



DIPECHO project:

“Multihazards Risk Disasters Reduction in municipalities of La Paz Altiplano, Bolivia”

ECHO/DIP/BUD/2006/03006



PRINCIPAL OBJECTIVE

Strengthening response capacity to natural hazards at both community and local level.

SPECIFIC OBJECTIVE

Strengthening capacity response to frost, landslides and other related Natural hazards at both community and local level.

Partner ECHO: COOPERAZIONE INTERNAZIONALE (COOPI)

Co-Ejecutor: VICEMINISTERIO DE DEFENSA CIVIL Y COOPERACIÓN AL DESARROLLO INTEGRAL (VIDECICODI)

DIPECHO project: *“Multihazards Risk Disasters Reduction in municipalities of La Paz Altiplano, Bolivia”*

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Exact location:

*Bolivia, Muñecas
Province*

Start date:

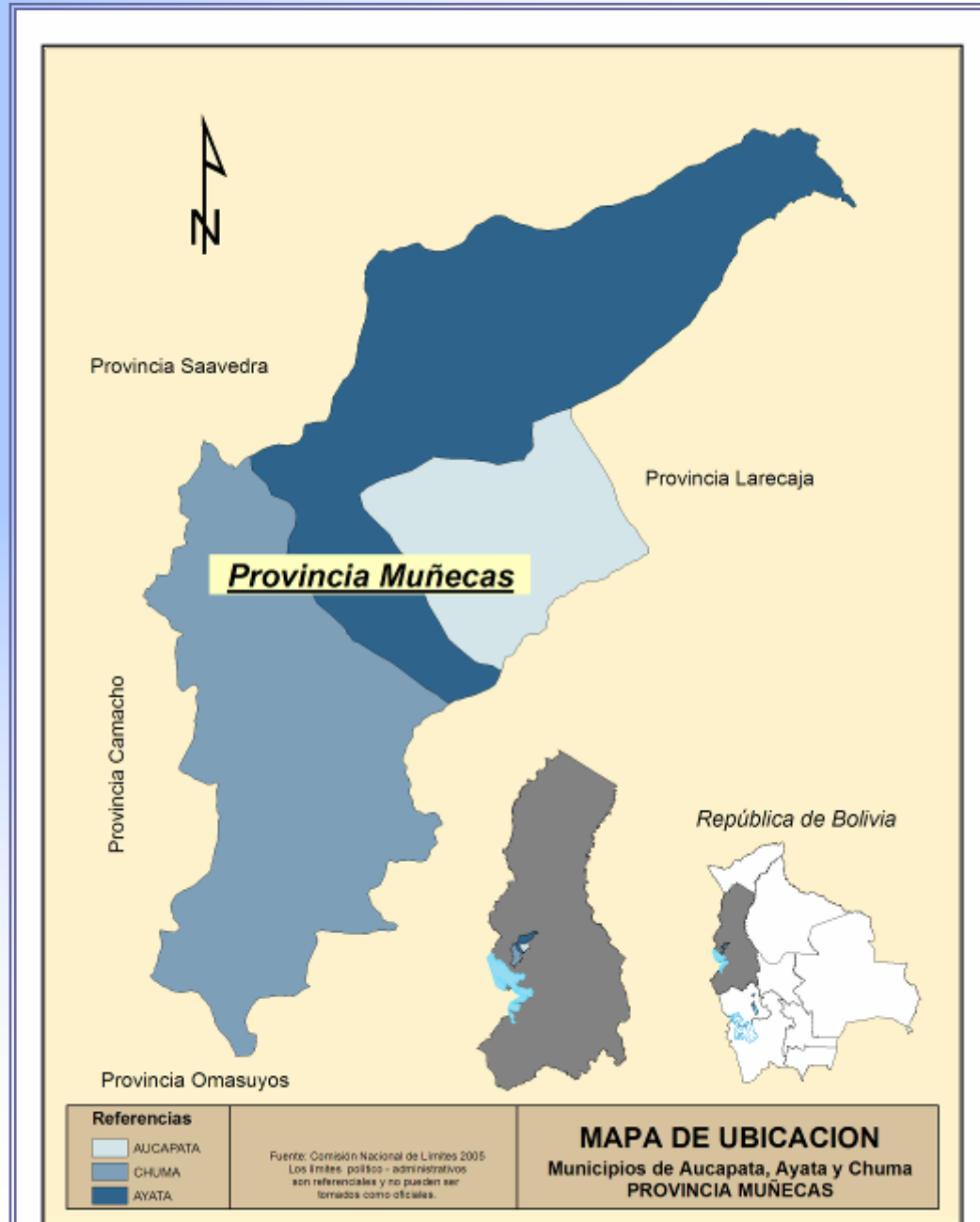
15th of March 2006

Duration:

13 months

Total budget:

€ 235,294.11



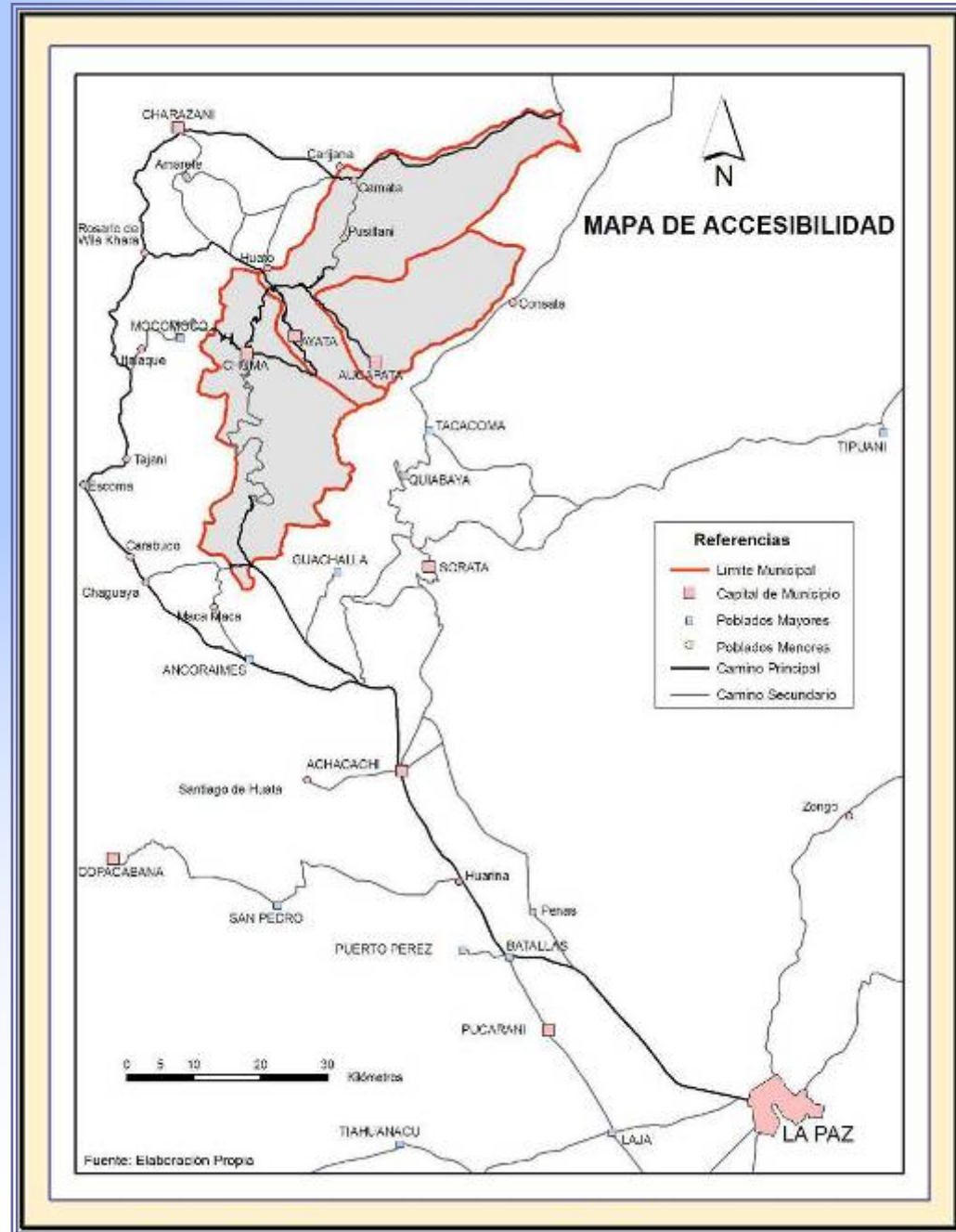


Expected Result 1:

Response capacity at Institutional level improved

Various activities among which:

- Risk Study realization
- Multihazards risk maps elaboration





Hazards

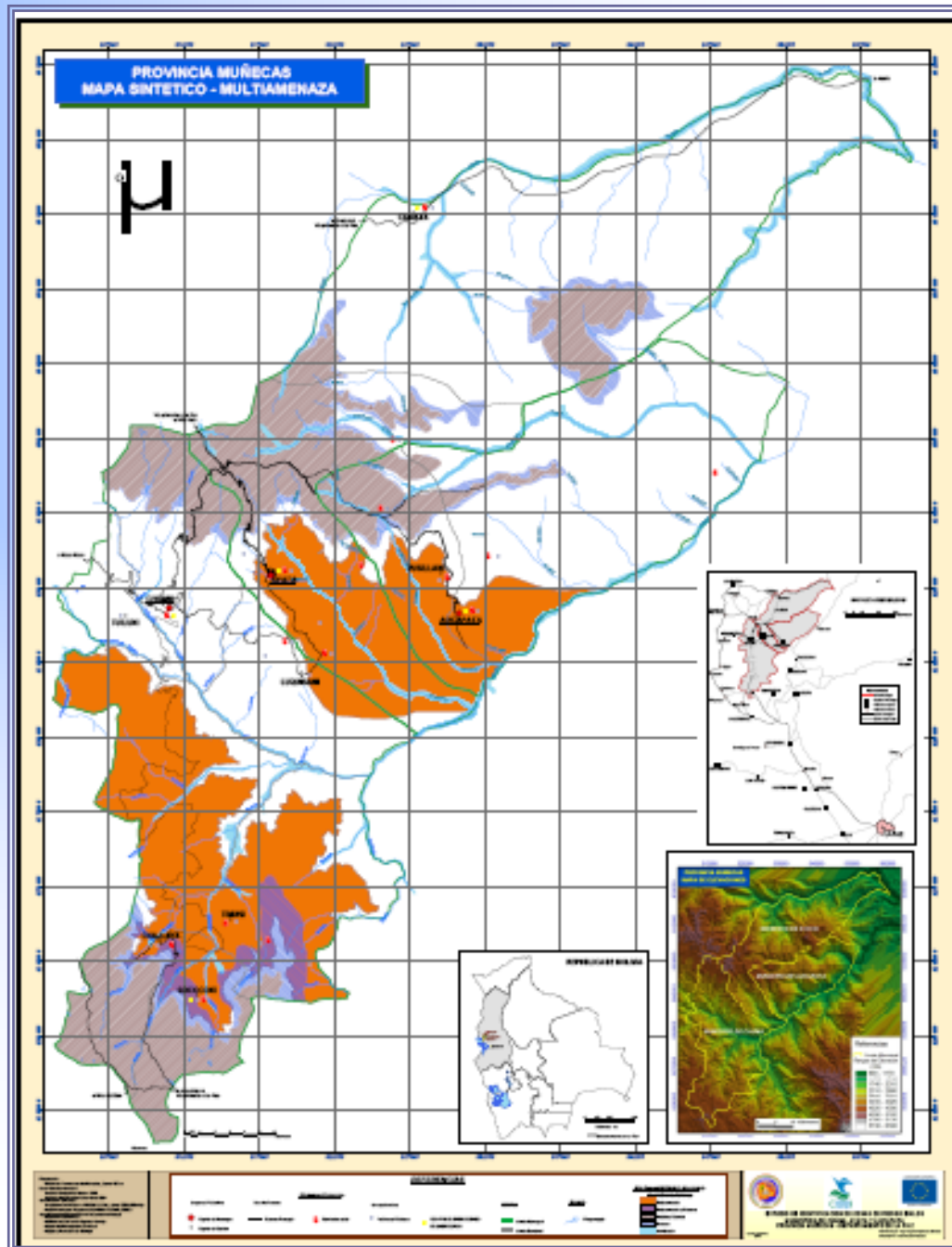
Landslides

Frost

Hail

Floods

•(Drought)





Vulnerability

**25.848
inhabitants**

**99,5% of
poverty and an
average HDI of
0,447**

**Poor
accessibility**

**Strong
migration**

**Spoken
languages:
Aymara and
Quechua**



Landslide threatening Totorani Community, Ayata Municipality, 2006.



Activity budget:

€ 12,100.00

Activity length:

6 months



Risk study overall objective:

To count with technical information of the Muñecas province to improve decision making process upon planning and disaster preparedness



Risk study specific objective:

To find out the exact nature of vulnerability to natural hazards of the local population in order to sensitize the local population, to count with adequate information for emergency management and to foster a genuine development policy including mitigation works and support infrastructure realizations





Results obtained :

- **12 hazard maps for each Municipality** (One for each hazard identified that is to say four for each municipality)
- **4 multihazards maps** (One for each Municipality and one a provincial level)
- **12 vulnerability maps** (Four for each municipality)
- **4 Vulnerability maps to multihazards** (One for each Municipality and one a provincial level)
- **4 Safe places maps** (One for each Municipality and one a provincial level)



Risk study methodology

- *Collection of existing basic information*
- *Satellite images and air photographs analysis*
- *On site visits and opinion and perception polls realization*
- *Information processing*
- *Matrix construction (vulnerability and hazard probability indicators)*



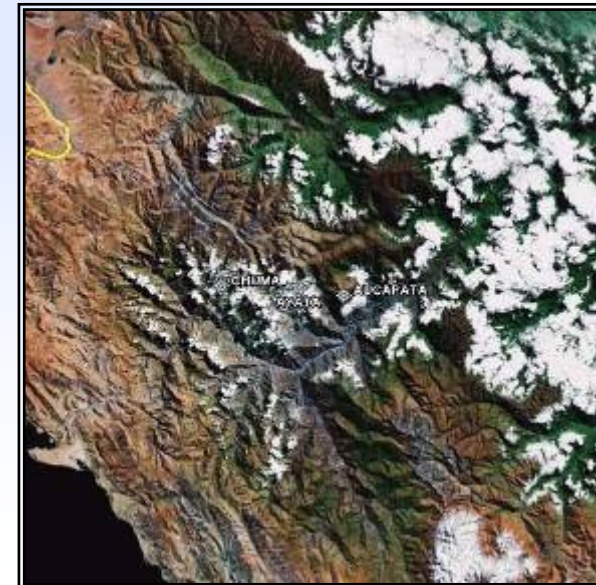
Information collection and perception maps construction with the population



Collection and analysis of existing basic information

Various sources of information among which

- *National institute for Statistics (2001 national census)*
- *Military Geographic Institute (Air photographs)*
- *National Ministry of sustainable development and territorial planning*
- *National Geological Service and Mines techniques (SERGEOTECMIN)*
- *National Service for Meteorology and hydrology (SENAMHI)*
- *Economic Policies Department (UDAPE)*





On site visits, opinion and perception polls realization

Questionnaire elaboration and submission

- *To verify the information obtained in the previous step*
- *To better understand population characteristics, economic activities and risk perceptions.*



Information processing

- *Standardization of the information collected in the first and second steps*



The screenshot shows the ArcMap interface with a map of a region in Bolivia. The map displays several data layers, including 'ACCESIBILIDAD', 'UBICACION', 'DESPLAZAMIENTOS', and 'cap_canton'. The 'cap_canton' layer is highlighted in yellow. The attribute table for 'cap_canton' is visible at the bottom, showing a list of records with columns for FID, Shape, CADTEXT, ID, Codigo, ZONANO, MUNICIPIO, CANTON, CAPITAL, and 14 additional columns (A1-A14).

FID	Shape	CADTEXT	ID	Codigo	ZONANO	MUNICIPIO	CANTON	CAPITAL	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12	A13	A14
0	Point	4	4	0205010100400	CHUMA	Chuma	Chuma	capital	207	185	392	392	392	318	64	10	392	138	58	131	3	5
1	Point	49	49	0205010201900	TIMUSI	Chuma	Timusj	capital	145	130	275	275	275	241	25	9	275	66	36	142	5	10
2	Point	68	68	0205010300900	LUQUISANI	Chuma	Luquisa	capital	8	9	17	17	17	10	4	3	17	5	4	8	0	0
3	Point	88	88	0205010500100	CHAJLAYA	Chuma	Chajlay	capital	335	328	663	663	663	620	28	15	663	194	87	328	15	6
4	Point	84	84	0205010400800	TUILLUNI	Chuma	Tuilluni	capital	55	61	116	116	116	94	12	10	116	38	6	50	2	1
5	Point	116	116	0205010600700	SOCOCONI	Chuma	Sococon	capital	148	134	282	282	282	261	19	2	282	73	25	132	10	4

Matrix construction (vulnerability and hazard probability indicators)



In the specific case of landslides, three pillars can be identified in maps elaboration process

- *Information obtained in the first step*
- *Information obtained in the second step throughout perception polls*
- *Information collected during on site visits (high risk and vulnerability areas)*

MATRIZ DE IDENTIFICACION DE SUCCEPTIBILIDAD DE DESLIZAMIENTO

Competencia de Roca y Suelo

		Mala	Regular	Buena
		3	2	1
Estabilidad de la Pendiente	Alta 3	6	5	4
	Moderada 2	5	4	3
	Baja 1	4	3	2

Fuente: Elaboración Propia. Espinoza, 2006



Matrix construction (vulnerability and hazard probability indicators)

In a second phase the matrix was built using two criteria

- *Ground consistency (firm or limp)*
- *Slope*

MATRIZ DE IDENTIFICACION DE SUCCEPTIBILIDAD DE DESLIZAMIENTO	
DESCRIPCION	
6	Alta Suceptibilidad (Mala competencia de roca y suelo) + (Alta Pendiente)
5	Moderada a Alta Suceptibilidad (Regular competencia de roca y suelo) + (Alta Pendiente) (Mala competencia de roca y suelo) + (Moderada Pendiente)
4	Moderada a Baja Suceptibilidad (La competencia de roca y suelo se neutraliza con la pendiente)
3	Baja Suceptibilidad (Competencia de roca y suelo de buenas a regulares) (Pendientes de Moderadas a Bajas)
2	Areas no Suceptibles (La competencia de roca y suelo ni la pendiente influyen)

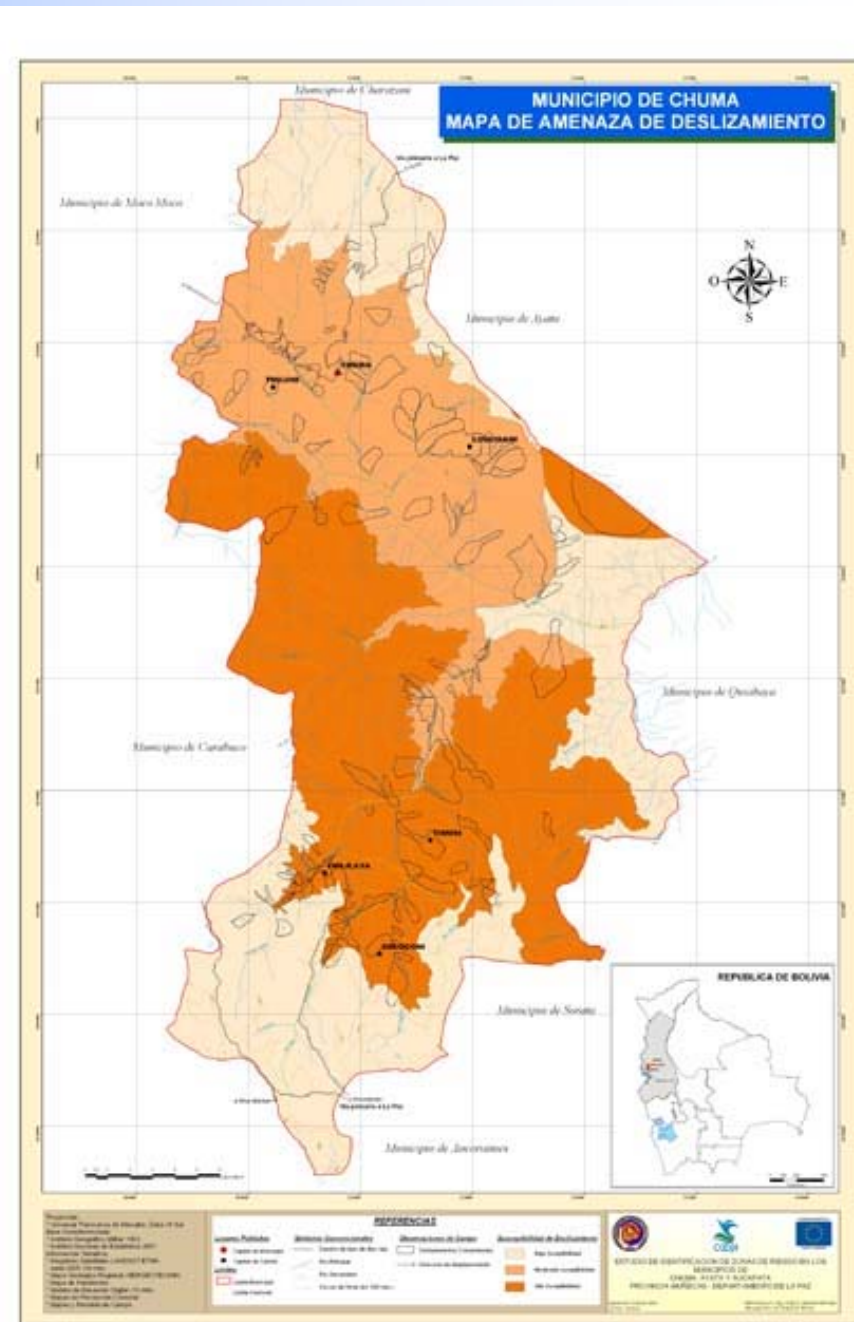
Fuente: Elaboración propia. Espinoza, 2006

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In a third phase maps were obtained by entering the formula into Arcgis software





In the case of vulnerability maps
the following infrastructure
elements were taken into
account

Elementos Expuestos

Lugares Poblados

- Capital de Municipio
- Capital de Cantón
- Comunidades
- Estancias dispersas

Vías de Acceso

- Camino principal
- Camino secundario

Infraestructura

- Centro de salud
- Centro educativo
- Iglesias
- Teléfonos públicos
- Espacios deportivos
- Centro de Operaciones de Emergencia

