering the basin as a climate-hydrological unit, vulnerable to changes and variations in components of the hydrological cycle and vegetation cover.

  As the basin is highly dependent on climate changes and variations and extremes can affect the performance of it, and long-term, human communities and natural and social systems to live there. That can lead to serious social crisis due to lack of water damage due to excess water and flooding, and general discontent among the population and even collapse of local and regional governments, leaving aside the possibility of public disorder and strikes.

Qurpuma Micro-basin
Bolivian National Watershed Plan

- This is why we suggest working Qurpuma basin, located at an altitude of 4515 meters at the top and 3993 m at the bottom. This is a watershed of 3.9 km². As Navarro said (2005), the watershed area belongs to the biogeographical province of the Peruvian highlands.

  Due to their socioeconomic conditions and vulnerability to climate risks the watershed and its catchment area is a priority for studies by the Water Resources and Irrigation Vice-ministry.


Mapa Hidrológico
Cuenca Nivel 5
Corpuma
1:100.000
N
S
E
W
LAGO TITICACA
LGNA. AGUALLAMAYA
Lgna. Desaguadero
Leyenda
poblados corpuma
Capitales Municipales
Carreteras
Escuelas
Cuenca Corpuma Nivel 6
Area de Cuenca Corpuma Nivel 5
Area de Cuenca Corpuma Nivel 5
Area subcuencas (m2)
11543420,4749148
42965734,0947476
61575015,8884672
99877200,1990755
101172747,032118
151224775,942091
210988977,134085
212013264,623358
559171922,118882
Fuente:
-Rios: Modelamiento mediante ArcHydro
-Curvas de Nivel: Modelamiento mediante Spatial Analyst en base a un DEM 30x30 de la NASA
-Poblados, capitales municipales, límites municipales: INE 2004
-Caminos, vias ferreas: ABC 2007
-Imagen: Lansat ETM+ 2008 de NASA
-Cuencas Nivel 4: Viceministerio de Recursos Hídricos y Riego
-Cuencas Nivel 5: Modelamiento mediante ArcHydro
Datum: UTM WGS 84 Zona 19 S
Area de la Cuenca Nivel 5 de Guardaña: 52.57 Km2
0 1,25 2,5 5 7,5 10
Km
Preparado por: Lic. Freddy Flores Figueroa 2010
480000
490000
500000
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Environmental Quality Laboratory

What does the IE

- Make Certified Analysis for:

  - Water and soil physicochemical

  - Analysis of organic samples

  - Analysis bromatológicos

  - Determination of heavy metals in water, soil, sediment and organic samples

  - Sampling service

- Conducting training in latest methodologies on “diálogo de saberes y sobre el vivir bien”

Qué necesitamos

Networking

- Work and coordinate with sector ministries and the MA and A Development Planning

- Access the databases from WCS, CI, COSUDE and other institutions working with CC through agreements

- Data analysis (at least partially)

- We will be a leading project in Bolivia:

  - to develop institutional capacity and the country on the subject to undertake specific studies

Qué necesitamos

Technical Support (in-situ)
"Support" scientist (external)

- Information about the climate
- Training courses on latest methodologies of soil and water analysis and others