# ANDEAN CAPITAL CITIES 2007

REGIONAL CATALOGUE OF MUNICIPAL MANAGEMENT TOOLS IN **risk**

RISK REDUCTION AND EMERGENCY PREPAREDNESS

# La Paz - Bolivia

COMISION EUROPEA
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PROYECTO REGIONAL DE REDUCCIÓN DE RIESGOS EN CAPITALES ANDINAS

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**Regional Strengthening and Risk Reduction in Major Cities of the Andean Community**

**Catalogue of Municipal Management Tools in Risk Reduction and Emergency Preparedness in Andean Capital Cities**

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# Presentation

Disasters affecting La Paz have taught us important lessons. To rise from the damages caused by these disasters has required concerted efforts. It is at this juncture that prevention activities and preparedness capacities take relevance. Whatever amount we spend to reduce risks will be reflected on a higher degree of security for our community and a diminishing of emergency responses.

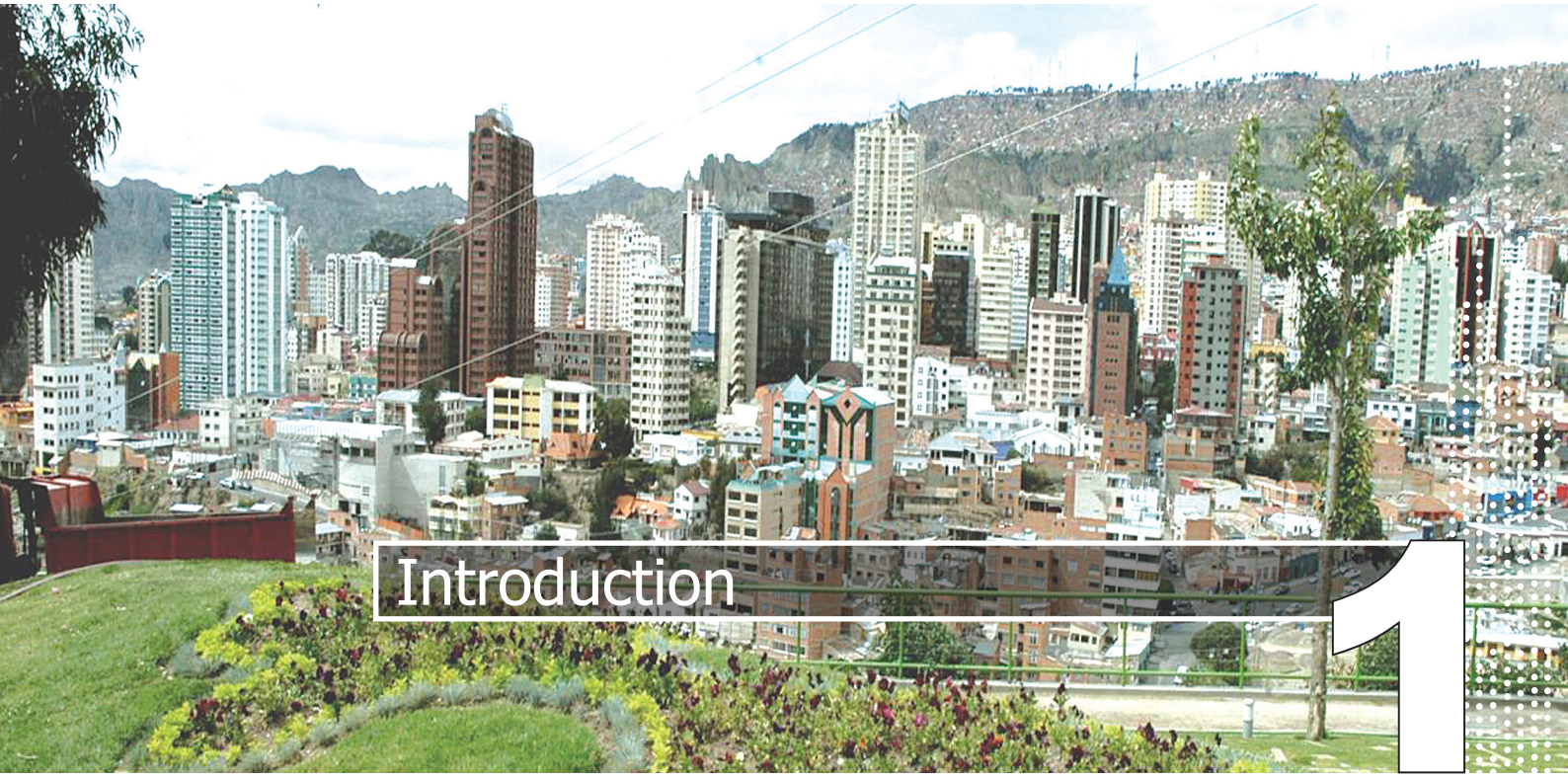
This has been the maxim of the La Paz Municipality when it assumed the task of reconstructing and recovering the municipality after the disasters caused by the hailstorm of 2002, and to project from there, a risk prevention sustainable policy. This maxim has also applied to the work performed by technical personnel and municipal workers, who have promoted a number of interesting experiences from each one of their departments: technical, planning, land management, cultural and human development and neighborhood improvement.

Without doubt, there is still a long way to go. We must recognize the fact that we still have to coordinate and articulate better the different actions performed to make them more efficient, and this is the path being followed. An important fist step has been taken through the program articulated by the UNDP and DIPECHO. Our work has been identified and appreciated; we have come together as a group, we have learned and have shared our knowledge with the municipalities of Andean capital cities and this in turn, has fostered technically and morally our work.

This catalogue summarizes part of an intense project developed by the Municipal Government of La Paz and it is available to those, like us, who are committed to improving the integral security of our communities. We hope it is of help to those interested but mainly, we hope it contributes to improving our work by establishing a permanent forum for discussion on this matter.

Sincerely,

Juan Del Granado Cosio
Municipal Mayor of La Paz



# 1 Introduction

According to the last Census of Population and Housing in 2001, La Paz has a population of 793,293 inhabitants. When combined with the 649,958 inhabitants of the city of El Alto, it is the largest urban area in Bolivia. The growth process of La Paz has been vertiginous on the hillsides located on the east and west parts of its central axis, characterised by a low-income population from the *Altiplano* rural areas, which migrated to the city attracted by better social and economic opportunities and settled on unstable areas that are considered "non-urban areas". The informality of the settlement, of the services and of their economic activities, has kept this population away from the formal city, a process the Municipal Government of La Paz (GMLP) is trying to change.

The natural disaster of February 2002 highlighted the risks 60% of the city faces. A short but intense hailstorm left 68 people dead and caused considerable damage to homes, public buildings and communications infrastructure (estimated at US$10,000,000). This event affected the hillsides but specially the centre of La Paz, where water drains from the basin. The following quote by Rodolfo Ayala clearly summarizes the configuration process of the risk conditions and helps to understand the causes of this event:

*"La Paz has been developed in a narrow valley of La Paz River; it has a rough topography, with more than 200 rivers and brooks crossing the city and with many areas of geologically unstable soils. On the other hand, the occupation of flood risk areas, the construction on high slope hillsides; the alteration of hydraulic patterns, the invasion of areas with precarious stability conditions, the blocking and cramming of slopes, and the throwing of debris and waste in channels and culverts, are social construction risk factors that increase the vulnerability of city in the event of a disaster"*[1].

During the last five years, the GMLP has made staunch efforts to reduce these risk conditions by developing several actions: municipal ordinances, building hydraulic works, communication and education campaigns, and information systems. These measures, among others, have been incorporated in the municipal dynamics in order to improve the security and dwelling conditions of the city. The last two Municipal Development Plans (2001-2005, 2006-2010) show a clear motivation to incorporate Risk Management, as a crosscutting theme, into every development sector. Undoubtedly, there is still much to do, but a show of political will is essential to inject energy into the process.

The present document intends to recover the experiences developed by the GMLP, aimed at risk reduction and disaster preparedness, analysing them in the light of processes of risk construction. In its development, there have been contributions from technicians from the different GMLP departments[2] through cabinetwork, debates, and plenary reflection meetings. For this reason, it would be difficult to appoint one person as the sole author, and impossible to name all those who have contributed to the writing of this document. In that sense, we must only mention that this is a La Paz Municipal Government document, produced with the support of the United Nations Development Programme – Bolivia Office, in the framework of the Regional Programme for Risk Reduction in the Andean Capital Cities UNDP/DIPECHO.

1 Ayala, Rodolfo. *La nueva visión de la gestión del riesgo local en el Municipio de La Paz.* Bolivia.

2 It is important to acknowledge the Oficialía Mayor Técnica (Technical Office), Gestion Territorial (Land Management), Cultura (Culture), Desarrollo Humano (Human Development), and Promoción Económica (Economic Promotion); Programme "Barrios de Verdad"; Secretaría Ejecutiva (Executive Secretary) and Dirección de Planificación y de Relaciones Internacionales (Planning and Foreign Affairs Department).

# Characterisation of the Scenario 2

The city of La Paz is located on the narrow valley of the Choqueyapu River and the surrounding hillsides descending from the Bolivian Altiplano[3]. This situation, although protects the city from the intense climate, has generated serious limiting factors for its growth and densification. In its formal expansion, La Paz has expanded mainly towards the Southern part of the city, at a lower altitude and always seeking gently sloping areas. In the meanwhile, low-income population without economic access to the "formal city" was settling on steep slopes and ravine beds[4].

As a result of this differentiated process of land occupation, three settlement areas can be identified:

a. Gentle relief: plains, alluvial terraces, and riverbeds where formal settlements are mainly located: the neighbourhoods Centre and Sopocachi; as well as those technically planned: Miraflores and Obrajes.

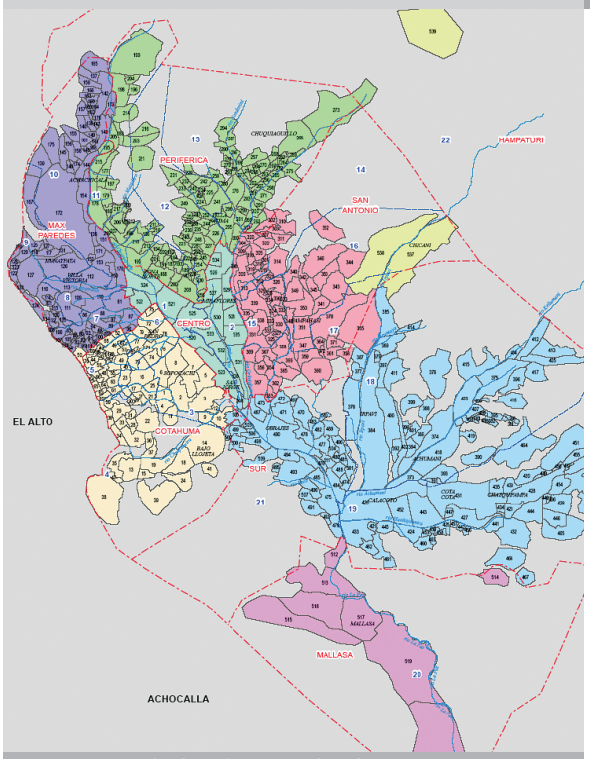
b. Medium relief: formed by deposits from constant landslides. The first informal settlements were located in this area, around the road to El Alto, La Paz train station, and textile industries. Today these areas are more consolidated, with mixed activities: industry-commerce and housing.

3 The first foundation of La Paz was in Laja (1548), on the *Altiplano* plateau (4000 meters above sea level). Affected by strong cold winds, it was relocated to the valley of Chuquiago, now Choqueyapu.

4 The occupation of the hillsides surrounding the centre, with access to industrial and commercial areas, as well as routes of approach, began in the 1940s. Currently, 50% of the population of the city lives on medium and steep hillsides, highly susceptible to erosion.

c. High rough relief: formed by original alluvial deposits caused by erosion. In this area, the extensions of informal settlements from both La Paz and El Alto are located.

TERRITORIAL GRASSROOTS ORGANISATIONS BY MACRO-DISTRICT MAP 01




Source: Atlas from the Municipality of La Paz, GMLP, 2006

With a low growth rate (1.1%) and social and economic indicators above the national average, La Paz appears to be a promising modern city. However, these numbers do not represent the differences between the centre and the periphery; the latter mainly represented by the settlements on the hillsides of the macro-districts Cotahuma, Max Paredes, Periferica and San Antonio[5]. This population, mainly of Aymara origin, presents higher poverty rates and lower levels of education; higher rates of family dependence, more precarious housing conditions, and inadequate access to water and sewer systems. In this way, as we go up the hillsides, moving away from the Centre, the socio-economic indicators go down.

Throughout this characterization, the structural and specific causes of the occupation and consolidation process of the settlements on the hillsides, as well as their basic characteristics effects, are reviewed, in order to identity the main hurdles that must be overcome to ensure an adequate reduction of risk conditions.

## 2.1. THE ENVIRONMENT

Risk conditions on the hillsides of La Paz is a consequence of the interaction between the population living in these areas and the pressures and adaptation to a number of social, political, and economic factors at local, national, and even international level. Some of these pressures are still present today, and

5 La Paz is divided in nine macro-districts, seven of which are urban: Centre, Cotahuma, Max Paredes, Periferica, San Antonio, Zona Sur and Mallasa; and two rural: Zongo and Hampaturi.

it is important to consider them in order to promote future processes for reducing risk conditions.

Four key factors that affect the configuration of risk conditions in La Paz have been identified: the impact of the situation at national level, the low priority given to the issue by institutional and community actors, legal vacuums and institutional conflicts at national and local levels, and the lack of urban planning in the development process of the city.

### 2.1.1. IMPACT OF EXTERNAL FACTORS AND PUBLIC POLICIES ON THE MIGRATION PROCESS

During the past century, a number of events in Bolivian history have affected the migration processes towards the major city, which centralized the administrative, financial, and commercial services of the entire country. The end of the Chaco War (1932-1935) generated a first wave of occupation on the hillsides of La Paz. The veterans, coming from rural areas, did not return to their original areas, instead, they sought to settle in the city to work on the technical occupations they learnt in the army.

This period coincided with the crisis of 1929 and the Second World War, during which the substitutive industrial activity in Bolivia was encouraged. An example of this was the creation of important textile, manufacture, and construction material industries in the seat of government[6]. As a result of this process, the population of La Paz increased five-fold between 1900 and 1950, concentrating, by 1951, 50% of the urban population of the entire country. It was during this period when the first occupations on high slope hillsides (Vino Tinto and Achachicala), on the embankments towards the train station and the road to El Alto took place; textile industries also settled around these areas. (See Chart A, 2003).

A stronger impact on the occupation of hillside areas came from the liquidation of the Bolivian Mining Corporation (COMIBOL), by Supreme Decree No. 21060. This triggered the 'mining relocation', so-called because 25,000 miners lost their jobs and were then forced to migrate to areas of agricultural colonization, especially to the Chapare, for coca cultivation, and to other urban areas. In La Paz, this migration process affected the occupation of the hillsides in the west part of the city, around Buenos Aires Avenue (Los Andes neighbourhood), which became a core route. Likewise, it affected the growth of the population of El Alto.

6 It is estimated that by 1938, 61% of national industry was concentrated in La Paz, a trend which reached 72% by 1945.

### 2.1.2. DISASTER RISK NOT A PRIORITY FOR LOCAL ACTORS

Traditionally La Paz has not considered the value of the environment or the landscape, but especially the security that the hillsides must provide to the lower areas of the city. In the first town-planning projects, the hillsides were not considered as protection areas to invest in, but as boundaries of the city, authorizing its informal occupation. In recent years, the occurrence of natural disasters has increased the level of awareness in risk issues, which currently have a greater institutional presence in these areas and more investment in risk reduction measures.

However, the hillsides are already occupied and becoming overcrowded. Although neighbourhood leaders, authorities, and population now consider risk an important issue, they still do not see it as a priority, because there are more urgent and short-term problems to solve such as access to housing, economic activities or services; as has been shown by the municipal survey carried out for the elaboration of the Municipal Development Plan 2006-2010.

### 2.1.3. LEGAL VACUUMS AND CONFLICTS AT NATIONAL AND LOCAL LEVELS

La Paz, through its Municipal Government, has acquired greater autonomy in land management. However, there are still many vacuums and overlapping areas in its legislation, which have generated conflicts of responsibility, of land ownership and municipal boundaries. This situation has affected the expansion of informal settlements on the hillsides and their consolidation.

#### Conflicts of responsibility between national and local institutions

- The land titling process is done through Derechos Reales (Property Registry Office), which grants the property without considering its risk condition, or the planimetry and cadastre studies carried out by the municipality.
- The resources of housing promotion, necessary to reorganise land occupation are nationally centralised. In this way, the municipality does not have enough resources to relocate families situated in risk areas.
- Greater validity of the National Law of Private Right versus municipal property. This situation has not allowed the necessary expropriations to assure the protection of highly unstable lands.

### Law No. 2372 Regularisation of Property Rights

This state law promotes the regularisation of property. Protected by this law, residents demand title deeds for their land, even though they are located on risk areas or they belong to the municipality. In the event of this situation, the Municipal Government of La Paz has created the Urbanisation and Remodelling Regularisation Plan (PRUR), which includes geotechnical studies for a better distribution of lots, trying to prevent their location in high-risk areas.

### Conflicts of municipal boundaries

Given the inexact definition of boundaries of the Municipal Section of La Paz (Law No. 1669 of 1995), a series of boundary problems in the districts of Palca, Mecapaca, and Achocalla have arisen. Taking advantage of this situation, urbanisation companies process the study and design of the planimetry in these neighbouring districts, with less restrictions and technical requirements; and later they ask for their registration in La Paz for the provision of services. Therefore, many of these urbanisations are located in risk areas.

## 2.1.4. URBAN PLANNING HAS IGNORED THE REAL GROWTH PROCESS OF THE CITY

Urban planning has been traditionally oriented to formal, high- and middle-class settlements, located in flat areas of the city, ignoring the intense growth process of the low-income population and the occupation of hillsides areas. As a result, there are big differences between the neglected and disorganised settlements of Cotahuma and San Antonio[7], compared to other areas such as Sopocachi and Miraflores that have had adequate studies and planning. Consequently, the land use plans without a future vision that considers both

7 The informal occupations were based on the type of fragmentation carried out by the agricultural owners, *loteadores,* or by the residents themselves, without considering equipment areas, public areas, or risk areas.

the biophysical and socio-demographic elements of the development of the city have been repeatedly surpassed by territorial and population growth.

The Study of Constructibility and the Urban Development Plan (PDU)[8] of 1978 together with the Land Use Regulation and the Settlement Standards (USPA) were the first attempts to incorporate measures to control and order the settlements on hillside areas. These state that any slope having more than 45 degrees of inclination must only be used as a forestry area, limiting the residential use to a small portion of land. Without having an alternative to the existing housing demand and in the event of this prohibition, the owners of lands near the city made use of this opportunity to start the "sale" of their lands through intermediaries as "lotes de lucha" (disputed lots) at low prices. In this context, the neighbours must organise themselves in order to protect their land and to process their titling and services.

A similar situation arose in less steep areas, which also present predisposition to erosion. These areas were considered as restricted occupation areas[9]. However, considering that land occupation and planning have been informal[10], in approximately 80% of the area, these technical specifications have been ignored. The weak prospective vision of the problem; the lack of technical assistance for this occupation; the difficulties in the supervision and control; and even the scarce revision of the regulations[11], have affected their fulfilment.

To ensure the respect of the norm, the departments of control and supervision of the sub-City Hall offices have the responsibility to supervise and monitor the occupation of the area and the construction on the lots. However, these departments do not have enough human resources or budget to fulfil this responsibility[12]. Therefore, the hillsides have been occupied first, and then regularised through the recurrent urban remodelling programmes.

On top of this, in 1989 the metropolis was divided into two cities, La Paz and EL Alto. This political-administrative division hindered the continuity of joint planning of the metropolitan area, the first attempts at which took place in the 1940s and 1950s, but in which the investment was not enough. This division does not consider the social and economic interdependence between the cities and the link between their problems. Without a doubt, to solve the problems of La Paz, it is necessary to come up with a process of land management that recognises, considers and designs the metropolitan area, incorporating the following neighbouring municipalities: El Alto, Palca, Mecapaca, and Achocalla. Promoting the development of these regions could help to complement the urban functions as well as reducing the pressure on the capital city (GMLP, 2006).

8 Plan de Desarrollo Urbano (Urban Development Plan), Instituto de Investigación y Planificación Municipal -IIPLAM (Municipal Research Institute), Municipal Government of La Paz, 1977.

9 There are two standards for the property administration of the hillsides and high slopes.

- 1st Settlement Standard, referred to as HPE and which characteristics are: minimum lot area: 100 m2, minimum lot front: 8 m, maximum area to be covered: 50%, maximum area to be built: 100%, and maximum frontage height: 2 floors.
- 2nd Standard H2: which characteristics are: minimum lot area: 100 m2, minimum front lot: 6 m, maximum area to be covered: 70%, maximum area to be built: 250%, and maximum frontage height: 4 floors.

10 Cotahuma 100%, Max Paredes around 96.55%, Periferica around 94.12%, San Antonio around 77.78%, and even Zona Sur around 50.46%.

11 The standards mentioned above (H2, HPE and the restriction of 45%) have not undergone any amendment since their approval. However, the standards related to the change of use of flat areas, between residential, commercial, and services have been constantly revised. The current Municipal Government has just started revising the USPA for these areas.

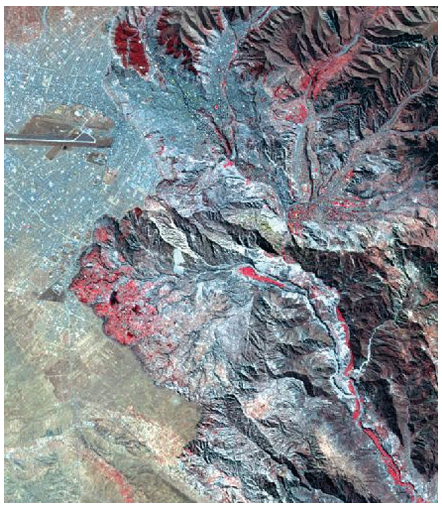
12 Information from the sub-City Hall of Cotahuma.

## 2.2. THE NUCLEUS OF THE SCENARIO

Currently the hillsides of La Paz are undergoing a double process:

- Informal housing occupation, in total disregard of PDU, and the regulations of land use and settlement standards, USPA.
- Densification and consolidation of the settlement through the gradual access to services, planimetry, and land titling, as well as investment in housing and economic activities.

### 2.2.1. THE AREAS AND THEIR CHARACTERISTICS



The hillsides of La Paz are formed by alluvial material (blend of clays, sand, mud, and gravel) that is highly unstable and susceptible to rain erosion. They have little or no natural vegetation, even though they have opportunities for forestation[13]. The slope of the hillsides goes from medium to high and presents deep gullies (ditches produced by water). The different meteorological seasons in the La Paz River Basin have an average annual rainfall of 500 mm, not a very high number but still important in the generation of erosive processes given its seasonality. Most of the rain, 77 %, falls between November and March.

CHART 01 AREA OF THE SETTLEMENTS ON THE HILLSIDES

| Total built area in the city (area in hectares) | Total area built on slopes steeper than 15% | Total area of informal settlements (later-on legalised or not) | Total area of informal settlements slopes steeper than 15% |
|---|---|---|---|
| 13.911,41 | 9.716,28 | 6.065,70 | 2.855,84 |

On these hillsides and on slopes even steeper than 100%, are located other informal settlements that surround the city centre, such as Bello Horizonte, Alta Tacagua, Pasankeri, Tupac Amaru, amongst others. As a reflection of the existing differences between the centre and the periphery, the settlements on

13 An instance of this are the woods of Pura Pura, 260 hectares, the only wooded area of the city, product of the forestation of the railway areas for the construction of cross ties.

the hillsides, mainly formed by population of Aymara and Quechua origin, show lower socio-economic indicators compared to the central areas. For example, poverty conditions higher than 60% in some areas[14]; high overcrowding rates (3 to 5 people in one room); the highest level of instruction, on average, is primary education; amongst other indicators. In the same way, there are more precarious constructions on the informal settlements (more than 50% adobe houses, with corrugated iron roofs and even with earth floors), as well as the basic services (pipes outside the house and no sewer system).

The population of the suburbs work mainly in commerce, industry, housing services, construction, and public transport (GMLP, 2006). Most of the activities are carried out independently, which reflects the informality of the local economy. On the lower hillsides, where there are more consolidated settlements, the population works in small-industry activities in mixed facilities: workshop-store-housing. On the higher hillsides, the constructions are used mainly for housing; therefore, workers from these areas have to go to lower areas or to El Alto.

## 2.2.2. THE ACTORS AND THE PROCESSES IN RISK CONSTRUCTION

A wide range of actors have participated in the process of land occupation; mainly the community, given the conditions in which they had to make their living and struggle to obtain a portion of land in the city. The acquisition of those rights contributed to the gradual consolidation of the settlements.

### The community and its different ways of occupation

As mentioned before, diverse regional and national factors have caused the population to migrate from the country to the city. These low-income families, unable to enter planned and formal areas of the city (because of the cost of land[15] or access to employment), were forced to seek other lands, more economically accessible and closer to their social and economic networks.

Taking advantage of these situations, informal land processors, called "loteadores" (land dealers) invade, divide, and sell lots of land. In many cases, they work with political authorities. These neighbourhoods have been gradually obtaining their title deeds, planimetry, and services. Therefore, several settlements, even when they are located on hillside areas (on slopes steeper than 45 degrees, the limit established by the USPA), or on ravines have already obtained their title deeds and complete services.

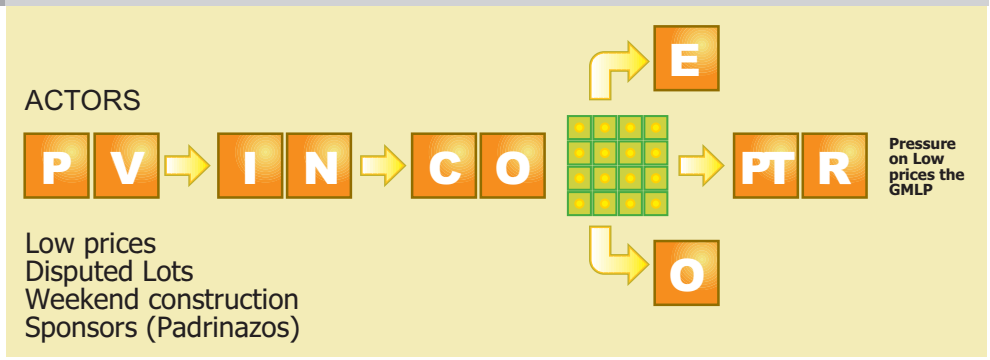
14 According to the statistics on unsatisfied basic needs (GMLP, 2005).

15 The cost per urbanised square meter in La Paz ranges between US$ 40 and 60, while on the black market it costs US$ 5. Formal areas are inaccessible to a population with an average salary of Bs. 800 (US$ 100). Information from the sub-City Hall of Cotahuma.

In the process of consolidation of the settlement, other economic, industrial and services activities are also consolidated, in many cases increasing and making the risk scenario even more complex. In the oldest settlement areas, the presence of workshops (carpentry, mechanics, welding) next to clandestine establishments selling fuel and crowded commercial areas, increase the risk of fire.

The following outline by the Architect Ricardo Uzin, Land Use Planning Director in the GMLP, shows the actors who participate in the process of occupation on hillside areas. The owner (PV) of a land – likely to be urbanised, because of its proximity to a consolidated area – gives his land to a mediator (IN), who then gathers a group of families assigning them a lot of that land. Those families pay the mediator for the lot and for the processing of its services. Once the payment is settled, in most cases, the mediator disappears and the families, already organised in communities (CO), must continue with the process of acquisition of the property and its services. In this way, the settlement is consolidated either spontaneously (E) or systematically (O).

GRAPHIC 02 PROCESS OF OCCUPATION ON HILLSIDE AREAS




At this stage, politicians and technicians (PT) also participate in the process, who having different interests, help the community with the regularisation of their title deeds and services. In former municipal governments, campaigning council members have promised to process titles and services in exchange for votes, and have later had to keep these promises in the face of residents' demands. On the other hand, the greater presence of technicians in the settlements has somehow organised the occupation, with a better streets arrangement, better location of the houses, and of the basic equipment.

## The construction of houses in informal settlements

The construction of houses is done progressively depending on the saving capacity of the family. To level and give more stability to the land the owners first make a sloping side cross-section, where they settle the first level of the house. The house is mostly made of adobe (blend of sand, water, and straw) and corrugated iron roofs over a wood structure. In settlements located in ravines, these are first filled with debris, which covers the natural drainages and later generates problems in the houses settled on them.

In a second stage, for the construction of the upper levels of the house, the foundation and the construction of a concrete structure is carried out, which rarely has technical supervision. The mezzanine levels are made of wood and the roofs of zinc alloy. The house gradually occupies most of the land, even though the Land Use Regulation recommends and regulates the use of the 50 and 70% of the lot only.

## The settlements on the hillsides: consolidation, densification and overcrowding

As mentioned before, the hillsides of La Paz are not only undergoing a process of expansion, but mainly, and considering the reduced space available, a process of densification. The growing increase of the weight of these houses, workshops, and business shops, built with no technical criteria and on highly unstable hillsides, increases the risk in these areas.

The neighbourhoods situated on the hillsides are inhabited by migrants (mainly from the department of La Paz), which attract relatives and friends from their place of origin. However, there is greater natural increase, as the population in these areas is mainly made up of children and young people. According to the 2006 Atlas of the Municipal Government of La Paz, the ratio between children under 15 years old and women in fertile age shows higher numbers in areas located on the hillsides of medium and high slope. Greater densification, therefore, is expected in these settlements.

## Access to basic services and road network

Most of the settlements have been built around a core route, around which the population started building their houses. The Buenos Aires Avenue and the railway, at first, were the axes for the urban expansion towards the west hillsides: Max Paredes and Cotahuma. The road to Los Yungas, on the

east hillsides, and Naciones Unidas Avenue, on the west hillsides are also part of this expansion.

The road network has two characteristics: the first that corresponds to the oldest settlements, a network that has an irregular outline, it is unclassified, with variable sections, and has not considered the slope. The second one, corresponds to the most recent settlements where the participation of technical staff is visible, it presents some classification criteria. However, both cases are characterised by an outlining in favour of the slope, which accelerates erosion.

The supply of services considerably affects the consolidation of these settlements. Political pressures and economic interests of the companies have influenced the increase of coverage towards areas that, in most cases, do not have up-to-date title deeds or approved planimetry, or are located on risk areas. Two services that strongly affect the consolidation of the settlements are:

- Electrical networks that are expanded according to the demand of the population and do not require the presentation of a title deed or a planimetry of the settlement. The connection is individual, and may even be connected to a mobile business.
- Water connections do require planimetry but not the title deed. In this way, when the planimetry is approved, even when the technical specifications are not fulfilled, the water company is obliged to provide the service. However, it is not obliged to connect it to the main sewer system, which worsens the problem.

The consolidation of the settlement finishes after considering the coverage of education and health services, and programmes for the improvement of the infrastructure.

In summary, the main actors and their actions affecting the configuration of risks in La Paz are:

SUMMARY OF ACTORS IN RISK CONSTRUCTION AND MANAGEMENT — CHART 02

| ACTORS | MODE OF INTERVENTION |
|---|---|
| **Community** | Informal occupation of unstable areas, progressive construction of housing and urban infrastructure with no previous planning. |
| **Municipal Government** | Reactive intervention, high investment in the construction of infrastructure for prevention. Action, disperse and isolated, but intensive on the hillsides. |
| **Service Companies** | Intervention separated from the municipal planning and, in many cases, conditioned by the pressure of the community and political actors. |
| **Private** | Mainly owners and "loteadores" who take advantage of the sale opportunity even illegally. |

## 2.3. UNSAFE CONDITIONS: HAZARDS AND VULNERABILITIES

As a result of the determining factors of the environment and of the characteristics of the occupation and consolidation process of the informal settlements on the hillsides (nucleus), extreme hazard and vulnerability conditions have been consolidated. However, the process has not stopped, and risk increases as the city grows and becomes overcrowded; and while comprehensive and prospective alternatives for development are not found.

### 2.3.1. HAZARD CONDITIONS

The high susceptibility to erosion on the hillsides of La Paz (given the characteristics of land, the presence of subsoil waters, the surface water pattern, the scarce vegetation, and the slope level) predisposes a natural threat condition on the neighbourhoods settled on them. However, other man-made factors, which increase the speed and magnitude of the erosion process, add to the land weakness. Some factors that increase the probability of collapses are the interruption of natural drainages, land cuts for the construction of roads and infrastructure; the lack of sewer systems, the discarding of debris in the channels and culverts, and the increase in the weight of the houses.

Other areas prone to landslide identified within the urban area are Seguencoma[16], Villa Armonía, Kupini, Pampahasi, Mejillones, amongst others. Some of the factors recognised to contribute to their activation are the type of land, the presence of subterraneous waters and the slope of the strata. However, other causes include the continuous drainage of wastewaters over the area, the land cuts for the construction of road networks, and the greater weight of the houses.

Another typical threat on the hillsides is the so-called *mazamorra* (mudslide), which is a kind of small alluvium that descends along the gullies and ravines. This threat has increased because of the filling of natural drainages, the construction of incomplete and inadequate drainages, and the discarding of debris into the channels.

Nevertheless, collapses, landslides, and mudslides are not the only hazards formed on the hillsides. High levels of contamination increase the risk of pulmonary disease and severe diarrhoea. The wind patterns in La Paz mean that industrial pollution from El Alto is concentrated on the western slopes of the city.

### 2.3.2. VULNERABILITY CONDITIONS

As previously mentioned, the combination of social, economic, political, and institutional factors has conditioned the occupation and consolidation of the hillside areas. The lack of attempts to understand the real process of growth of the city and the inability to foresee or react to the problem, have enabled the origin, encouragement, and over-expansion process of the informal settlements. In this sense, the analysis of vulnerabilities entails understanding the main and specific causes (revised in the analysis of the scenario and the nucleus) and their effects in the intensification of hazards, as well as in the generation of weaknesses in the settlements to resist and recover from its effects.

It is clearly possible to recognise the physical and technical vulnerabilities of the settlements, regarding their location and the quality of the constructions: houses, educational and health centres, road networks, etc. The location of the settlements on unstable lands and on steep slopes gives a natural condition of vulnerability, in which 60 % of the city finds itself. The process of progressive housing construction, which entails cutting and filling the slopes, and the change from lighter materials (adobe and wood) to more

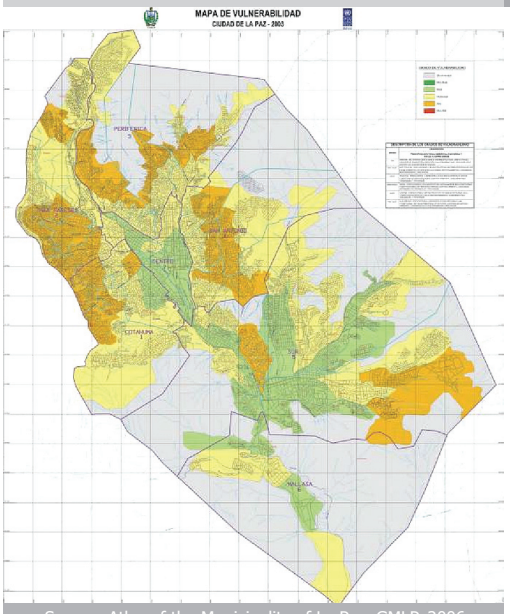
16 The stabilization of this landslide that affected a main road of the city, has required the investment of US$2,788,517 financed via credit from the Andean Development Corporation (CAF).

rigid and heavier ones, increase the instability of the hillside[17]. The problem is particularly worrying in the case of basic facilities, given that they were built on the areas "free" of settlement, after the "lotización" or distribution of lots for housing. With no previous planning for their construction, they are generally situated on the more unstable areas.

The lack of access to basic services, water supply and sewer system, increases the environmental vulnerability of the population. The impact of the lack of sewage systems is particularly important, as it affects more than 50% of high slope settlements. These waters poured into the land increase its instability. The deficiency in the system of waste collection and the discarding of waste into gutters and ravines intensifies the effects of rain.

The vulnerability study developed by the GMLP[18] reflects this situation. In brown are moderate and high vulnerability areas that correspond to hillside areas. These areas have medium and high indicators of infrastructure and equipment, environmental quality, and service coverage.

VULNERABILITY MAP OF LA PAZ — MAP 02




Source: Atlas of the Municipality of La Paz, GMLP, 2006

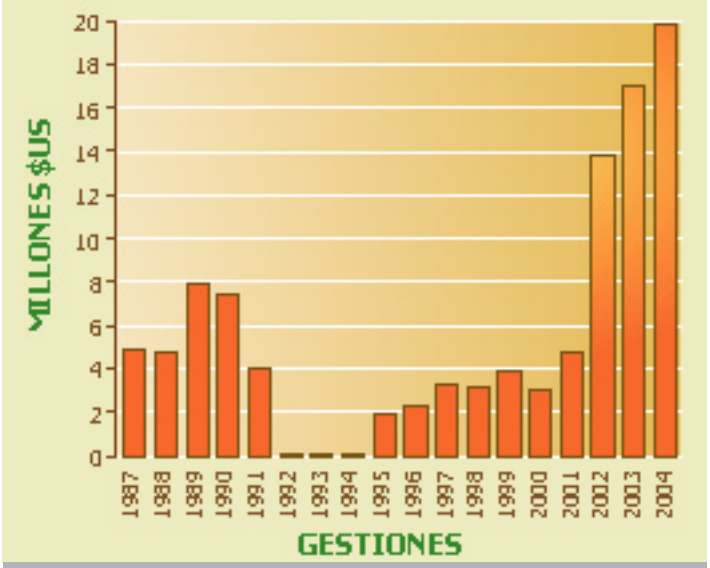
The social, political, and institutional vulnerabilities are indicators which are difficult to measure quantitatively, although it is possible to make a qualitative analysis of them. In the case of the settlements on the hillsides, however, the high organisational capacity developed during the process of occupation and consolidation of these settlements must be acknowledged. The ownership of the land, the acquisition of every service, the construction of houses, and the basic facilities, has required the commitment and participation of the residents. Nevertheless, this organisational capacity has not been used to prevent the configuration and reduction of risk conditions. This issue, although essential, has been scarcely considered in comparison to other more urgent problems such as water supply, housing, and employment; and more recently to other social problems that are also linked to the process of construction of the settlements: lack of safety (thefts), family disintegration.

17 These settlements currently have constructions from 4 to 5 floors, built without technical criteria that produces a strong pressure on the land, which causes collapses and landslides.

18 The risk studies developed by the Direccion de Cuencas de GMLP (River Basin Directorate) have contributed to make municipal technicians more aware and to the incorporation of the situation in their institutional agendas. However, the scale of study (1:25,000) allows carrying out for an analysis at city level, but not at locality level. In order to facilitate land administration, this Directorate has undertaken the task of increasing the analysis scale to 1:5,000.

The political and institutional vulnerability has been the main determining factor that caused and consolidated the problem. National and regional factors (conditions of inequality to the access to economic and to natural resources, closure of public companies, and even the end of the Chaco war), have caused the expulsion of the population from rural areas and its migration to the political and economic centre of the country. On top of this, the weaknesses in local management have allowed the occupation and, many times, contributed to the development and consolidation of the settlements. In summary, local and national institutions have seen their capacity to predict, control, and deal with this process comprehensively overwhelmed.

GRAPHIC 02 INVESTMENT OF GMLP IN PREVENTION AND ATTENTION OF EMERGENCIES




Source: GMLP, 2006.

In the last five years, local management has made significant progresses thanks to the political willingness of the Mayor to include the risk issue in the dynamics of the GMLP. Therefore, the institutional presence is more and more efficient and permanent on hillsides areas, in both prevention and mitigation tasks and emergency response[19].

However, there has been greater investment in the construction of works for hydraulic and erosion control than in the development of initiatives for land control and housing solutions. Even though there has been some progress (incorporation of risk studies in the development of planimetry, and considerations for the property valuation), a more effective intervention is required to have a wider metropolitan vision of land development, which foresees the growth of the city and its future problems. This implies the coordinated participation of the City Hall with other actors: NGOs, public institutions nationwide, and service companies. It is necessary to strengthen coordination with the City Hall, as head of the system.

19 The GMLP has invested during 2000-2005 a total of US$44,500,000 of which, 56% was allocated to emergency assistance and 46% to works of canalisation and culverting, gutters, drains, and retaining walls.

Aimed at emergency attention, the City Hall has developed a system that comprises an emergency call network, the immediate inspection through the sub-City Halls, primary attention through voluntary organisations, and, when necessary, the activation of the emergency committee. This system has proved to be efficient when assisting isolated but recurrent cases (3000 cases is the annual average). However, it is necessary to measure and strengthen its capacity to respond medium-sized and larger events.

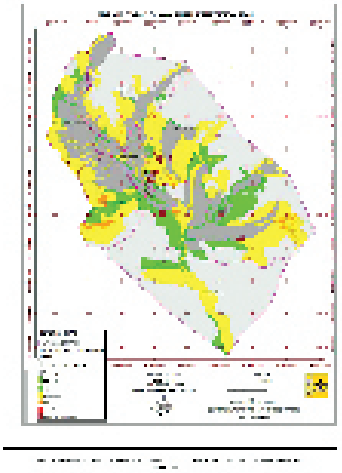
## 2.4. EFFECTS: UNSAFE CONDITIONS

The risk manifests itself directly through its effects on the community but also on the city as a whole. The first effects are related to damage to the population, their houses, basic infrastructure, or over health and education conditions. The second effects, more difficult to measure, are related to damage to economic activities or to public finances.

### 2.4.1. EFFECTS ON THE COMMUNITY (NUCLEUS)

The risk study of the GMLP (2004) has identified 14 critical areas on the hillsides, where the risk is considered as high, specific, and obvious (in red on the map annexed). This affects 138 blocks, where there are 1,331 properties, in the neighbourhoods of 23 de Marzo, Villa Armonía, Villa San Antonio, Obrajes, Bella Vista Alto, Seguencoma, and Cota Cota. This study also indicates that 60% of the occupied area of the city presents risk conditions - between low, moderate, and high – from geodynamic phenomena. Equally, it recognises that free areas within the urban macro-districts show potential threat conditions, if they become occupied, for both the characteristics of land and the level of slope.

MAP OF DE RISK OF LA PAZ — MAP 03



Source: Atlas Of The Municipality Of La Paz, GMLP, 2006.

This risk situation has been present throughout the history of the city - landslides of Kanko Hanko (Llojeta) in 1548, and Tembladerani in 1873-; and has increased in the last decades. The following disasters show this increase, the landslides of Cotahuma (1994), Kupini[20] (1999), Federico Avila and Llojeta (2003), and Las Lomas and Bolivar Street (2004); as well as the floods of Achumani (1997) and Jilusaya (2004).

20 139 families were affected and 72 houses were destroyed (between construction of reinforced concrete and adobe, the structures had several floors). 200 meters of the roadway of Av. Armando Uría were destroyed as well as the roads of the upper part of the Illimani Sector of Alto San Isidro; also the water, sewage, electricity, and telephone systems were destroyed.

However, the most important event, for both the effects it produced and the change it generated in the attitude of the institutions and organisations, has been the natural disaster, which occurred on the 19th of February 2002, reviewed in the introduction.

La Paz is characterised by the occurrence of a great number of small disasters; annually around 3,000 emergency cases are registered[21]. These cases are dealt with by the Centro Operativo de Emergencia (Emergency Operative Centre), and economically supported by resources from the GMLP, but mainly from the families and their community organisations. The affectation of properties, educational centres, health centres, and sections of the roads, is expected effects when a threat appears. However, the effects after a disaster are not only physical. Poverty increases in these areas as people's savings and the investment they have made in their settlements are affected. In many cases, the effort of decades, to consolidate a settlement, is destroyed by the occurrence of a disaster; and in many occasions, these risk conditions are built again.

### 2.4.2. EFFECTS ON THE CITY AS A WHOLE

The effects of these disasters do not have impacts only on the hillsides directly affected, but on the city as a whole. The economic activities developed in these areas (commerce and industry) are drastically reduced during every rainy season, affecting formal and informal jobs. In the same way, when educational and health centres are affected, the impact moves from the population in the risk areas to the indirectly affected population who cannot use the service. On the other hand, the resources that are diverted for the reconstruction of damages reduce the investment in issues that had been planned at the beginning of the year. The GMLP estimates that the total amount destined to emergency response and recovery adds up to US$5,000,000 per year, a sum that corresponds to a normal year with small emergency cases, such as the 3,000 mentioned above, but not to a year with bigger events[22].

21 Small disasters that do not attract national or international investment, but that put together have a greater impact than medium- and large-scale events. In the last five years, the GMLP has allocated a total of Bs. 199,149,350 to emergency assistance.

22 The 19th of February 2002 disaster alone generated losses estimated at US$10,000,000.

In contrast, the occupation of unstable areas, undoubtedly, increases the investments that must be made by the residents, for the construction of their houses, the service companies for the supply of water, electricity, and sewer system connections, and the GMLP for the enlargement of access roads. These costs are not usually calculated. What is possible to estimate is the cost of prevention works especially constructed to reduce risk conditions of the communities on the hillsides. In the last five years, the GMLP has invested around US$45,000,000 in infrastructure works to control erosion in riverside areas and hillsides. Equally, 40% of the investments of the Programme *Barrios de Verdad* (Real Neighbourhoods), in selected areas, include prevention works.

Another impact that must be considered is the reduced revenue received by the Dirección de Información Teritorial (Territory Information Directorate) from the areas seen as evident risk areas. In those 14 areas, and thanks to the pressure of the residents, the GMLP decrees by the Municipal Ordinance No. 186/2005 the reduction of 15% of their real property tax. This total diminishes the municipal income by Bs. 3,000,000 annually (US$ 375,000).

These numbers show that a comprehensive reduction of the risk condition in the city would contribute not only to improve the security of the citizen and their life quality, but also it would be profitable for the economy of the Municipal Government and, clearly, for family investments.

# Compilation of Tools 3

## 3.1. INVENTORY AND DESCRIPTION OF RISK MANAGEMENT INSTRUMENTS

Risks in La Paz have been generated throughout the decades of the city's growth, through the combination of factors in the scenario (development model of the country, inequality between the countryside and the city) with internal factors (weaknesses in territorial organisation and in institutional coordination). Therefore, the transformation of the risk scenario requires permanent, comprehensive, and coordinated work, aimed at mitigating existing risks and, mainly, influencing the processes which create new risks.

During the last five years, the Municipal Government of La Paz (GMLP) has been making significant efforts to incorporate the risk issue in the different offices of the City Hall. Undoubtedly, the political willingness of the mayor has been the driver of this process and has lent new dynamics to the task of increasing the security of the population. The results of this are the 18 instruments that have been prioritised for this regional catalogue and that are a sample of the characteristics of the risk management model of the GMLP.

The instruments have been methodologically grouped according to the emphasis put on one or another component of management:

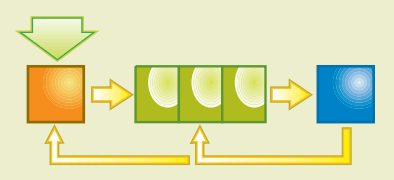
- The management of the scenario will try to influence structural aspects that determine the construction of risk conditions. They are generally part of long-term strategies that need to be negotiated with national and regional institutions. In the case of La Paz, the Municipal Development Plan (PDM) 2006-2010 is a big step in this respect. In this plan, risk reduction has been incorporated as a crosscutting theme, and must be the basis for the updating of the Territorial Land Use Plan.
- Nucleus management seeks to influence prospectively the actors and processes directly related to risk generation. The strategies of land management implemented by the GMLP intend to reduce, although incipiently, the occupation and use of hillside areas. A significant contribution to the decision-making process in each of the components is the information on risk analysis, which has helped to give priority to areas of intervention where the investment was concentrated.
- Unsafe-conditions management, through corrective measures, intends to reduce the already existing hazard conditions and vulnerabilities. The investment of the GMLP has been higher for this type of strategy. In the PDM 2001-2005 and 2006-2010, more priority has been given to prevention work, which has been carried out gradually. Investment has also been made in the improvement of settlements (Barrios de Verdad) in which 40% of the budget is earmarked for prevention measures. Some strategies of land management have also been incorporated to promote better occupation of the land.
- Effects management intends to strengthen the capacities to react in case of an institutional or community emergency. La Paz currently has a Centro de Operaciones de Emergencia (Emergency Centre), a Grupo de Atención de Emergencias Municipales (Municipal Emergency Attention Group), and an Immediate Response System, which are efficient for the intervention in the small but numerous disaster events. Additionally, instruments for training and awareness have been developed, and implemented at community and professional levels. Nevertheless, these are not considered enough for responding to high-intense events.

In general, the GMLP has developed different capacities that, although they emphasise corrective measures and emergency preparedness, have also started the path towards more prospective initiatives. The definition of a common policy that integrates the different offices and gives added value to their intervention is vital during this process of institutional strengthening. Moreover, strengthening inside the City Hall will also help to fortify its capacity of coordination with other local and regional actors.

## ANALYSYS OF INSTRUMENTS FOR EMERGENCY PREPARDENESS AND RISK REDUCTION

| INSTRUMENTS / KEY DETERMINIG FACTORS | SETTING MANAGEMENT | NUCLEUS MANAGEMENT | | | | | STATE MANAGEMENT | | | | | | EFFECT MANAGAMENT | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Incorporation of the RM in the PDM | Risk Analysis 1:20.000 | Threat Analysis 1:10.000 | Municipal Information System | Revision by USPA | Ordinance for the Protection for riversides and hillsides | Barrios de Verdad | Planimetry | Property Rate | Technological Innovationss | Drainage Master Plan | Prevention Plan | Community Training | Awareness Campaigns | Disaster Management System | COE | GAEM | Emergency Follow-up System |
| **SETTING** | | | | | | | | | | | | | | | | | | |
| Short and medium-term vision in the planning of the development, separated from its regional setting. | | | | | | | | | | | | | | | | | | |
| Conflict of responsibilities with national institutions. | | | | | | | | | | | | | | | | | | |
| Risk issues are not a priority at institutional level. | | | | | | | | | | | | | | | | | | |
| **NUCLEUS** | | | | | | | | | | | | | | | | | | |
| Deficiencies in the system to control new occupations | | | | | | | | | | | | | | | | | | |
| Construction of badly located houses and with inadequate technical measures. | | | | | | | | | | | | | | | | | | |
| Isolated intervention by the different offices of the GMLP and service companies. | | | | | | | | | | | | | | | | | | |
| **STATE** | | | | | | | | | | | | | | | | | | |
| Increase and acceleration of the erosion process in ravines and hillsides. | | | | | | | | | | | | | | | | | | |
| Settlement under high risk and in consolidation. | | | | | | | | | | | | | | | | | | |
| The population prioritise more urgent problems over the risk issue. | | | | | | | | | | | | | | | | | | |
| **EFFECTS** | | | | | | | | | | | | | | | | | | |
| Ocurrence of 3,000 small and medium disasters during rainy season. | | | | | | | | | | | | | | | | | | |
| Transference of budgets from other areas for emergency attention and recovery. | | | | | | | | | | | | | | | | | | |
| Weak intervention of other actors and the population. | | | | | | | | | | | | | | | | | | |

## 3.2. MANAGING THE ENVIRONMENT



The political, institutional, social, and economic determining factors, at local, regional, and national levels, are essential elements that have influenced the transformation of risk conditions. During the characterisation, the following factors of the scenario, which need intervention, have been mentioned: boundary and regulatory conflicts, vision of long-term metropolitan development, public and institutional awareness on the issue. The strategies adopted will be long term, but more structural regarding risk reduction.

### 3.2.1. REGULATORY AND PUBLIC POLICY FRAMEWORK

Law No. 2140 of the Sistema de Reducción y Atención de Desastres - SISRADE (Reduction System and Disaster Attention) states that the municipal governments are the main body responsible for the prevention, mitigation, response, and reconstruction, which should be integrated to the process of local development. In this sense, they are given the responsibility of being in charge of the risk reduction system, locally, coordinating the intervention of the different actors. Assuming this responsibility, the last two municipal administrations of La Paz have included actions for the reduction of risk conditions in their development plans. Even though there is not an explicit policy on risk management, which combines the duties and responsibilities of each of the municipal offices, the political willingness of the Mayor has encouraged the inclusion of initiatives in the dynamics of the entire institution.

Some risk considerations had already been included in previous decades, such as prevention work, control plans for ravines and watercourses as well as the Urban Land Use Plan (1978), and the corresponding Land Use Regulation and the Settlement Standards (USPA)[23]. However, these initiatives, and even the current ones, have been unable to reduce the trend of occupation and densification on the hillsides of La Paz, and consequently the process of construction of risk conditions. The land planning norms have been completely exceeded by the process of growth of the population. The lack of policies that proactively arrange land occupation in safe areas and promote the construction of safe housing has not helped in fulfilling the norms. Additionally, in cases where the law was being enforced, the owners, protected under the Bolivian Constitution (that authorizes the use

23 The valid USPA regulation forbids the occupation on hillsides with slopes steeper than 45 degrees and restricts the occupation on hillsides with lower slope. However, this regulation has been exceeded by the expansion of the city and in many cases has been regularised. In this process of consolidation, the acquisition of services is an important fact. The only existing prohibition is the water supply in non-formalized settlements. In the settlements already formalized, even if they are situated in a risk area, it is mandatory to have water service, but not sewer system. The other services can be supplied with no restriction.

and possession of private property), have won court cases against the City Hall. This cases show a clear confusion between the legitimate right to land ownership and the type of use given to this property, which is regulated by the Land Use Regulation.

### 3.2.2. INSTITUTIONAL FRAMEWORK

Each one of the offices, departments, and programmes of the GMLP has identified initiatives aimed at incorporating the risk issue. In this way, different experiences related to planning development, land management, education, planning, neighbourhood improvement, and emergency attention, amongst other aspects, have been developed. Many of these initiatives are carried out in a dispersed (that is, they are not within a strategy previously designed) and isolated manner (with weak coordination between the GMLP offices and with external institutions). Despite this, however, they are linked by the same purpose and their intervention, which focuses on high-risk areas of the city. The Risk Map has contributed greatly to this dynamics, after being used by each municipal office in the development of their initiatives.

Leadership in this issue is under the Oficialía Mayor Técnica - OMT (Technical Department) administration, which has given the intervention a more technocratic approach: generation of information, prevention and reduction work, and emergency attention. The recently created Dirección de Gestion Integral de Riesgo (Comprehensive Risk Management diretorate), formerly Basin Directorate of the OMT, has increased its importance, especially when considering its budget. However, until December 2006, the Risk Management

Unit had a small municipal branch office, with little capacity for involvement in institutional planning and far removed from the decision-making process. This unit must be strengthened, assuming the role of coordinator within an Intra-Municipal System, the creation of the latter being a priority. It would also be the basis for the creation of a Municipal System of Risk Reduction, which includes other public and private actors.

The Dirección de Planificación (Planning Directorate) has incorporated some prospective initiatives, which still belong to this technocratic approach of intervention. The last two municipal development plans have included the issue of risk reduction as an urgent need. The Municipal Development Plan 2001-2005 included the issue in many programmes: Risk Protection, Basin Management, and Emergency. In that plan, the activities were aimed at the knowledge of risk conditions, at the construction of canalisation and culverting works, and at the maintenance of infrastructure. Since the February 2002 disaster, investment has increased each year, and the vision of the issue has particularly expanded. Therefore, in the Municipal Development Plan 2006-2010 risk reduction has been included as one of the five axes of the GMLP programme: Integral Protection of the City and the Community; it was also explicitly included in the Programme "Barrios de Verdad" (Real Neighbourhoods).

The most important limiting factor is the lack of a long-term development plan. There are only medium term plans for periods of five years. A wider land and time vision could provide more opportunities to influence the trend of construction of new risk conditions.

# INSTRUMENT 1 INCORPORATION OF RISK MANAGEMENT AS A CROSS CUTTING AXIS IN MUNICIPAL DEVELOPMENT PLANNING

| | |
|---|---|
| **Objective:**<br><br>To implement a crosscutting approach to comprehensive risk management in each one of the actions of the GMLP. The problems identified in the risk study have enabled the implementation of a comprehensive vision of Risk Management, which will guide the actions of the GMLP in the area of risks in the next five years. | **Institution or organisation that implements it:**<br><br>Dirección de Planificación (Planning Directorate), Secretaría Ejecutiva (Executive Secretariat), GMLP. |
| **Implementation** | **When:**<br><br>With the approval of the Municipal Development Plan 2007-2011, given to the Honourable Municipal Council in La Paz for its consideration, it is hoped to start the implementation stage of the strategic actions and policies broadly included in Risk Management. Equally, the PDM, within its framework, also intends to implement a System to monitor the execution of the programmes and the fulfilment of strategic objectives and policies. |
| | **Where:**<br><br>This process was agreed with the execution of workshops, where actors from different sectors, functions and areas took part, in each one of the nine macro-districts (7 urban, and 2 rural) of the Municipality of La Paz. The workshops considered their demands, related to the institutional offer proposed by the GMLP. |
| | **With whom:**<br><br>It is implemented by the Planning Directorate of the GMLP, in coordination with the Risk Management Unit, Basin Directorate and the Head of the Technical Bureau. |

**Background:**

The Municipal Development Plan 2001-2005 included the risk reduction issue within Guideline No. 2: Habitable Municipality. This guideline presents direct considerations in its Risk Protection, Basin Management, Maintenance, and Emergencies programmes.

After the February 2002 disaster, and with the support of the UNDP, the Programme for Risk Prevention, Emergency Attention and Reconstruction was created. In subsequent annual operative plans, the investment made in construction of protection work* and generation of support information (Risk Maps) were considerably increased. Moreover, the risk variable is gradually included in the activities of other directorates and bureaus: OMT, OMGT and OMC.

For the elaboration of the present Municipal Development Plan, JAYMA 2007-2011, a highly participative methodology has been defined. During the construction process of the development vision and the strategic axes of JAYMA, which support this vision, the participation of the Juntas Vecinales (Area Committees), of actors related to different issues in the municipality, national and prefecture authorities, and technicians from the ministries, has been promoted. This process has showed the need to include the issue of risk management comprehensively and adopt a crosscutting approach, for all the aforementioned actors.

(*) The investment in prevention work reached US$10,500,000 in 2004.

**Results:**

One of the five axes of the Government Programme explicitly includes city's need for "protection from natural risks": Comprehensive Protection of the City and the Community.

Axis 5 Sustainable La Paz includes the topic through the Risk Management Sub-axis, which is operated in three programmes: Structural Prevention, Annual Prevention and Emergency Attention.

# INSTRUMENT 1 INCORPORATION OF RISK MANAGEMENT AS A CROSS CUTTING AXIS IN MUNICIPAL DEVELOPMENT PLANNING

Continuation...

**Activities:**

- Workshops with the residents were carried out in the 23 districts of the municipality. Each workshop included a round table on'] urban infrastructure, in which other risk problems were discussed.
- Additionally, a specific workshop on risk and basin management was organised by the Risk and Basins Directorate and with the participation of actors specialised on the risk issue (SAR, Association of Professional Engineers, Military Geographic Institute, etc.)

All the workshops were analysed in three stages:

- Evaluation of the past, mainly analysing the state of the municipality five years ago (PDM 2001-2005), what its needs were, and how much progress has been made.
- Evaluation of the present, a thorough analysis of the main problems and challenges.
- Scope of a strategic vision of the future towards 2011; as well as the necessary strategies and policies to achieve it.


**Financial source:**

The development planning process is supported by the United Nations Development Programme and by the Spanish Agency for International Cooperation.

**Potential:**

Incorporate the risk issue in the municipal development planning process, allowing the mainstreaming of risk management in the dynamics of each bureau and management office. This could be the basis for defining a municipal risk management strategy.

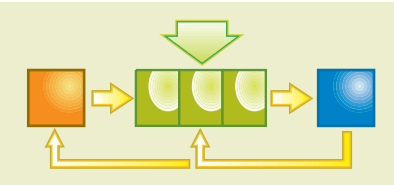
**Limitations:**

- Reflections and discussions about risk are within the technical and infrastructure areas only.
- Studies about vulnerabilities or emergency mobility systems have not been considered.
- Planning is limited to the action of the City Hall and not to the definition of responsibilities of other local actors: Territorial Grassroots Organisations (OTB), service companies, private organisations, Non-Governmental Organisations (NGOs), amongst others.
- Planning is restricted to the Municipality of La Paz only, and does not include neighbouring municipalities: El Alto, Palca, Mecapaca, Achocalla, and Viacha.

**Proposals for improvement:**

- A long-term planning vision (20-25 years), in the definition of policy guidelines, that would guide the development process.
- Creation of sector inter-institutional groups that enable joint planning, definition of responsibilities for the different development actors, beyond the intervention of the City Hall.

## 3.3. MANAGING THE NUCLEUS OF THE SCENARIO



Measures aimed at influencing the actors and their actions to reduce their effects on hillside areas. The results will be seen in the medium and long term; however, the measures are focused on pro-actively reducing the impact of growth of the city and preventing the construction of new risk conditions. Moreover, risk valuation is a useful tool for the making of both prospective and corrective decisions, or for responding more efficiently to an emergency.

### 3.3.1. RISK VALUATION

Since 2002, significant efforts have been carried out to consolidate information on emergency occurrence and to broaden knowledge on threat conditions, vulnerability, and risk in La Paz. Through the Programme GMLP/PNUD of Risk Prevention, Emergency Attention, and Reconstruction, the first risk study, scale 1:10,000, was made; and later updated in 2004. This study has identified the most critical risk areas in the city that required immediate attention; this contributed to more effective decision-making in each one of the offices of the GMLP. Consequently, prevention works, neighbourhood improvement programmes, planimetric studies, and training activities have been carried out in these priority areas.

Studies on hazards had already been carried out. The Geotechnical Map, as part of the Constructibility Study in 1977, showed that 62% of the land did not have favourable conditions for construction. Subsequently, the Hazards Map (1999) made by the Company CAEM, showed that 74% of the land was unsuitable for construction. The same percentage corresponds to the Plano de Riesgos Geologicos y Tratamiento de Torrenteras (Geological Risks and Watercourse Treatment Plan), made by the GMLP within the framework of the Municipal Development Plan 2001-2005. Currently, La Paz has a study that analyses not only the physical conditions but also the social, economic, and institutional vulnerability factors.

The scale of the aforementioned study helps to make decisions at city level. For an intervention at settlement level, higher scale studies are required. In this sense, the Basin Directorate is carrying out a pilot study, scale 1:5,000 that, for now, focuses on the study of external geodynamic conditions. In order to give more comprehensive recommendations, and with greater

possibility of success of the intervention at community level, it is necessary to include the analysis of vulnerability variables.

Although this information is frequently used by the GMLP, the use is not the same by other actors involved in both risk construction and reduction: private and public actors, as well as service companies. Greater dissemination of the study is indispensable to increase the level of involvement and the efficiency of the intervention in the issue. Equally, better coordination between the different institutions that generate information is required: Servicio Geológico, Tecnológico y Minero - SERGEOTECMIN (Geological, Technological and Mining Service), Servicio Nacional de Meteorología e Hidrgrafía - SENAMHI (National Meteorology and Hydrology Service), universities, etc; which can contribute to the revision, updating, and dissemination of these studies.

An instrument developed last year, and that has been the basis for the design of the Municipal Development Plan 2006-2011, is the Municipal Information System. This system has included analysis of the risk map comparing it with the information obtained from social and economic variables, clearly showing the similarities –not surprising- of low indicators of housing, health, education and economic activities in informal settlements on the hillsides in the city. A large part of this information has been the basis for the previous characterisation chapter.

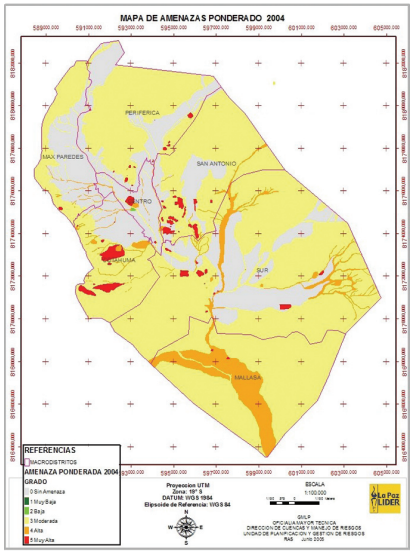
### 3.3.2. PROSPECTIVE MANAGEMENT

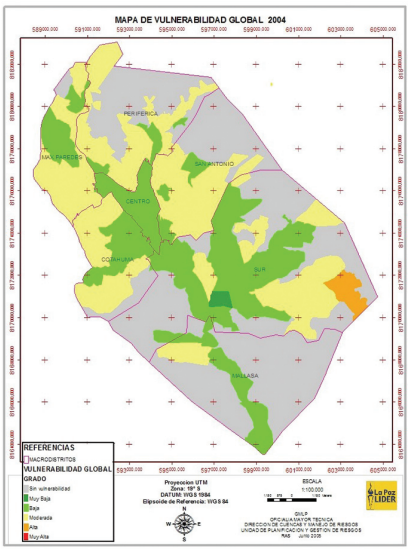
Prospective management requires the implementation of initiatives that foresee the generation of new risk conditions: controlling the occupation, and making it more efficient if the soil permits it; promoting investment in housing and services in safer areas, etc. For this reason, land management is vital for the comprehensive reduction of risk conditions.

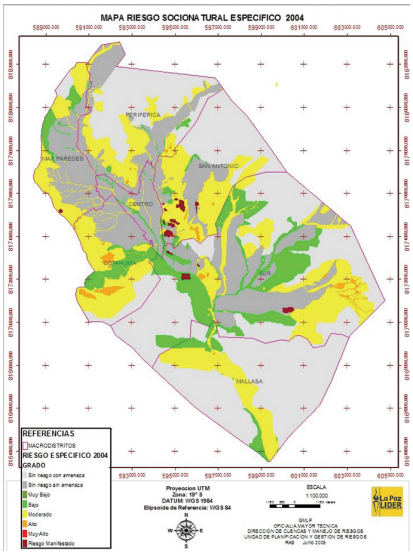
Currently, the GMLP has undertaken the task of reformulating the Plan de Ordenamiento Territorial - POT (Land Use Planning), with the policies and strategies proposed in the Municipal Development Plan 2006-2010. The last POT, made in 1977, has already been totally exceeded by the growth of the population. The Land Use Regulation and the Settlement Standards (USPA) attempted to regulate the occupation and construction methods in different degrees of slope. The regulation, characterised by a more prohibitive than proactive control, was not able to control the growth trend in these areas. Today, the USPA is being revised, in an attempt to identify the occupation

conditions using the investment each family makes in their house, and trying to improve occupation and construction methods.

The process has included some measures to try to control the occupation on hillside areas: Ordinances that ban the occupation of hillsides and riverside areas, and giving ownership to the GMLP. However, one identified limiting factor is the lack of efficient control in these areas. The capacity of the inspection units of the sub-City Halls is not enough to allow for constant monitoring of this process. Moreover, without a specific housing policy for the city, it has not been possible to move occupation to safer areas. The housing issue is still a centralised issue in the central government therefore, the municipalities are not granted any resources.



# INSTRUMENT 2 SPECIFIC SOCIO-NATURAL RISK MAP

**Objective:**

To identify the hazards and vulnerabilities of La Paz (urban spot) as a planning instrument.

**Institution or organisation that implements it:**

Risk Management Unit/Basin Directorate /OMT/ Municipal Government of La Paz.

**Implementation**

**When:**
Map published in December 2004. The work took 11 months.

**Where:**
The study area corresponds to the urban area. (around 81 km$^2$)

**With whom:**
Comprehensive Risk Management Unit, Basin Directorate, OMT

**Background:**

The map is a compilation of a large amount of unpublished and scattered information from the GMLP. It was made though the application of modern techniques of digital cartography based on field information, which data have been revised, examined, discussed, and validated by different technical offices of GMLP.

After the 2002 disaster, the UNDP financed the first part of the project, as part of the Programme of Risk Prevention, Emergency Attention, and Reconstruction of the Municipality of La Paz; which included the production of this map.

**Results:**

- It has helped in the inclusion of this issue in the different offices of City Hall and the concentration of risk reduction strategies in high-risk areas.
- Support the Risk Reduction Plan and the Drainage Master Plan of La Paz.

**Activities:**

- Form multi-disciplinary team.
- Design the methodology.
- Training on methodology analysis and the use of related software.
- Present information and reports.
- Review the results.
- Update the information.

**Estimated Budget:**

| | |
|---|---|
| Expert salary 1: | Bs. 165,000 |
| Expert salary 2: | Bs. 132,000 |
| Draftsman: | Bs. 38,500 |
| Material: | Bs. 16,000 |
| Other expenses: | Bs. 140,000 |
| Total: | Bs. 491,500 (US$61,437) |

**Potential:**

- The risk map is a graphic document of conventional representation that intends to show the space and geographic distribution of the expected losses (economic, social, and environmental damages) of one or more hazards. It is the result of the joining of information between the Hazard Map and the Vulnerability Map; it is used by all the management offices in the GMLP with the aim of optimising the monitoring and control of human settlements.
- It can contribute to the awareness of other non-municipal actors and to the creation of the Municipal Risk Management System.

**Limitations:**

- The scale 1:10,000 is not operative for the work of the management offices in the GMLP.
- Slow updating.
- It does not consider maps of existing works, their current state and recommendations.
- It does not consider the information of basins and sub-basins, outside the urban area.

**Proposals for improvement:**

- Increase the level of the scale up to 1:5,000 so that it allows a more precise study at community level.
- The need of a permanent multi-disciplinary team for its updating.

# INSTRUMENT 3 PILOT PLAN FOR GEOLOGIC HAZARDS ON THE HILLSIDE [SAN ANTONIO CALLAPA]

**Objective:**

To develop a planning instrument for the intervention of settlements.

**Institution or organisation that implements it:**

Risk Management Unit, Basin Directorate, OMT.

**Implementation**

**When:**
The making of the map started in August 2006 and is expected to finish in April-May 2007.

**Where:**
Geological and geomorphologic information and information on the land and slope map of the 16 km$^2$ of the pilot area San Antonio-Callapa has already been processed.

**With whom:**
Initially, with all the technical staff of the Basin Directorate and Risk Management. In the future the work will be done with all the sub-City Halls and management offices from the GMLP with the aim of compiling and updating the data.

**Background:**
The specific Socio-cultural Risk Map was made in 2003, through a project between the GMLP and UNDP. This study enabled the analysis of the city as a whole, and identifying critical areas. The study of these areas requires a deeper analysis.

For this reason, several studies and specific geology, geomorphology projects, and hydraulic works are being compiled in La Paz: Study in 1962 by the Engineer Ernest Drobovolny; Study in 1977 by the French consulting companies BRGM-BECOM; Pilot Project Huayllani, within the technical cooperation Bolivia-Germany, as part of the project for the regulation of the basins Irpavi-Achumani (1988). Updating of these studies will help to make a more precise analysis of these areas.

**Results:**
Hazard maps are being designed on paper and digitally, at a scale 1:5,000, so would allow making fast, precise and operative decisions to control the movements of external geodynamics.

**Activities:**
- Create a technical team.
- Revise the models.
- Compile and update cartographic and thematic information.
- Carry out fieldwork.
- Systematise the methodology.
- Design maps on paper and digitally.

**Estimated budget:**

Only for technical staff and some administrative expenses.

Total US$1,875 per month.

**Potential:**
- The use of maps on paper and digitally will be extended to other Management offices in the City Hall to make the intervention in high-risk areas more efficient.
- It will contribute to a coordinated decision-making process between municipal and non-municipal actors in high-risk areas.

**Limitations:**
- The pilot plan and the other areas require the regular input of updated information, which will be too expensive for the City Hall.
- There are not updated aerial photographs (2005-2006)
- It is limited to the study of geological conditions, not include the analysis of the social, economic, and organisational conditions of the sector.

**Proposals for improvement:**
- The length of time taken for the aerophotogrammetric flights and cartographic restitution must be reduced.
- Considering that, the jurisdiction of the GMLP is around 2,000km_, and that in the middle areas and in the heads of the hydrographical basins there are no aerophotogrammetric flights, it is necessary to obtain satellite images with good resolution in the future, which will facilitate risk diagnosis.

# INSTRUMENT 4 INCORPORATION OF THE RISK ISSUE IN THE MUNICIPAL INFORMATION SYSTEM

| | |
|---|---|
| **Objective:**<br>To maintain quality decisions and actions for the effective supply of services of public interest valued by the population, considering the sector expertise of the different organisational areas in their field of action; the comprehensive and concentrated approach required by municipal and institutional development planning; and accountability of public management. | **Institution or organisation that implements it:**<br><br>Planning Directorate, Executive Secretariat, GMLP. |
| **Implementation** | **When:**<br>The Municipal Information System has been implemented from 2006, with the production of the Statistics Dossier of the Municipality of La Paz and the Socio-demographical Atlas, instruments that act as resource for future research; for example a vulnerability study of the metropolis of La Paz (cooperation GMLP, IRD). |
| | **Where:**<br>The implementation of the system was carried out through an internal process of dissemination to all the organisational units of the GMLP, central and regional government institutions, external cooperation, research institutions, etc. |
| | **With whom:**<br>The Planning and Control Directorate is responsible for the administration of the Municipal Information System, through the Municipal Statistics and Research Unit. |

**Background:**

The generation of results requires that the GMLP creates valued external products, which direct consumption is perceived in the main direct users of the policies, programmes, and projects implemented by each units, within a perspective of action and disposition of sector services.

However, these products must translate into concrete effects that go beyond the direct users; and benefit the society as a whole from their consumption. The institutional capacity to generate results is considered a construction from different levels of institutional development. However, two aspects are identified that concern the capacity of the GMLP to solve planning problems for the generation of results, which are:

- The lack of tools that enable the GMLP authorities to prioritise, focus on and render effective resources and institutional efforts towards obtaining results through the rendering of public interest services.
- The need to create an institutional network of actors that would support a process of effective public policy production, aimed at sustainable development in the municipality, a comprehensive approach in which result management is supported.

**Results:**

- Document: Statistical Dossier of the Municipality of La Paz produced and published.
- Document: Socio-demographical Atlas of the Municipality of La Paz produced and published.

**Activities:**

- Consolidation of socio-demographical information and poverty indicators at district and macro-district level.
- Consolidation and systematisation of the administrative records of the GMLP.
- Making a cartographical adjustment for the conventional and preliminary establishment of the OTBs (Basic Planning units).
- Identification of the characteristics that homogenise some urban sub-centres in the Municipality of La Paz.
- Building an OTB ranking, considering the 11 socio-demographical indicators that define their quality of life.

# INSTRUMENT 4

## INCORPORATION OF THE RISK ISSUE IN THE MUNICIPAL INFORMATION SYSTEM

Continuation...

**Financial source:**

The Statistical Dossier was made using staff and resources from the Statistics and Research Unit, dependent on the Control and Planning Directorate.
The Atlas was made jointly by the staff of the Municipal Statistics and Research Unit (UIEM), the Technical Secretariat of the Population Council for Sustainable Development (CODEPO) and the French Institute for Development (IRD).

**Potential:**

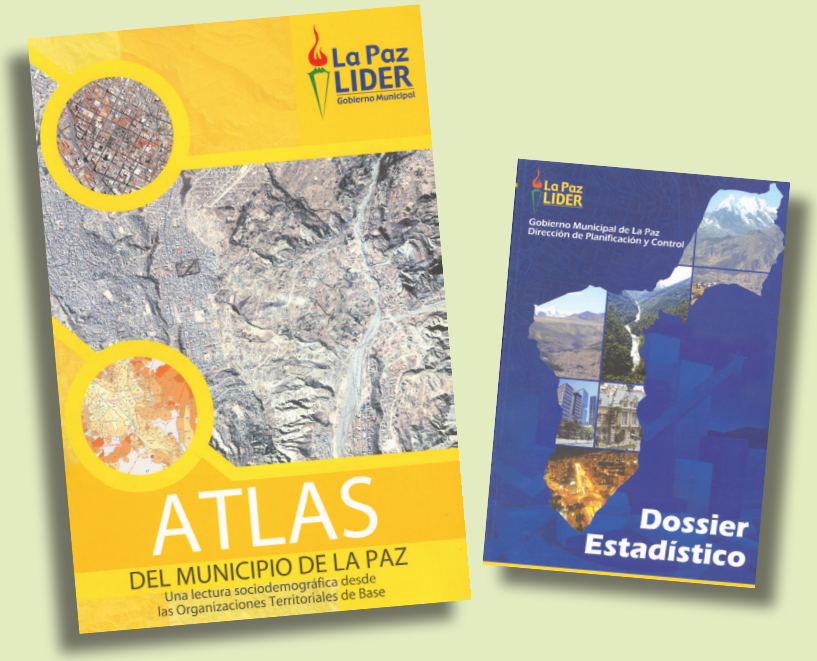
- Systematised institutional information useful for the support of decisions and formulation of municipal public policies.
- Information and indicators grouped by macro-district and district levels.
- Resources for the construction of poverty profiles of the Municipality of La Paz.
- Resources for the elaboration of the Diagnosis of the Municipality within the framework of the Municipal Development Plan JAYMA 2007-2011.

**Limitations:**

- Information from CNPV 2001 was used for the construction of socio-demographical indicators.
- Merged information, in the case of rural districts (Hampaturi and Zongo).
- Conventional delimitation of the basic planning units (it is not official, a strategy for municipal re-districting is required)

**Proposals for improvement:**

- Designing indicators based on the administrative records identified in the diagnosis of information of organisational units.
- Development of the information systems platform to operate the Network SIM-Planning.



# INSTRUMENT 5 LAND USE REGULATION AND SETTLEMENT STANDARDS (USPA-93) CURRENTLY UNDER REVISION

| | |
|---|---|
| **Objective:**<br>To efficiently control of the occupation of steep slope areas in La Paz. | **Institution or organisation that implements it:** Direccion de Ordenamiento Territorial (Land Use Planning Directorate), Oficialía Mayor de Gestion Territorial (Land Management Bureau). |
| **Implementation** | **When:**<br>The USPA-93 is being reviewed prior to its presentation to the Municipal Council. |
| | **Where:**<br>The Land Use Regulation and Settlement Standards (USPA) would make a differentiated regulation of the occupation of the territory in the whole city. |
| | **With whom:**<br>Experience developed by the Urban Development Council, in which the School of Architects, School of Engineers, and the Municipality of La Paz also participate. |

**Background:**

The current Land Use Regulation and Settlement Standards (USPA-1987, revised with no considerable amendments in USPA-93) was developed based on the Urban Development Plan 1977-1997. This regulation prohibited construction on slopes steeper than 45 degrees, and regulated the type of structure on areas with slopes steeper than 15 degrees (H2 and HPE). In the last three decades, this plan and the respective regulation have been greatly exceeded by the process of population growth in the city.

The Land Use Planning Directorate and the Land Management Bureau have revised the regulation in an attempt to modify its prohibitive nature (which has not produced any results) by making it more propositive and proactive. In this sense, the objective is to adapt the regulation to the new needs of the city, so that the growth and the urban investment mirror the interests of the population.

The proposal for the regulation is not yet finished, as it needs to be adapted to the Land Use Planning Plan 2007-2027. The new POT will be developed in accordance with the Municipal Development Plan, which was finalised in December 2006.

**Results:**
It has not yet come into force. However, it is worth highlighting the process of interaction and coordination initiated by municipal and private institutions.

**Activities:**
- Present to the Municipal Development Council the need to modify the USPA.
- Create a working group for the revision and definition of modification proposals.
- Present it to the Land Management Bureau for its approval.
- Present it to the Municipal Council for its approval.

**Budget:**
Non-applicable. The experience has been developed within the Municipal Development Council without requiring external staff.

**Potential:**
- It is hoped that a more proactive legal framework would promote more adequate occupation of flat areas and moderate slopes (slope less then 45 degrees) areas, and prevents settlements on steep areas more than 45 degrees).

**Limitations:**
- The GMLP has not had the necessary human resources to supervise and control the compliance of the previous regulations. Overcoming this limiting factor will ensure compliance with the new regulation.
- Lack of comprehensive, proactive proposals that offer alternative settlement options to current and potential settlers of informal settlements, so that they will not occupy the hillside areas.

**Proposals for improvement:**
- A more proactive USPA
- A more efficient USPA regarding land use on safer areas.
- More investment for monitoring and control of compliance with the regulation.
- It must include other initiatives for popular housing.

# INSTRUMENT 6

## MUNICIPAL ORDINANCE 281/2001 HAM-HCM 268/2001 DEFINING PROPERTY AND SECURITY STRIPS OF LAND BORDERING RIVERS AS PROPERTY OF THE MUNICIPAL GOVERNMENT FOR PUBLIC USE'

**Objective:**

Have control of the property of the rivers through a security strip to prevent human settlements that might be vulnerable and threatened by rising river levels.

**Institution or organisation that implements it:**

GMLP, Land Systems Directorate, Basin Directorate.

**Implementation**

**When:**
This municipal ordinance was promulgated in December 24, 2001

**Where:**
All the rivers, ravines, streams and watercourses.

**With whom:**
Land System Directorate, Basin Directorate, OMT.

**Background:**
La Paz has more than 200 rivers and streams that crisscross the urban area and that during rainy season increase their level and risks significantly. In recent years, the growth of the population has occupied these riversides both at the source of watercourses and at lower levels. These areas are private property, which has hindered effective conservation management of these areas by the Municipality of La Paz.

**Results:**

- Public and private institutions have decided not to invest in these areas, which have prevented the occupation of the riverbanks.
- It has supported expropriation processes in these banks.
- Having municipal property in order to design and build hydraulic works, roads, etc.

**Activities:**

- Carry out coordination meetings between the offices of Legal Consultancy, Planning, and other GMLP departments.
- Compile information and maps.
- Present it to the Municipal Council and to the Mayor
- Present it for official approval.
- Dissemination.

**Estimated Budget:**
The costs are concentrated on land expropriation; and monitoring and control of new occupations.

**Potential:**

- Control human settlements on riverbanks.
- All land, house, and urbanisation owners in the riversides, as well as the public institutions and private companies respect the Ordinance.

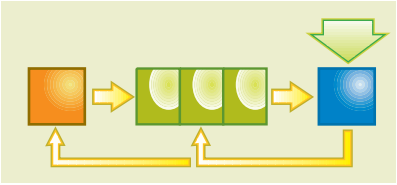
**Limitations:**

- Sometimes people from large companies that have worked on the riverbanks with heavy machinery take advantage of the areas, causing problems for the GMLP.
- Although it has contributed to preventing] occupation by urban companies, the regulation has not been complied with in the case of informal settlements, due to the lack of control mechanisms for the occupation and the development of alternative proposals for housing.
- In the same way, this regulation has not been reproduced in the neighbouring municipalities, part of the same basin.

**Proposals for improvement:**

- The scope of the issue must be increased so that neighbouring municipal governments may adopt similar attention to the problem.

## 3.4. MANAGING UNSAFE CONDITIONS



Corrective risk management seeks to reduce the existing hazard and vulnerability conditions, by minimising the impact of hydrometeorological and geodynamic phenomena, or strengthening the resistance capacity of the urban infrastructure, the population and its economic activities.

Considering the critical risk situation of the settlements on the hillsides of La Paz and their effects on lower areas, the intervention of the GMLP has focused on improving the habitability conditions in the areas that are already occupied. Large-scale engineering work to protect slopes, control landslides and prevent the erosion of ravines, are aimed at minimizing the impact of hazards generated by the occupation of these hillsides.

The investment for these corrective works has required loans from development banks: Inter-American Development Bank (IDB), The World Bank (WB). The updating of the Drainage Master Plan (financed by the IDB, US$750,000) will help to extend these works and include improvement measures for existing constructions. This study estimates an additional investment of US$20,000,000 to control critical areas in the city.

Technical prevention measures are organized in the plans of Prevencion Estructural (Structural Prevention) and Prevención Annual (Annual Prevention), which also include emergency management. The former corresponds to Large-scale engineering work laid out in the Drainage Master Plan. The Annual Prevention Plan incorporates the infrastructure maintenance measures, prior to the rainy season: cleaning of drains and reinforcement of canalisation and culverting. Special emphasis is placed on the maintenance of education and health infrastructure, coordinated between the Oficialía de Desarrollo Humano (Human Development Bureau) and the Dirección de Mantenimiento de la OMT (OMT Maintenance Directorate).

Equally, the programme for neighbourhood improvement tries to correct the risk conditions generated in the process of consolidation of the settlements. This programme focuses its intervention on the settlements situated in risk areas, allocating up to 40% of its investment to prevention measures, mainly rain drainages and retaining walls. In the same way, it strengthens the community organisation and includes training activities for emergency preparedness.

Some initiatives aimed at reducing risk conditions have been included in land management. In the processes of urban remodelling, for the regulation of settlements, risk considerations have been included in the development of the planimetry from water, geological, and land studies. The settlements on high-risk areas are not included in the programme. The problem is that once the planimetry is obtained, even when the given recommendations have not been implemented, the settlements can obtain basic services. On the other hand, the lack of planimetry is not a restriction for land titling and cadastre.

Another land management strategy is directed at the incorporation of the risk variable in the economic valuation of properties, which lower it down considering the risk condition of the settlement. When the existing risk situation is reduced, the economic valuation returns to the regular rate. This has promoted higher investment in prevention measures in priority areas and it is hoped that later the investment will be recouped through taxation.

Some aspects that are worth considering for more efficient corrective risk management are:

- Incorporation of environmental recovery strategies that harmonise land occupation with protection measures: reforestation of slopes, maintenance of ravines and gullies, etc.
- It is also necessary to strengthen the participation of community for better maintenance of infrastructure. The discarding of waste and debris reduce the effectiveness and useful life of the prevention infrastructure.
- In some cases, it would be necessary to estimate the cost-benefit ratio of these works. It is possible that the construction of the protection work is more expensive than the cost of relocation of these houses to a safer place. In general, there are no strategies to relocate the population settled on risk areas.
- Better coordination between the presented initiatives is necessary. For example, the Programme for Neighbourhood Improvement and other prevention work can later take the recommendations for urban remodelling.

# INSTRUMENT 7 REVISION AND UPDATING OF THE DRAINAGE MASTER PLAN FOR LA PAZ URBAN AREA

**Objective:**

To establish the framework for preventive, corrective, structural, and non-structural necessary actions so the drainage system can fulfil its basic function of preventing, as much as possible, damage to people and their properties caused by rainwater, contributing to the urban development of the city.

**Institution or organisation that implements it:**
Basin Directorate, Main Technical Bureau, GMLP.

**Implementation**

**When:**
The project started on the 20th of February 2006; and it is expected to finish in April.

**Where:**
It covers all the basins of the urban area of La Paz: Choqueyapu, Orkojahuira, Irpavi, Achumani, Jilusaya, Huañajahuira, as well as the Alpacoma and Cotahuma basins.

**With whom:**
The IBD, as donor, hired the consortium NIPPON KOEI CO., LTD - PCA CONSULTANT ENGINEERS, who are responsible for the elaboration of the plan.

**Potential:**
- Control human settlements on riverbanks.
- All the owners of land, houses, and urbanisation on the riversides, as well as public institutions and private companies comply with the ordinance.

**Background:**

La Paz, because of its geological, hydrological, and topographical characteristics, presents a number of variables that define different problems. The city has more than 200 rivers and streams, with permanent flows that increase the rainy season.

In 1972, a consortium developed the Drainage Master Plan for La Paz, but the municipal governments were unable to implement it. Given the growth of the city and the expansion of the drainage systems in the last 35 years, the need to elaborate a document to update the plan has been considered.

**Results:**

- Four research projects have been developed:
  - General Basic Studies.
  - Evaluation of the Existing Systems.
  - Conceptualisation and characterisation of the Drainage Master Plan
  - Intermediate report of the formulation of the Master Plan.
- 80% of the plan is in progress.
- It is hoped that this plan would define the basic investment guidelines allowing the acquisition of a credit of US$20,000,000 from the IBD.

# INSTRUMENT 7

## REVISION AND UPDATING OF THE DRAINAGE MASTER PLAN FOR LA PAZ URBAN AREA

Continuation...

**Activities:**

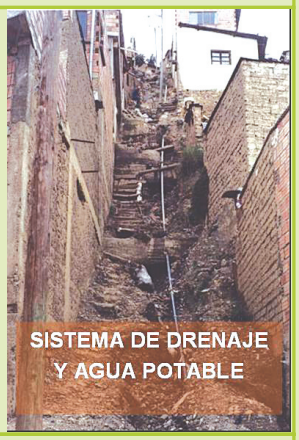
- Hold coordination meetings.
- Compile information.
- Assess, in situ, the existing hydraulic and civil works.
- Monitoring the development of the project.

**Estimated Budget:**

Inter-American Development Bank (IDB): US$750,000
Municipal Government of La Paz (GMLP): US$100,000
TOTAL: US$850,000

**Potential:**

- It will clearly define the necessary investment for structural (civil and hydraulic works) and non-structural (community participation, education, forestation, etc.) measures to control the overflow in basins and in urban areas in La Paz. In this measure, the PDM and POA will have more proactive criteria for the benefit of the community.
- It will identify the condition of the existing infrastructure and its capacity to deal with the likelihood of overflow in extreme events.




**Limitations:**

- The old part of the city has channels and culverts with dimensions that cannot be extended. These structures must stay, but their state must be monitored.
- The rain drainage system has many sanitary and industrial water inputs, that in many cases, change the quality of the hydraulics making it erosive, depending on the presence of strong chemicals. These variables cannot be controlled, or at least not immediately.

**Proposals for improvement:**

- The operation and application of the plan requires political willingness from the current and future municipal governments.
- Compliance with the established ordinances is required in different issues, such as environment, respect for riverbank property, municipal property, etc.

# INSTRUMENT 8 INCORPORATION OF THE ISSUE OF RISK MANAGEMENT IN URBAN IMPROVEMENT PROCESSES PROMOTED BY THE GMLP

**Objective:**

Qualitative improvement of habitability, security and reorganization conditions; achieve a crosscutting approach of the risk issue in the implementation of the programme.

**Institution or organisation that implements it:**

Programme "Barrios de Verdad" (Real Neighbourhoods Programme)

**Implementation**

**When:**
It started in 2000

**Where:**
In informal settlements of the macro-districts: Cotahuma, Max Paredes, Periferica, Zona Sur, San Antonio, located in the risk areas.

**With whom:**

The project started under the direction of the Mayor's office and was implemented through the Programme "Barrios de Verdad", with contributions from:

- Residents' Associations.
- Sub-City Halls (4).

**Background:**

The programme identifies the habitability features, which are lacking and the high-risk conditions in which informal settlements in La Paz have been developed. In the first stage, Fondo Nacional de Desarrollo Regional -FNDR (National Fund for Regional Development) developed the Programme for Neighbourhood Improvement, from 2000.

Subsequently, the GMLP obtained a loan of US$5,500,000 from the IDB to finance the improvement of ten neighbourhoods. One of the criteria to select the neighbourhoods to be intervened is that they should not be located in risk areas, which after the 2002 disaster became a fundamental condition, in order to reduce risk conditions.

The third stage is financed with resources from the GMLP, which reach a sum of US$1,700,000; six neighbourhoods are being benefited. In the fourth stage, a loan from the WB, of US$10,000,000 will be obtained to finance the improvement of twenty neighbourhoods. By 2007, the GMLP will finance with its own resources sixteen other neighbourhoods, an estimated investment of US$6,400,000.

**Results:**

The inclusion of risk management as an essential part in the implementation of the project in 36 neighbourhoods; other criteria of risk management in the selection of neighbourhoods, in the construction of infrastructure, and maintenance training, and disaster management, were also incorporated.

**Activities:**

(Activities inherent to qualifying competition/"Barrios de Verdad"/eligibility criteria).

- Call for applications (with the conceptual inclusion of risk management).
- Pre-selection (sewer system coverage must cover more than 75% of the neighbourhood area).
- Make the selection, applying the rating table that considers the level of vulnerability or exposure of the neighbourhood to different hazards; neighbourhoods where original topography, rain drainage, etc have been altered by the settlements.
- Application and signing of the letter for the maintenance of the works between the Programme and the Community.

# INSTRUMENT 8 INCORPORATION OF THE ISSUE OF RISK MANAGEMENT IN URBAN IMPROVEMENT PROCESSES PROMOTED BY THE GMLP

Continuation...

**Estimated Budget:**

The estimated total for each intervention is Bs. 3,400,000 (US$428,000). On average, 40% of the investment is allocated to the construction of mitigation works.

**Potential:**

Besides the investment in physical infrastructure, there is a specific module for community development to work directly with grassroots organisations, which educate and empower the civil population on the issue of risk management.

**Limitations:**

- The programme depends on bank loans and on the availability of internal resources.
- The programme tries to reduce hazards and vulnerability conditions. However, it does not halt the occupation process on new hillside areas.

**Proposals for improvement:**

The programme hopes to finish works in 100 neighbourhoods, giving them a new image by 2010.

# INSTRUMENT 9 INCLUSION OF RISK CRITERIA IN THE PROCESS OF URBAN REMODELLING

**Objective:**

To limit the occupation of risk areas, restricting the planimetry or including prevention recommendation in the process.

**Institution or organisation that implements it:**
Proyecto de Regularización de Urbanizaciones y Remodelaciones (Project for the Regularisation and Remodelling of Urban Areas); Dirección de Administración Territorial (Land Administration Directorate); Land Management Bureau

**Implementation**

**When:**
2003-2006

**Where:**
Informal settlements that are regularising their planimetry.

**With whom:**
In coordination with the Risk Management Unit, Basin Directorate, Main Technical Bureau.

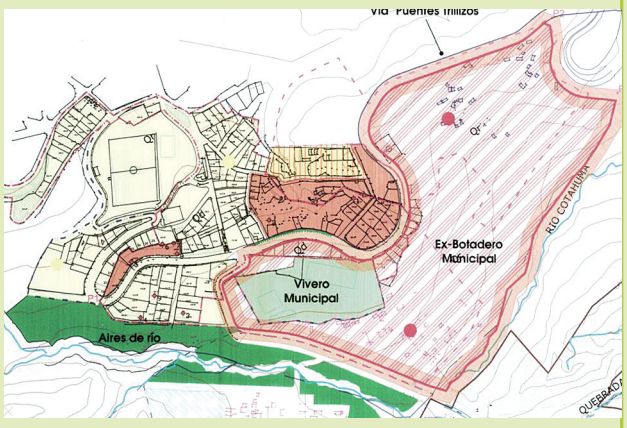
**Background:**
75% of the settlements in the city of La Paz started as informal settlements. Law No. 2372 of Regularizacion del Derecho Propietario (Regularisation of Ownership Right) forces the municipalities to incorporate fast-track mechanisms for property titling, without including as a restriction the risk conditions of the sector.

In order to promote a more efficient process, the GMLP through the Land Administration Directorate implemented the Project for the Regularisation and Remodelling of Urban Areas (PRUR).

**Results:**
- Regularisation of 74 neighbourhoods to date, corresponding to the same number of Grassroots Organisations (OTBs).
- Inclusion of the risk variable in the process of implementation of the project.
- Neighbourhood selection.
- Planimetry.

**Activities:**

- Restrict the participation of neighbourhoods located in risk areas. Of the 58 neighbourhoods so far deemed to be ineligible, half were discounted because they were located in risk areas.
- Include in the elaboration of the planimetry, three studies essential for the analysis of hazards in the sector: topographical, geological, and land study. In coordination with the Risk Management Unit (Basin Directorate), the hazard prone lots are defined and recommendations to reduce the risk in the sector are presented.



# INSTRUMENT 9 INCLUSION OF RISK CRITERIA IN THE PROCESS OF URBAN REMODELLING

Continuation...

**Estimated Budget:**

No information

**Potential:**

- It contributes to the non-consolidation of neighbourhoods at risk, restricting the planimetry to high-risk areas.
- In medium-risk areas, the Areas Subject to Revision (ASR) are identified, including recommendations in the planimetry document.

**Limitations:**

- The planimetry is neither essential for land titling (processed at Derechos Reales or Real Estate) nor for the supply of services (telephone, electricity).
- At the presentation of the planimetry, the grassroots organisation - OTB can demand the installation of drinking water and sewer systems, whether or not the recommendations to reduce risks have been fulfilled.

**Proposals for improvement:**

- Coordinate with Real Estate to limit the obtaining of land titling to the compliance of the considerations stated in the planimetry.
- Coordinate with service companies to limit the supply of services to the compliance of the considerations stated in the planimetry.

# INSTRUMENT 10 MUNICIPAL ORDINANCE No 296, FROM 18th OF DECEMBER 2003, THAT INCORPORATES THE RISK VARIABLE SPECIFIED IN THE ECONOMIC VALUATION OF PROPERTIES

| | |
|---|---|
| **Objective:** To recognise the risk variable in the system of land titling and cadastre in the properties of La Paz. | **Institution or organisation that implements it:** Direccion de Informacion Territorial - DIT (Directorate of Territorial Information), Land Management Bureau. |
| **Implementation** | **When:** This ordinance was promulgated on the 18th of December 2003. |
| | **Where:** Implementation in 14 neighbourhoods of La Paz, located in specific risk areas. |
| | **With whom:** DIT, OMGT, in coordination with the Risk Management Unit, OMT. |

**Background:**
Between 1986 and 1987, an update of the calculation of the value of cadastral land was carried out, according to its physical characteristics and service quality. The variables included in the valuation are: location, slope, services, infrastructure, and type of construction.

In 2005, the DIT proposed a valuation table that included the risk issue, supported by the risk-zoning plan made by the Basin Directorate. This proposal was approved by the Municipal Ordinance No. 186/2005 and then by Supreme Resolution in 2006.

This modification proposal was made in response to the pressure of the population, arguing that they should pay less property tax if their construction was located in a risk area. In this sense, the GMLP decided to reduce property tax by about 15%, in these 14 neighbourhoods. What is anecdotic and paradoxical at the same time is that the pressure did not come from the popular neighbourhoods but rather from the upper and middle class neighbourhoods from the Zona Sur (Southern area) of the city.

**Results:**
It has encouraged the participation of the GMLP in these areas, both to reduce risk conditions and to recover investment through the regularisation of taxes.

**Activities:**
- Design the proposal of a valuation table and risk zoning.
- Present it to the Municipal Council for approval by ordinance.
- Present it to the Sustainable Development Ministry and later to the Presidency of the Republic for its approval.
- Make the Administrative Procedure Manual for the Reduction of Basic Tax in Specific Risk Areas.
- Coordinate with the Risk Management Unit to identify specific-risk areas which will be considered within the procedure.
- Update the included areas every year, considering the prevention works that may have been implemented by the GMLP.

**Financial source:**
It does not apply. It was developed with human resources from the DIT, the Main Technical Bureau, in coordination with the Risk Management Unit, the Basin Directorate, and the Main Technical Bureau.

**Potential:**
- It encourages the intervention of the GMLP in the reduction of risk conditions in these sectors, with the aim of incorporating them into the regular system of property tax.
- It includes the risk issue in the system of land titling and cadastre.
- It is an initiative of coordination between different municipal management offices.

**Limitations:**
- This measure neither prevents nor imposes restrictions on the occupation of risk areas. It recognises the risk condition of the land and the construction, but it does not impose financial penalties for inappropriate occupation.
- This measure reduces municipal income (Bs. 3,000,000 annually) which could be used for the execution of prevention works. This contradicts the higher investment that the local government will have to make to reduce the risk in these areas of the city.

**Proposals for improvement:**
It is a positive norm as it includes the risk variable in the tax system. However, its impact on hillside areas needs revision.

# INSTRUMENT 11 TECHNOLOGICAL INNOVATIONS FOR THE IMPROVEMENT OF HYDRAULIC BEHAVIOUR OF CHANNELS

| | |
|---|---|
| **Objective:** To include civil structures in hydraulic works to diminish erosion, increase the useful life infrastructure, and provide more security to the community. | **Institution or organisation that implements it:**<br><br>Basin Directorate, OMT, GMLP. |
| **Implementation** | **When:**<br>Canalisation of the River Irpavi (October 2004-May 2006) and the River Choqueyapu (from July 2005).<br>Sedimentary basin of Achumani (1996-97). |
| | **Where:**<br>In the construction of the canalisation of the River Irpavi, and in the existing channel of the River Choqueyapu (in the section: Street 1 Obrajes to Puente del Encuentro). Sedimentary basin in the middle basin of Achumani. |
| | **With whom:**<br>OMT, Basin Directorate, and construction companies. |

**Background:**
Prior to this innovation, open channels were built with transversal walls. In the falls, the sidewalls were made of stone, and did not have fittings to dissipate the energy, and the subterraneous flow was not considered, either.

Equally, the sediments that descended from the Achumani and Huallani upper basins diminished the hydraulic capacity of the channel.

**Results:**
- Build narrow and reinforced channels, where there is more erosion.
- Minimise the effect of the underground waters on the fall walls of the channels.
- During low water season, the flow is led by a drain.
- The energy of the runoff on the falls is dissipated.
- Retention of sediments.

**Activities:**
- Coordination and conceptualisation meetings about new methodologies to address hydraulic problems.
- Hydraulic mattresses were built in the channel of the River Choqueyapu, on falls higher than 1.8 meters.
- In the construction of the canalisation of the River Irpavi, the following techniques for the barriers were developed:
  - Central drains.
  - Reinforcement of sidewalls with ashlars up- and downstream of the barriers.
  - In the outlining of the transversal wall, the underground water is captured, it is diverted to a chamber, and finally the flow enters a channel downstream.
- The material that descends from the upper part is stored in the basin, then it is removed with machinery, and finally moved to a deposition area.

**Estimated Budget:**
In the case of the River Irpavi, for being a new construction, the investments have been part of the own investment, therefore it is difficult to estimate the cost of the initiative.

**Potential:**
The technical innovations will be used in the new designs and channel construction; and whenever possible, the existing channels will be repaired in the same way.

**Limitations:**
It is difficult to apply these innovations in culverts built in the old part of the city.

**Proposals for improvement:**
Encourage alliances with the Hydraulic Institute of The Faculty of Engineering to carry out simulations of hydraulic behaviours for future canalisations.

# INSTRUMENT 12 STRCUTURAL PREVENTION, ANNUAL PREVENTION AND EMERGENCY ASSISTANCE PLANS*

**Objective:**

To direct the resources and efforts of GMLP to the assistance of the city during rainy season, and maintain the control of different areas identified as threat.

**Institution or organisation that implements it:**

Technical Bureau of the GMLP, with its different management offices, especially with the Basin Directorate.

**Implementation:**

**When:**

The plan has been implemented every year, since 1992; it runs from November to April.

**Where:**

It applies the different basins of La Paz, especially river headwaters and entrances to channels.

**With whom:**

Risk Management Unit, OMT, with the support of machinery and heavy equipment.

**Background:**

Flooding of rivers during rainy season is constant but sometimes excessive; sweeping material into the basins. Because basin headwaters have not been controlled, the channels become saturated with the material being swept down (stones, sand).

**Results:**

- An adequate planning of the construction of prevention works.
- Cleaning of dragged material at identified areas.
- More monitoring of risk areas, allowing quicker attention.

**Activities:**

For the implementation of the Structural and Annual Prevention Plan, construction companies are hired, based on the designs developed by the Comprehensive Risk Management Directorate. A company hired, depending on the magnitude of the project, carries out the supervision. The Supervision and Control Department, Executive of the Secretariat GMLP carry out the inspection, in all cases.

**Estimated Budget:**

The annual budget for the construction of works of structural prevention is variable. The investment in 2006 was Bs. 20,130,000 (US$2,516,250).

**Potential:**

- Reduction of the occurrence of disasters and faster assistance in emergencies.
- There are engineers and technicians with more practical experience.

**Limitations:**

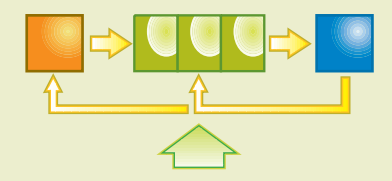
- In the event of an extraordinary natural phenomenon, the assistance capabilities of municipal staff and equipment may be exceeded.
- The community is not included in the maintenance stage of the prevention works.
- The legal processes for the hiring of companies delay the start of the construction. These processes are accelerated during emergencies.
- Lack of a Drainage Master Plan to organise investments.

**Proposals for improvement:**

- Acceleration of hiring processes of construction companies.
- Implementation of the next Drainage Master Plan.

(*) The System of Emergency Assistance is analysed in the section of effects management.

## 3.5. EFFECTS MANAGEMENT



The effects felt by the city in February 2002 raised public and private awareness, and motivated more participation in the risk issue. In the last five years, the GMLP has strengthened its disaster intervention capabilities, from preparedness actions and emergency response to the rehabilitation of the affected area.

The strategies for emergency preparedness and effects management have been aimed at strengthening the institutional capacities to intervene, more efficiently, in disasters and to encourage the participation of the community. The creation of the Centro de Operaciones de Emergencia (Operative Emergency Centre), the centralisation of assistance through RED 134 and the creation of the Grupo de Atención de Emergencias Municipales – GAEM (Municipal Emergencies Attention Group), have contributed to improving the response capacity of the GMLP. It is necessary to measure its intervention capabilities in medium- and large-scale disasters, because at present there are no emergency shelters, warehouses with support equipment, or prepared personnel for psychological treatment of victims.

In the last two years, a series of training and awareness activities, with special emphasis on high-risk areas, have been developed. These activities, aimed at children, young people, and adults depending on their economic activity, sought to strengthen their capacity to react to an emergency. During these activities, the Culture Secretariat has been preparing training instruments, later systematized with the financing of the Municipality of Bolzano, Italy. Other activities from the GAEM and the Risk Management Unit of the Main Technical Bureau also accompanied these training sessions. However, the fact that the budget allocated to these activities is limited and the need to generate a strategy of intervention so the actions are not isolated cannot be ignored. On the other hand, it is also necessary to strengthen coordination with other institutions in order to make intervention more efficient.

Funds of the general municipal budget are usually allocated to rehabilitation and reconstruction, negatively affecting the plans made at the beginning of the year. In cases of bigger disasters, the GMLP has had to obtain loans from development banks: World Bank (WB) and Inter-American Development Bank (IDB). However, the affected families are mainly the ones who invest in the reconstruction of their infrastructure.

A highly valuable tool for the municipal planning is the inclusion of the risk variable in the Municipal Information System. This allows detailed monitoring of each situation of emergency, implemented action, and invested budget. The objective is to achieve better planning of budgets for emergency assistance, without affecting the development lines.

# INSTRUMENT 13 TRAINING INSTRUMENTS FOR EMERGENCY PREPAREDNESS

**Objective:**

To strengthen the capacities of children, young people, and adults, who live under risk conditions, on preparedness actions and emergency attention.

**Institution or organisation that implements it:**

GMLP, Cultural Bureau, Culture Directorate.

**Implementation:**

**When:**

The workshops were held from August to December 2005, and from May to July 2006, during the dry periods of the year.

**Where:**

The workshops took place in municipal facilities and schools in high-risk neighbourhoods (Cotahuma, San Antonio, Periferica, Alto Tacagua, and Pura Pura).

**With whom:**

Coordinated work between schools, GAEM, Red Cross, the Basin Directorate, and the theatre group "Arte Presa".

**Background:**

The Main Culture Bureau included in its POA 2005 (Operative Annual Plan) the Programme of Risk Prevention. In this sense, once the rainy season was over, the training of vulnerable groups started.

During these activities, training issues and methodologies were consolidated. Specific materials were prepared, and a theatrical play was designed to encourage public participation.

The Autonomous Province of Bolzano (Italy) and the Municipal Government of La Paz signed a letter of intent in 2005, in which the Government of Italy allocated economic resources for the culverting of the River Janko Kollo. This budget allocated a percentage for Risk Prevention education.

Using these resources it was possible to systematise methodologies, edit them, and publish them. These training materials are annexed in the CD of the Catalogue.

**Results:**

- 8,036 state school pupils were trained in disaster response.
- 834 citizens from vulnerable socio-labour sectors, such as retail traders, wholesale food market vendors, elderly people, and unionised drivers from the San Francisco area, all received training in disaster response.

**Activities:**

- Script writing and presentation of the play "Don Feroz y los tres Chanchitos" (Mr. Fierce and the Three Little Pigs); Cotahuma version.
- Hold coordination meetings between the GAEM, Red Cross, and the Basin Directorate.
- Design and produce materials for dissemination.
- Visit and carry out activities with schools.
- Prepare a group of 25 young people to support the notification process, making the population aware and distributing educational and informative material on the issue. They are called "Jovenes Zebra" (Young Zebras) because they wear a white and black striped outfit.
- Carry out training activities:
  - Ten intervention workshops in the main squares in high-risk neighbourhoods on the hillsides.
  - Six training workshops on risk prevention, working with 400 brigade members in three plants of the textile firm AMETEX, working at the factories MEX, UTEX, and MATEX.
  - Training of 900 residents from Cotahuma (close to the culverting of Janko Kollo).
  - Training of 40 employees of the sub-City Hall of Cotahuma.
  - Training of 140 employees of the GMLP.
  - Distribution of 2,500 educational booklets "The Zebra in Cotahuma".
  - Distribution of 150 risk maps of the city given to municipal employees..

# INSTRUMENT 13 TRAINING INSTRUMENTS FOR EMERGENCY PREPAREDNESS

Continuation...

**Estimated Budget:**

| | |
|---|---|
| Drawing: | Bs. 1,155 |
| Design: | Bs. 2,010 |
| Printing of "The Zebra in Cotahuma" | Bs. 10,900 |
| Trainer: | Bs. 4,995 |
| Theatre group: | Bs. 4,999 |
| Desk material: | Bs. 3,000 |
| Printing of Risk Maps: | Bs. 2,100 |
| Petrol: | Bs. 500 |
| Snacks: | Bs. 2,000 |
| Transport: | Bs. 500 |
| TOTAL | Bs. 32,159 (US$4,122.00) |

**Potential:**

Production of didactic and easy to understand materials on risk prevention. The methodology helps to attract the attention of trainees, especially through the interventions of the theatre group "Arte Presa" and its comical-educational play "Mr. Fierce and the Three Little Pigs".

The methodology makes training on more technical subjects easier, in a differentiated way depending on the public:

- Rescue practices in coordination with GAEM.
- Risk analysis in coordination with the Basin Directorate.
- Reading and use of risk maps.
- Management of solid wastes.
- Response actions during disaster.

**Limitations:**

The allocated budget for the 2005 Programme of Risk Prevention is not enough to cover more vulnerable areas; to pay costs of personnel, training, transport, and material.

**Proposals for improvement:**

- A policy for the continuity of these activities is required, so the acquired knowledge can be turned into practice, through the formation of school squads, workshops carried out by students, and the generation of preventive awareness.
- Channel international cooperation on risk prevention.


# INSTRUMENT 14 POPULATION AWARENESS FOR EMERGENCY REACTION

**Objective:**

To disseminate to ensure a timely response before and during a disaster.

**Institution or organisation that implements it:**

GMLP, Main Culture Bureau, Culture Directorate.

**Implementation:**

**When:**
Implemented in January and February.

**Where:**
The material was distributed in the neighbourhoods of Irpavi, Achumani, La Florida, Koani, and other high-risk neighbourhoods.

**With whom:** The implementation was coordinated with the Dirección de Comunicación del Gobierno Municipal de La Paz (Communication Directorate of the Municipal Government).

**Background:**
The increase of rains caused rivers to flood, which caused some fatal accidents. On the 26th of January 2006, Municipal Resolution No. 0020 was issued, declaring "Alerta Naranja" (Orange Alert) in La Paz.

**Results:**
- Irpavi, Achumani, La Florida, Koani, high-risk neighbourhoods in the Zona Sur of the City, received direct information on risk prevention through the presence of "Zebras", who disseminated preventive information in all the neighbouring areas of the riverbeds.
- Printing of 8000 leaflets and 23 information banners, with clear recommendations on what actions to take in case of an emergency caused by rain and floods.
- The messages were also spread through the Programme "Buenas Noticias Para La Paz" (Good News for La Paz).
- 59 neighbourhoods received information on risk prevention through 62 street banners.

**Activities:**
- Design and make materials for distribution.
- Inter-institutional Coordination.
- Intervention in the Zona Sur.

**Estimated Budget:**

| | | |
|---|---|---|
| Leaflets: | Bs. | 4,490 |
| Banners: | Bs. | 2,880 |
| Elaboration of street banners: | Bs. | 14,000 |
| TOTAL: | Bs. | 21,870 (US$2,800) |


**Potential:**
It helps to educate the population in general and to inform, with precise instructions, about the reaction in the event of an emergency. After the fatal accident, where municipal worker died, the population in the area became frightened; but with this intervention, more presence in the area was achieved, thus reassuring the area/people.

**Limitations:**

Because the intervention area is far from the city centre, the main limitation for the Young Zebras was transport.

**Proposals for improvement:**

- Purchase its own vehicle to overcome this problem.
- Carry out regular campaigns, also focused on prevention actions.

# INSTRUMENT 15 ANNUAL SYSTEM OF EMERGENCY MANAGEMENT

| | |
|---|---|
| **Objective:**<br><br>Efficient, organized, and planned emergency response. | **Institution or organisation that implements it:** Retén de Emergencia (Emergency Squad), Dirección de Mantenimiento (Maintenance Directorate), Basin Directorate, Main Technical Bureau.. |
| **Implementation:** | **When:**<br>The whole year |
| | **Where:**<br>La Paz city |
| | **With whom:**<br>The work is done with the Maintenance Directorate (four central offices), in coordination with the Main Technical Bureau, Basin Directorate, and sub-City Halls. |

**Background:**

The so-called "Posta Municipal" was created in the 1970s. It is in charge of dealing with emergencies in the city. In recent years, a call centre, RED 134, was made available for the population in order to respond immediately and efficiently to the requests for emergency assistance.

The Maintenance Department needs better planning for its annual activities; therefore, it divides its annual work into three stages: a) from April to August, work on structural prevention, b) from August to November, work on annual prevention of emergencies; and c) from November to April, work on emergency assistance.

In 2005, a technical coordination office was set up to provide a more organised and efficient response to emergencies. This coordination team is made up of professionals from the Main Technical Bureau, the Basin Directorate, Maintenance Directorate, Emergency Squad, and Sub-City Halls, with a total of 13 workers (technicians BETA 13); joining them are work groups from the Maintenance Directorate.

There are four warnings applied by the MAE: a) Green (dry season). In this first warning mainly structural and annual prevention works are carried out; b) Yellow. State of alert without mobilisation; materials are bought and stored; c) Orange. Physical presence of the technical team organised in BETA 13, and all the staff from the City Hall at the disposal of the emergency Squad; d) Red. Declaration of State of Emergency, with the extra presence of staff, purchase of supplies, material, and hiring of companies for the implementation of emergency works.

**Results:**

An efficient emergency response carried out during rainy season; good prevision during dry season, computerised system of geo-referenced information based on phone calls and their origin (neighbourhoods, avenues, streets).

**Activities:**

**Planning and organisation**

- Form multidisciplinary work teams, with the participation of the OMT, Basin Directorate, Maintenance Directorate, and sub-City Halls.
- Produce an emergency response calendar (November-April), identifying personnel.

# INSTRUMENT 15 ANNUAL SYSTEM OF EMERGENCY MANAGEMENT

Continuation...

**Emergency attention:**

- Call identification (transcription of data on forms for emergency and disaster information, locating the caller, address, district, and affected area).
- Coordinate intra-institutionally with the sub-City Halls offices to determine the reliability and magnitude of the information.
- Attend the emergency with an identified technical team (BETA 13 more groups).

**Estimated Budget:**

n/a

**Potential:**

- Efficient inter-institutional coordination.
- Identify, through computer systems and the geo-reference of districts, the neighbourhoods, avenues, and streets that need more attention; and the possibility of a structuring work in the area.

**Limitations:**

- Budget is a limiting factor in this kind of activities.
- The pull of machinery is deteriorated and needs maintenance.

**Proposals for improvement:**

A formal request will be made to increase the budget in the POA 2007, to improve attention.


# INSTRUMENT 16 EMERGENCY OPERATION CENTRE (COE)

**Objective:**

To establish a direct coordination system between the Emergency Operation Centre (COE), the COEM from the nine macro-districts of La Paz, and the residents of the most vulnerable areas, organised in a Comité Operativo de Emergencia Barrial-COEB (Neighbourhood Operative Emergency Committee) in order to respond immediately to adverse events that may occur in their neighbourhoods.

**Institution or organisation that implements it:**

GMLP in coordination with the sub-City Halls and the neighbourhood committees.

**Implementation:**

**When:**
It was created after the February 2002 disaster, and consolidated through the promulgation of Municipal Resolution No. 0480/06 on 28th of August 2006.

**Where:**
COE and COEMs. The latter regards to the nine macro-districts. COEB, in the most vulnerable areas, where the Programme "Barrios de Verdad" is implemented.

**With whom:**
The COE and the nine COEM establish three areas: Operative, Logistics, and Humanitarian Assistance, subdivided in commissions to which all institutions that form the COE inter-institutional are attached. The COEB establishes a structure led by the president of the residents committee, organising the neighbours in commissions: immediate assistance, basic services, neighbourhood security, humanitarian assistance, health, etc

**Background:**

The COE was created in November 2002 after the fatal hailstorm on the 19th of February, with the vision of a protected Municipality of La Paz thanks to the participation of the population and the cooperation of all the institutions involved in Risk Management, Emergency, and Disaster Administration.

The COE, as a mechanism of immediate response to adverse events in the Municipality of La Paz, and despite the influence it had on the institutions that were part of it, did not find a mechanism to achieve coordination with the sub-City Halls; therefore it decided to create an Operative Committee of Macro-District Emergency (COEM) in each sub-City Hall. This committee should work as a direct coordination office, grouping all the offices that work in its jurisdiction, linked to a local COEB, establishing a communication chain with the residents so they can be the first ones to help and act when a disaster occurs, having previously received training.

**Results:**

COE has helped hundreds of people in the entire Municipality of La Paz, having today good resident participation, institutional prestige, and acknowledgment from institutions such as the International Red Cross, CARITAS BOLIVIA, Vice-Ministry of Defence, SEDES.
To this date, nine COEs at macro-district level and nine COEs at neighbourhood level have been created.

**Activities:**

- Make a call for the organisations and institutions that will be part of the COE on each of the levels.
- Coordination and awareness meetings.
- Establishment of municipal resolution of creation (0480/06 of 28th of August 2006).

# INSTRUMENT 16 EMERGENCY OPERATION CENTRE (COE)

Continuation...

**Financial source:**

- Own resources — Budget of the POA-GMLP
- External Management — Cooperation of some institutions

**Type of financing:**
Contribution from the GMLP through the promulgation of specific municipal resolutions in cases of disaster and/or emergency; and contribution of various institutions.

**Estimated Budget:**
POA-COE Bs. 84,989.00 (US$10,896.00) for 2007.

**Potential:**

- Teamwork.
- Knowledge of the area.
- Experience.
- Willingness to serve.
- Interest of communities.

**Limitations:**

- Although there is a good technical team, it is necessary to reinforce it with the inclusion of specialised personnel in planning, and an engineer expert in collapsed structures.
- Lack of specialised equipment.
- Low budget.
- Authorities have little knowledge of the COE's work.

**Proposals for improvement:**

- Coordination meetings with the Technical Coordination team to carry out more effective work.
- Specialisation courses for technicians.
- Make RM 0480/2006 feasible to strengthen the COE, COEM, and COEB.
- Encourage resident participation.
- Make authorities aware of the importance of this programme.

# INSTRUMENT 17 MUNICIPAL EMERGENCY ATTENTION GROUP (GAEM)

**Objective:**

To intervene in search and rescue actions to minimize the suffering of people; reduce material and human losses. Train people with high willingness to help to prevent, assist, and support during and after emergencies and/or disasters.

Support any kind of emergencies requiring immediate assistance.

**Institution or organisation that implement it:**

GMLP-Emergency Squad

**Implementation:**

**When:**

In emergency situations such as:

- Immediate assistance in emergencies and/or disasters.
- First-aid assistance.
- Risk Management Education for the population in general.
- Prevention works: Slope checks, demolitions, propping, etc.
- Support sport, educational, and cultural activities.
- Coordination and support to the Antofagasta Fire Brigade.
- Coordination and support to the GMLP operative entities.
- Humanitarian Assistance:
  - Provision of shelter.
  - Social events.
  - Support to RED 136

**Where:**
In the entire jurisdiction of the Municipality of La Paz and where it is needed.

**With whom:**
With all the sub-City Halls, internal institutions of the GMLP, members of the municipal, departmental, and national COE.

**Background:**

After the hailstorm on the 19th of February 2002, the solidarity of La Paz citizens was self-evident; they helped to rescue and support the victims without expecting anything; particularly young people who without having any knowledge of specific rescue techniques risked their lives to help the victims immediately. From this work, the initiative of coordinating efforts between all the institutions has begun. It is then that in March 2002, inter-institutional coordination meetings started in order to organise the Emergency Operative Centre, with a permanent office within the Maintenance Directorate, which in order to fulfil its objectives it was unable to give immediate response to any emergency, therefore the need to have an operative body to overcome this situation was raised.

**Results:**

- Organised, trained, and prepared young people to respond to any emergency in the municipality.
- The GAEM makes annual calls to recruit men and women who are willing to provide solidarity and serve the general population.
- Thanks to this, there is a contingency group of one thousand passive volunteers and fifty active volunteers to assist in emergencies.
- Effective emergency assistance reported to RED 134 in all the districts of the municipality.
- Active members of the National Emergency Centre in the areas of Search, Salvage and Rescue.
- Intra and inter-institutional training aimed at children and young people who want to help.

# INSTRUMENT 17 MUNICIPAL EMERGENCY ATTENTION GROUP (GAEM)

Continuation...

**Activities:**

Created thanks to the support of the Mayor for the initiative proposed by the Emergency Operative Centre, for the GMLP to have a trained team committed to serving the population and that can work effectively as an operative arm of the COE. In November 2003, the young people that were supporting the COE, and who wanted to receive training, created the GAEM. Therefore, it is essential to have an expert group to train the civil society and GMLP employees in dealing with physical, natural, and man-made disasters.

For this reason the Municipal Emergency Support Group (GAEM) is created, which depends on the Maintenance Directorate of the City Hall.

Currently, the GAEM is in the process of approving its regulations, seeking a resolution that would strengthen and stabilise it. Thanks to the implementation of different courses on search, salvage, and rescue the inclusion of many institutions was achieved.

**Financial source:**

- Own resources.
- External financing.

**Type of financing:**
None, the work is done only with resources from POA of the Maintenance Directorate.

**Estimated Budget:**
The GAEM does not have an independent budget, which is not enough to work efficiently. Being an operative arm of COE, it depends on it. There is a need for more stretchers, rescue equipment, among other things.

**Potential:**

- Teamwork.
- Commitment to the municipality.
- Willingness to serve.
- Knowledge of the area.
- Experience.
- Capacity

**Limitations:**

- Scarce material and work teams.
- Poor access to specialisation courses and training on topics like rescue, salvage, and search.
- The team of trainers is under contract, which does not facilitate sustainable work.

**Proposals for improvement:**

- Dissemination of the effective high-risk work carried out by the different GAEM.
- Enable the participation of both contracted personnel and outstanding volunteers in specialisation courses.
- Gain the support of different foreign institutions related to the same kind of work.

# INSTRUMENTO 18 MUNICIPAL SYSTEM OF EMERGENCY MONITORING

| | |
|---|---|
| **Objective:**<br><br>Daily monitoring of emergencies generated in the municipality and follow up of the emergency attended. | **Institution or organisation that implements it:**<br><br>Planning Directorate, Executive Secretariat, GMLP, Emergency Squad. |
| **Implementation:** | **When:**<br>The monitoring system of emergencies was developed and implemented in the first months of 2006. |
| | **Where:**<br>It includes information on emergencies reported and attended, and their status in each of the nine macro-districts of La Paz. |
| | **With whom:**<br>Implemented through the Emergency Squad in coordination with the system units of the GMLP. |

**Background:**

According to the organic structure of the GMLP, the Main Technical Bureau through the Maintenance Directorate is the office responsible for the administration and recording of emergencies. However, in 2006, due to the immediate need of carrying out the on-line recording and monitoring of emergencies reported to Red 134; the Planning and Control Directorate, in the framework of the Municipal Information System, proposed the joint development, with the OMT, of a computer tool that would allow opportune monitoring of emergencies and that can be fed by different levels of users, according to the kind of event.

**Results:**

Classified information by location and by estate of each reported emergency.

**Activities:**

- Development of the emergency system.
- Development of reference reports and applications.
- Implementation and training of squad workers in the use of the instrument.

**Financial source:**

Own resources and personnel from GMLP.

**Potential:**

- On-line records of reported emergencies.
- Job assignment by type of operator through electronic messaging.
- Reports on the status of the emergencies, geo-referenced, updated on-line.

# INSTRUMENTO 18 MUNICIPAL SYSTEM OF EMERGENCY MONITORING

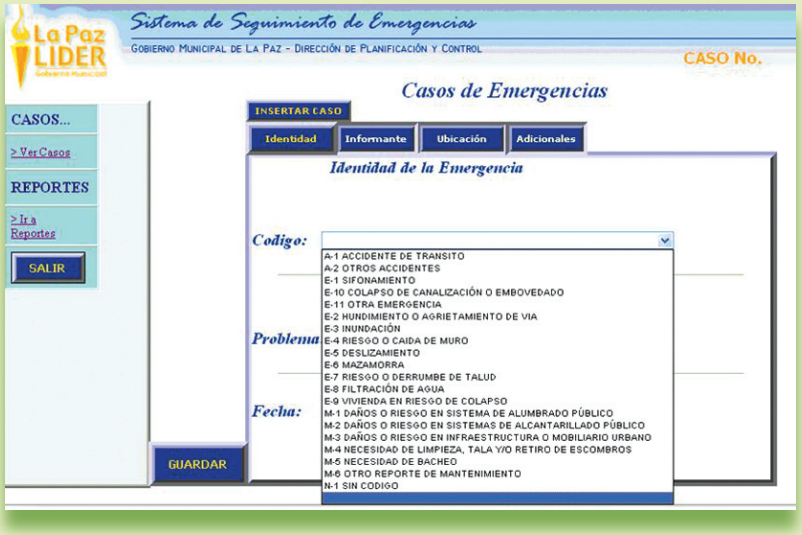
Continuation...

**Limitations:**

The investment in risk management is limited to expenses generated by emergency assistance and construction of prevention works. The investment coming from other sectors corresponding to other Bureaux such as Culture and Land Management and the programme "Barrio de Verdad" is not taken into account.

**Proposals for improvement:**

One of the pending assignments according to the competences of the Planning and Control Directorate relating to information administration is to incorporate the emergency Monitoring System into the development of the Municipal Information System, consistent with the objective of the macro-system. On the other hand, and in a more operative way, it is expected to complement the Municipal Information System through a risk prevention module from the records of the projects and works of the POA as well as the categories presented on the risk map.

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